

H12479

NOAA Form 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H12479

LOCALITY

State: Connecticut

General Locality: Long Island Sound

Sub-locality: 4 NM South of Guilford Pt, CT

2012

CHIEF OF PARTY
CDR Lawrence T. Krepp

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET**H12479**

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: **Connecticut**

General Locality: **Long Island Sound**

Sub-Locality: **4 NM South of Guilford Pt, CT**

Scale: **10000**

Dates of Survey: **10/02/2012 to 10/17/2012**

Instructions Dated: **06/13/2012**

Project Number: **OPR-B370-TJ-12**

Field Unit: **NOAA Ship *Thomas Jefferson***

Chief of Party: **CDR Lawrence T. Krepp**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder Backscatter**

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 Geophysical Data Center (NGDC) and can be retrieved via <http://www.ngdc.noaa.gov/>.*

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Descriptive Report to Accompany Survey H12479

Project: OPR-B370-TJ-12
 Locality: Long Island Sound
 Sublocality: 4 NM South of Guilford Pt, CT
 Scale: 1:10000
 October 2012 - October 2012
NOAA Ship *Thomas Jefferson*
 Chief of Party: CDR Lawrence T. Krepp

A. Area Surveyed

This survey was conducted in Eastern Long Island Sound in the vicinity of Guilford Point, CT .

A.1 Survey Limits

Data was acquired within the following survey limits:

Northeast Limit	Southwest Limit
41.2013136111 N 72.6448625 W	41.2016822222 N 72.7796688889 W

Table 1: Survey Limits

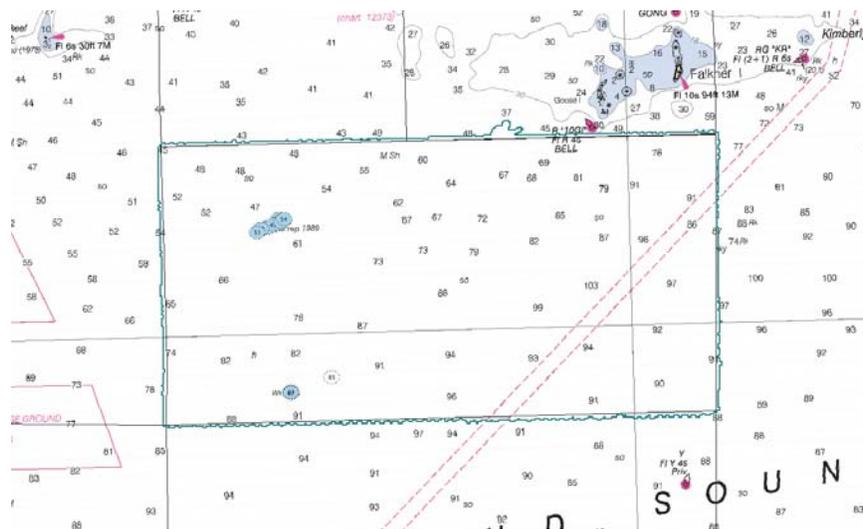


Figure 1: Survey extents of H12479

Survey Limits were acquired in accordance with the requirements in the Project Instructions and the HSSD.

A.2 Survey Purpose

This project is being conducted in support of NOAA's Office of Coast Survey to provide contemporary hydrographic data in order to update the nautical charting products and reduce the survey backlog within the area. In addition, data from this project will support the Long Island Sound Seafloor Mapping Initiative in New York and Connecticut. This project will cover approximately 138 NM² of which 120 NM² are critical survey areas as designated in the NOAA Hydrographic Survey Priorities, 2011 edition.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

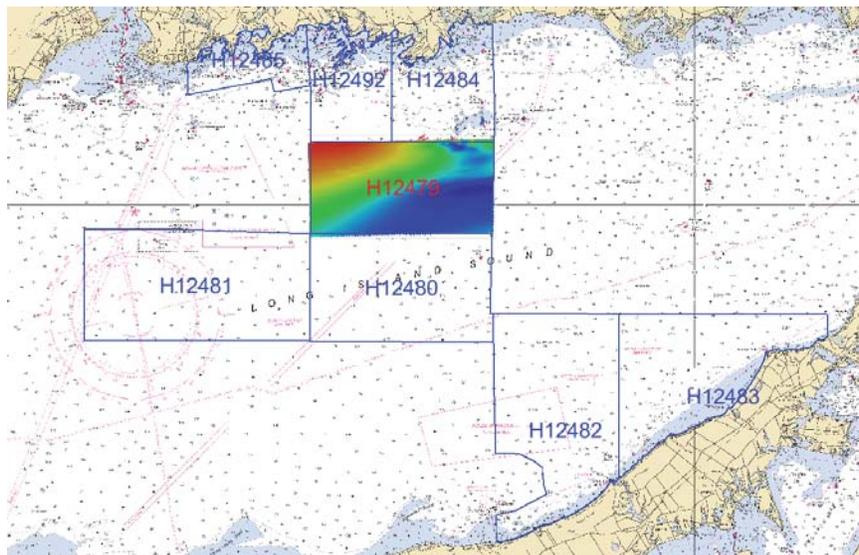


Figure 2: Coverage Graphic For H12479

Survey Coverage was in accordance with the requirements in the Project Instructions and the HSSD.

A.5 Survey Statistics

The following table lists the mainscheme and crossline acquisition mileage for this survey:

	HULL ID	<i>HSL</i> <i>3102</i>	<i>HSL</i> <i>3101</i>	<i>Total</i>
LNM	SBES Mainscheme	0	0	0
	MBES Mainscheme	303.88	357.29	661.176
	Lidar Mainscheme	0	0	0
	SSS Mainscheme	0	0	0
	SBES/MBES Combo Mainscheme	0	0	0
	SBES/SSS Combo Mainscheme	0	0	0
	MBES/SSS Combo Mainscheme	0	0	0
	SBES/MBES Combo Crosslines	15.60	12.71	28.313
	Lidar Crosslines	0	0	0
Number of Bottom Samples				0
Number of DPs				0
Number of Items Items Investigated by Dive Ops				0
Total Number of SNM				18.69

Table 2: Hydrographic Survey Statistics

The following table lists the specific dates of data acquisition for this survey:

<i>Survey Dates</i>
10/02/2012
10/03/2012
10/04/2012
10/05/2012
10/06/2012
10/07/2012
10/16/2012
10/17/2012

Table 3: Dates of Hydrography

A.6 Shoreline

Shoreline was investigated in accordance with the Project Instructions and the HSSD.

A.7 Bottom Samples

Bottom Samples were acquired in accordance with the Project Instructions or the HSSD.

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures, and data processing methods. Additional information to supplement sounding and survey data, and any deviation from the DAPR are discussed in the following sections.

B.1.1 Vessels

The following vessels were used for data acquisition during this survey:

Hull ID	<i>HSL 3101</i>	<i>HSL 3102</i>
LOA	31 feet	31 feet
Draft	5.2 feet	5.2 feet

Table 4: Vessels Used

HSL 3101 and HSL 3102 acquired Multibeam data, Sound Velocity data, Positioning data and Attitude data.

B.1.2 Equipment

The following major systems were used for data acquisition during this survey:

Manufacturer	Model	Type
RESON	7125 SV1	MBES
Seabird	Seacat 19+	Conductivity, Temperature and Depth Sensor
Applanix	POS MV	Positioning and Attitude System
RESON	SV-70	Sound Speed System

Table 5: Major Systems Used

Vessel configurations, equipment operations, and data acquisition & processing were consistent with specifications described in the DAPR.

B.2 Quality Control

B.2.1 Crosslines

The Thomas Jefferson's hydrographic survey launches 3101 and 3102 collected 28.31 linear nautical miles of MBES crosslines, equating to 4.28% of mainscheme MBES data. Crosslines were compared to mainscheme using a difference surface, created in CARIS BathyData Base. Using the difference surface, every instance of overlap was evaluated. The mean was 0.006 m and the standard deviation was 0.056 m. Survey H12479 complies with section 5.2.4.3 of the HSSD (2012 ed). Of 1,344,603 nodes, 72 varied by greater than 1 m.

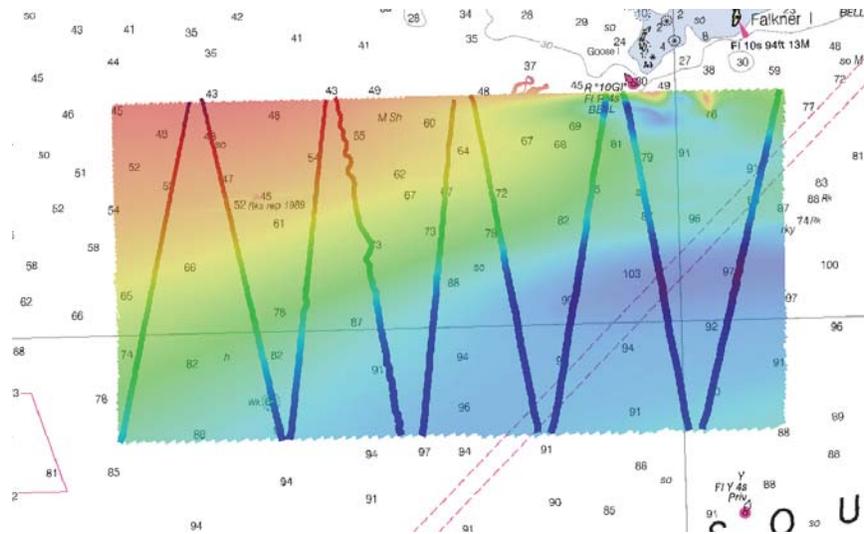


Figure 3: H12479 Crosslines overlaid on 2m grid

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.102meters	0meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
HSL 3101 and 3102	4.0meters/second		0.2meters/second

Table 7: Survey Specific Sound Speed TPU Values

Total Propagated Uncertainty values for survey H12479 were derived from a combination of fixed values for equipment and vessel characteristics, as well as field assigned values for water level and sound speed uncertainties. Uncertainty stemming from survey equipment and vessel configuration were set by the field unit in accordance with the NOAA Field Procedure Manual (ed 2011), Appendix 4, table 4.9. Sound speed uncertainty was based on the frequency and location of CDT casts, in accordance with the guidance set by Appendix 4 of the FPM. Tidal uncertainties were provided by NOAA's Center for Operational Oceanographic Products and Services (CO-OPS) and were applied to depth soundings using a Tidal Constituent and Residual Interpolator (TCARI) grid. TCARI automatically calculates the error associated with water level interpolation, which is then included in the CARIS HDCS lines. For this reason, no Tidal Uncertainties values were entered into the Tide Value section of the CARIS Compute TPU function. A cumulative uncertainty value was propagated to each CARIS grid node using the supplied sensor, vessel, water level, and sound speed uncertainties.

During post-processing TCARI data was overwritten by IAPPK Smoothed Best Estimate of Trajectory (SBET) solution. The tidal uncertainty above is associated with the SBET uncertainty. The entirety of survey H12479 was post-processed using ERS with the exception of line 454_1238 acquired on day number 278 by HSL 3101, which was processed using final verified tides.

Total Propagated Uncertainty was then evaluated to ensure compliance with section 5.1.3 of NOAA's Hydrographic Survey Specification and Deliverables (HSSD). First the maximum allowable uncertainty for each node was calculated. Second the actual uncertainty for each node was subtracted from the maximum allowed uncertainty. The resulting 'IHOness' layer was filtered to show any areas where actual uncertainty exceeded the maximum allowed uncertainty. For the 50cm grids 13,811,302 nodes were evaluated and only seven nodes did not meet IHO Order 1 uncertainty requirements. For the 2m grid 58,181,043 nodes were evaluated and only 688 nodes did not meet IHO uncertainty requirements with the majority of those occurring in the rocky seabed area.

B.2.3 Junctions

There were a total of 5 contemporary surveys that junction with Survey H12479.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H11043	1:10000	2001	NOAA Ship RUDE	W
H11999	1:10000	2008	NOAA Ship THOMAS JEFFERSON	SE
H11252	1:20000	2004	NOAA Ship THOMAS JEFFERSON	E
H12480	1:20000	2012	NOAA Ship THOMAS JEFFERSON	S
H12484	1:10000	2012	NOAA Ship THOMAS JEFFERSON	N

Table 8: Junctioning Surveys

H11043

The mean difference between H11043 and this survey was 15.4cm with a standard deviation of 11.8cm.

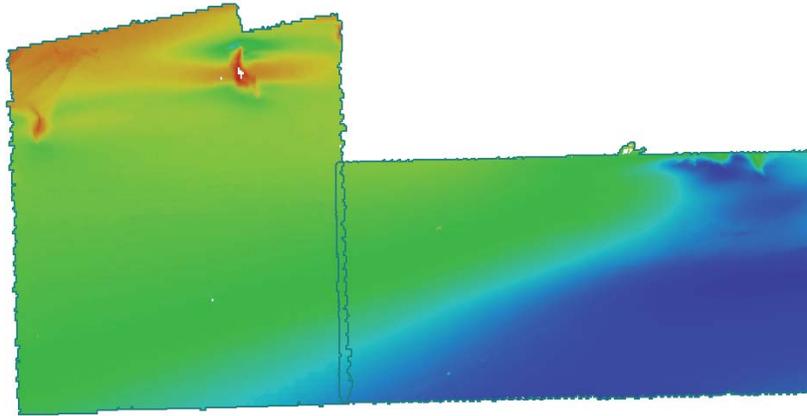


Figure 4: H11043 Junction

H11999

The mean difference between H11999 and H12479 was 15.8cm with a standard deviation of 7.9cm.

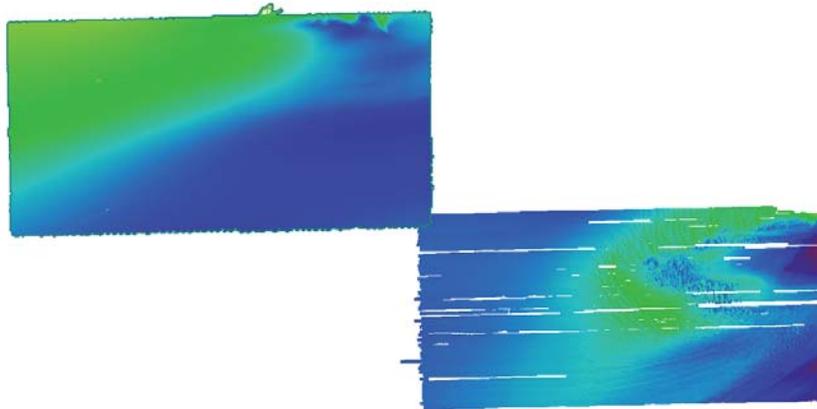


Figure 5: H11999 Junction

H11252

Any significant difference between survey H12479 and H11252 could not be determined as the field unit could not open the provided BAG files.

H12480

The mean difference between survey H12479 and H12480 was 3 cm, and the standard deviation was 5.1 cm. Out of 278,743 of nodes only three were 1 meter or larger in difference.

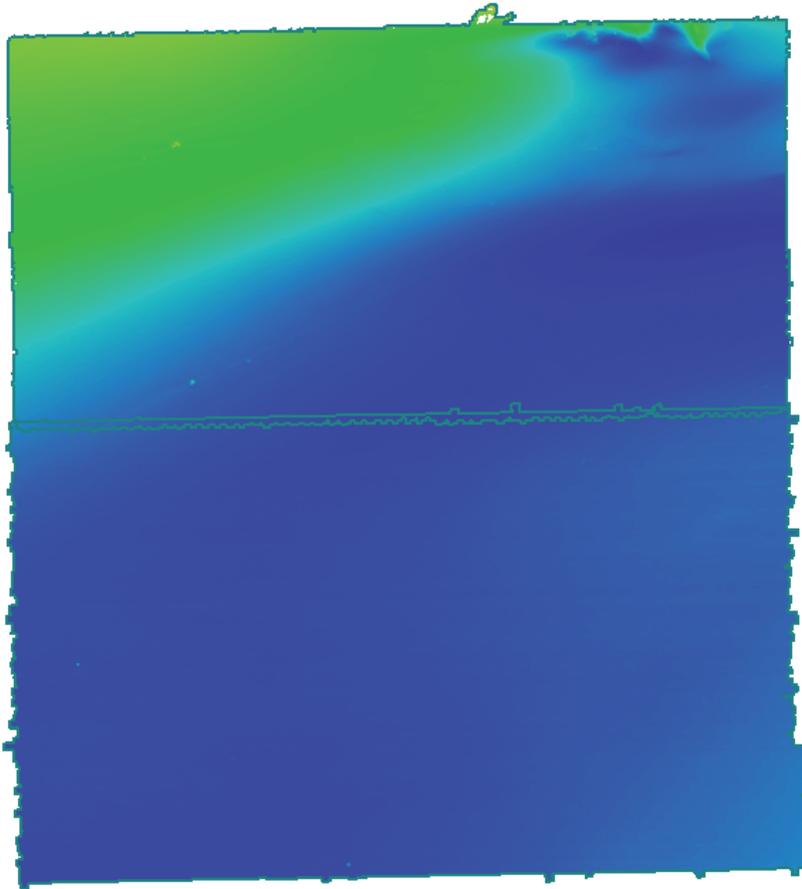


Figure 6: H12480 Junction

H12484

The mean difference between survey H12479 and H12484 was 0.3 cm, and the standard deviation was 5.2 m. Out of 161,255 of nodes only 31 were 1 meter or greater in difference.

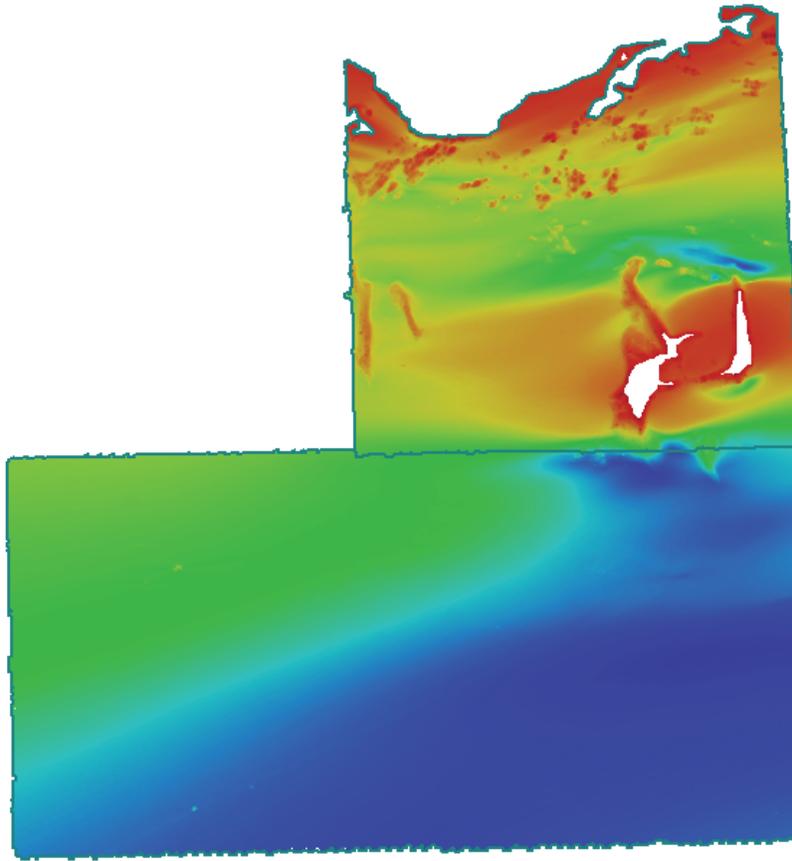


Figure 7: H12484 Junction

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

B.2.5 Equipment Effectiveness

B.2.5.1 None Exist

There were no conditions or deficiencies that affected equipment operational effectiveness.

B.2.6 Factors Affecting Soundings

B.2.6.1 None Exist

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Both hydrographic survey launches 3101 and 3102 acquired CTD casts at intervals of 2-3 hours. Sound speed profiles were analyzed for data quality, concatenated and then applied to the bathymetry using the "nearest in time" mode in CARIS HIPS and SIPS.

Due to the well mixed nature of the area surveyed, CTD casts were planned primarily as a function of time, but a range of depths were generally obtained due to the nature of the line plan in relation to the bathymetric contours. No abnormal sound velocity issues were present in the data.

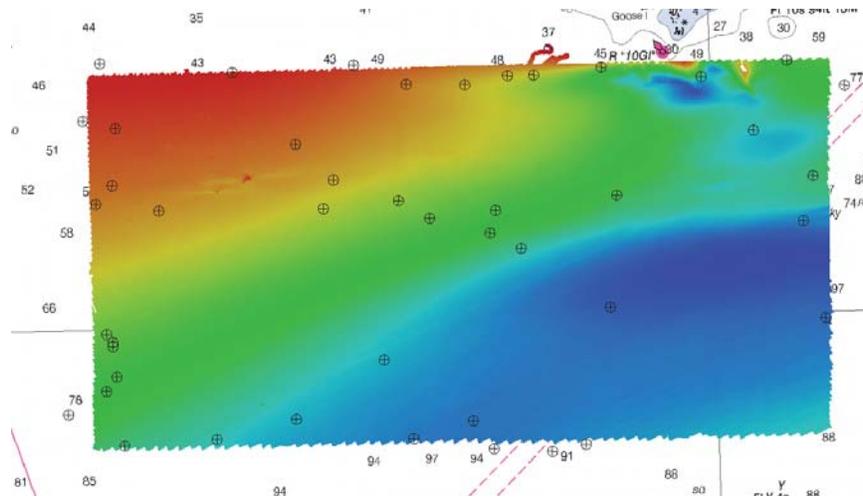


Figure 8: H12479 SVP cast locations from survey launches 3101 and 3102

B.2.8 Coverage Equipment and Methods

All equipment and survey methods were used as detailed in the DAPR.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Backscatter was logged as 7k files and submitted to the IOCM processing center and/or directly to NGDC, and is included with the data submitted to the Branch.

B.5 Data Processing

B.5.1 Software Updates

There were no software configuration changes after the DAPR was submitted.

The following Feature Object Catalog was used: NOAA Profile Field V 5.2

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12479_50cm_MLLW_CUBE_Final	CUBE	2.0 meters	12.11 meters - 20 meters	NOAA_0.5m	Object Detection
H12479_2m_MLLW_CUBE_Final	CUBE	2.0 meters	18 meters - 34.70 meters	NOAA_2m	Complete MBES
H12479_2m_Final_Combined_MLLW_CUBE	CUBE	0.5 meters	12.11 meters - 34.70 meters	N/A	Complete MBES

Table 9: CARIS Surfaces

Per section 5.2.2.1 of the NOAA HSSD Manual (2012 ed), all MBES data was gridded according to depth: 0.5m resolution for depths ranging from 0 - 20m, and a 2m for depths 18m and greater.

B.5.3 H12479 Additional Data Processing Issues

One line in survey H12479, 454_1238 acquired on DN278 by Hydrographic Survey Launch 3101, would not accept SBET application. This issue was due to a delay in starting the logging of positioning data in reference to bathymetric data. Instead, line 454_1238 received final verified TCARI tide application.

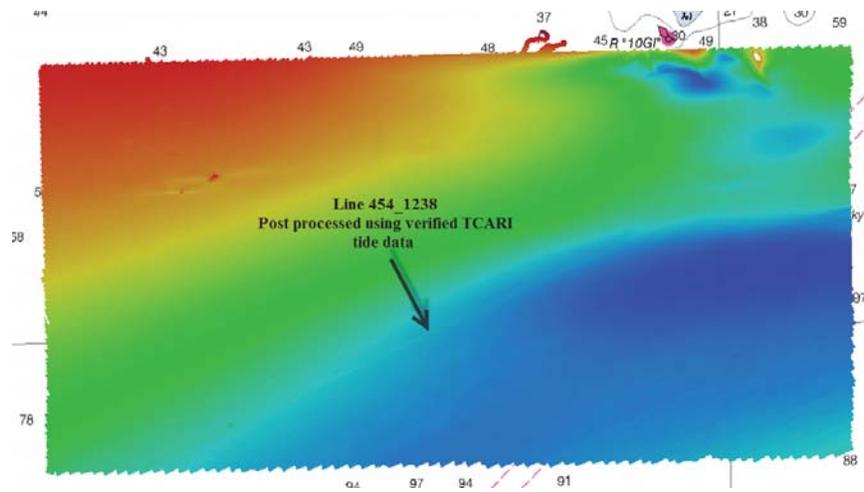


Figure 9: Line 454_1238 of survey H12479

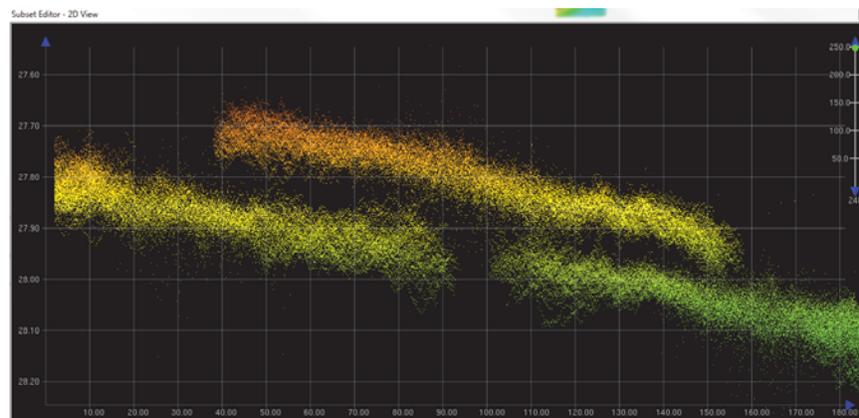


Figure 10: Vertical offset of line 454_1238 due to lack of ERS application

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying HVCR.

C.1 Vertical Control

The vertical datum for this project is Mean Lower Low Water.

Standard Vertical Control Methods Used:

TCARI

The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
New London, CT	8461490
New Haven, CT	8465705

Table 10: NWLON Tide Stations

File Name	Status
8465705.tid	Final Approved
8461490.tid	Final Approved

Table 11: Water Level Files (.tid)

File Name	Status
B370TJ2012.tc	Final

Table 12: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 10/26/2012. The final tide note was received on 11/09/2012.

Non-Standard Vertical Control Methods Used:

VDatum

Ellipsoid to Chart Datum Separation File:

2012_B370_VDatum_Ellip_MLLW.xyz

Crosslines with and without SBETs applied were compared using Pydro's Time Series Comparison tool. Statistics for HSL 3101 crosslines were: N,mean,stdev = 35658,0.102,0.026. Statistics for 3102 crosslines were: N,mean,stdev = 51213,-0.014,0.037. See Appendix V for the interim deliverable memo and resulting VDATUM approval memo. The majority of H12479 was processed to the ellipsoid and used the OPS provided VDATUM separation model to reduce data to MLLW. 1 line file, 454_1238, from day number 278 from 3101 did not have GPS tides applied and instead were processed with TCARI tides.

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD83).

The following PPK methods were used for horizontal control:

Smart Base

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
ZNY1	ZNY1
MOR5	MOR5
CTGU	CTGU
NYRH	NYRH
CTNE	CTNE
NYCI	NYCI
CTDA	CTDA
CTGR	CTGR

Table 13: CORS Base Stations

The following DGPS Stations were used for horizontal control:

DGPS Stations
Moriches, NY (293 kHz)
Acushent, ME (306 kHz)

Table 14: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

D.1.1 Raster Charts

The following are the largest scale raster charts, which cover the survey area:

Chart	Scale	Edition	Edition Date	LNМ Date	NM Date
12354	1:80000	43	09/2010	08/24/2010	09/04/2010
12373	1:20000	15	07/2005	06/14/2005	06/18/2005

Table 15: Largest Scale Raster Charts

12354

In general, surveyed soundings agree within 4-5 feet of charted depths. The eastern section of the sheet has the largest difference in depths (Figure 11).

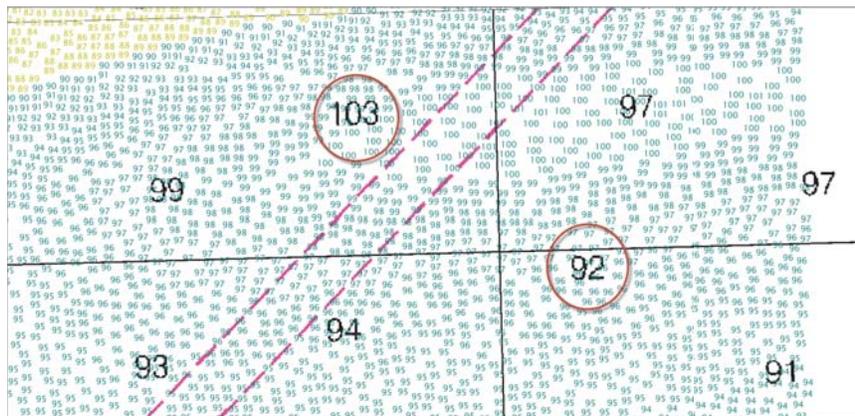


Figure 11: 12354 Eastern depth differences

12373

Soundings on the western section of the sheet generally agreed within 1-2 feet. Soundings on the eastern section of the sheet generally agreed within 4-5 feet with the largest difference being 10 feet.

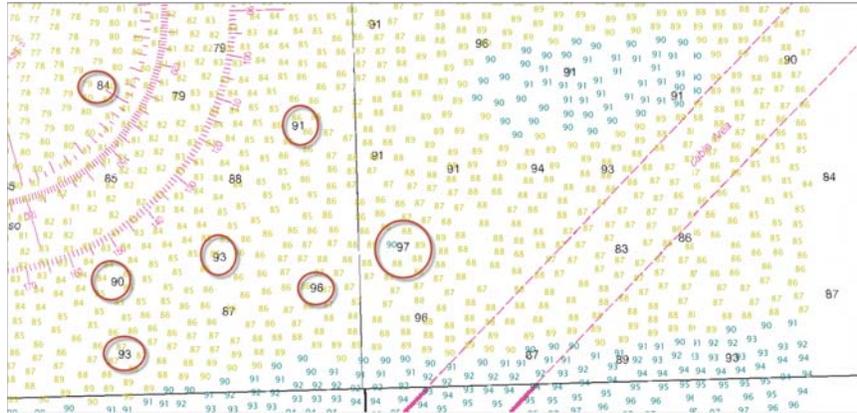


Figure 12: 12373 Eastern depth differences

D.1.2 Electronic Navigational Charts

The following are the largest scale ENC's, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US5CN15M	1:20000	9	07/10/2012	01/15/2013	NO
US4NY1GM	1:80000	20	06/14/2011	05/03/2012	NO

Table 16: Largest Scale ENC's

US5CN15M

See discussion of raster chart 12373.

US4NY1GM

See discussion of raster chart 12354

D.1.3 AWOIS Items

Number of AWOIS Items Addressed: 5

Number of AWOIS Items Not Addressed: 0

A total of 5 AWOIS items were investigated. AWOIS item numbers 15002, 15003, 15004, 1807, and 1820 were fully investigated. For a full discussion see the Final Feature File. It is recommended to update the AWOIS database.

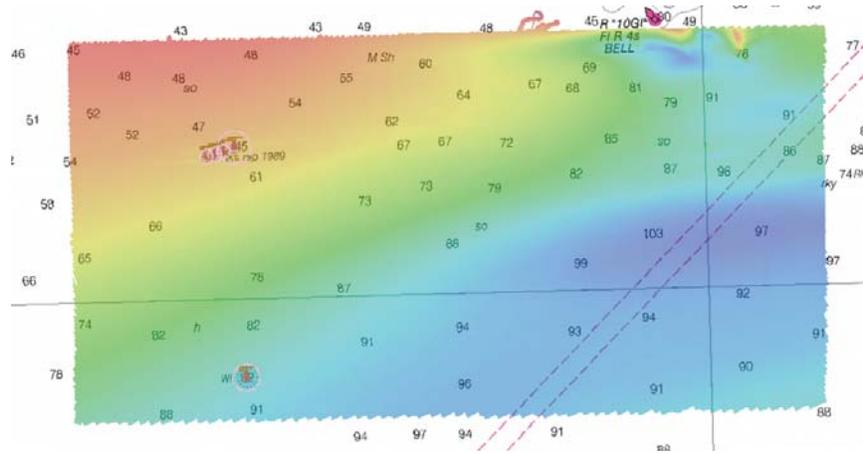


Figure 13: AWOIS items of interest for survey H12479



Figure 14: AWOIS items of interest for survey H12479

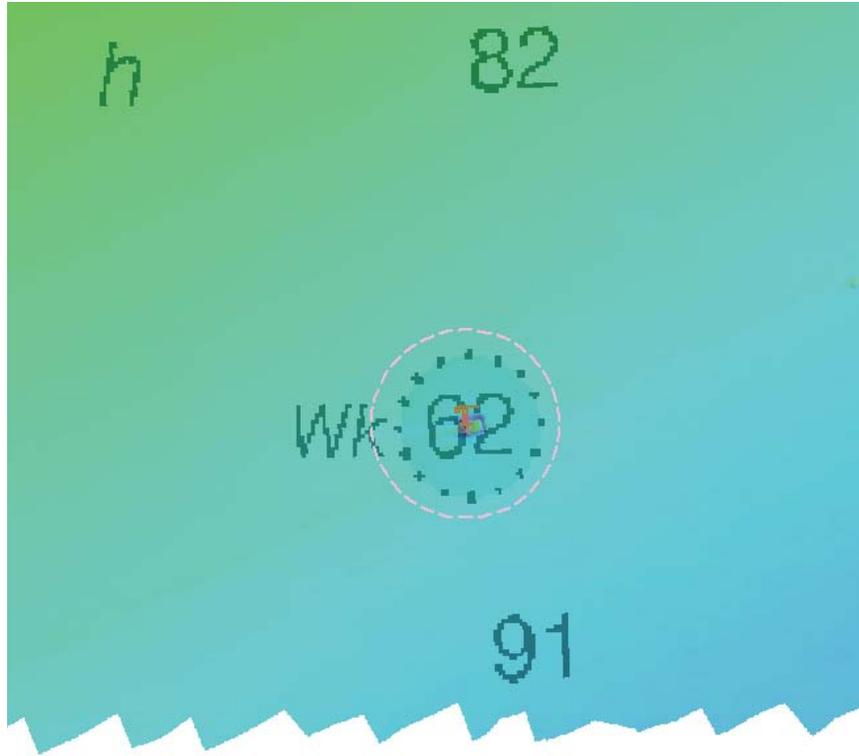


Figure 15: AWOIS item of interest for survey H12479

D.1.4 Charted Features

No charted features exist for this survey.

D.1.5 Uncharted Features

A previously uncharted wreck or obstruction was discovered. Also, a significant rock was found to be outside the AWOIS radius of item # 15004. For a full discussion, refer to the Final Feature File.

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.8 Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

D.2 Additional Results

D.2.1 Shoreline

Shoreline was not assigned in the Hydrographic Survey Project Instructions or Statement of Work.

D.2.2 Prior Surveys

Prior survey comparisons exist for this survey, but were not investigated.

D.2.3 Aids to Navigation

Aids to navigation (ATONs) do not exist for this survey.

D.2.4 Overhead Features

Overhead features do not exist for this survey.

D.2.5 Submarine Features

Cable area, as charted, was investigated with no significant findings. Cables are assumed to be properly buried.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

No significant features exist for this survey.

D.2 Construction and Dredging

There is no present or planned construction or dredging within the survey limits.

E. Approval Sheet

As Chief of Party, Field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements 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 Descriptive Report.

Approver Name	Approver Title	Approval Date	Signature
Allison Stone	Sheet Manager	03/07/2013	 <small>Digitally signed by Allison Stone DN: cn=Allison Stone, o=NOAA, ou=NOAA Ship Thomas Jefferson, email=alison.stone@noaa.gov, c=US Date: 2013.03.11 04:04:46 -0500</small>
LT William Winner	Field Operations Officer	03/07/2013	
CDR Lawrence Krepp	Commanding Officer	03/07/2013	

F. Table of Acronyms

Acronym	Definition
AFF	Assigned Features File
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
CO	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continually Operating Reference Station
CTD	Conductivity Temperature Depth
CEF	Chart Evaluation File
CSF	Composite Source File
CST	Chief Survey Technician
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DP	Detached Position
DR	Descriptive Report
DTON	Danger to Navigation
ENC	Electronic Navigational Chart
ERS	Ellipsoidal Referenced Survey
ERZT	Ellipsoidally Referenced Zoned Tides
FOO	Field Operations Officer
FPM	Field Procedures Manual
GAMS	GPS Azimuth Measurement Subsystem
GC	Geographic Cell
GPS	Global Positioning System
HIPS	Hydrographic Information Processing System
HSD	Hydrographic Surveys Division
HSSDM	Hydrographic Survey Specifications and Deliverables Manual

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
HSX	Hypack Hysweep File Format
HTD	Hydrographic Surveys Technical Directive
HVCR	Horizontal and Vertical Control Report
HVF	HIPS Vessel File
IHO	International Hydrographic Organization
IMU	Inertial Motion Unit
ITRF	International Terrestrial Reference Frame
LNM	Local Notice to Mariners
LNM	Linear Nautical Miles
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	Notice to Mariners
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRT	Navigation Response Team
NSD	Navigation Services Division
OCS	Office of Coast Survey
OMAO	Office of Marine and Aviation Operations (NOAA)
OPS	Operations Branch
MBES	Multibeam Echosounder
NWLON	National Water Level Observation Network
PDBS	Phase Differencing Bathymetric Sonar
PHB	Pacific Hydrographic Branch
POS/MV	Position and Orientation System for Marine Vessels
PPK	Post Processed Kinematic
PPP	Precise Point Positioning
PPS	Pulse per second

Acronym	Definition
PRF	Project Reference File
PS	Physical Scientist
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPU	Total Propagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positioning System timing message
ZDF	Zone Definition File

APPENDIX I
TIDES AND WATER LEVELS



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Coast Survey
Silver Spring, Maryland 20910-3282

February 25, 2013

MEMORANDUM FOR: CDR Larry Krepp, NOAA
Commanding Officer, NOAA Ship *Thomas Jefferson*

FROM: Jeffrey Ferguson
Chief, Hydrographic Surveys Division

SUBJECT: Vertical Datum Transformation Technique,
OPR-B370-TJ-12, Long Island Sound, NY

Hydrographic surveys H12479 & H12481 are approved for vertical reduction to chart datum, Mean Lower Low Water (MLLW), using the NOAA Vertical Datum Transformation (VDatum) (<http://vdatum.noaa.gov>) derived separation (SEP) model provided on the project CD/DVD.

Approval of VDatum, in lieu of the NOAA Center for Operational Oceanographic Products and Services (CO-OPS) TCARI package as per the Project Instructions, is based on your recommendation and the review of comparison results you included in your memos from December 3, 2012, Subject "H12479 Interim Deliverables" & "H12481 Interim Deliverables".

The results of the data analysis show that ellipsoidally referenced survey (ERS) techniques with VDatum used as the vertical datum reducer to MLLW in this area indicate a better internal consistency of the survey data and produces final sounding values that meet or exceed horizontal and vertical specifications for hydrographic surveys.

The comparison techniques are in line with the procedures that were developed and approved as part of the CSDL Ellipsoidally Referenced Survey (ERS) project. These procedures and deliverables were added to the April 2012 edition of the NOS Hydrographic Surveys Specifications and Deliverables Manual and Field Procedures Manual documents.

You shall include a description of your ERS processing procedures and the comparisons you conducted between ERS and traditional tides in the appropriate Descriptive Report (DR), Horizontal and Vertical Control Report and/or Data Acquisition and Processing Report.

This memo and your memo, shall be included in the supplemental correspondence Appendix of the DR.





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : November 9, 2012

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-B370-TJ-2012
HYDROGRAPHIC SHEET: H12479

LOCALITY: 4 NM South of Guliford Pt, Long Island Sound, CT & NY
TIME PERIOD: October 2 - October 17, 2012

TIDE STATION USED: New Haven, CT 8465705
Lat. 41° 17.0' N Long. 72° 54.5' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.946 meters

TIDE STATION USED: New London, CT 8461490
Lat. 41° 21.7' N Long. 72° 5.4' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.839 meters

REMARKS: RECOMMENDED GRID

Please use the TCARI grid "B370TJ2012.tc" as the final grid for project OPR-B370-TJ-2012, H12479, during the time period between October 2 and October 17, 2012.

Refer to attachments for grid information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

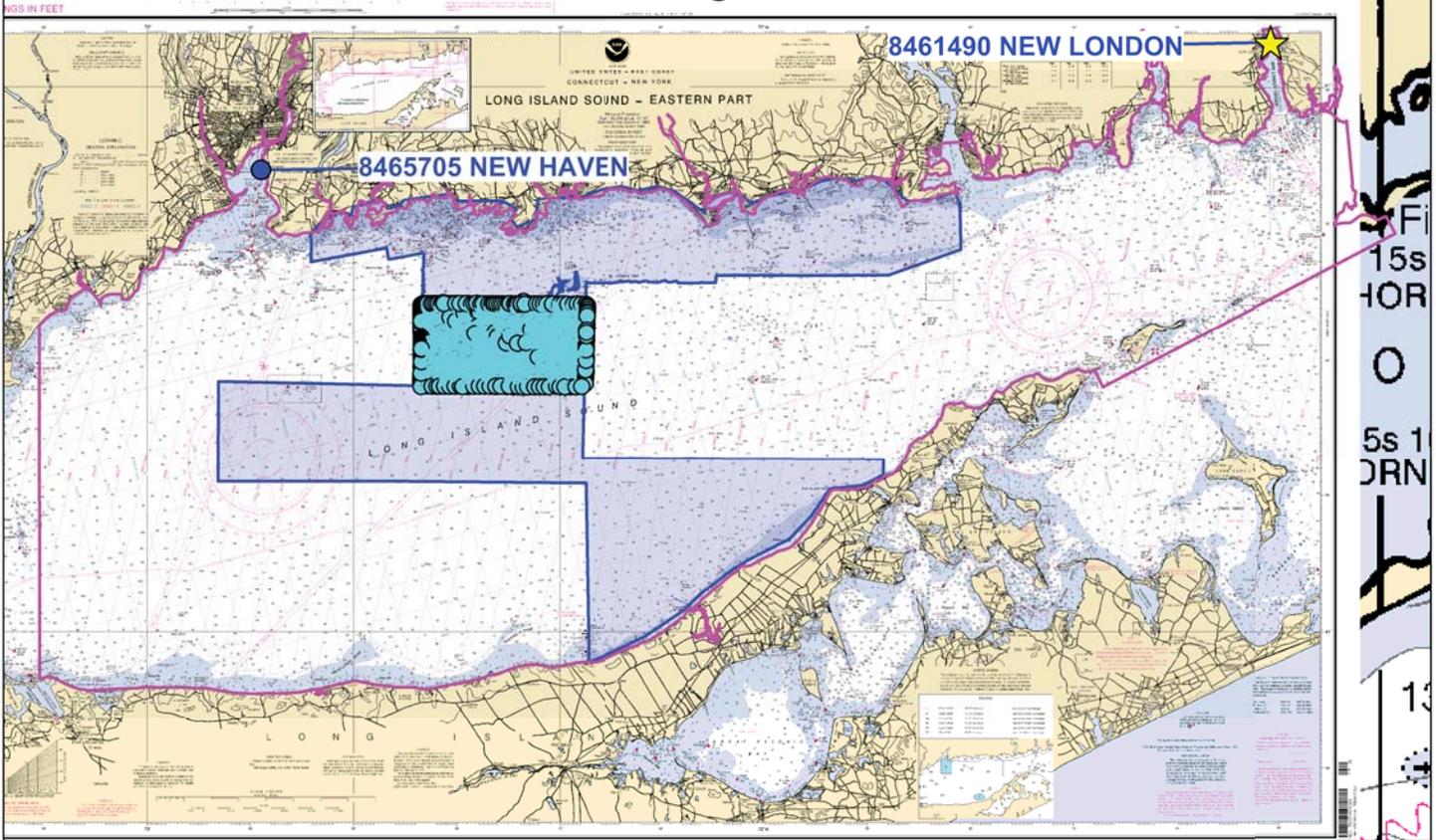
HOVIS.GERALD.
THOMAS.13658
60250

Digitally signed by
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ou=DoD, ou=PKI, ou=OTHER,
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250
Date: 2012.11.14 08:59:10 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH



**Preliminary as Final TCARI Grid for OPR-B370-TJ-2012, H12479
4NM South of Guilford Pt, Eastern Long Island Sound, CT & NY**



APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

Subject: Re: Crossline comparison

From: Chris van Westendorp <Christiaan.VanWestendorp@noaa.gov>

Date: Thu, 10 Sep 2009 13:00:35 -0400

To: "mark.blankenship" <Mark.Blankenship@noaa.gov>

CC: LCDR Rick Brennan <Richard.T.Brennan@noaa.gov>, Castle Parker <Castle.E.Parker@noaa.gov>, Edward Owens <Edward.Owens@noaa.gov>, LT Jasper Schaer <jasper.schaer@noaa.gov>, CDR Shep Smith <Shep.Smith@noaa.gov>, Daniel Wright <Daniel.Wright@noaa.gov>

Mark,

Per 5.1.4.3 of the HSSD, AHB authorizes TJ to use the Standard Deviation layer to conduct surface difference comparison and analysis on future survey submissions of multibeam data. This meets the crossline comparison requirement laid out in HSSD.

Please let me know if you have any questions or need for further clarification.

R/

LCDR Chris van Westendorp, NOAA

mark.blankenship wrote:

Chris,

You mentioned in the meeting today that AHB was not going to require the multiple CUBE surface comparison, instead allowing us to use a single surface standard deviation layer to do our checks with. Is there any memo coming out for that?

Mark

LCDR Chris van Westendorp <christiaan.vanwestendorp@noaa.gov>

Atlantic Hydrographic Branch

NOAA OCS

Subject: Re: Bottom Sample submission

From: Gene Parker <Castle.E.Parker@noaa.gov>

Date: Mon, 31 Jan 2011 11:47:48 -0500

To: "ops.thomas.jefferson" <OPS.Thomas.Jefferson@noaa.gov>

Good day Mark,

Submit both. HSSD specifies both in two areas of the document. First one needs to comply with HSSD; if the TJ wants to make the Hob file, then they have gone beyond the minimum requirements. If the TJ doesn't do it, then AHB would have to as long as the BS is within the Pydro PSS. Reference HSSD Section 8.2 S57 Feature File, paragraph 6:

The S-57 feature file contains all the attributed information on specific objects that cannot be portrayed in a simple depth grid. Features to include in the S-57 feature file include; wrecks, obstructions, shoreline, rocks, islets, oil platforms, nature of seabed (bottom samples) and all other objects that may need to be compiled to a navigational product and require additional information that cannot be included in the BAG.

The Pydro PSS is in lieu of the S57 format file.

We could make the hob from the table, but since the TJ has done this, submit both the Hob file and the table contained in DR Appendix 5. Place the Hob file in the PSS directory which has contained all features in NOAA PSS format as in the past. If the TJ is going to submit the hob file, the source would be the table, so HSSD specifies delivery of both. If the TJ only submitted the table, AHB would have to generate the feature objects. If the TJ creates the hob file, then submit it.

gene

ops.thomas.jefferson wrote:

Gene,

We will be submitting .HOB files for the bottom samples in addition to the summary table found in the supplemental survey records and correspondence section of the DR. It is my understanding that the table is only used to create the .HOB anyways. A recommendation will need to be made that either the table either be omitted or be used in place of the .hob file. Only the summary table is mention in the HSSD april 2010 version. If there are any other issues with this idea please let us know.

Mark

Castle Eugene Parker <castle.e.parker@noaa.gov>

Physical Scientist - Hydrographic Team Lead

Atlantic Hydrographic Branch

NOAA Office of Coast Survey

APPENDIX III

SURVEY FEATURES REPORT

AWOIS - five

Dangers to Navigation - none

Maritime Boundary - none

Wrecks - two

H12479 Features Report

Registry Number:

State:

Locality:

Sub-locality:

Project Number:

Survey Dates: 01/01/1981 - 10/17/2012

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12373	15th	06/01/2005	1:20,000 (12373_1)	USCG LNM: 2/25/2014 (2/25/2014) CHS NTM: None (12/27/2013) NGA NTM: None (3/1/2014)
12372	34th	11/01/2006	1:40,000 (12372_16)	[L]NTM: ?
12354	44th	05/01/2012	1:80,000 (12354_1)	USCG LNM: 2/25/2014 (2/25/2014) CHS NTM: None (12/27/2013) NGA NTM: 12/4/1999 (3/1/2014)
12300	47th	05/01/2008	1:400,000 (12300_1)	[L]NTM: ?
13006	34th	05/01/2007	1:675,000 (13006_1)	[L]NTM: ?
5161	13th	10/01/2003	1:1,058,400 (5161_1)	[L]NTM: ?
13003	49th	04/01/2007	1:1,200,000 (13003_1)	[L]NTM: ?

* Correction(s) - source: last correction applied (last correction reviewed--"cleared date")

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	AWOIS 15004 - delete Obstrn	Rock	[None]	41° 11' 09.3" N	072° 45' 17.9" W	---
1.2	AWOIS 15003 - delete Obstrn	Rock	[None]	41° 11' 10.0" N	072° 45' 12.4" W	---
1.3	AWOIS 15002 - delete Rk	GP	[None]	41° 11' 11.5" N	072° 45' 07.3" W	---
1.4	chart 42 Rk (AWOIS 1820)	Rock	12.88 m	41° 11' 13.7" N	072° 45' 01.0" W	---
1.5	chart 69 Wreck (AWOIS 1807)	Wreck	20.96 m	41° 09' 21.5" N	072° 44' 55.7" W	---
2.1	Add 85 Wreck	Wreck	25.88 m	41° 09' 31.2" N	072° 44' 20.3" W	---

1 - Charted Features

1.1) AWOIS 15004 - delete Obstrn

Survey Summary

Survey Position: 41° 11' 09.3" N, 072° 45' 17.9" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 1981-001.01:01:01.001 (01/01/1981)
Dataset: H12479_AWOIS_Features.000
FOID: US 0000181570 00001(02260002C5420001)
Charts Affected: 12373_1, 12372_16, 12354_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

History -

FE340ss/89 - OPR-B660-HE; Series of rocks located with SSS, divers determined least depth to 52 ft @ 72/45/17.5 41/11/9.2. (PTT 5/14/2012)

Type: OBSTRUCTION, Itemstatus: ASSIGNED, Searchtype: FULL, Technique: SSS, MB

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12479_AWOIS_Features.000	US 0000181570 00001	0.00	000.0	Primary

Hydrographer Recommendations

\$CSYMB/remrks: AWOIS item 15004 was found, however it is not significant (less than 1m in height).

S-57 Data

Geo object 1: Cartographic symbol (\$CSYMB)
Attributes: NINFOM - delete charted 52 Rock
 NTXTDS - US5CN15M,20120710
 SORDAT - 19890000
 SORIND - US,US,graph,chart 12373

Office Notes

SAR: Concur with clarification. AWOIS item is located approximately 20m to the SSW . Delete charted rock and update chart with new rock to the SSW.

Compile: Delete charted 52 Rk and Rk rep 1989 notation.

1.2) AWOIS 15003 - delete Obstrn

Survey Summary

Survey Position: 41° 11' 10.0" N, 072° 45' 12.4" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 1981-001.01:01:01.001 (01/01/1981)
Dataset: H12479_AWOIS_Features.000
FOID: US 0000181569 00001(02260002C5410001)
Charts Affected: 12373_1, 12372_16, 12354_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

History -

FE340ss/89 - OPR-B660-HE; Series of rocks located with SSS, divers determined least depth to 52 ft @ 72/45/12.4 41/11/10.2. (PTT 5/14/2012)

Type: OBSTRUCTION, Itemstatus: ASSIGNED, Searchtype: FULL, Technique: SSS. MB

UWTROC/remrks: New position and depth of rock found with 100% SWMB.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12479_AWOIS_Features.000	US 0000181569 00001	0.00	000.0	Primary

Hydrographer Recommendations

\$CSYMB/remrks: AWOIS item 15003 was found, however it is not significant (

S-57 Data

Geo object 1: Cartographic symbol (\$CSYMB)
Attributes: NINFOM - delete charted 52 Rock
 NTXTDS - US5CN15M,20120710
 SORDAT - 19890000
 SORIND - US,US,graph,chart 12373

Office Notes

SAR: Concur with clarification. AWOIS item is found to the SE. Remove charted rock and update chart with new rock to the SE.

Compile: Delete charted 52 Rk and Rk rep 1989 notation.

1.3) AWOIS 15002 - delete Rk

Survey Summary

Survey Position: 41° 11' 11.5" N, 072° 45' 07.3" W
Least Depth: [None]
TPU (±1.96σ): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 1981-001.01:01:01.001 (01/01/1981)
Dataset: H12479_AWOIS_Features.000
FOID: US 0000181567 00001(02260002C53F0001)
Charts Affected: 12373_1, 12372_16, 12354_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

History -

FE340ss/89 - OPR-B660-HE; Series of rocks located with SSS, divers determined least depth to 45 ft @ 72/45/06.9 41/11/11.6. (PTT 5/14/2012)

Type: OBSTRUCTION, Itemstatus: ASSIGNED, Searchtype: FULL, Technique: SSS, MB

\$CSYMB/remrks: Presence of submerged rock disproved using RESON 7125 object detection multibeam.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12479_AWOIS_Features.000	US 0000181567 00001	0.00	000.0	Primary
H12479_AWOIS.000	0_ 0000984412 00001	9.34	252.8	Secondary (grouped)

Hydrographer Recommendations

Delete from AWOIS db and from chart.

S-57 Data

Geo object 1: Cartographic symbol (\$CSYMB)
Attributes: NINFOM - delete charted 49 Rock
 NTXTDS - US5CN15M,20120710
 SORDAT - 19890000
 SORIND - US,US,graph,chart 12373

Office Notes

SAR: AWOIS 15002, Feature disproved with 100% SWMB.

Compile: Delete charted 49 Rk and Rk rep 1989 notation

1.4) chart 42 Rk (AWOIS 1820)

Survey Summary

Survey Position: 41° 11' 13.7" N, 072° 45' 01.0" W
Least Depth: 12.88 m (= 42.25 ft = 7.042 fm = 7 fm 0.25 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: 2012-291.00:00:00.000 (10/17/2012)
Dataset: H12479_AWOIS_Features.000
FOID: US 0000181634 00001(02260002C5820001)
Charts Affected: 12373_1, 12372_16, 12354_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

History -

NM48/63(6120)--BUOY EST. AT OBSTR. COVERED 30 FT. CL738/64--COE; DIVER INVESTIGATION SHOWS LARGE ROCKS (BOULDERS, LEDGE), 35 FT LD. CL117/65--OBSTR. REMOVED TO 42 FT LD.

H9088/69--OPR-474, SP-AMC-11-68; ROCK DOES EXIST BUT ATTEMPTS AT LEAST DEPTH ON PEAK WERE UNSUCCESSFUL; PEAK APPARENTLY MISSED WITH CLOSELY SPACED DEVELOPMENT; APPARENTLY ITEM IS A RATHER SMALL, SHARPLY RISING ROCK WHICH FORMS A PINNACLE TYPE SHAPE; WIRE DRAG OR DIVER INVESTIGATION RECOMMENDED.

FE340SS/89--OPR-B660-HE; SIDE SCAN SEARCH OVER THE AREA REVEALED NUMEROUS ROCK FIELDS. ONLY THE MOST SIGNIFICANT ONES WERE ABSTRACTED. HYDROGRAPHER DEVELOPED THE HIGHEST DENSITY OF ROCKS AND DETERMINED THE MOST SIGNIFICANT ROCK TO DIVE ON. DIVERS DETERMINED THIS TO BE A PINNACLE ROCK WITH A LEAST DEPTH OF 44.8 FT (13.7M) IN POS. LAT.41-11-13.04N, LONG.72-45-00.01W (NAD 83). LORAN RATES: CHAIN 9960, W-14987.9, X-26481.6, Y-44003.7, Z-60106.0. HYDROGRAPHER AND EVALUATOR RECOMMENDS TO DELETE 42 FT SOUNDING AND ADD THE ABOVE CONTACT AS 45 RK. (UPDATED 8/92 MCR)

Type: OBSTRUCTION, Itemstatus: ASSIGNED, Searchtype: FULL, Technique: ES,S2,MB,BD,DI,SD

UWTROC/remrks: Submerged rock detected using RESON 7125 object detection multibeam. Data processed to the ellipsoid and reduced to MLLW using VDATUM. Shoalest rock within search radius for AWOIS 1820.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12479_AWOIS_Features.000	US 0000181634 00001	0.00	000.0	Primary
H12479_AWOIS.000	0_ 0000984411 00001	30.21	308.4	Secondary (grouped)

Hydrographer Recommendations

Update AWOIS db. Chart a rock.

Cartographically-Rounded Depth (Affected Charts):

42ft (12373_1, 12372_16, 12354_1)

7fm (12300_1, 13006_1, 13003_1)

12.9m (5161_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: EXPSOU - 2:shoaler than range of depth of the surrounding depth area

NINFOM - add UWTROC

QUASOU - 6:least depth known

SORDAT - 20121017

SORIND - US,US,graph,H12479

TECSOU - 3:found by multi-beam

VALSOU - 12.879 m

WATLEV - 3:always under water/submerged

Office Notes

SAR: Feature depth and position confirmed with 100% SWMB.

Compile: Delete charted 51 and 45 Rks and Rk rep 1989 notation, delete charted Obstrn area, and Chart 42 Rk and add rky seabed area.

Feature Images

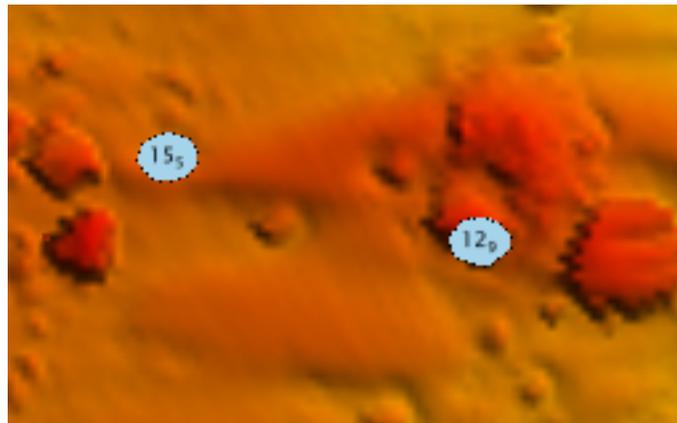


Figure 1.4.1

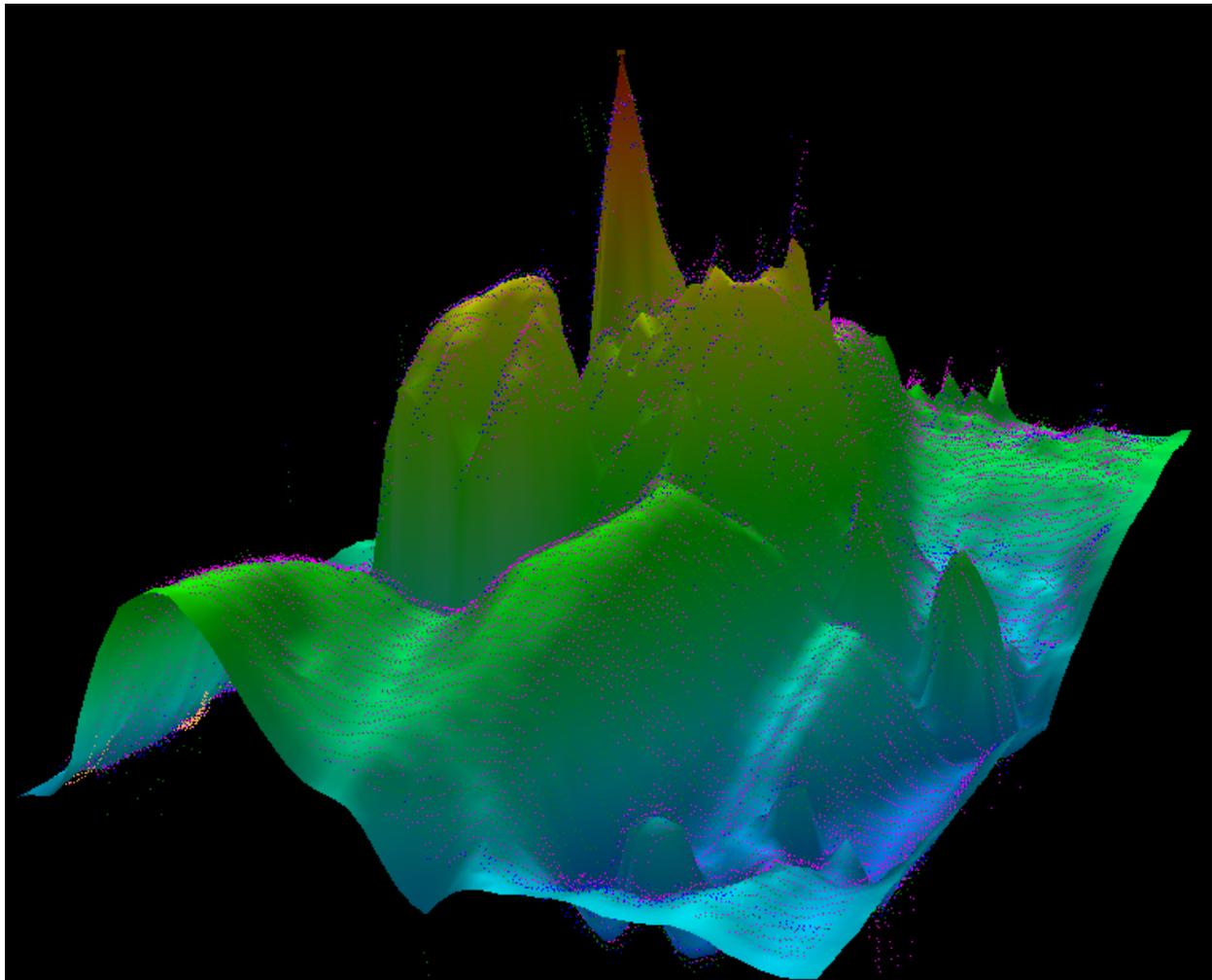


Figure 1.4.2

1.5) chart 69 Wreck (AWOIS 1807)

Survey Summary

Survey Position: 41° 09' 21.5" N, 072° 44' 55.7" W
Least Depth: 20.96 m (= 68.77 ft = 11.462 fm = 11 fm 2.77 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2012-291.00:00:00.000 (10/17/2012)
Dataset: H12479_AWOIS_Features.000
FOID: US 0000181589 00001(02260002C5550001)
Charts Affected: 12354_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

History -

LNM14/75--WOODEN DRYDOCK AT POS.41-09-30N, 72-45W, IN 90 FT., BUOY EST.
 LNM16/75--BUOY EST. AT WK. COVERED BY 43 FT AT POS.41-09-21N, 72-41-37W
 LNM33/77--CHANGE POS. FROM 41-09-21N, 72-41-57W TO 41-09-17.5N, 72-44-58.5W, COVERED 42 FT (MLW); LIGHTED BUOY DISCONTINUED

RU/HE MAR--9/10/82, 9/30/82--FOUND BY SIDE SCAN. DIVERS ATTEMPTED LEAST DEPTH DETERMINATION BUT PREVENTED DUE TO POOR VISIBILITY. WIRE DRAG HUNG AT 49 FT CLEARED TO 45.5 FT; POS. 41-09-21.98N, 72-44-58.01W FE241WD/82--OPR-B660-RU/HE-82; ITEM 7; WK FOUND DURING INVESTIGATION IN LAT 41-09-21.98N, LONG 72-44-58.01W; POSITIONED BY SSS ANALYSIS AND WIRE DRAG HANG; DIVER INVESTIGATION CONDUCTED BUT WAS UNSUCCESSFUL IN OBTAINING LEAST DEPTH OR POSITION; EVALUATOR RECOMMENDED CHARTING 42 FT WIRE DRAG CLEARANCE IN SURVEY POSITION. (UPDATED MSM 9/89)

F00469/00-- OPR-B317-RU; ITEM LOCATED BY SIDE SCAN SONAR. LD OF 62 FEET OBTAINED BY SWMB SONAR IN LAT. 41-09-22.33N, LONG. 72-44-55.91W. DIVER LD NOT POSSIBLE DUE POOR VIS. EVALUATOR RECOMMENDS DELETING CHARTED 42-FOOT CLEARED DEPTH AND CHARTING A 62WK AS SURVEYED. (UP 2/23/01, SJV)

DESCRIPTION **** OBSTRUCTION, COE, 4/2/75; LOCATED WK BY ECHO SNDR. W/43 FT LD (PLOTING SHEET ONLY) **** OBSTRUCTION SURVEY REPORT, NAVAL UNDERWATER SYSTEMS CENTER, MAY 1977; LOCATED WK BY SIDE SCAN SONAR AND LORAN C CONTROL AT POS.9930 Z 69720.1, 9930 Y 50280.7; DIVERS VERIFY EXISTENCE AND DESCRIBE WK AS INTACT WITH MANY LARGE TIMBERS PROTRUDING FROM BREAKS IN THE HULL BUT APPARENTLY STABLE AND NOT SUSCEPTIBLE TO RAPID BREAKUP; TOP OF WK WAS 42 FT INSIDE FLOOR WAS 70 FT AND GENERAL DEPTHS ARE APPROX. 85 FT OVER A FEATURELESS BOTTOM COMPOSED OF FINE SAND AND SILT, VISIBILITY WAS LIMITED TO 1-2 FT.

Type: WRECK, Itemstatus: ASSIGNED, Searchtype: FULL, Technique: ES,S2,MB,BD,DI,SD

WRECKS/remrks: Submerged non-dangerous wreck was detected using RESON 7125 object detection multibeam. Data Reduced to MLLW using verified waterlevel and finalized TCARI grid. Affiliated with updated AWOIS 1807.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12479_AWOIS_Features.000	US 0000181589 00001	0.00	000.0	Primary
H12479_AWOIS.000	0_ 0000984410 00001	24.78	170.8	Secondary (grouped)

Hydrographer Recommendations

Update charted position and depth.

Cartographically-Rounded Depth (Affected Charts):

69ft (12354_1)

11ft (12300_1, 13006_1, 13003_1)

20.9m (5161_1)

S-57 Data

Geo object 1: Wreck (WRECKS)
Attributes: CATWRK - 1:non-dangerous wreck
 NINFOM - add 69 Wreck
 QUASOU - 6:least depth known
 SORDAT - 20121017
 SORIND - US,US,graph,H12479
 TECSOU - 3:found by multi-beam
 VALSOU - 20.962 m
 WATLEV - 3:always under water/submerged

Office Notes

SAR: Submitted depth and position of wreck does not correspond to the HDCS data. The least depth and position were corrected upon SAR review and agrees with 100% MBES. Wreck dimensions approximately 39m long by 29m wide.

Compile: Chart 69 Wk

Feature Images

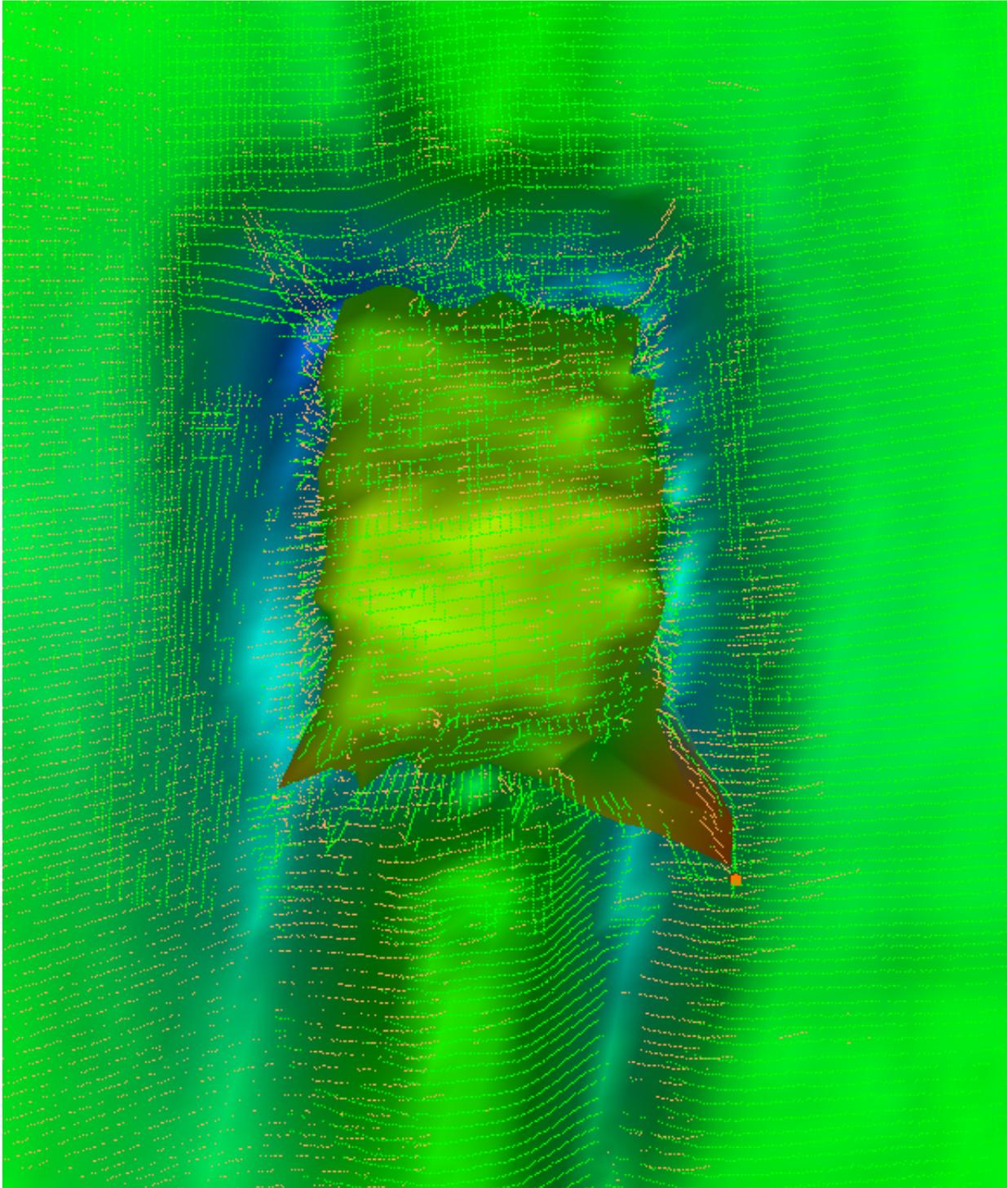


Figure 1.5.1

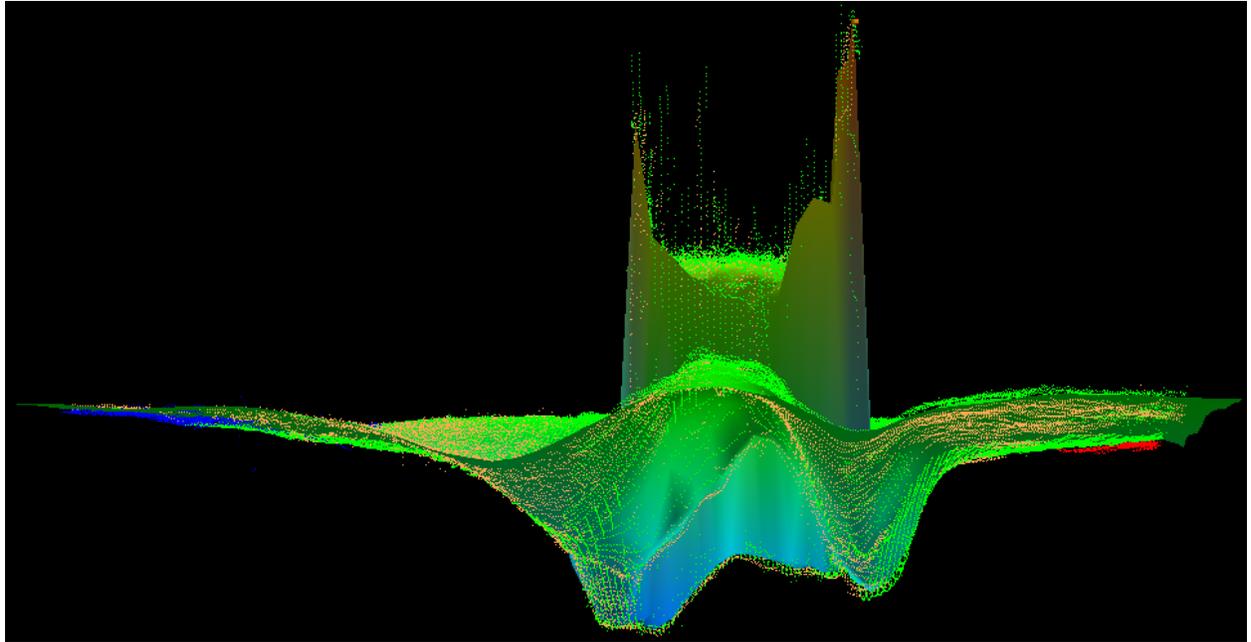


Figure 1.5.2

2 - New Features

2.1) Add 85 Wreck

Survey Summary

Survey Position: 41° 09' 31.2" N, 072° 44' 20.3" W
Least Depth: 25.88 m (= 84.91 ft = 14.151 fm = 14 fm 0.91 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2012-291.00:00:00.000 (10/17/2012)
Dataset: H12479_NewWreck.000
FOID: 0_ 0000412797 00001(FFFE00064C7D0001)
Charts Affected: 12354_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

WRECKS/remrks: Submerged rock detected using RESON 7125 object detection multibeam. Data Reduced to MLLW using verified waterlevel and finalized TCARI grid. Possibly affiliated with updated AWOIS.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12479_NewWreck.000	0_ 0000412797 00001	0.00	000.0	Primary

Hydrographer Recommendations

Retain charted soundings.

Cartographically-Rounded Depth (Affected Charts):

85ft (12354_1)

14ft (12300_1, 13006_1, 13003_1)

26m (5161_1)

S-57 Data

Geo object 1: Wreck (WRECKS)
Attributes: CATWRK - 1:non-dangerous wreck
 EXPSOU - 1:within the range of depth of the surrounding depth area
 NINFOM - add 85 Wreck
 QUASOU - 6:least depth known
 SORDAT - 20121017

SORIND - US,US,graph,H12479

TECSOU - 3:found by multi-beam

VALSOU - 25.880 m

WATLEV - 3:always under water/submerged

Office Notes

SAR: Feature depth and position confirmed with 100% SWMB. Wreck interpreted as barge like in appearance, 25m long by 14m wide.

Compile: Add 85 Wreck.

Feature Images



Figure 2.1.1

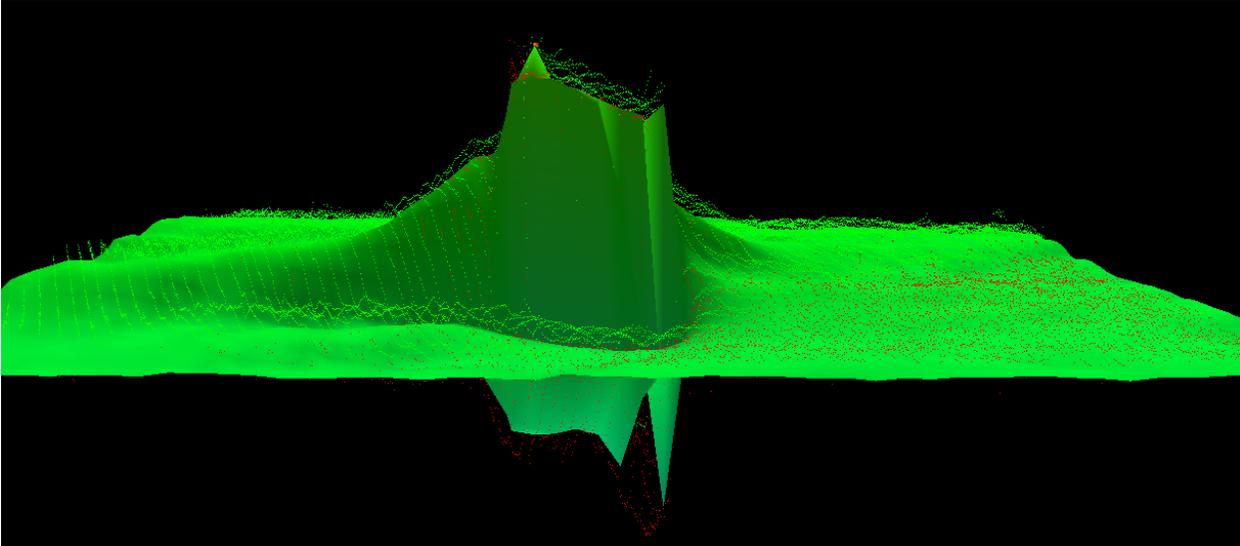


Figure 2.1.2

APPROVAL PAGE

H12479

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 NGDC for archive

- H12479_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12479_GeoImage.pdf

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.

Approved: _____

Lieutenant Matthew Jaskoski, NOAA
Chief, Atlantic Hydrographic Branch