H12313

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: H12313

LOCALITY

State: Washington

General Locality: Southern Puget Sound

Sub-locality: Henderson Bay

2011

CHIEF OF PARTY
Dan Jacobs (Acting)

LIBRARY & ARCHIVES

Date:

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET		**H12313**

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:	**Washington**
General Locality:	**Southern Puget Sound**
Sub-Locality:	**Henderson Bay**
Scale:	**10000**
Dates of Survey:	**07/13/2011 to 09/22/2011**
Instructions Dated:	**03/25/2011**
Project Number:	**OPR-N360-NRT3-11**
Field Unit:	**NOAA Navigation Response Team 3**
Chief of Party:	**Dan Jacobs (Acting)**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	
Verification by:	**Pacific Hydrographic Branch**
Soundings Acquired in:	**meters at Mean lower low water**
H-Cell Compilation Units:	***fathoms at Mean lower low water***

Remarks:

All times are UTC. UTM Zone 10N. 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. Revisions and end notes in red were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non-sequential.

Descriptive Report to Accompany Survey H12313

Project: OPR-N360-NRT3-11

Locality: Southern Puget Sound

Sublocality: Henderson Bay

Scale: 1:10000

July 2011 - September 2011

NOAA Navigation Response Team 3

Chief of Party: Dan Jacobs (Acting)

A. Area Surveyed

This hydrographic survey was completed as specified by hydrographic survey project instructions OPR-N360-NRT3-11 signed March 25, 2011 and all other applicable direction. The survey area is Henderson Bay in southern Puget Sound, Washington. This survey corresponds to sheet "4" in the sheet layout provided with the project instructions. Complete multibeam echosounder (MBES) coverage was achieved in the assigned survey area in waters 4 meters and deeper except where the hydrographers deemed it unsafe or not navigationally significant.

A.1 Survey Limits

Data was acquired within the following survey limits:

Northeast Limit	Southwest Limit
47.3970972222 N 122.626813889 W	47.3287472222 N 122.727533333 W

Table 1: Survey Limits

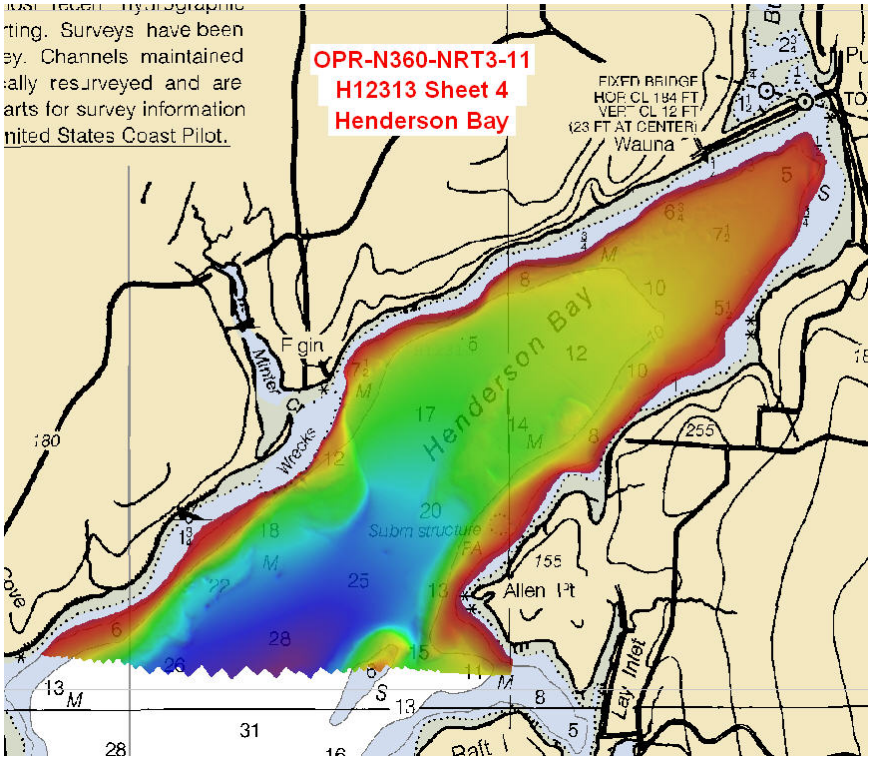


Figure 1: H12313 Survey Area (chart 18448)

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

A.2 Survey Purpose

The Southern Puget Sound area is in need of an updated bathymetric survey. The prior surveys in this area date back to the 1930s. The intent of this priority survey is to supersede all bathymetry, sea floor features and bottom characteristics within the survey boundaries.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

This survey is complete and no additional work is required.

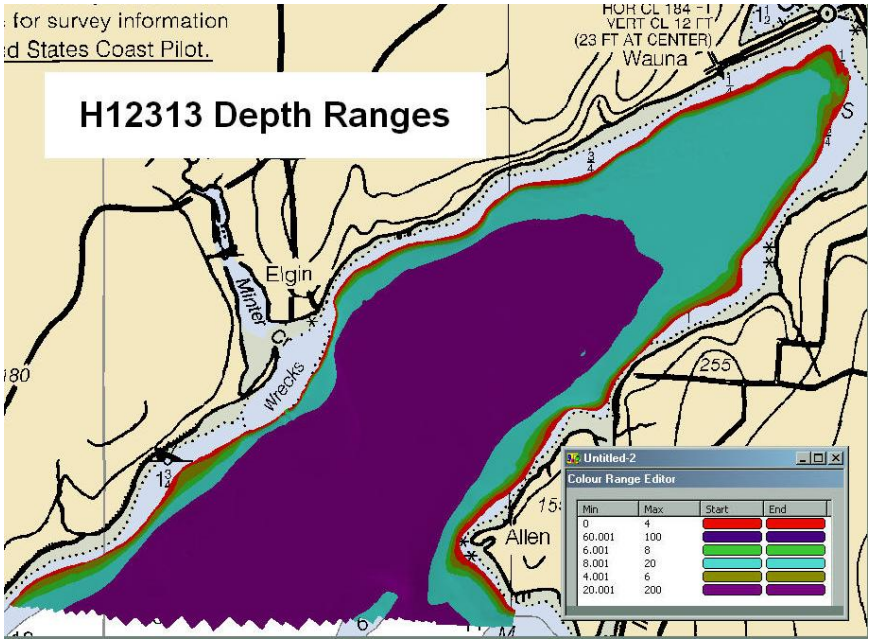


Figure 2: H12313 Depth Ranges

A.4 Survey Coverage

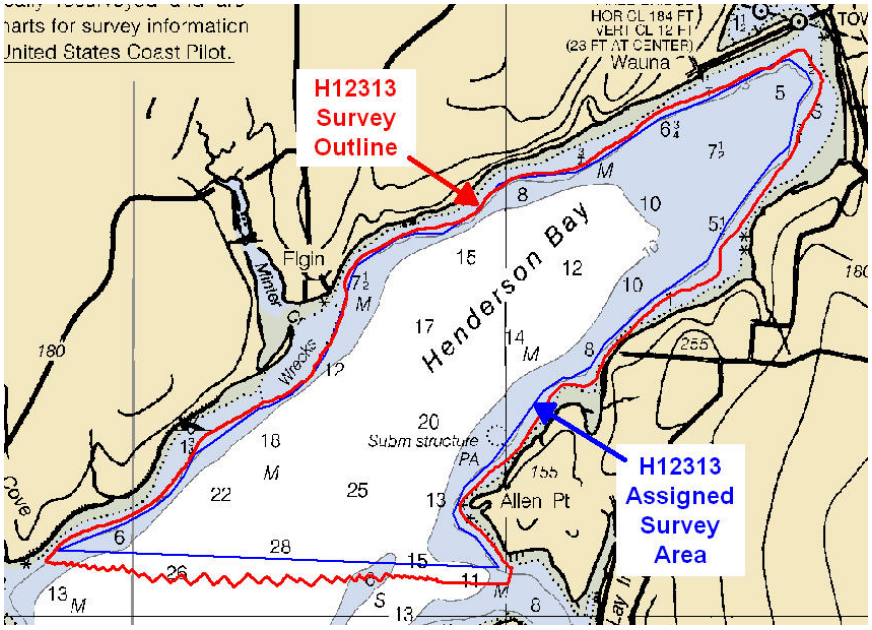


Figure 3: H12313 Survey Outline

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	*Total*
LNM	**SBES Mainscheme**	0
	MBES Mainscheme	166.76
	Lidar Mainscheme	0
	SSS Mainscheme	0
	SBES/MBES Combo Mainscheme	0
	SBES/SSS Combo Mainscheme	0
	MBES/SSS Combo Mainscheme	0
	SBES/MBES Combo Crosslines	9.25
	Lidar Crosslines	0
Number of Bottom Samples		5
Number of DPs		0
Number of Items Items Investigated by Dive Ops		0
Total Number of SNM		3.76

Table 2: Hydrographic Survey Statistics

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

Survey Dates
07/13/2011
07/14/2011
07/19/2011
07/28/2011
08/09/2011
08/17/2011
08/19/2011
08/24/2011
08/29/2011
08/31/2011
09/13/2011
09/14/2011
09/15/2011
09/22/2011

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 vessel, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations 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	***S1212***
LOA	30 feet
Draft	0.65 meters

Table 4: Vessels Used

Figure 4: NOAA Survey Vessel S1212

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg	EM 3002	MBES
Applanix	POS/MV	Vessel Attitude System
Applanix	POS/MV	Positioning System
Odom	Digibar Pro	Sound Speed System
Sea-Bird Electronics	SeaCAt SBE 19, SeaCat SBE19+ CTD Profilers	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Multibeam echo sounder (MBES) crosslines (XL) totaled 9.25 nautical miles, comprising 5.5% of main scheme (MS) MBES bathymetry. Separate CARIS BASE surfaces of the MS and XL data were created and compared using the cursor information tool in CARIS HIPS software. One hundred seventy eight (178) locations were compared through all depth ranges of the survey area; the results are shown in figure 5. Ninety seven percent (97.7%) of XL data used in the comparison agreed with MS data within 0.3 meters.

Depth Difference between MS and XL	Number of Measurements	Percent of Total
0	44	24.71
.1 meter	70	39.32
.2 meter	44	24.71
.3 meter	16	8.98
.4 meter	4	2.24

Figure 5: H12313 Crossline Comparison Statistics

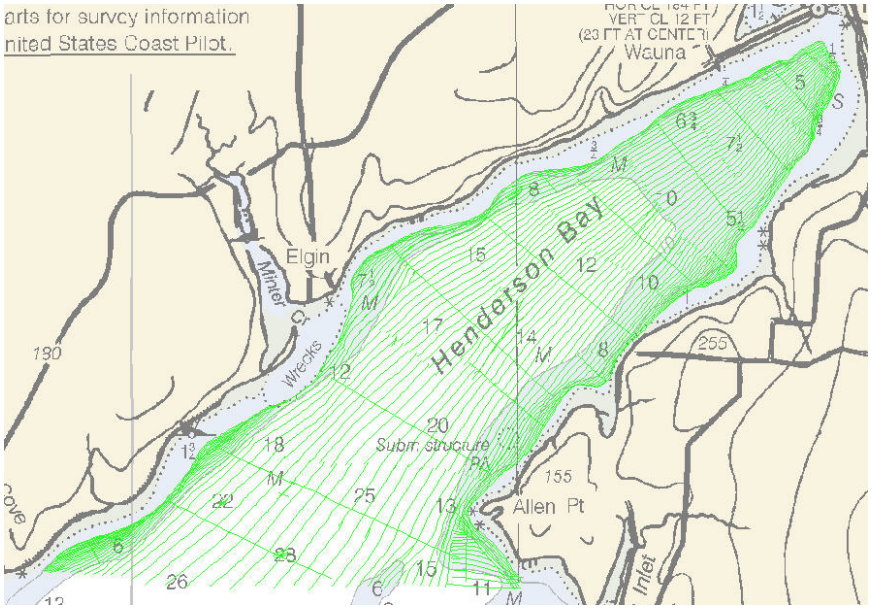


Figure 6: H12313 Main Scheme and Cross Lines

B.2.2 Uncertainty

Uncertainty values of submitted, finalized grids were calculated in CARIS using the "Greater of the Two" of total propagated uncertainty and standard deviation (scaled to 95%). In CARIS HIPS, an IHO attribute layer was created for the H12313 finalized combined 2 meter surface using the following IHO Order 1 formula: ((0.5 +((Depth*0.013)^2))^0.5)-Uncertainty. Uncertainty values throughout survey H12313 meet IHO Order 1 (figure 7).

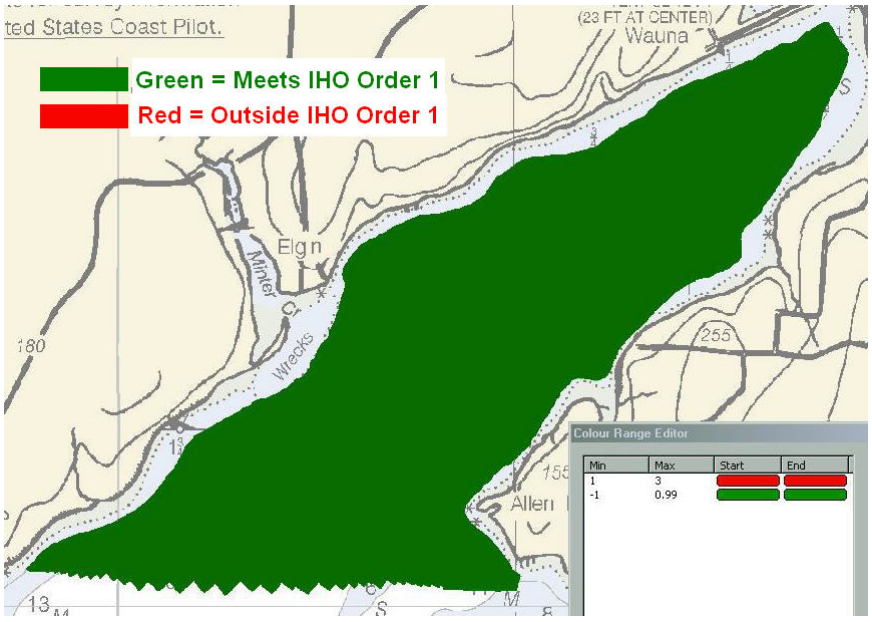


Figure 7: H12311 IHO Compliance

B.2.3 Junctions

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12312	1:10000	2011	Navigation Response Team 3	S

Table 6: Junctioning Surveys

H12312

H12313 junctions to the south with H12312, sheet "3" Northern Carr Inlet, of the same project (OPR-N360-NRT3-11, Southern Puget Sound, WA). Thirty seven (37) locations across depths ranging from four (4) meters to fifty five (55) meters were compared using individual two-meter BASE surfaces and the CARIS cursor information tool. Ninety two percent (92%) of soundings compared, agreed within 0.2 meters; eight percent (8%) agreed within 0.3 meters. Good general agreement between the surveys was observed.

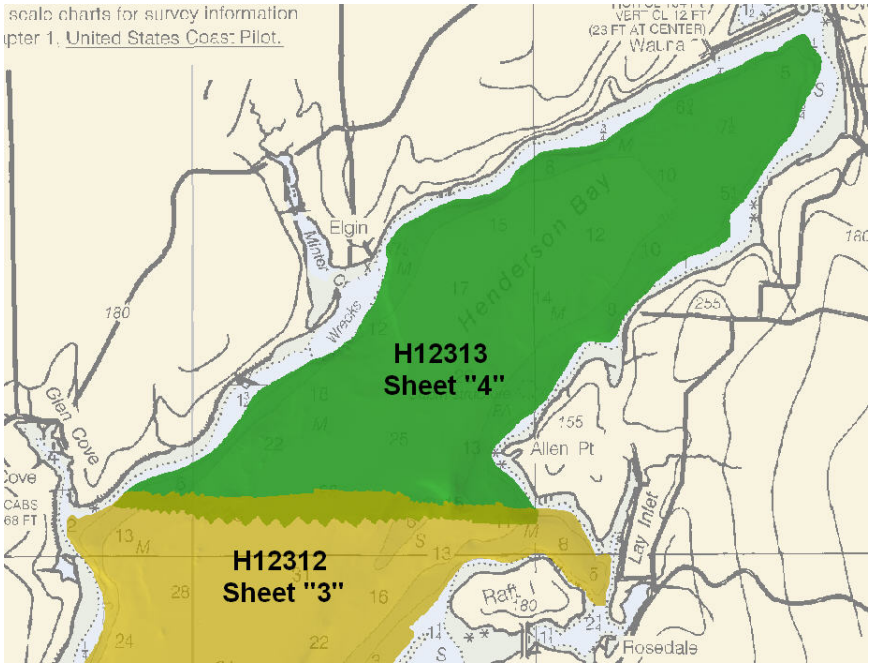


Figure 8: H12313 Junction Survey

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.2.5.1Acquisition Computer Freezes / Vertical Offsets

A series of acquisition computer freezes occurred during this survey that indirectly affected the quality of bathymetric data in the area of Allen Point. When the crashes occurred, survey operations had to be suspended in order to troubleshoot and correct the problem, often requiring several hours or days. As a result, the data collected near Allen Point was acquired over a period of five days and displays what appear to be tide-related artifacts (figures 9 and 10).

The area between Allen Point and Raft Island was a challenging place to survey due to its complex tidal characteristics and restricted water flow. The discrete tide zoning method and correction data used for this project may be inadequate to fully account for these complexities. Vertical offsets of up to 0.45 meters between different day's data have been noted in this area. The source of the computer crashes appears to have been a Windows program intended to synchronize the PC clock using an on-line source. This proved problematic while running Hypack navigation software; the clock synch program was disabled and computer crashes were greatly reduced.

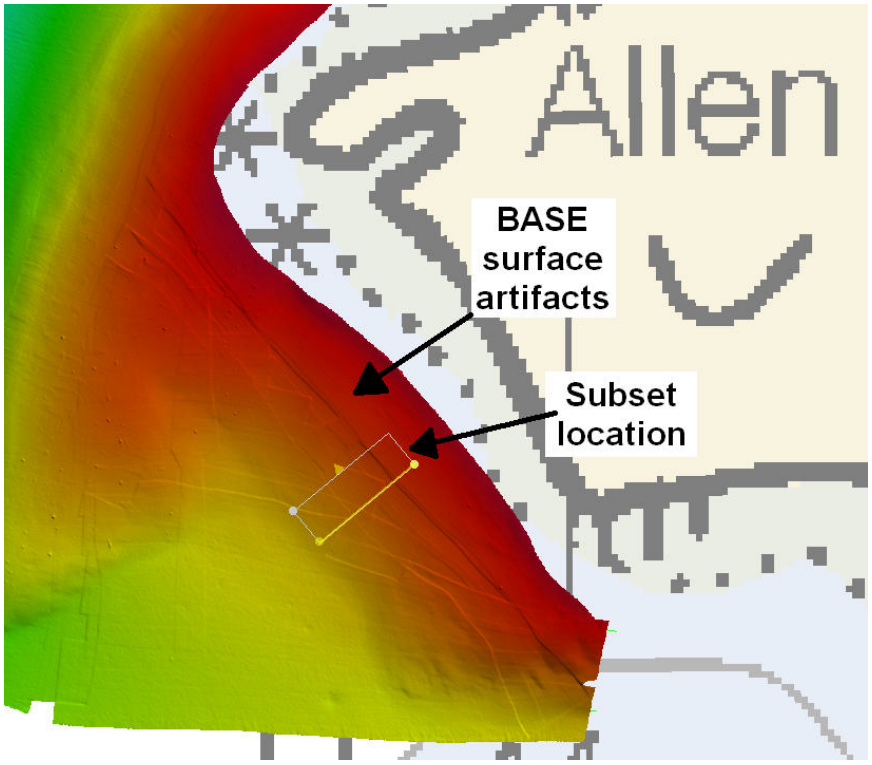


Figure 9: Tide-related Surface Artifacts

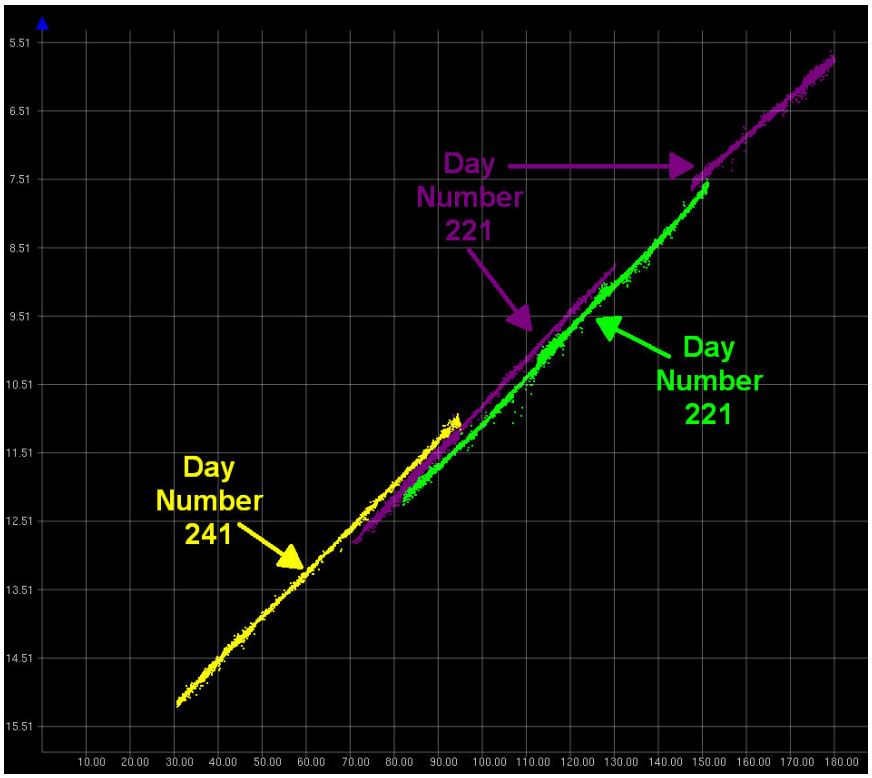


Figure 10: Subset Editor View ofTide-related Artifacts

Although the offsets mentioned exceed the maximum allowable tidal error of .45 meters in places, the data is considered adequate to supersede the charted data due to the age of the previous surveys (1900-1939).

B.2.5.1True Heave

The True Heave file does not match Navigation time for eight (8) lines of H12313 data. As a result, real-time heave but not True Heave is loaded to those lines. The problem appears related to crashes of the acquisition computer. Figure 11 lists the lines affected.

Day Number	Line
200	1513
200	1700
221	1846
229	2024
236	1710
236	1735
236	1939
241	1528

Figure 11: H12313 Lines without True Heave Applied

The data is adequate for charting despite not having true heave applied.

B.2.6 Factors Affecting Soundings

B.2.6.1 Suboptimal Sound Speed Correction

Due to variations in the water column, thermal layering, tidal influence and other related factors, a distinct demarcation of water masses was sometimes observed in the field. This proved problematic in the acquisition and application of sound velocity (SV) correction data. SV data were applied real-time by the Kongsberg EM 3002 multibeam echo sounder during acquisition; no post processing of SV data was performed. Despite the best efforts of the hydrographers to conduct sufficient SV casts distributed both spatially and temporally, in some areas sound velocity data correction was suboptimal. Some data exhibit upward or downward deflection ("smiles" or "frowns") when viewed in CARIS 2D Subset Editor, indicative of inaccurate SV correction. To compensate, some outer-beam soundings obviously in error were flagged as rejected. An example of suboptimal SV data correction at Latitude 47-22-39.38N, Longitude 122-37-52.52W, is shown in figure 12.

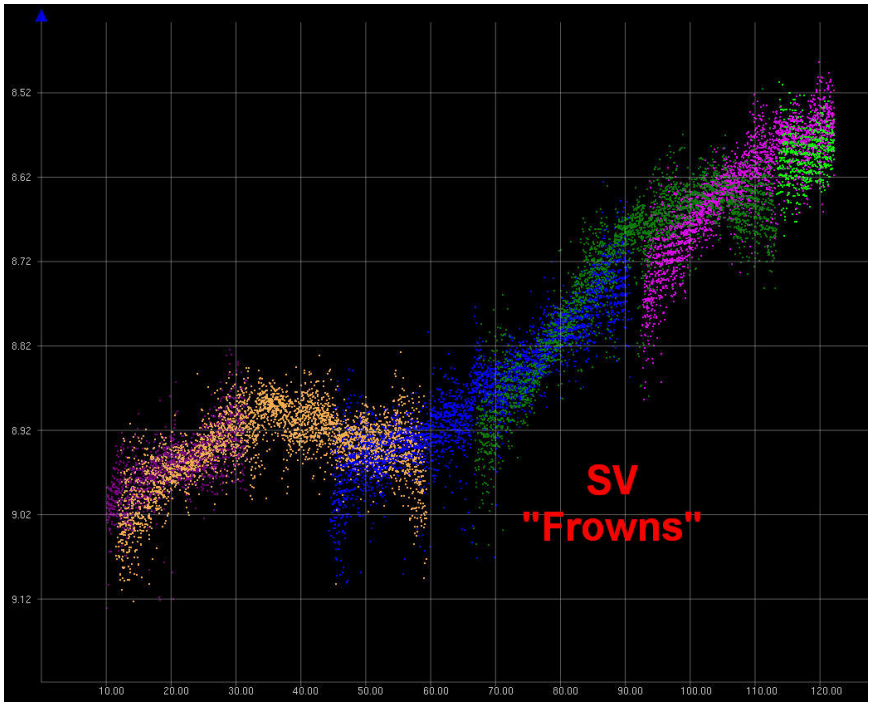


Figure 12: Example of Suboptimal SV Correction

The data is adequate for charting after editing outer beam data.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: CTD (Conductivity Temperature Density) casts were performed and the data loaded into the Kongsberg EM 3002 multibeam echo sounder using SIS acquisition software prior to logging data. Additional casts were made at four (4) hour intervals or more frequently when observed surface sound speed values changed significantly (approximately 3 meters per second). CTD data were applied real-time during acquisition; no post application of CTD data was performed. Twenty nine (29) CTD casts were made and recorded to the following submitted concatenated file: H12313_Concat_SVP.svp.

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 not collected for this survey.

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: S-57 ENC 3.1

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
1m	CUBE	1 meters	0.06 meters - 56.53 meters	NOAA_1m	Complete MBES
2m	CUBE	2 meters	0.98 meters - 56.38 meters	NOAA_2m	Complete MBES
4m	CUBE	4 meters	1.05 meters - 56.31 meters	NOAA_4m	Complete MBES
1m_Final	CUBE	1 meters	0.06 meters - 20 meters	NOAA_1m	Complete MBES
2m_Final	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
4m_Final	CUBE	4 meters	36 meters - 56.31 meters	NOAA_4m	Complete MBES

Table 7: CARIS Surfaces

One (1) field sheet, three (3) single-resolution and three (3) finalized BASE surfaces were created to process H12313. Final BASE surface resolutions and depth ranges were specified in the file "CUBEParams_NOAA_2011.xml" submitted with this report.

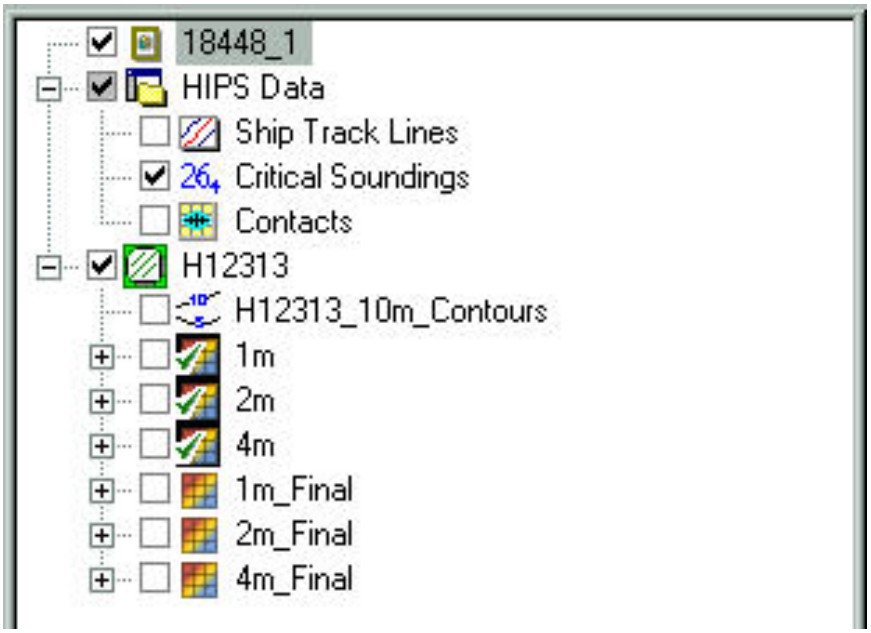


Figure 13: H12313 Field Sheet and Surfaces

The 4m resolution surface, H12313_4m_Combined_Office, created during office processing, was used for generation of the soundings used in compilation.

C. Vertical and Horizontal Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide station at Tacoma, Washington (944-6484) served as control for datum determination and as the primary source for water level reducers for survey H12313. No tertiary gauge was required.

Preliminary zoning was accepted as the final zoning for survey H12313 (see Appendix IV). All data were reduced to MLLW using the final approved water levels (verified tides) from the Tacoma, WA station (944-6484) by applying tide file 9446484.tid and the time and height correctors through the zone corrector file N360NRT32011CORP.zdf. It will not be necessary for the Pacific Hydrographic Branch to reapply the final approved water levels (smooth tides) to the survey during branch processing.

C.1 Vertical Control

The vertical datum for this project is Mean lower low water.

Standard Vertical Control Methods Used:

Discrete Zoning

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

Station Name	Station ID
Tacoma, WA	944-6484

Table 8: NWLON Tide Stations

File Name	Status
9446484.tid	Final Approved

Table 9: Water Level Files (.tid)

File Name	Status
N360NRT32011CORP.zdf	Final

Table 10: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 09/27/2011. The final tide note was received on 10/13/2011.

The Tide Note is attached.

C.2 Horizontal Control

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

The following DGPS Stations were used for horizontal control:

DGPS Stations
Robinson Point, WA 323 kHz

Table 11: 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	LNM Date	NM Date
18448	1:80000	34	07/2006	12/06/2011	12/03/2011

Table 12: Largest Scale Raster Charts

18448

H12313 soundings agreed with charted (18448) depths to within one (1) fathom across all depth ranges except as noted in figure 14. Charted depths circled in green indicate where H12313 soundings are within one (1) fathom of charted depths. Blue circled depths indicate where H12313 soundings are more than one (1) fathom deeper than charted. The red circled depth indicates where H12313 soundings are more than one (1) fathom shoaler than charted. The one red-circled depth is located on a shoal extending from the outflow of Minter Creek where H12313 soundings of approximately 9 fathoms were recorded over a charted 12 fathom depth (figure 15).

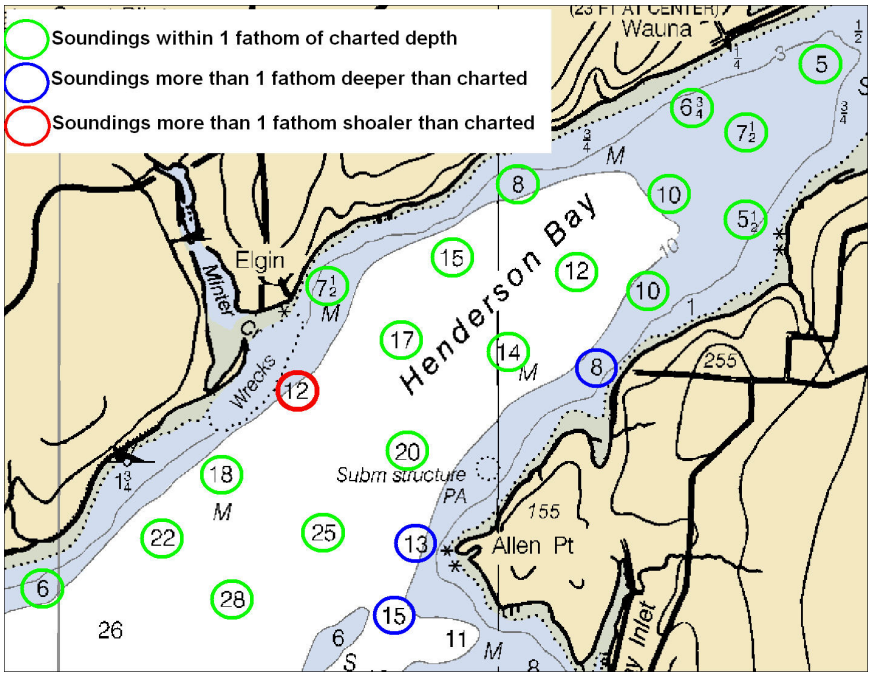


Figure 14: H12313 Depth Comparison

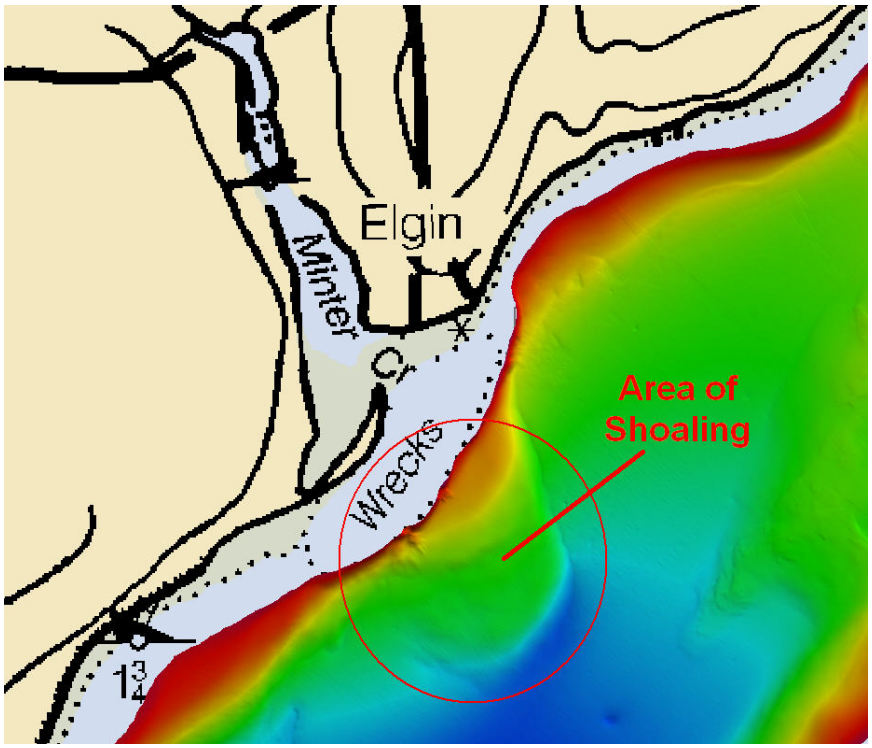


Figure 15: H12313 Area of Shoaling

Raster chart 18445 (1:80,000) also covers the survey area. Survey data generally agree with charted soundings and features.

D.1.2 AWOIS Items

Number of AWOIS Items Addressed: 3
Number of AWOIS Items Not Addressed: 0

Two (2) AWOIS items were assigned for full investigation (#54,006, #54,008) and one (1) item was provided for information (#54,007). The results of H12313 AWOIS investigation are included in the H12313 Feature Report in Appendix II.

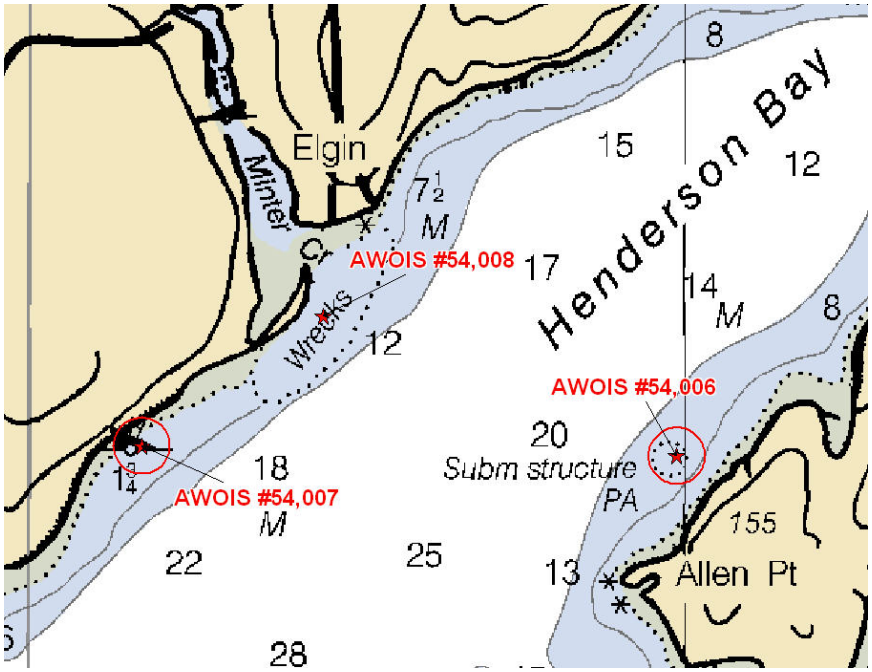


Figure 16: H12313 AWOIS Items

The AWOIS section of the feature report is attached. The Survey Feature Report is filed with the hydrographic records. Note: the survey feature report does not include all features from H12313. Additional features were added, some removed, and some modified in CARIS Notebook after the feature report was generated from Pydro. All features included in the compilation of H12313 have come directly from CARIS Notebook, which is the official features deliverable for this survey.

D.1.3 Charted Features

See H12313 Feature Report and the following submitted CARIS Notebook shoreline files: H12313_Field_Verified_AFF.hob, H12313_Disprovals.hob.

D.1.4 Uncharted Features

Refer to submitted shoreline file H12313_Field_Verified_AFF.hob and H12313 Feature Report.

D.1.5 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.6 Shoal and Hazardous Features

See figure 15 and description.

D.1.7 Channels

No maintained channels exist in the area surveyed.

D.2 Additional Results

D.2.1 Shoreline

Limited shoreline verification was accomplished using the Project Reference File (PRF) and the Assigned Feature File (AFF) provided with the project instructions. The PRF contains the limits of the assigned survey area and the Automated Wreck and Obstruction Information Service (AWOIS) features and search radii. The AFF is a subset of the Composite Source File (CSF) which includes those features specifically assigned for investigation by this survey. Both PRF and AFF are S-57 attributed datasets in .000 file format.

Limited shoreline verification was conducted near predicted low water in accordance with the applicable sections of NOAA Specifications and Deliverables and Field Procedures Manual. Assigned features seaward of the Navigation Area Limit Line (NALL) were addressed as required, S-57 attributed and recorded in the appropriate CARIS Notebook (v3.0, SP1, HF1) .hob files indicated in figure 17 and submitted with this survey. Additional features including AWOIS items, were processed using Pydro version 11.11 and are included in the H12313 Feature Report found in Appendix II of this report.

Shoreline File	Description
H12313_Original_AFF.hob	Original source data (0_1AFF01.000) as provided for project OPR-N360-NRT3-11 and filtered to the limits of survey H12313 and converted to .hob format.
H12313_Field_Verified_AFF.hob	An exact copy of H12313_Original_AFF.hob modified by the field unit to best represent shoreline features at survey scale. This includes the addition of new features and modification of source features. This file retains all features neither verified nor disproved by this survey
H12313_Disprovals.hob	Features deleted from H12313_Field_Verified.hob based on survey findings.
0_4PRF01.000	Project Reference File with survey limits and AWOIS item positions and search radii.

Figure 17: H12313 Shoreline Files

D.2.2 Prior Surveys

A prior survey comparison was not conducted.

D.2.3 Aids to Navigation

There are no aids to navigation within the H12313 assigned survey area.

D.2.4 Overhead Features

A charted (18448) fixed span bridge exists at the north end of the assigned survey area in water too shoal to safely approach.

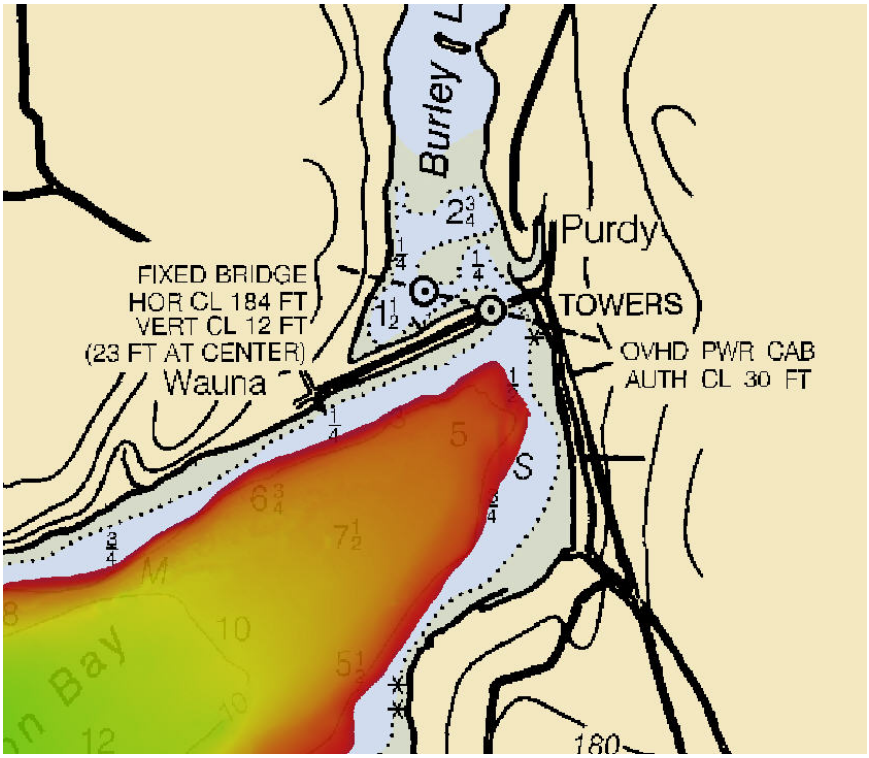


Figure 18: Fixed Bridge

D.2.5 Submarine Features

No submarine cables or pipelines are charted (18448) within the survey limits of H12313 and none were detected in the data.

D.2.6 Ferry Routes and Terminals

No ferry operations were observed in the H12313 survey area.

D.2.7 Platforms

No platforms were observed in the H12313 survey area.

D.2.8 Significant Features

There are no additional significant features to report.

D.2 Construction and Dredging

No construction or dredging was observed in the H12313 survey area.

D.2.9.1 Bottom Samples

Five (5) bottom samples were taken during this survey; the results are included in the following submitted CARIS Notebook file: H12313_Field_Verified_AFF.hob.

The five surveyed bottom samples have been recommended for charting.

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
Dan Jacobs	NRT-3 Acting Team Lead	12/20/2011	Dan Jacobs I attest to the accuracy and integrity of this document 2012.01.12 08:58:40 -08'00'
B. Jackson	H12313 Survey Sheet Manager	12/20/2011	Barry Jackson I am the author of this document 2012.01.06 07:28:20 -08'00'

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 Staiton
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	Discrete 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 Porpagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Exectutive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

H12313 AWOIS Report

Registry Number: H12313
State: Washington
Locality: Southern Puget Sound
Sub-locality: Henderson Bay
Project Number: OPR-N360-NRT3-11
Survey Date: 07/14/2011

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18474	8th	10/01/2003	1:40,000 (18474_1)	[L]NTM: ?
18445	32nd	08/01/2007	1:80,000 (18445_8)	[L]NTM: ?
18448	34th	07/01/2006	1:80,000 (18448_1)	USCG LNM: 5/10/2011 (6/7/2011) CHS NTM: None (5/27/2011) NGA NTM: 9/30/2006 (6/11/2011)
18440	29th	09/01/2007	1:150,000 (18440_1)	[L]NTM: ?
18003	20th	11/01/2006	1:736,560 (18003_1)	[L]NTM: ?
18007	33rd	02/01/2009	1:1,200,000 (18007_1)	[L]NTM: ?
501	12th	11/01/2002	1:3,500,000 (501_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

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

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	AWOIS	[no data]	[no data]	[no data]	---
1.2	AWOIS	[no data]	[no data]	[no data]	---
1.3	AWOIS	[no data]	[no data]	[no data]	--

1 AWOIS Features

1.1) AWOIS #54006 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position: 47° 20' 55.2" N, 122° 40' 01.8" W

Historical Depth: [None]

Search Radius: 150

Search Technique: MB, ES, S2

Technique Notes: [None]

History Notes:

L489/73-- A charted Submerged Structure is charted at 47/20/55.22 - 122/40/01.78 with PA text.

Survey Summary

Charts Affected: 18474_1, 18445_8, 18448_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Full AWOIS # 54006. L489/73-- A charted Submerged Structure is charted at 47/20/55.22 - 122/40/01.78 with PA text.

H12313 complete multibeam coverage over AWOIS #54006 disproves charted (18448) submerged structure Position Approximate (PA). H12313 located 3 insignificant objects approximately 30 meters east of charted submerged structure PA. The objects were found in waters of approximately 10 meters depth, they were 1 meter tall or less. The objects appear to be rocks and not part of the charted subm Structure PA.

Feature Correlation

Address	Feature	Range	Azimuth	Status
AWOIS_EXPORT	AWOIS # 54006	0.00	000.0	Primary

Hydrographer Recommendations

delete charted (18448) Subm Structure PA. Chart as per digital data.

S-57 Data

Geo object 1: Obstruction (OBSTRN)

Feature Images

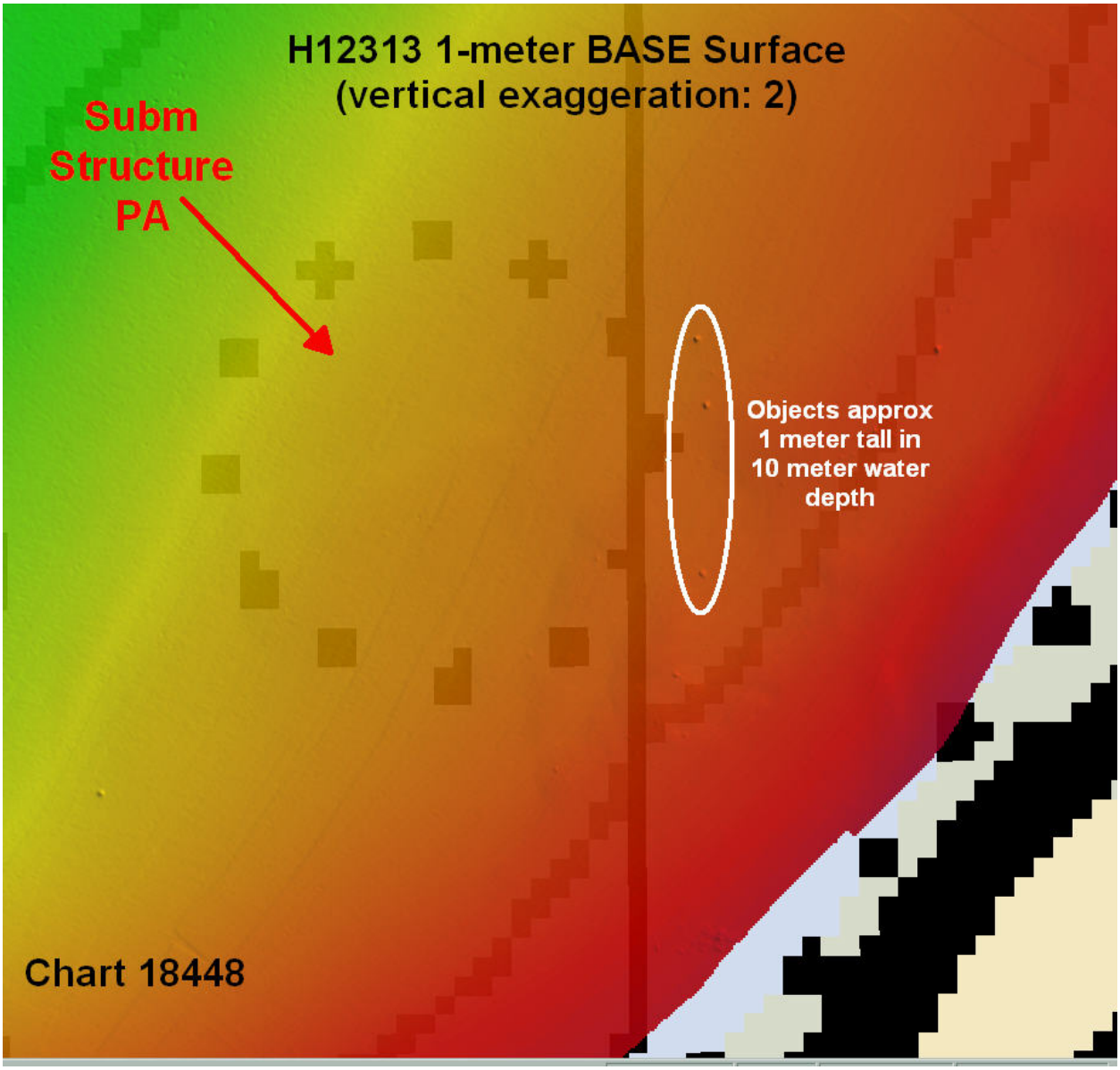


Figure 1.1.1

Office Notes: Concur. Remove charted obstruction.

1.2) AWOIS #54007 - UNKNOWN

No Primary Survey Feature for this AWOIS Item

Search Position: 47° 20' 57.0" N, 122° 42' 17.7" W
Historical Depth: [None]
Search Radius: 150
Search Technique: VS
Technique Notes: [None]

History Notes:

****Unknown Source-- A visible wreck is charted at 47/20/56.95 - 122/42/17.67.

Survey Summary

Charts Affected: 18474_1, 18445_8, 18448_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Full AWOIS # 54007. ****Unknown Source-- A visible wreck is charted at 47/20/56.95 - 122/42/17.67.

H12313 observed no obvious wreck however some indistinct debris was seen protruding at the position of the charted (18448) wreck. photos DN265_1431.jpg, DN265_1432.jpg, DN265_1433.jpg. H12313 visual observed height on debris -0.2 meters 14:36:05 UTC September 22 2011.

Feature Correlation

Address	Feature	Range	Azimuth	Status
AWOIS_EXPORT	AWOIS # 54007	0.00	000.0	Primary

Hydrographer Recommendations

delete charted (18488) wreck. Chart obstruction at same position.

S-57 Data

Geo object 1: Obstruction (OBSTRN)
Attributes: SORDAT - 20110922
SORIND - US,US,graph,H12313
WATLEV - 4:covers and uncovers
Geo object 2: Wreck (WRECKS)

Attributes:

CATWRK - 1:non-dangerous wreck

CONVIS - 2:not visual conspicuous

QUASOU - 2:depth unknown

WATLEV - 4:covers and uncovers

Feature Images

Figure 1.2.1

Office Notes: Do not concur. Enough debris remains to retain the wreck as charted instead of charting an obstruction in it's place.

1.3) AWOIS #54008 - UNKNOWN

No Primary Survey Feature for this AWOIS Item

Search Position: 47° 21' 19.3" N, 122° 41' 31.5" W

Historical Depth: [None]

Search Radius: 0

Search Technique: [None]

Technique Notes: [None]

History Notes:

**Unknown Source-- 3 visible wreck were charted.

**Unknown Source-- Between 1982 and 1984, the three visible wreck were revised to an area with the area labled "Wrecks" with a dotted danger curve and blue tint.

Survey Summary

Charts Affected: 18474_1, 18445_8, 18448_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Information AWOIS # 54008. **Unknown Source-- 3 visible wreck were charted. H12313 observed charted (18448) area foul with wrecks. 27 photos: DN265_1435.jpg through DN265_1461.jpg.

Feature Correlation

Address	Feature	Range	Azimuth	Status
AWOIS_EXPORT	AWOIS # 54008	0.00	000.0	Primary

Hydrographer Recommendations

Retain as charted (18448).

S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes: CATWRK - 2:dangerous wreck

CONVIS - 2:not visual conspicuous

QUASOU - 2:depth unknown

STATUS - 1:permanent

Feature Images

Figure 1.3.1

Figure 1.3.2

Figure 1.3.3

Office Notes: Concur. Retain as charted.

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : October 13, 2011

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-N360-NRT3-2011
HYDROGRAPHIC SHEET: H12313

LOCALITY: Henderson Bay, Southern Puget Sound, WA
TIME PERIOD: July 13 - September 22, 2011

TIDE STATION USED: 944-6484 Tacoma, WA
Lat. 47° 16.0'N Long. 122° 24.8' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.331 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-N360-NRT3-2011, H12313, during the time period between July 13 and September 22, 2011.

Please use the zoning file "N360NRT32011CORP" submitted with the project instructions for OPR-N360-NRT3-2011. Zone PS195 is the applicable zone for H12313.

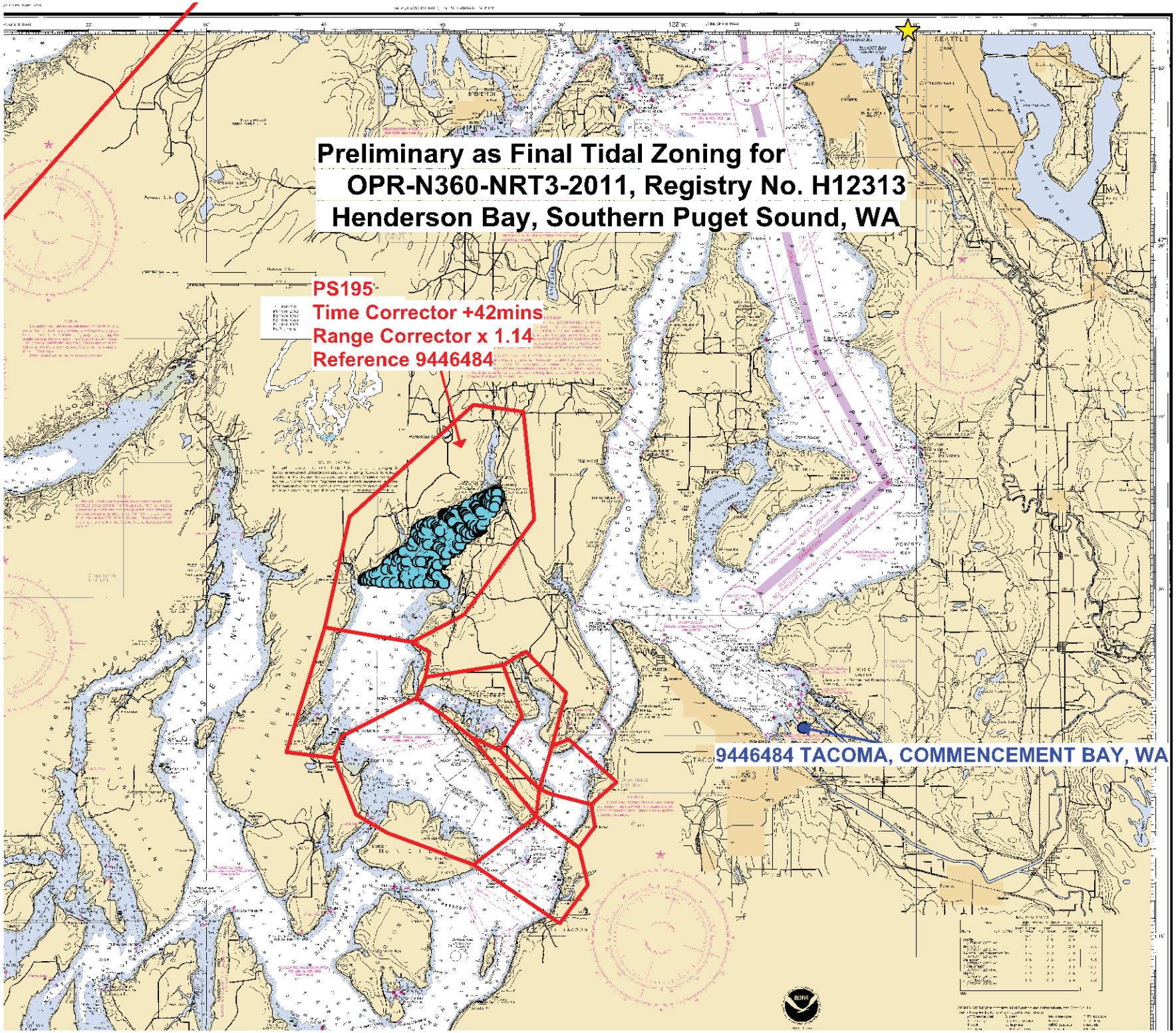
Refer to attachments for zoning information.

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).

Gerald Hovis

Digitally signed by Gerald Hovis
DN: cn=Gerald Hovis, o=Center for Operational Oceanographic Products and Services, ou=NOAA/NOS/CO-OPS/OD/PSB, email=gerald.hovis@noaa.gov, c=US
Date: 2011.10.13 13:47:23 -04'00'

CHIEF, Products and Services Branch


Preliminary as Final Tidal Zoning for
OPR-N360-NRT3-2011, Registry No. H12313
Henderson Bay, Southern Puget Sound, WA
PS195
Time Corrector +42mins
Range Corrector x 1.14
Reference 9446484
9446484 TACOMA, COMMENCEMENT BAY, WA

PHB Compilation Log

General Survey Info

Survey Number	H12313	Field Unit	NRT3	State	Washington	UTM Zone	10N
Project Number	OPR-N360-NRT3-11	Project Name (Locality)	Southern Puget Sound				
Start Date	7/13/2011	Sublocality	Henderson Bay				
End Date	9/22/2011	Survey Scale	10000	Compilation Scale	80000		

Affected Raster Charts

Chart	KAPP	Scale	Edition	Date	NTM Date
18448	1712	80000	35th	4/01/2012	4/28/2012
18445	1699	80000	34th	4/01/2012	4/28/2012

Add Chart | Remove Chart

Affected Electronic Charts

ENC	Scale
US4WA10M	80000

Add ENC | Remove ENC

Spatial Refrence

Horizontal Datum	WGS84
Coordinate System	LLDG
Sounding Datum	MLLW
Vertical Datum	MHW

Junction Surveys

Survey Number	Survey Date	Location Relative to Current Survey
H12312	11/10/2011	S

Add Survey | Remove Survey

Processing Info

SAR Reviewer	Adam Argento	**HCell Compiler**	Kurt Brown	**HCell Reviewer**	Pete Holmberg

Source Surfaces

Resolution	File Name
4m	H12313_4m_Combined_Office

Add Surface | Remove Surface

Supporting Documents

Name	Version
Specs and Deleverables	April 2011
HCell Specs	6.1

Add Doc | Remove Doc

PHB Compilation Log

Select Software Used	CARIS Hips

Software	Version, Hot Fix	Used For
CARIS HIPS	7.1 HF3	SAR Review. Inspection of Combined BASE Surfaces.
Pydro	12.2	SAR Review. Generation of Features Reports.
CARIS BASE Editor	3.2.2 SP2 HF2	Creation of soundings and bathy-derived features, meta area object, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer	2.2 SP1 HF3	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS	4.4 SP5 HF40	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding. (For Fathoms and Feet chart units only.)
CARIS HOM	3.3 SP3 HF8	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding. (For Fathom and Feet chart units only)
CARIS Plot Composer	5.1 SP1	Generate plots of CARIS Session files used for QC.
HydroService, dKart Inspector	6.0	Validation check of the base cell file.

Reset Table

Product Info

Deliverables	
Chart Scale HCell	H12313_CS.000
Survey Scale HCell	H12313_SS.000
HCell Report for MCD	H12313_HR.pdf
Feature Listing	
Descriptive Report	H12313_DR.pdf
Survey Outline	H12313_Outline.gml and .xsd
Geospatial PDF	H12313_GeoImage.pdf

Horizontal and Vertical Units

During creation of the HCell all soundings and features are maintained in metric units with as high precision as possible. Depth units for soundings measured with sonar maintain millimeter precision. Depths on rocks above MLLW and heights on islets above MHW are typically measured with range finder, so precision is less.

Depth Units (DUNI)	Fathoms
Positional Units (PUNI)	Meters
Height Units (HUNI)	Feet

PHB Compilation Log

Radius Setting

A survey-scale sounding (SOUNDG) feature object layer was built from the Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at survey scale using a Radius Table file with values shown below.

Radius (mm)	Min. Depth (m)	Max Depth
3	0	10
4	10	20
4.5	20	50
5	50	500

Contours

Depth contours at the intervals on the largest scale chart are included in the SS HCell for MCD raster charting division to use for guidance in creating chart contours. With the exception of the zero contours included in the *_CS file, contours have not been deconflicted against shoreline features, soundings and hydrography.

Charted Contours	Metric Equivalent	Metric NOAA Rounded	Charted NOAA Rounded
0	0	0.2286	0.125
3	5.4864	5.715	3.125
10	18.288	18.5166	10.125

Add Contour | Remove Contour

Additional Info

Contact Information

Inquiries regarding this HCell content or construction should be directed to:

HCell Compiler: Kurt Brown

Phone Number: 206-526-6839

Email: kurt.brown@noaa.gov

Compilation Comments

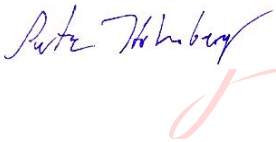
APPROVAL SHEET
H12313

Initial Approvals:

The survey evaluation and verification has been conducted according to branch processing procedures and the HCell compiled per the latest OCS HCell Specifications.

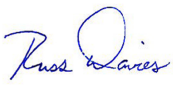
Digitally signed by Kurt Brown
DN: cn=Kurt Brown, o=Pacific Hydrographic Branch, ou=NOAA, email=kurt.brown@noaa.gov, c=US
Date: 2012.05.21 14:08:33 -07'00'

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or disproval of charted data within the survey limits. The survey records and digital data comply with OCS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.



Digitally signed by Peter S. Holmberg
DN: cn=Peter S. Holmberg, o, ou, email=peter.holmberg@noaa.gov, c=US
Date: 2012.05.29 10:02:14 -07'00'

I have reviewed the HCell, accompanying data, and reports. This survey and accompanying digital data meet or exceed OCS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.



Digitally signed by Russ Davies
Reason: signing for Dave Zezula
Date: 2012.05.29 10:24:30 -07'00'