F00571

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic Survey

Field No. N/A

Registry No. F00571

LOCALITY

State Oregon

General Locality Tillamook Bay

Sublocality Approach to Tillamook Bay to Miami Cove

2010

CHIEF OF PARTY

Dan Jacobs, NOAA

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DATE

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

HYDROGRAPHIC TITLE SHEET

REGISTRY No

F00571

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

FIELD No: N/A

State **Oregon**

General Locality **Tillamook Bay**

Sub-Locality **Approach to Tillamook Bay to Miami Cove**

Scale **1:10,000** Date of Survey **August 16 - September 15, 2010**

Instructions dated **7/30/2010** Project No. **S-N908-NRT3-10**

Vessel **NRT 3 S1212**

Chief of party **Dan Jacobs, NOAA**

Surveyed by **Ian Colvert, Dan Jacobs**

Soundings by **Kongsberg EM 3002 echo sounder**

SAR by **Andrew Clos** Compilation by **Peter Holmberg**

Soundings compiled in **Feet**

REMARKS: **All times are UTC. UTM Zone 10**

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 recomendations in the DR unless otherwise noted. Page numbering may be interrupted or non sequential.

All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.

Descriptive Report to Accompany Hydrographic Survey F00571

Project S-N908-NRT3-10
Tillamook Bay, Oregon
Approach to Tillamook Bay to Miami Cove
Scale 1:10,000
August, September 2010
NOAA Navigation Response Team 3 (S1212)

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Project Instructions S-N908-NRT3-10 dated July 30, 2010 and all other applicable direction[1], with the exception of deviations noted in this report. The survey area is Tillamook Bay in the state of Oregon. This survey corresponds to sheet 1 in the sheet layout provided with the Project Instructions. S-N908-NRT3-10 responds to a request from the regional Navigation Manager. It is reported that the soundings outside USACE maintained channel are unreliable. It is the intent of this survey to supersede all bathymetry, seafloor features, and bottom characteristics within the assigned survey, updating NOAA chart 18558.

Complete multibeam echosounder (MBES) coverage was achieved 4 meters and deeper from the entrance of Tillamook Bay, Crab Bay and to the small boat harbor of Garibaldi, with exception to the entrance of Coast Guard Station Tillamook Bay (see Figure 1). Offshore of the Tillamook Bay entrance coverage is complete to the suggested survey limits supplied by Navigation Response Branch, with exceptions of the extents of the jetties. Total mileage acquired by survey launch 1212 is reference in Table 1.

Limited Shoreline Verification was performed for the survey area seaward of the Navigable Area Limit Line (NALL) for F00571, as per section 3.5.5 of the Field Procedures Manual April, 2010 (FPM). Shoreline features were given S-57 attribution and included for submission in Notebook .hob files.

[1] NOS Hydrographic Surveys Specifications and Deliverables (April 2010), OCS Field Procedures Manual for Hydrographic Surveying (April 2010), and all Hydrographic Surveys Technical Directives issued through the dates of data acquisition.

Data Acquisition Type	Launch
	S1212
VBES (mainscheme, nm)	-
MBES (mainscheme, lnm)	90.56
SSS (mainscheme, nm)	-
VBES + SSS (mainscheme, nm)	-
PDBS (Testing, nm)	-
Crosslines (lnm)	6.25
Developments (lnm)	1.02
Shoreline (nm)	-
Bottom Samples	-
Total Number of Items Investigated	0
Total Area Surveyed (sq. nm)	0.87

Table 1: Statistics for survey F00571

Data acquisition was conducted from August 16 to September 15, 2010 (DN228 to DN258).

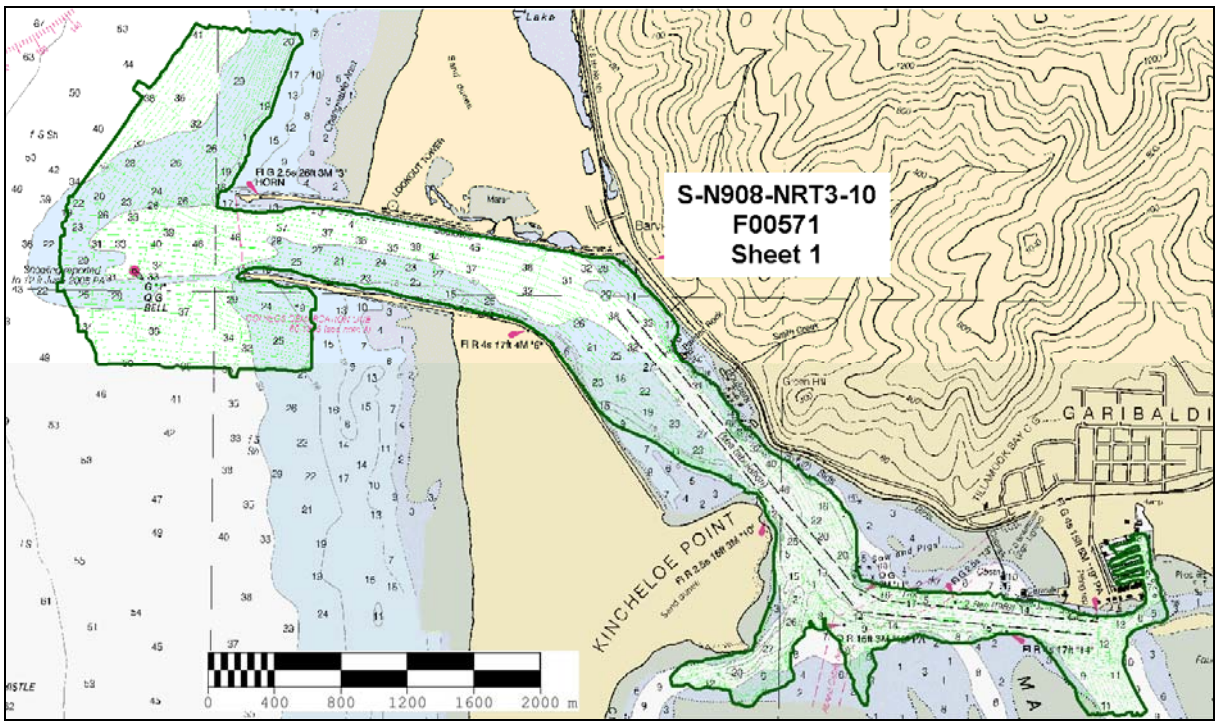


Figure 1: F00571 Survey Limits (green).

B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition and processing systems, survey vessel, quality control procedures and data processing methods can be found in the *S-N908-NRT3-2010 Data Acquisition and Processing Report* (DAPR), submitted under separate cover. Items specific to this survey, and any deviations from the DAPR are discussed in the following sections.

Final Approved Water Levels have been applied to this survey. See Section C. for additional information.

B.1. Equipment and Vessels

Data for this survey were acquired by the following vessel:

Hull Number	Name	Length	Draft	Acquisition Type
S1212	SeaArk	30 ft	.65m	Kongsberg EM 3002 echo sounder

Table 2. Data acquisition vessel and system for F00571.

Sound speed profiles were measured in accordance with the Specifications and Deliverables using SEACAT SBE 19*plus* profiler.

Multibeam vessel navigation and attitude data were measured and recorded using Applanix POS/MV 320 system, version 4. The Kongsberg EM 3002 was configured to not allow for post processing (loading) of true heave data. (See the *S-N908-NRT3 DAPR.)*

A complete description of survey vessels, hardware, and software systems is included in the *S-N908-NRT3 DAPR.*

No unusual vessel configurations were used for data acquisition.

B.2. Quality Control

Crosslines

Multibeam Echosounder (MBES) crosslines totaled 6.25 nautical miles, comprising 6.9% of mainscheme MBES hydrography. The mainscheme bathymetry was manually compared to the crossline nadir beams in CARIS subset mode and, in areas not affected by sand wave or sedimentation migration, generally agreed within 0.05 meters.

However, many of the crosslines offshore of the entrance to Tillamook Bay and crosslines in the channel leading to the entrance of Tillamook Bay generally exhibited error greater than 0.3 meters, with the most egregious error as great as 2 meters (45°33'49.18" N, 123°56'35.98" W). These errors are the result of temporal differences in mainscheme and crossline

acquisition. The majority of the mainscheme was acquired August 18, 23 and 24 (DN230, DN235, and DN236). Crosslines were acquired September 2, 8, and 13 (DN245, DN251 and DN256). This difference in time between mainscheme and crossline acquisition -- during which sand waves and sedimentation migrated -- resulted in gross inaccuracies between data.

By creating a one meter swath angle BASE surface showing a standard deviation representing areas 0.3 meters greater than the mean surface (see Figure 2), the Hydrographer was able to identify trends where crosslines did not agree with mainscheme bathymetry. Although non-ideal survey conditions during crossline acquisition contributed to this error, it was evident in mainscheme bathymetry that roving sedimentation and sand waves had the greatest effect.

Offshore crosslines (2010-251_1445, 2010-251_1451, 2010-256_1857, and 2010-256_1906) exhibited errors consistent with sedimentation movement and migrating sand waves. Crosslines located in the channel leading out to the entrance to Tillamook Bay (2010-245_1529, 2010-245_1541, 2010-251_1505, 2010-256_1917, 2010-256_1919, 2010_256_1921) exhibited errors consistent with migrating sand waves.

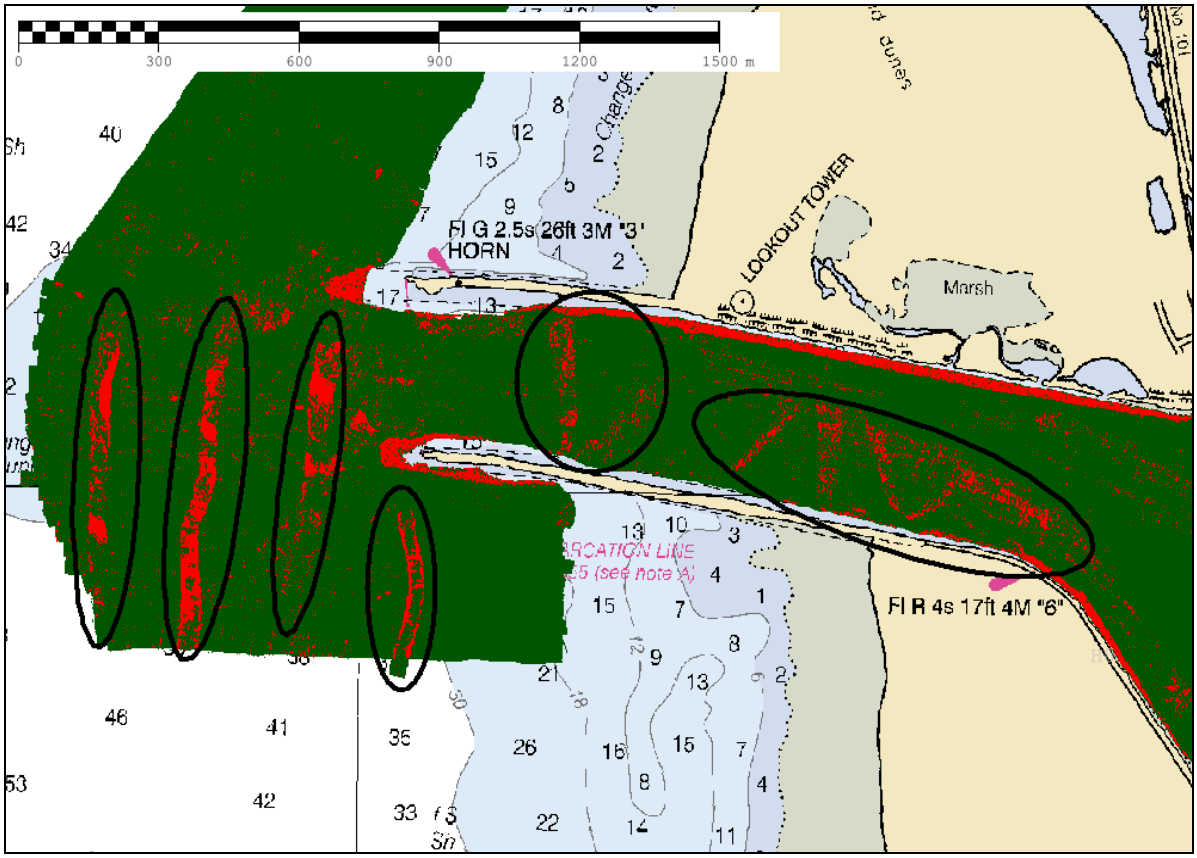


Figure 2: Areas (circled) where crosslines exhibited uncertainty greater than 0.3 meters from mainscheme bathymetry. Errors are primarily a result of temporal differences between mainscheme acquisition and migrating sedimentation and sand waves.

The most egregious crossline errors were seen offshore of the entrance to Tillamook Bay, crossline 2010-256_1906 (45°33'49.18" N, 123°56'35.98" W). Primarily because of the impressive movement of sedimentation during the tidal cycles of Tillamook Bay, crossline nadir comparison differed as great as 2.35 meters with mainscheme bathymetry (see Figure 3). This was a result of the temporal difference between mainscheme and crossline acquisition. Mainscheme was acquired August 23 (DN235) and the crosslines acquired September 13 (DN256).[1]

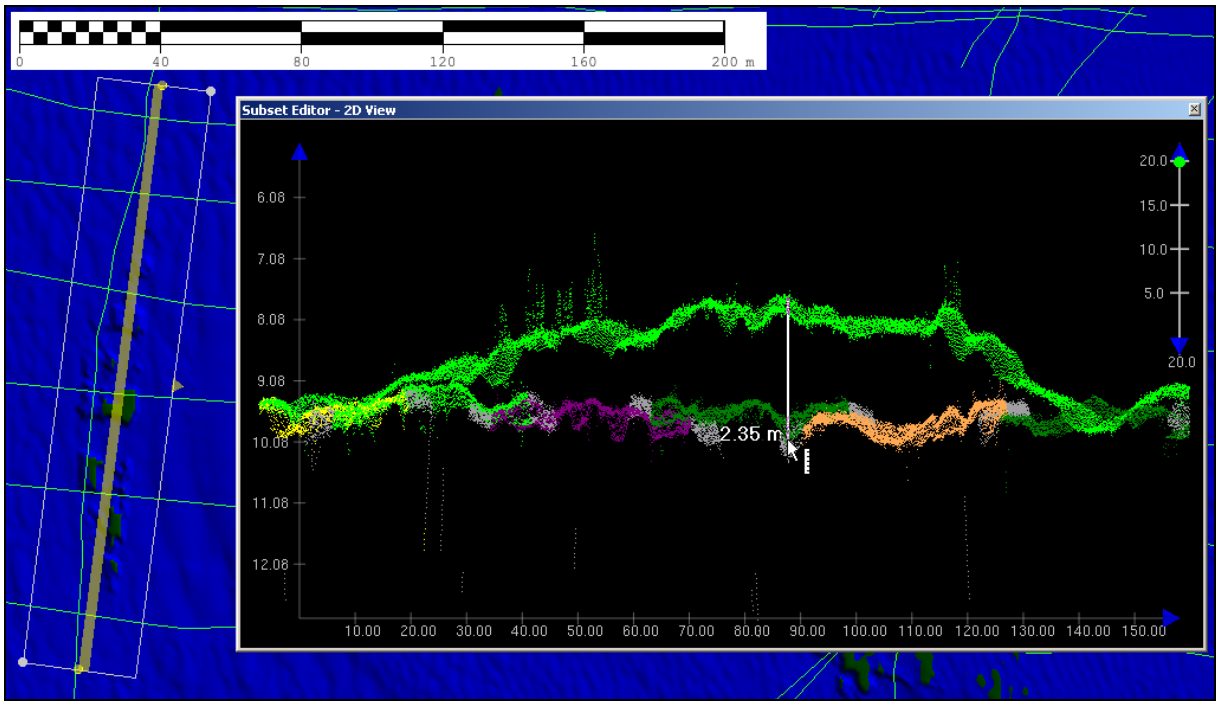


Figure 3: Due to temporal differences in mainscheme and crossline acquisition, crossline 2010-256_1906 acquired September 13 (DN256) differs at most 2.35 meters from mainscheme collected August 23 (DN235).

All crossline data was flagged as 'rejected' in CARIS HIPS & SIPS. Crossline data was used strictly for crossline comparison of mainscheme bathymetry and did not, nor needed to, add to the soundings per node of the CUBE surfaces.

A statistical Quality Control Report has been conducted on representative data acquired with the system used on this survey. Results of these tests are included in the updated 2010 NRT3 Hydrographic System Readiness Review package submitted with this survey.

Final Uncertainty

Uncertainty values of submitted, finalized grids are calculated in CARIS HIPS & SIPS using the "Greater of the Two" of total propagated uncertainty and standard deviation (scaled to 95%). An "IHO-ness" attribute layer was created for the F00571 finalized surface in CARIS HIPS & SIPS for analysis. Uncertainty values throughout the survey meet IHO Order 1 specifications with the exception of those areas show in red (see Figure 4).

Note that all designated soundings did not meet IHO Order 1 specifications. The jagged rocks of the north jetty sporadically did not meet IHO Order 1 specifications. A few miniscule areas in the main channel - where temporal differences between survey days over migrating sand waves - did not meet IHO Order 1 specifications.[2]

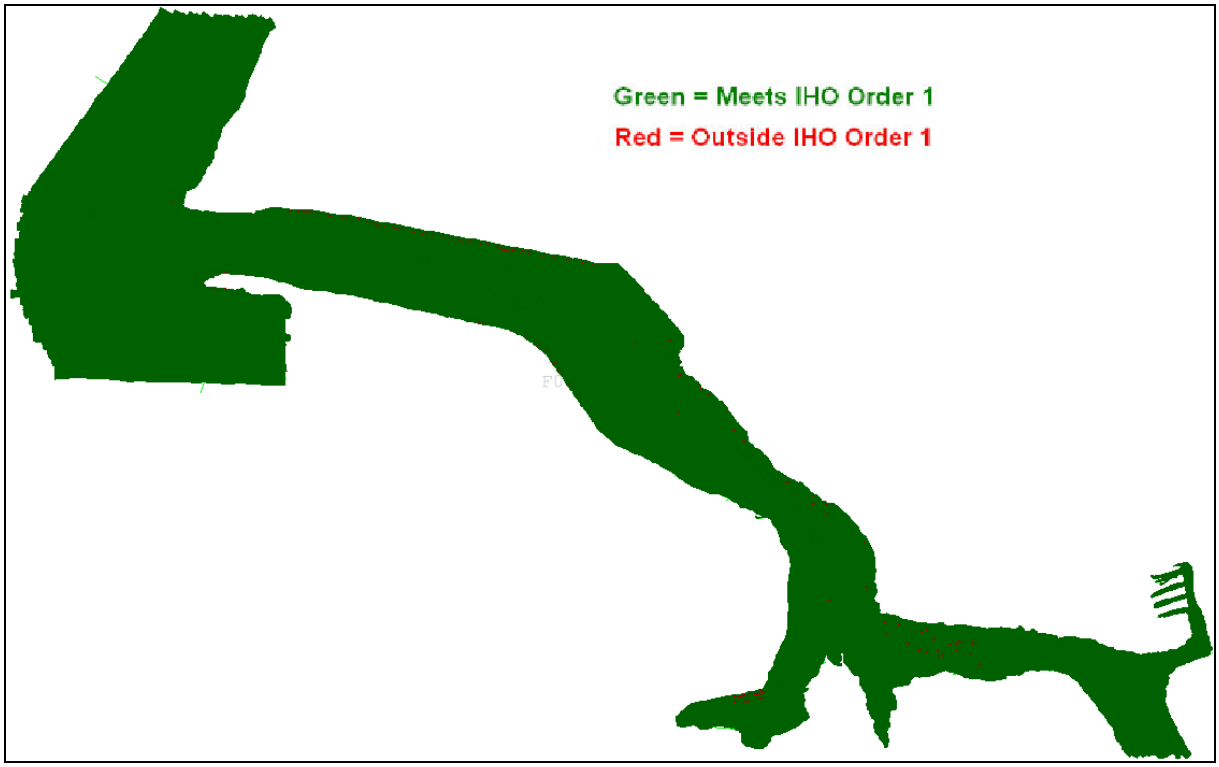


Figure 4: Areas, green, that meet IHO Order 1 specification. Red areas do not meet IHO Order 1 Specifications.

Junctions

No contemporary surveys junction with F00571.

Quality Control Checks

MBES quality control checks were conducted as discussed in the quality control section of the DAPR.

Data Quality Factors

Sound Velocity Errors

Subtle sound velocity errors were sporadic throughout survey F00571, primarily in areas west of Painted Rock and outside the entrance to Tillamook Bay. The sound velocity errors are due to the varying sound velocity range observed during acquisition and in large part to the Konsberg Simrad EM 3002 sonar system, which requires a sound velocity cast pre-loaded for beam forming purposes, eliminating tactful planning of CTD casts by the Hydrographer.

The Hydrographers took this limitation into account, and based on past experiences of shallow water survey acquired data with a 60/60 degree visible swath in Hypack and "drove lines" with a 1/3 overlap. During post production the Hydrographer applied a 58/58 degree filter in CARIS HIPS & SIPS, effectively "snipping" out the strong majority of the offending data (see Figure 5).

In areas where sound velocity relics remained, none were found to exceeded IHO Order 1 specifications. Data was reaccepted in areas where small holidays resulted or to bolster features or extend bathymetry beyond the 4 meter curve or to the 0.8 millimeters at the largest chart scale.

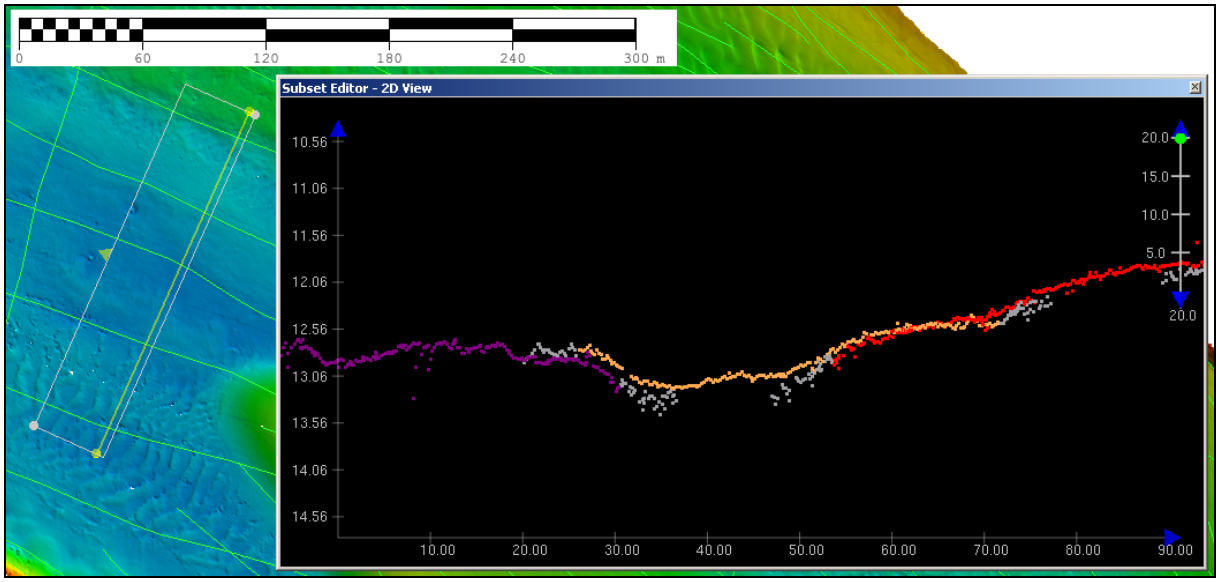


Figure 5: Example of rejected sound velocity error (gray) in the channel west of Painted Rock. (45°33'49.18" N, 123°56'35.98" W)

Konsberg Simrad EM 3002 Systematic Error, "Devil Horns"

The Konsberg Simrad EM 3002 sonar exhibited a consistent systematic error: two downward along-track spikes were consistently evident near 9-12 degrees either side of nadir. However, the one meter combined CUBE surface negated the error to within 0.1-0.2 meters, within IHO Order 1 specifications (see Figure 6).

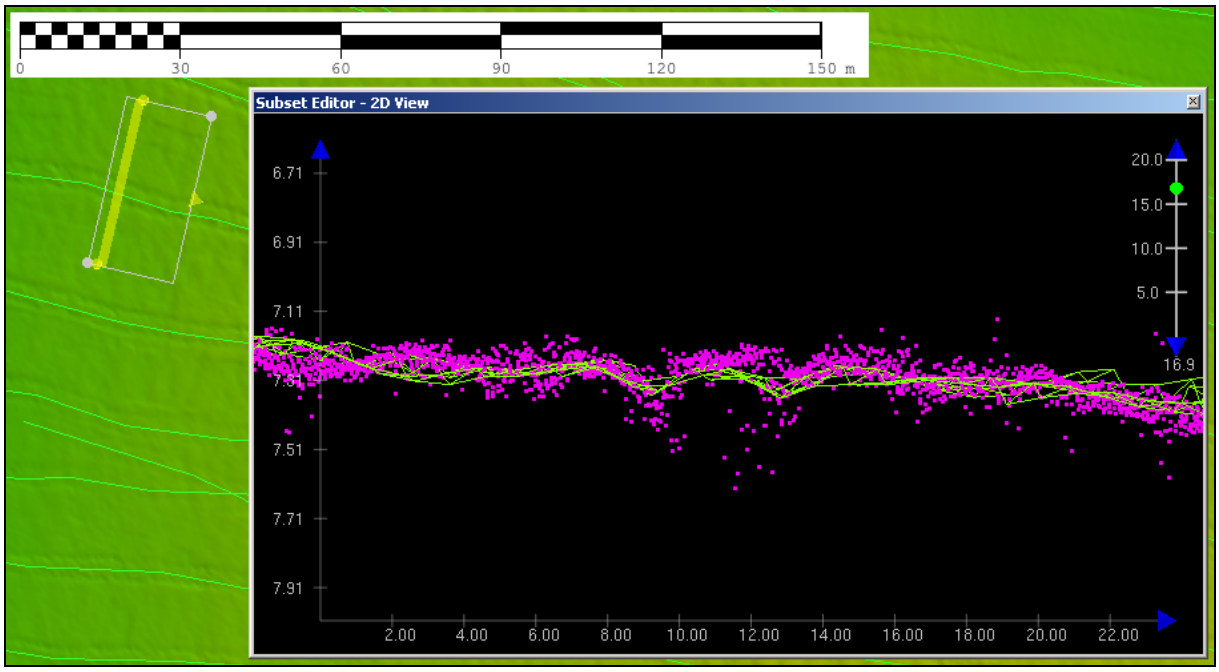


Figure 6: "Devil Horns" as seen in a half meter CUBE surface near nadir of the tracklines. Note the deliverable one meter combined CUBE surface's wireframe (Subset Editor 2D view) falls within IHO Order 1 specifications.

Tide Error

There is a tide error as great as a half meter located in the area near the western edge of survey F00571, due west of the northern jetty (45°34'12.73" N, 123°58'29.01" W) (see Figure 7). The error occurred August 23 (DN235). Lines 1504, 1510, 1515, 1520, 1525, 1530, and 1535 are consistently shoaler than lines 1818 and 1820. The greatest tide error is seen between lines with the greatest differences in time, roughly three hours. However, as the time differences became smaller (as the lines converge westward toward the entrance of Tillamook Bay) the tide error reduces to within IHO Order 1 specifications. Examination of the Final Approved Water Levels (predicted tide file 9437540.tid) supports that a falling tide occurred during these times of data acquisition. [3]

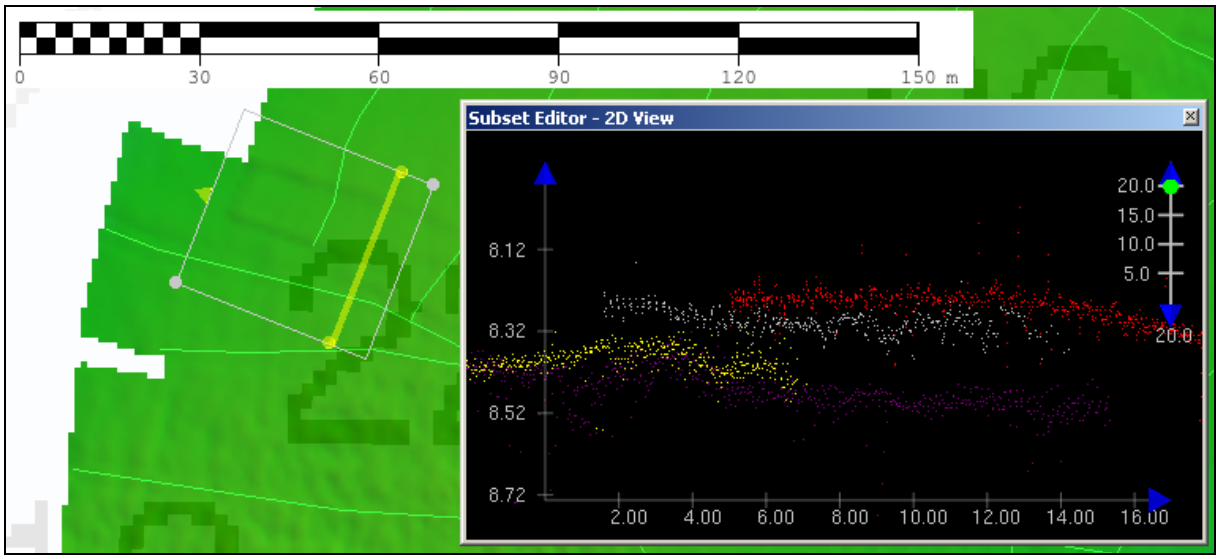


Figure 7: Tide error as great as 0.5 meters between lines collected nearly three hours apart. (45°34'12.73" N, 123°58'29.01" W)

Compounded Holiday Pickup Tide / Heave Error

There is a combination of heave and roll error occurring in the vicinity approximately 400 meters northwest from the entrance of Tillamook Bay (45°34'21.25" N, 123°58'11.29" W). There is a heave error exhibited in mainscheme bathymetry between lines 1540 and 1545 (August 23, DN235) (see Figure 8).

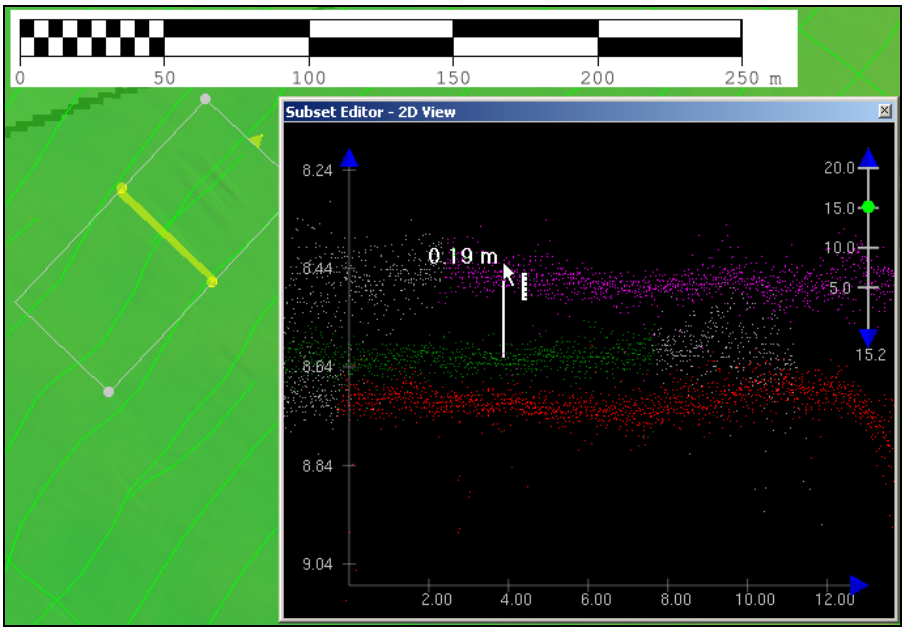


Figure 8: Heave error of 0.19 meters between lines 1540 (green) and 1545 (purple)

This heave error, caused by an abnormal wave that resulted in a holiday, was compounded further by the holiday pickup line that exhibited a tide error. The holiday pickup line 1638 acquired the same day, nearly 48 minutes after the mainscheme bathymetry, exhibited an error

of 0.2 meters. However, the area near the holiday coverage -- where the holiday pickup line supports the line with heave error (line 1545) – has a compounded error of 0.28 meters (see Figure 9). None of the error exceeds IHO Order 1 specifications.

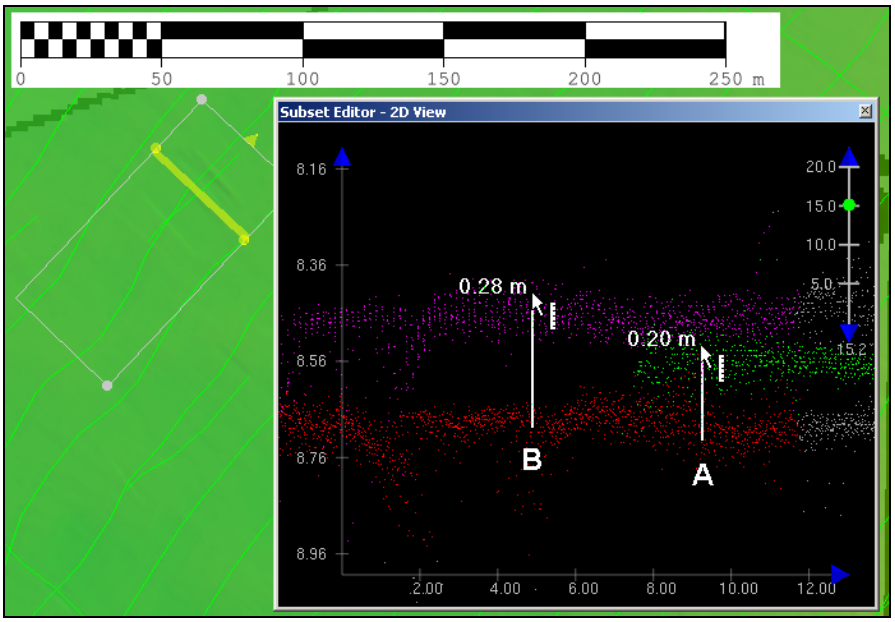


Figure 9: Tide error (A) is compounded by heave error (B) with the holiday pickup line (red).

Roll Error

Roll error, as great as 0.16 meters, was evident in mainscheme bathymetry in the location roughly 300 meters north to the entrance of Tillamook Bay (45°34'24.41" N, 123°57'54.16" W) (see Figure 10). Survey conditions deteriorated due to stacking waves as survey crew pushed shoreward to the suggested survey limits supplied by the Navigation Response Branch. None of the error exceeds IHO Order 1 specifications.

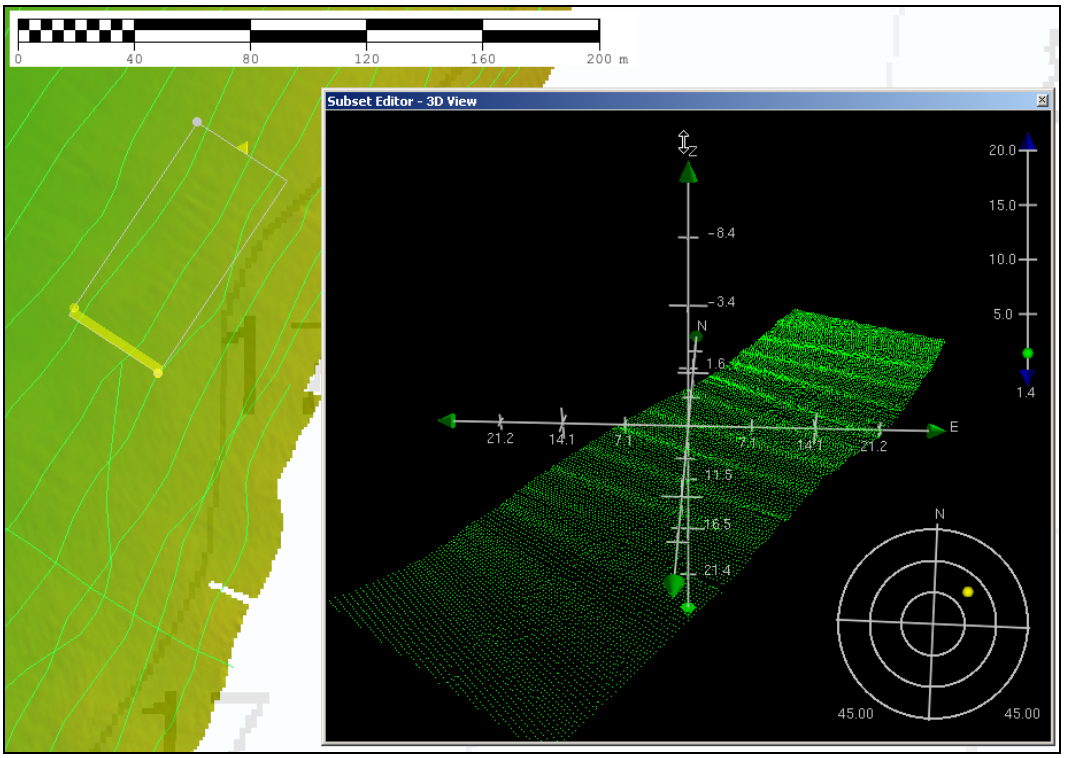


Figure 10: Roll error caused by stacking waves near the entrance of Tillamook Bay (45°34'24.41" N, 123°57'54.16" W).

Object Detection and Coverage Assessment

Critical Areas Methods and Detection

To include critical area requirements, the Hydrographer created half meter swath angle surfaces over areas less than 20 meters depth. After scrutiny of any suspected features, the Hydrographer created half meter 2010 NOAA parameter based CUBE surfaces over the same areas, and direct edited to this half meter surface. Using subset mode, the Hydrographer verified that the half meter CUBE surface was "grabbing" the tops of features within object detection requirements. This half meter surface was used as a guide to designate soundings for the one meter 2010 NOAA parameter based CUBE deliverable surface. The one meter surface was finalized to represent shoalest soundings in the surface.

No Coverage to the 4 Meter Curve

Mainscheme bathymetry was not achieved to the 4 meter curve near and around the tips of the north and south jetties of the entrance to Tillamook Bay (see Figure 11). These areas were hazardous due to breaking waves and strong current, and were given a safe birth during survey operations (see Figure 12). During survey operations, the Army Corps of Engineers was extending the northern jetty, creating a construction zone.

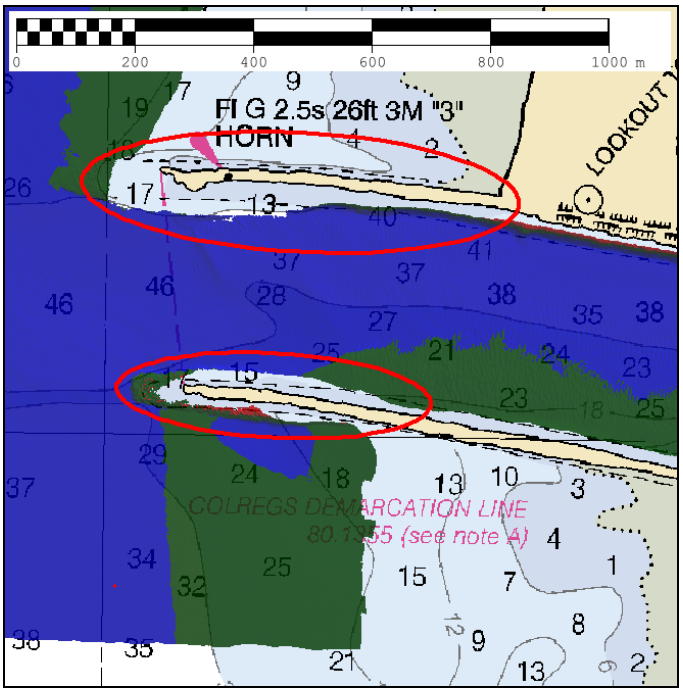


Figure 11: Areas (circled red) where mainscheme bathymetry does not reach the 4 meter curve.

Figure 12: A bird's eye view of the entrance to Tillamook Bay (image taken from Coast Pilot 7, 41st Ed., 2009). Note the pronounced hydrodynamics near and around the ends of the jetties.

Mainscheme bathymetry was not achieved to the 4 meter curve in the areas near and around Painted Rock (45°33'49.18" N, 123°56'35.98" W). Survey crews pushed in as safely as possible without taking undue risks for data collection (see Figure 13).

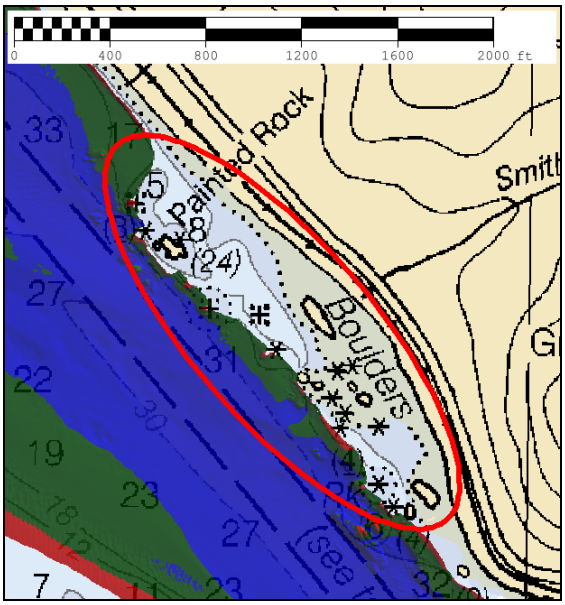


Figure 13: The 4 meter curve was not met in the areas near Painted Rock (circled red).

Mainscheme bathymetry was not achieved to the 4 meter curve in the areas near and around Sow and Pigs (45°33'18.72" N, 123°55'43.08" W). Survey crews pushed in as safely as possible without taking undue risks for data collection (see Figure 14).

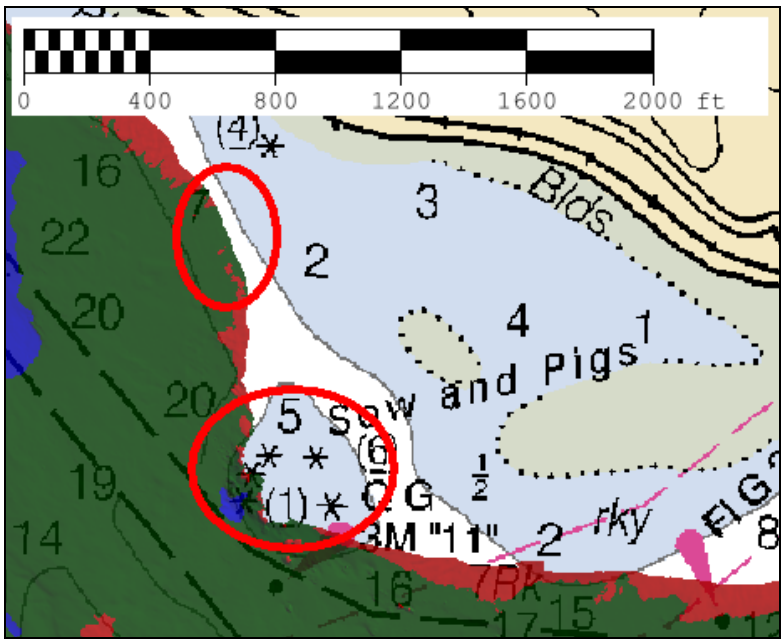


Figure 14: The 4 meter curve was not met in the areas near Sow and Pigs (circled red).

Mainscheme bathymetry was not achieved to the 4 meter curve in the areas near the entrance to the United States Coast Guard Station Tillamook Bay (45°33'15.75" N, 123°55'10.51" W). Survey crews adhered to the posted sign advising all non Coast Guard craft to stay out of the station's basin (see Figure 15).

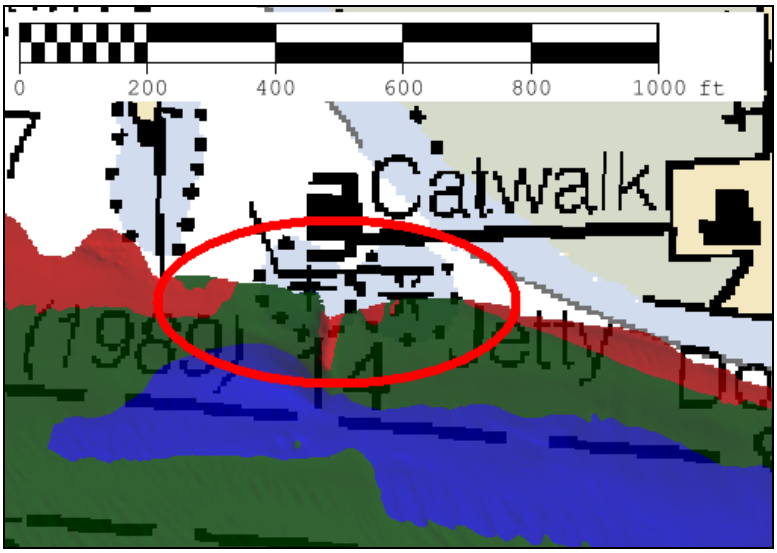


Figure 15: The 4 meter curve was not met in the areas near the entrance to the United States Coast Guard Station Tillamook Bay (circled red).

Mainscheme bathymetry was not achieved to the 4 meter curve in an area of Crab Bay (45°33'49.18" N, 123°56'35.98" W). Although survey crew failed to reach the 4 meter curve, they didn't miss it by much, average depths in the area are 12.5 meters (see Figure 16).

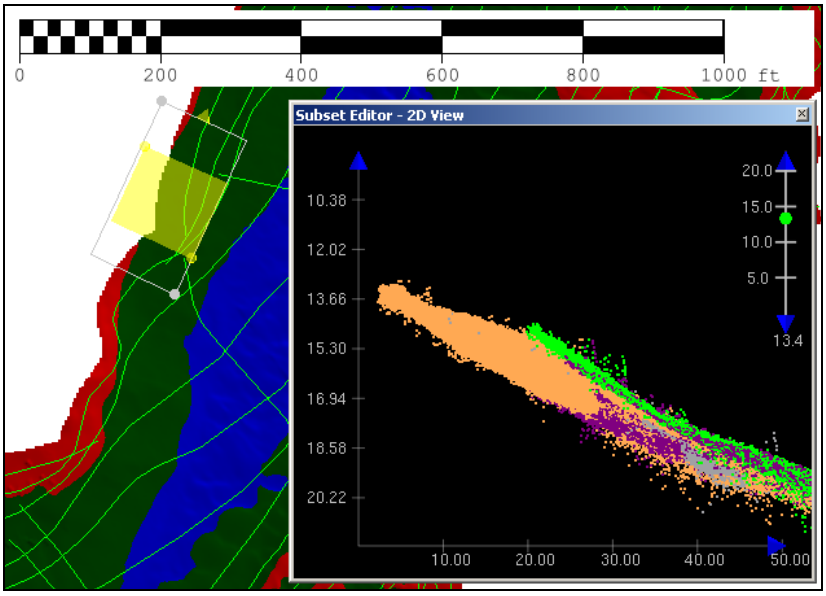


Figure 16: The 4 meter curve was not met in an area of Crab Bay.

Holidays

Three holidays greater than three nodes across were located within survey F00571. The corresponding multibeam backscatter side scan was examined and no navigationally significant items were found; additionally, the least depths were represented.

A holiday located near the west end of the northern jetty (45°34'11.92" N, 123°57'50.72" W) was a result of survey operations hampered by the Army Corp of Engineer's construction zone (see Figure 17).[4] The Army Corps of Engineers were in the process of extending the north jetty, utilizing a large crane. NRT3 used best discretion during mainscheme acquisition in the area, resulting in this holiday and coverage unattainable to the 4 meter curve or 0.8 millimeter at chart scale requirements.

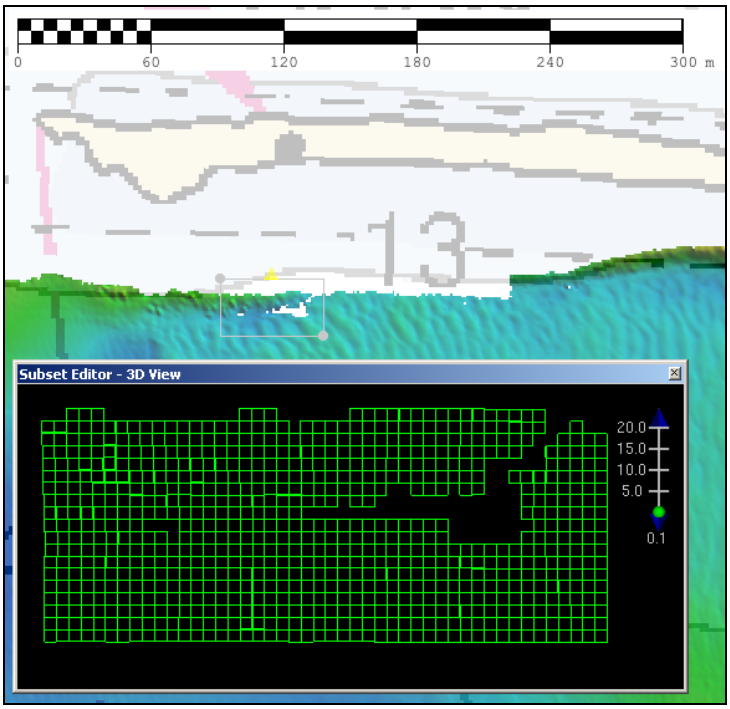


Figure 17: Holidays located near the west end of the northern jetty (45°34'11.92" N, 123°57'50.72" W).

A holiday located approximate 450 meters west of the southern jetty (45°34'04.48" N, 123°58'15.85" W) was a result of surveying during non-ideal conditions (see Figure 18).[5] At times the Konsberg Simrad EM 3002 became momentarily aerated during periods of sharp swell. Usually the survey crew backtracks and covers these holidays as they happen, but in this case the data gap was too small to be seen in Hypack's one meter matrix during acquisition and not discovered until post production.

An effort was made to cover the holiday with pickup holiday lines. However, temporal issues – the migration of the sand waves over time – prevented an accurate portrayal of the surface area. The Hydrographer deleted the holiday coverage to preserve the temporal integrity of the surface.

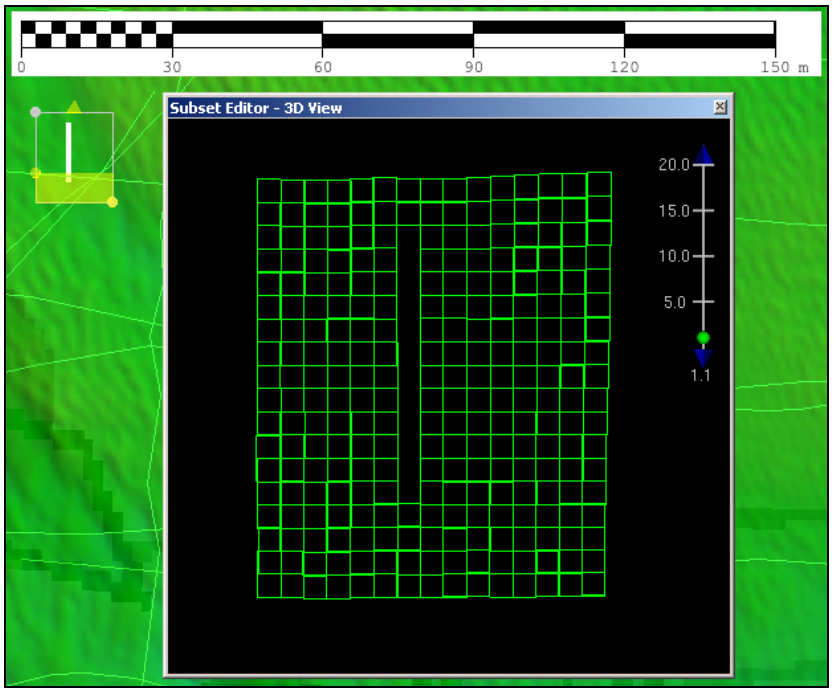


Figure 18: A holiday created as a result of Konsberg Simrad EM 3002 "hiccups" during non-ideal survey conditions, located 45°34'04.48" N, 123°58'15.85" W.

There is a holiday located near on the southern edge near the middle of the main channel leading to the entrance of Tillamook Bay (45°33'59.13" N, 123°57'14.78" W).[6] This holiday is a result of the Knudson Simrad EM 3002 transducer becoming momentarily aerated during non-ideal conditions (see Figure 19).

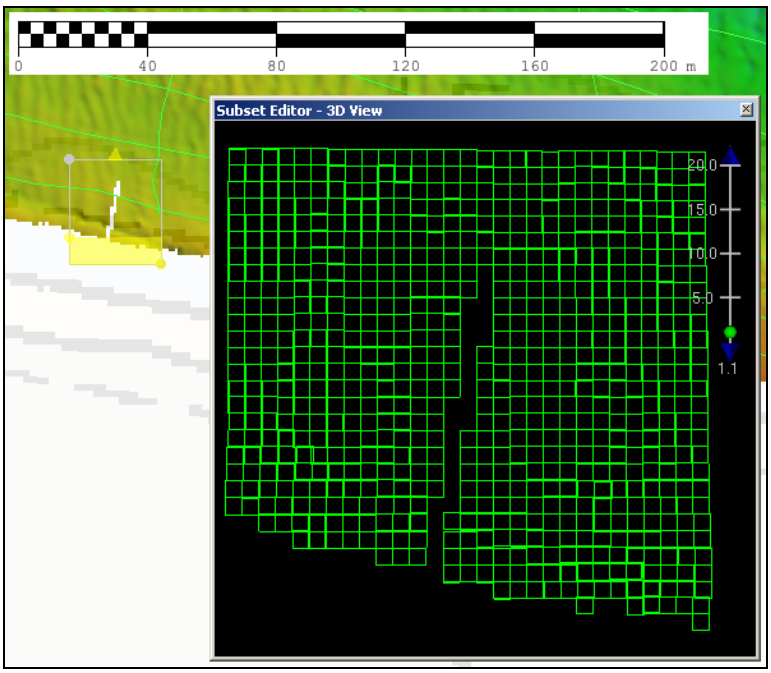


Figure 19: A holiday located 45°33'59.13" N, 123°57'14.78" W.

No Top of Rock

Although no holiday is present in the one meter CUBE surface, mainscheme bathymetry shows that there is no top to a rock approximately 200 meters southeast of the Sow and Pigs (45°33'49.18" N 123°56'35.98" W) (see Figure 20). This lack of coverage was anomalous; it could not have been seen in the one meter Hypack matrix during acquisition, nor was it seen during evening processing. Only during post processing was this lack of coverage discovered. The Hydrographer recommends charting as per digital data.[7]

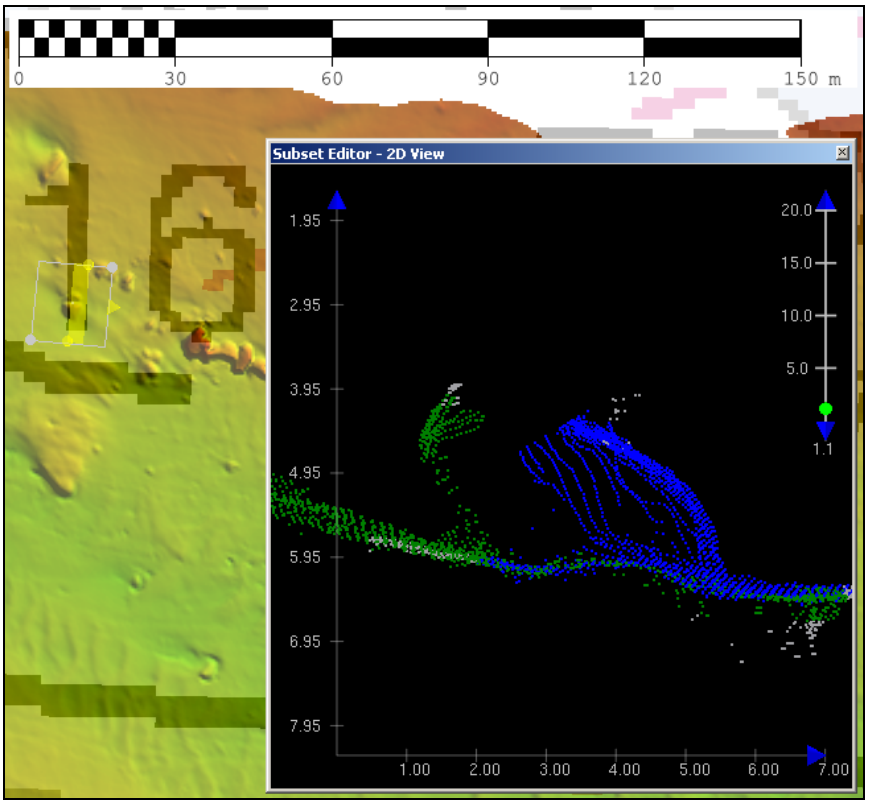


Figure 20: No top to a rock, located 45°33'49.18" N 123°56'35.98" W.

Unusual Conditions

Army Corps of Engineers Jetty Extension

During survey operations the Army Corps of Engineers were extending the northern jetty (see Figure 21). The Army Corps' construction zone hampered NRT3's ability to survey to 0.8 millimeters at the chart scale buffer or to the 4 meter curve near the western extent of the north jetty.[8]

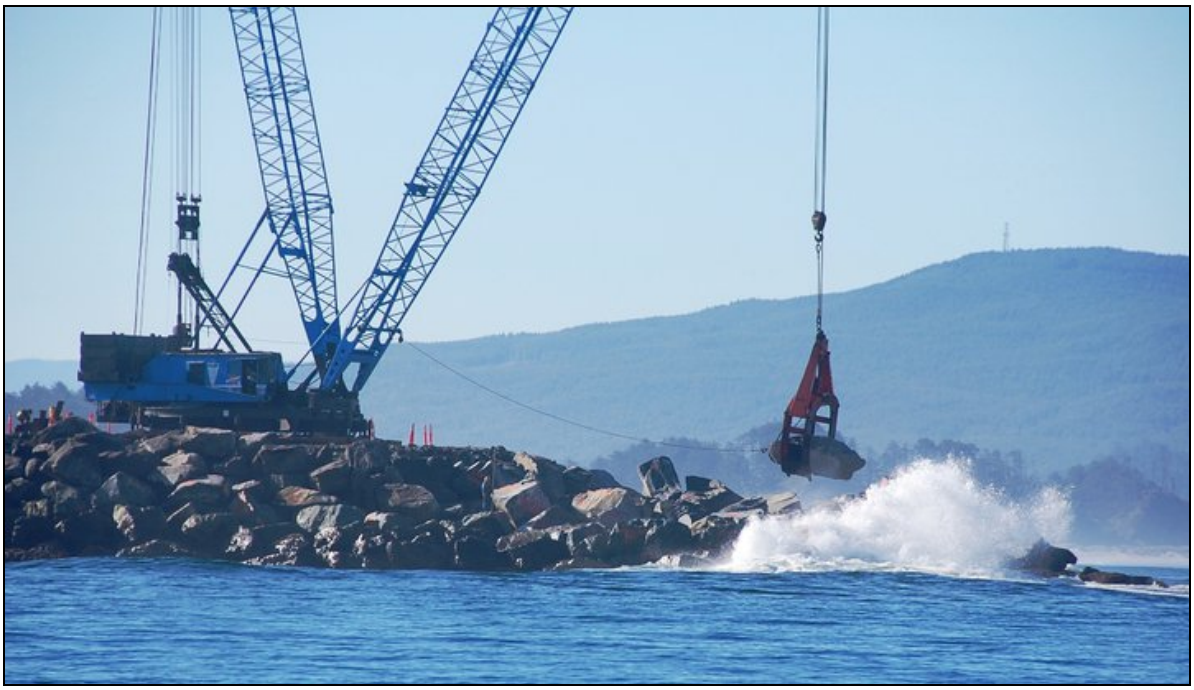


Figure 21: Army Corps of Engineers extending the northern jetty during survey operations.

Non-ideal Survey Conditions Outside the Entrance to Tillamook Bay

Conditions outside the entrance to Tillamook Bay were consistently and notoriously imperfect for bathymetric survey. Sea conditions were usually 3-4 foot swells (see Figure 22), usually with an added confused surface chop of 1-2 feet. During our seven week survey window several attempts were made to survey outside the entrance to Tillamook Bay. Only one day during our survey window, August 23 (DN 235), were conditions favorable for survey operations. Holiday pickups, crosslines, and the area south of the southern jetty were conducted in conditions that were not preferable for quality survey operations (see Figure 23).

Figure 22: Three to four foot swell were typical conditions outside the entrance to Tillamook Bay.

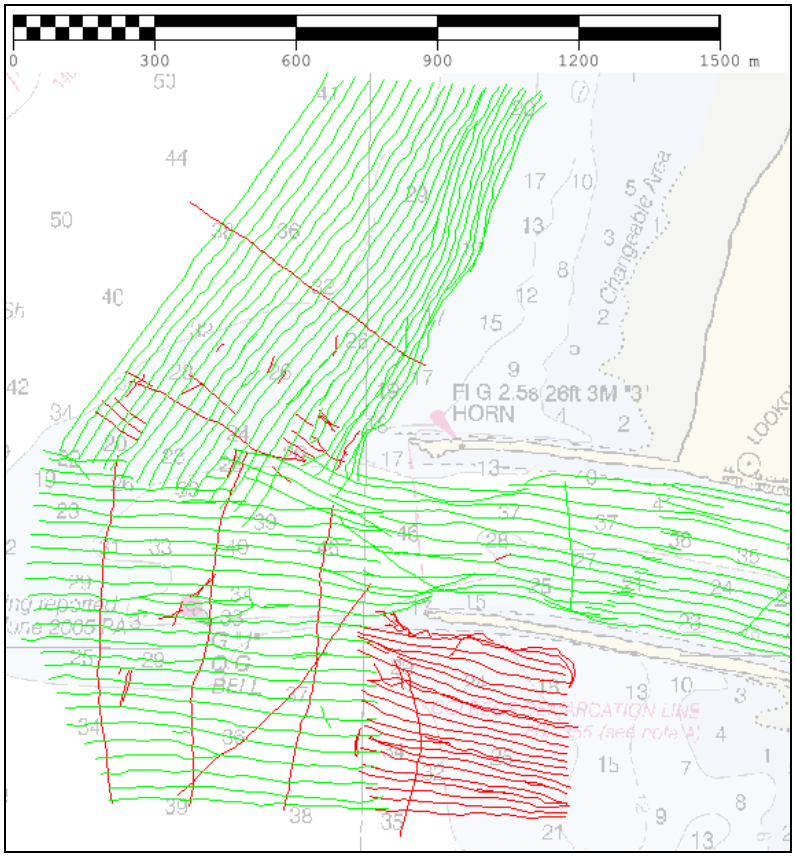


Figure 23: Lines (red) where survey operations were conducted during non-ideal seas.

B.3. Corrections to Echo soundings

Data reduction procedures for survey F00571 conform to those detailed in the *S-N908-NRT3-10 DAPR.*

B.4. Data Processing

Data processing procedures for survey F00571 conform to those detailed in the DAPR. Data were processed using CARIS HIPS & SIPS v7.0, Service Pack 1, Hotfix 5. Additional processing details regarding Total Propagated Uncertainty (TPU) and CUBE Surfaces and Parameters utilized, are discussed below.

TPU VALUES:
The survey specific parameters used to compute TPU in CARIS for F00571 are listed in Table 3.

Tide values:	Measured	0.01 m	Zoning	0.14 m
Sound Speed Values:	Measured	0.50 m/s	Surface	0.3 m/s

Table 3: F00571 CARIS TPU Parameters

One BASE surface was used in processing F00571. A one meter BASE surface with a depth range of 0 -23 meters with a field sheet smaller than $25x10^6$ nodes were used. CUBE surfaces were processed with a parameter set corresponding to each resolution as per HTD 2010-4. The CUBE parameter XML file is included with the data deliverables. The submission Field Sheet and BASE Surface structure are shown in figure 24.

In areas were multibeam data was acquired on charted cultural features (pilings, piers, etc) that were above MLLW, all data were rejected on the feature itself to more accurately represent the seafloor below these features.[9]

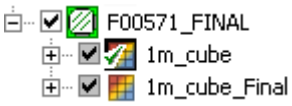


Figure 24: Field sheet and CUBE BASE surfaces submitted with F00571.

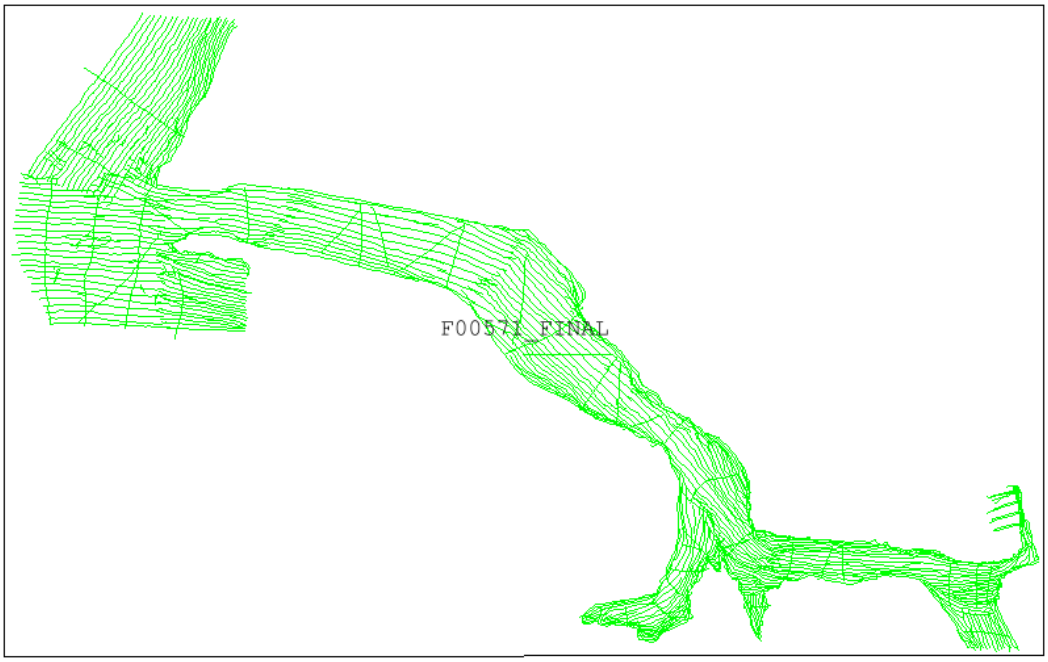


Figure 25: F00571 Field Sheet Layout.

C. VERTICAL AND HORIZONTAL CONTROL

Project S-N908-NRT3-10 did not require static GPS observations or other horizontal control work, and all tide corrections were generated from CO-OPS maintained tide station Garibaldi, OR (943-7540). Thus, no Horizontal and Vertical Control Report will be submitted.

C.1. Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. The differential corrector beacons utilized for this survey are given in Table 4.

Location	Frequency	Operator	Priority
Fort Stevens, WA	287 kHz	USCG	Primary

Table 4: Differential Corrector Sources for F00571.

C.2. Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) station at Garibaldi, OR (943-7540) serves as datum control for the survey area including determination at each subordinate station.

No tertiary gauges were required.

As per the Project Instructions, all data were reduced to MLLW using the final approved

water levels (smooth tides) from the Garibaldi, OR station (943-7540) by applying tide file 9437540.tid and time and height correctors through the zone corrector file N908NRT32010CORP.zdf. Preliminary zoning was accepted as the final zoning for the project. It will not be necessary for the Pacific Hydrographic Branch to reapply the final approved water levels (smooth tides) to the survey data during final processing.

The request for Final Approved Water Levels for F00571 was submitted to CO-OPS on September 20, 2010 in accordance with the Field Procedures Manual (FPM), dated April, 2010. The Final Tide Note was received on September 27, 2010. This documentation is included in Appendix IV.[10]

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparison

D.1.a. Survey Agreement with Chart

Chart comparison procedures were followed as outlined in section 4.5 of the FPM and section 8.1.3-D.1 of the HSSDM, utilizing CARIS HIPS & SIPS 7.0.1.0 software program.

Survey F00571 was compared with the following charts:

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
18558	1:20,000	38th Ed, July 2006	10/05/2010
18520	1:185,238	27st Ed; May 2009	10/05/2010

Table 5: Charts compared with F00571

Chart 18558 Comparison

Due to the strong tidal nature of the survey area, migrating sedimentation and sand waves skewed the accuracy of the charted soundings (see Figure 26). Most soundings that did not agree with those as charted tended to be within six feet. The most egregious shoaling differences were located outside of the entrance to Tillamook Bay. The shoalest depths of sand waves were as great as 18 feet shoaler than as a charted 40 foot sounding (45°34'06.61" N, 123°58'13.1" W). The most egregious deepening differences were located at the southern elbow of the main channel north of Kincheloe Point, where mainscheme bathymetry was nearly 35 feet deeper than as charted (45°33'51.71" N, 123°56'45.45" W).

Contours have taken a natural shift, with strong trends evident in these specific locations: south of the southern jetty (45°33'56.22" N, 123°57'49.06" W), at the southern elbow at the main channel north of Kincheloe Point (45°33'53.93" N 123°56'46.99" W), at Crab Bay (45°33'04.74" N 123°56'09.57" W), near the abandoned cable area east of Crab Bay (45°33'05.51" N 123°55'42.88" W), and at the entrance to Bay City Channel (45°33'05.55" N 123°54'53.61" W) (see Figure 27). [11]

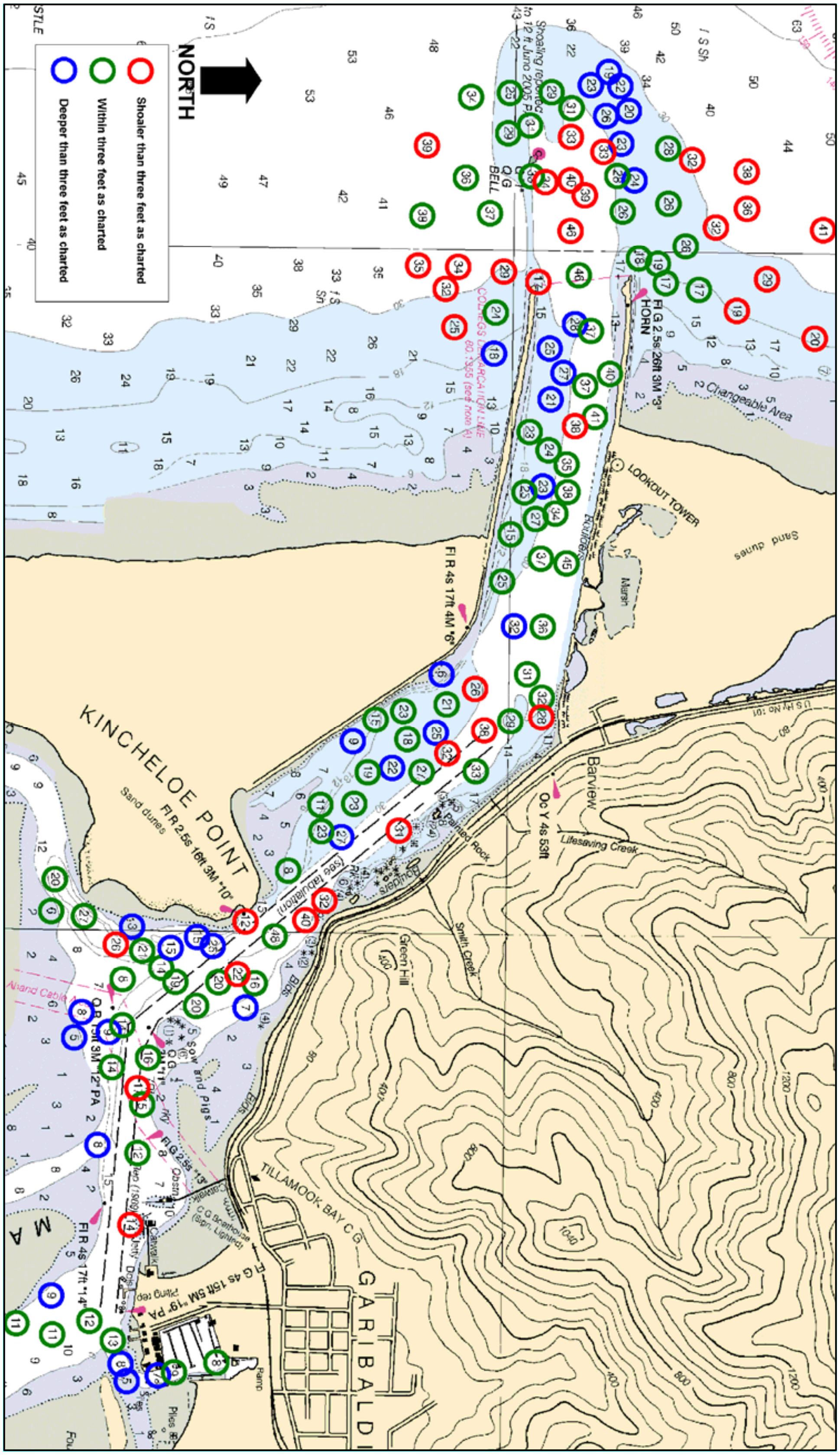


Figure 26: Soundings comparison of chart 18558.

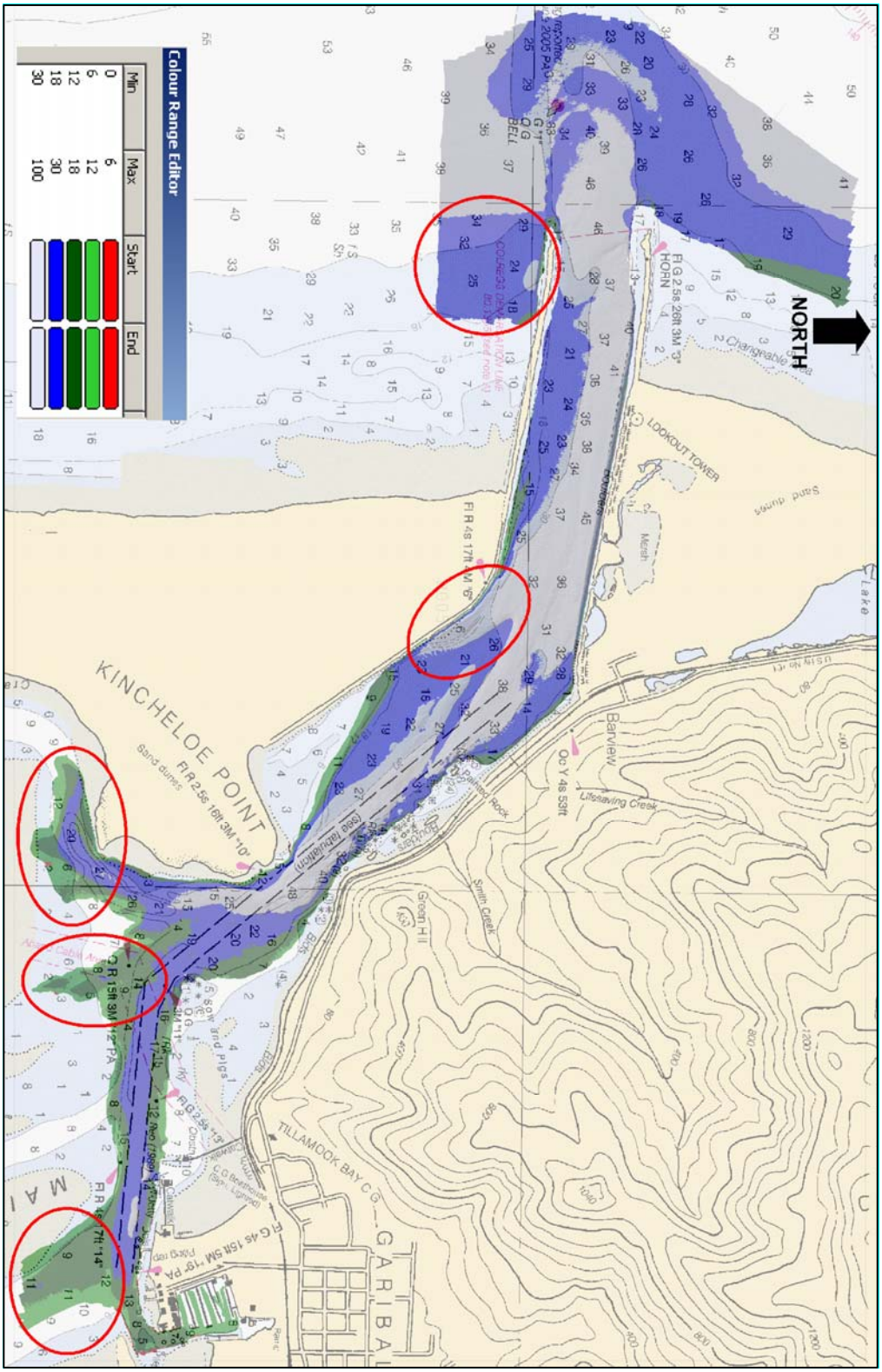


Figure 27: Contour comparison of chart 18558. Areas circled red indicates trends where contours strongly disagree with those as charted. Units are in feet.

Chart 18520 Comparison

Comparing survey F00571 to chart 18520, with a scale of 1:185,238, yielded gross discrepancies (see Figure 28). Due to the large scale of the chart many of the features are simply non-existent and the shoreline is grossly inadequate, primarily in the areas near the small boat harbor and Kincheloe Point.

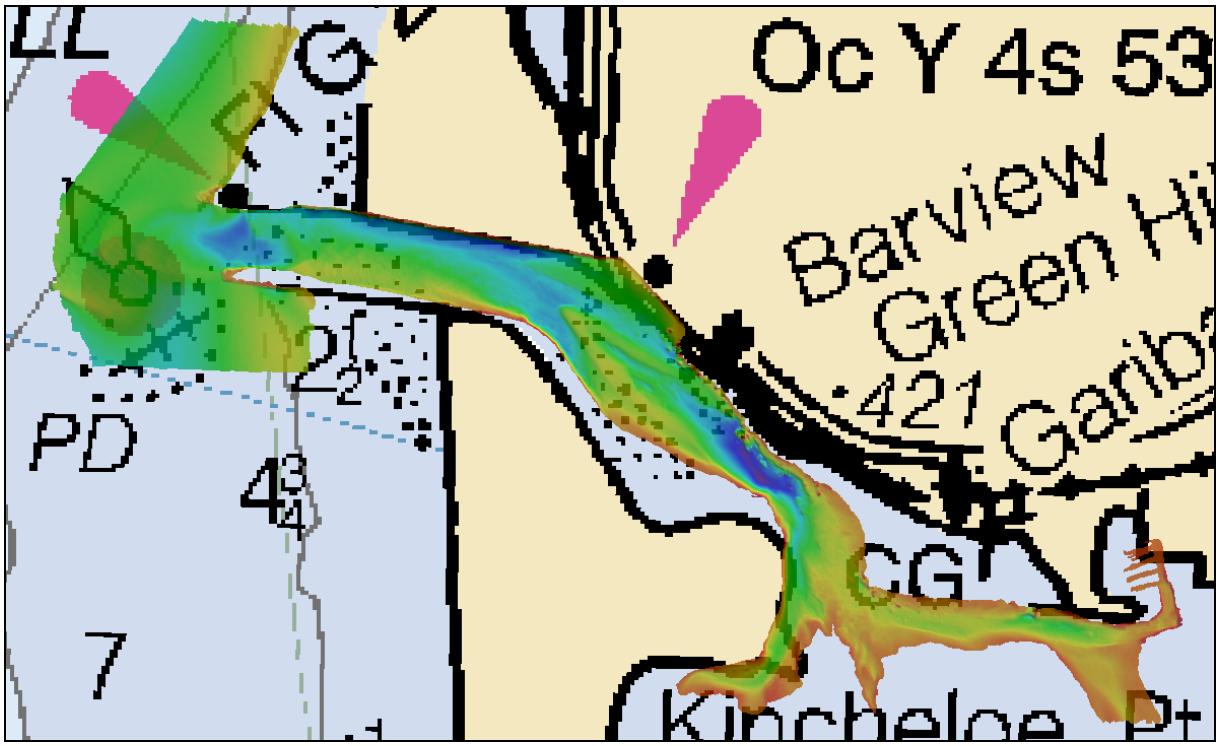


Figure 28: F00571 mainscheme bathymetry overlaid over chart 18520.

The Hydrographer recommends that survey soundings supersede all prior survey and charted depths in the common area.

D.1.b. Automated Wreck and Obstruction Information System (AWOIS) Items

There are no AWOIS items for survey F00571.

D.1.c. Other Investigated Features

No additional charted items were investigated and no other features were located on survey F00571.

D.1.d. Dangers to Navigation

No dangers to navigation (DTONs) were found in survey F00571.

D.2. Additional Results

D.2.a. Shoreline Verification (this section completed by PST Barry Jackson)

Shoreline Source
Limited shoreline verification was accomplished using the composite source file (CSF) and project reference file (PRF) provided with the project instructions. The CSF is an S-57 attributed dataset in .000 file format, compiled from the largest scale electronic navigation charts (ENC). The PRF is an S-57 attributed dataset containing reference layers (i.e. sheets and junctions) and features which are specifically targeted for further investigation such as items from the Automated Wreck and Obstruction Information Service (AWOIS) database.

Shoreline Verification
Limited shoreline verification was conducted near predicted low water in accordance with the Specifications and Deliverables and FPM sections 8.2 and 3.5. Features seaward of the NALL were addressed as required; S-57 attributed and recorded in the appropriate CARIS Notebook (v3.0, SP1, HF1) .hob files indicated below (see Table 6). The files are included in the CARIS Notebook session "F00571_NTBK.wrk" submitted with this project.

Notebook Files	Purpose and Contents
F00571_Original_CSF.hob	Original Composite Source Data provided by Navigation Response Branch for project S-N908-NRT3-10, clipped to F00571 survey area.
0_4PRF01.000	Survey sheet limits provided by Navigation Response Branch for project S-N908-NRT3-10.
F00571_Field_Verified_CSF.hob	Composite source data modified by the field to best represent the shoreline 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.
F00571_Disprovals.hob	Composite source features that were deleted or modified in position or geographic type.

Table 6: List and Description of F00571 Notebook .hob files.

Recommendations
The Hydrographer recommends that the shoreline as depicted in the delivered Notebook .hob files supersede and complement shoreline information compiled on the composite source file and charts as described above.[12]

D.2.b. Prior Survey Comparison

Prior survey comparison was not performed.

D.2.c. Aids to Navigation

There are no Aids to Navigation within the limits of F00571.[13]

D.2.d. Overhead Features

There are no overhead features within the limits of survey F00571.

D.2.e. Submarine Cables and Pipelines

Survey F00571 includes a charted abandoned cable are (see Figure 29). No evidence of cables was seen in mainscheme bathymetry or pseudo side scan imagery. The Hydrographer recommends keeping the abandoned cable area as charted.

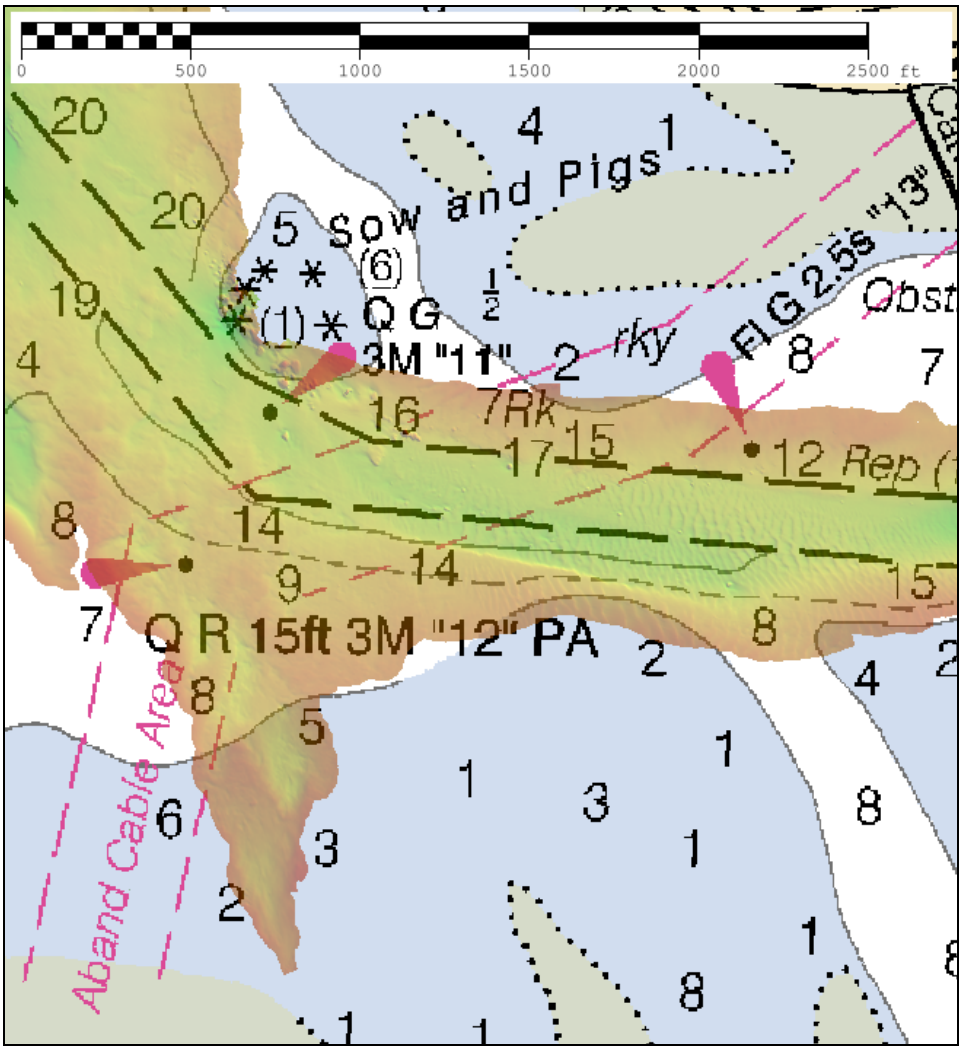


Figure 29: Charted abandoned cable area with survey F00571 mainscheme bathymetry overlay.

D.2.f. Ferry Routes

There are no ferry routes charted within the limits of survey F00571, and none were observed to be operating in the area.

D.2.g. Bottom Samples

Bottom samples were not assigned nor performed for survey F00571.

D.2.h. Other Findings

No other findings were found in survey F00571.

E. APPROVAL

As Chief of Party, field operations for hydrographic survey F00571 were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports. The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual (April 2010 edition), Field Procedures Manual (April 2010 edition), Standing and Project Instructions, and all HSD Technical Directives issued through June 2010. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required, except as noted in section D.2.h of this report. All data and reports are respectfully submitted to N/CS33, Pacific Hydrographic Branch.

Listed below are supplemental reports submitted separately that contain additional information relevant to this survey:

Title	Date Sent	Office
Data Acquisition and Processing Report for S-N908-NRT3-10	*Submitted with this report*	N/CS33
Coast Pilot Report for S-N908-NRT3-10	07/14/2010	N/CS26

Approved and Forwarded: Dan Jacobs
I am approving this document
2010.12.09 13:31:40 -08'00'

Dan Jacobs
Acting Team Lead, NOAA NRT3

In addition, the following individuals were also responsible for overseeing data acquisition and processing of this survey:

Ian Colvert
I am the author of this document
2010.12.09 13:33:23 -08'00'

Ian Colvert
Physical Science Technician, NOAA NRT3

[1] All soundings selected for charting represent the shoalest depths surveyed. Data are adequate to supersede charted soundings within common area.
[2] Despite failure to meet IHO order 1 in some areas data are superior to what is currently charted. Data from F00571 shall be used to supersede charted data per F00571_CS.000 within the common area.
[3] Data are adequate to supersede charted data within the common area.
[4] Based on the relatively small size of the holiday and surrounding depths, the holiday is not represented in F00571_CS.000.
[5] Based on the relatively small size of the holiday and surrounding depths, the holiday is not represented in F00571_CS.000.
[6] The small holiday is preserved and can be seen examining the M_QUAL layer of F00571_CS.000 at the given location.
[7] Concur with clarification. The reported position is incorrect. The position of the 'no top of rock' shown in figure 20 is located at 45-33-15.87N, 123-55-38.32W. Having not surveyed the top of the rock is not of any consequence in this circumstance. While the least depth acquired on the rock is 14 feet in what looks to be perhaps 2 to 3 feet shy of the true top, a rock with full coverage and a least depth 0f 8 feet is located just 25 meters east and has been selected for charting. At chart scale the symbol of the 8 foot rock will encompass the location of the adjacent deeper rock.
[8] Chart jetty extents per latest RSD imagery and/or documentation from ACOE.
[9] Post survey acceptance review a 1 meter resolution base surface was used as the basis of compilation for F00571_CS.000.
[10] Tide note is appended to this report.
[11] Chart soundings per F00571_CS.000
[12] Concur with clarification; feature files submitted to the Pacific Hydrographic Branch were used in the compilation of the survey, though generalizations relative to chart scale were made as necessary. Chart all features per F00571_CS.000.
[13] Do not concur. Survey F00571 contains several aids to navigation. Notably the Aid charted at 45-34-03.00N, 123-58-17.01W was positioned at 45-34-00.82N, 123-58-15.73W. Blue notes within F00571_CS.000 address and provide recommendations concerning this discrepancy. Chart all other ATONs per latest ATONIS publication.

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : September 27, 2010

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: S-N908-NRT3-2010
HYDROGRAPHIC SHEET: F00571

LOCALITY: Approach to Tillamook Bay to Miami Cove, OR
TIME PERIOD: August 16 - September 15, 2010

TIDE STATION USED: 943-7540 Garibaldi, OR
Lat. 45° 33.3'N Long. 123° 55.1' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.320 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project S-N908-NRT3-2010, F00571 during the time period between August 16 and September 15, 2010.

Please use the zoning file "N908NRT32010CORP" submitted with the project instructions for S-N908-NRT3-2010. Zones PAC204, PAC205, PAC600, PAC601, PAC602 & PAC603 are the applicable zones for F00571.

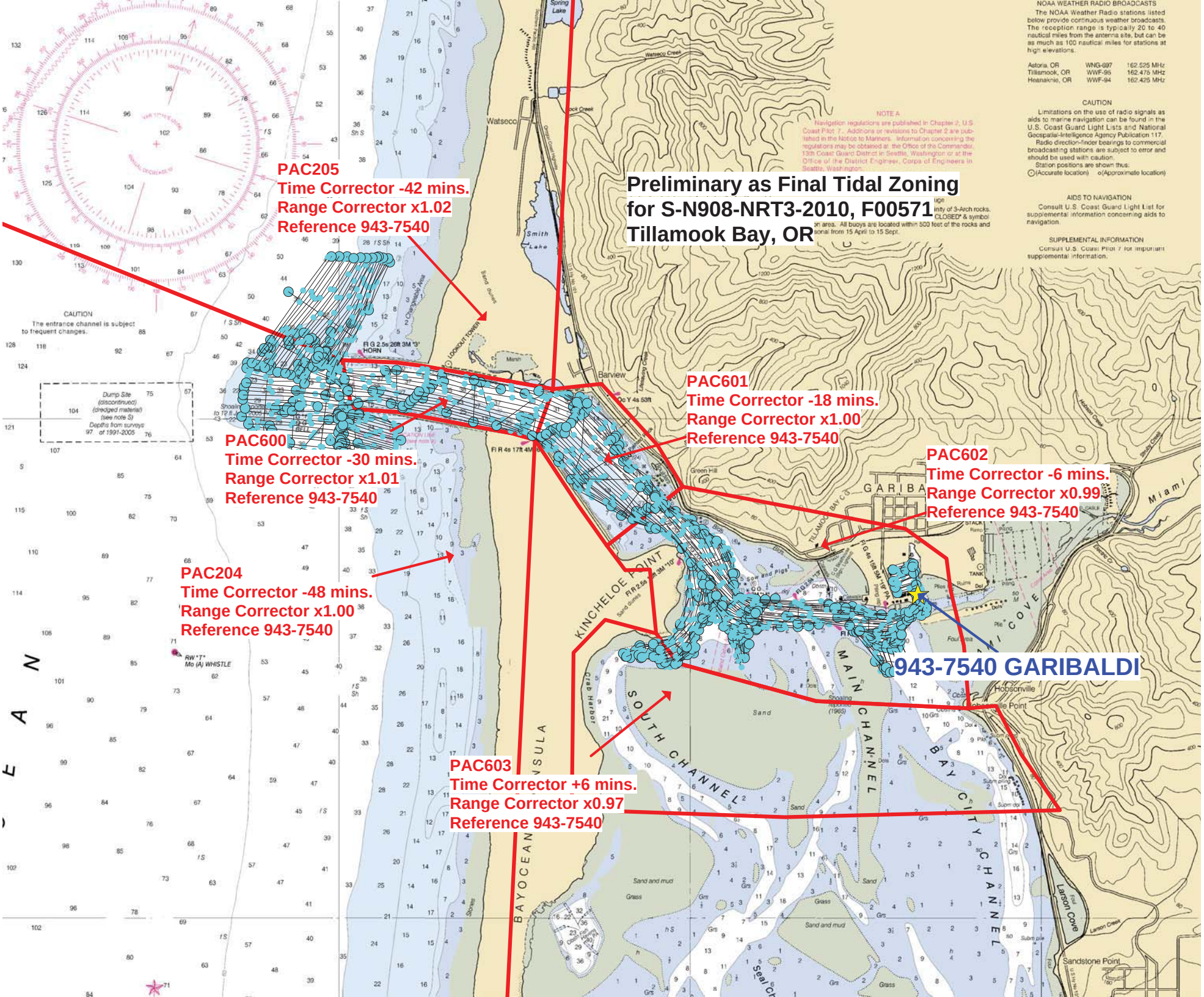
Refer to attachments for zoning information.

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).

Peter J. Stone

Digitally signed by Peter J. Stone
DN: cn=Peter J. Stone, o=Oceanographic Division, ou=NOAA/NOS/CO-OPS, email=peter.stone@noaa.gov, c=US
Date: 2010.10.07 09:22:05 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION


Preliminary as Final Tidal Zoning
for S-N908-NRT3-2010, F00571
Tillamook Bay, OR
PAC205
Time Corrector -42 mins.
Range Corrector x1.02
Reference 943-7540
PAC601
Time Corrector -18 mins.
Range Corrector x1.00
Reference 943-7540
PAC600
Time Corrector -30 mins.
Range Corrector x1.01
Reference 943-7540
PAC602
Time Corrector -6 mins.
Range Corrector x0.99
Reference 943-7540
PAC204
Time Corrector -48 mins.
Range Corrector x1.00
Reference 943-7540
943-7540 GARIBALDI
PAC603
Time Corrector +6 mins.
Range Corrector x0.97
Reference 943-7540
NOAA WEATHER RADIO BROADCASTS
CAUTION
AIDS TO NAVIGATION
SUPPLEMENTAL INFORMATION
Watseco
Barview
Hobsonville
Sandstone Point
KINCHELOE POINT
SOUTH CHANNEL
MAIN CHANNEL
BAY CITY CHANNEL
BAYOCEAN PENINSULA
Larson Cove

PHB Compilation Log

General Survey Info

Survey Number	F00571	Field Unit	NOAA NRT 3	State	OR	UTM Zone	10
Project Number	S-N909-NRT3-10	Project Name (Locality)	Tillamook Bay				
Start Date	08/16/2010	Sublocality	Approach to Tillamook Bay to Miami Cove				
End Date	09/15/2010	Survey Scale	1:10,000	Compilation Scale	1:20,000		

Affected Raster Charts

Chart	KAPP	Scale	Edition	Date	NTM Date
18558	1788	1:20,000	38th	07/01/2006	10/01/2011

Add Chart | Remove Chart

Affected Electronic Charts

ENC	Scale
US3OR01M	200,000

Add ENC | Remove ENC

Spatial Reference

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

Junction Surveys

Survey Number	Survey Date	Location Relative to Current Survey
N/A		(NE, SW, NNW, ect.)

Add Survey | Remove Survey

HCell Compiler	Peter Holmberg	QC Reviewer	TBD	SAR Reviewer	Andrew Clos

Source Surfaces

Resolution	File Name
1m	F00571_1m_Final_Office.csar

Add Surface | Remove Surface

Supporting Documents

Name	Version
Specs and Deliverables	April 2011
HCell Specs	6.1
Standards for HCell Compilation	1.0

Add Doc | Remove Doc

PHB Compilation Log

Processing Info

Software Used		
Software	Version, HF	Used For
CARIS HIPS	7.0 SP2 HF3	SAR Review. Inspection of Combined BASE Surfaces.
Pydro	11.8	SAR Review. Generation of Features Reports.
CARIS BASE Editor	3.2 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 HF4	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS	4.4a	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 SP 2	Generate plots of CARIS Session files used for QC.
HydroService, dKart Inspector		Validation check of the base cell file.
Fugawi View ENC	1.0.0.3	Independent inspection of final HCells using COTS viewer.

Product Info

Deliverables	
Chart Scale HCell	F00571_CS.000
Survey Scale HCell	F00571_CS.000
HCell Report for MCD	F00571_HR.pdf
Feature Listing	F00571_FL.txt
Descriptive Report	F00571_DR.pdf
Survey Outline	F00571_Outline.gml and .xsd

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)	Feet
Height Units (HUNI)	Feet
Positional Units (PUNI)	Meters

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 (m)
3	-4.7	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	Chart Contours - NOAA Rounded
0ft	0m	0.2286m	0.75ft
6ft	1.8288m	2.0574m	6.75ft
12ft	3.6576m	3.8862m	12.75ft
18ft	5.4864m	5.715m	18.75ft
30ft	9.144m	9.3726m	30.75ft

PHB Compilation Log

Add Contour | Remove Contour

Additional Info

Contact Information

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

HCell Compiler	Peter Holmberg
Phone Number	206-526-6843
Email	peter.holmberg@noaa.gov

Compilation Comments

APPROVAL SHEET
F00571

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 Pete Holmberg
DN: cn=Pete Holmberg, o=NOAA, ou=PHB, email=peter.holmberg@noaa.gov, c=US
Date: 2011.11.04 09:42:52 -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 NELSON.GARY.C.1365885318
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=NELSON.GARY.C.1365885318
Date: 2011.11.04 13:53:50 -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 NELSON.GARY.C.1365885318
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=NELSON.GARY.C.1365885318
Date: 2011.11.04 13:54:20 -07'00'