

H11391

NOAA FORM 76-35A

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

## DESCRIPTIVE REPORT

Type of Survey ..... HYDROGRAPHIC

Field No. .... N/A

Registry No. .... H11391

### LOCALITY

State ..... Alaska

General Locality ..... Prince William Sound

Sublocality ..... Port Bainbridge

2004

### CHIEF OF PARTY

Physical Scientist David A. Sinson, NOAA

### LIBRARY & ARCHIVES

DATE .....

NOAA FORM 77-28  
(11-72)

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

REGISTRY No

**HYDROGRAPHIC TITLE SHEET**

**H11391**

**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 Alaska

General Locality Prince William Sound

Sub-Locality Port Bainbridge

Scale 1:10,000 Dates of Survey 9/20/04 - 10/26/04

Instructions dated 9/22/2004 Project No. OPR-P139-TC-04

Vessel RV DAVIDSON, Launch R2, Launch D2, skiff

Chiefs of party Physical Scientist, David A. Sinson

Surveyed by SAIC Personnel

Soundings by echo sounder, hand lead, pole Reson 8101, Reson 8125, Reson 8111

Graphic record scaled by SAIC Personnel

Graphic record checked by NOAA Personnel Automated Plot N/A

Verification by Kurt Brown, Peter Holmberg

Soundings in Fathoms and Feet at MLLW

**REMARKS:** All times are UTC. UTM Projection (zone #8).

Revisions and annotations appearing as endnotes were generated during office processing. As a result, page numbering may be interrupted or non-sequential.

All separates are filed with the hydrographic data.

# Descriptive Report to Accompany Hydrographic Survey H11391

Project OPR-P139-TC-04  
Port Bainbridge  
Prince William Sound, Alaska  
Scale 1:10,000  
September-October 2004  
**NOAA Time Charter R/V DAVIDSON**  
Lead Hydrographer: PS David A. Sinson, NOAA  
Survey Manager: PS Toshihiko Uozumi

## A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-P139-TC-04, dated September 22, 2004, and the Draft Standing Project Instructions dated March 23, 2004. The survey area includes the central portion of Port Bainbridge, Prince William Sound, Alaska.

Northern Limit	Southern Limit	Western Limit	Eastern Limit
60-05-34.44 N	60-01-28.39 N	148-24-14.16 W	148-10-57.40 W

Data acquisition was conducted from September 20 to October 26, 2004 (Julian day numbers 264 to 300).

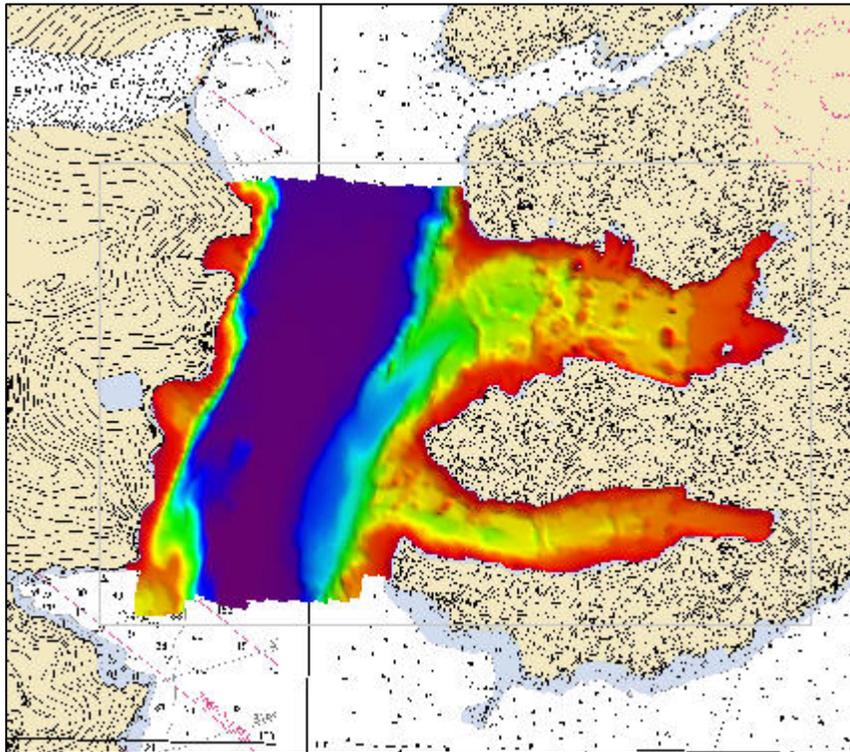


Figure 1 OPR-P139-TC-04 Survey H11391 limits and coverage.

## **B. DATA ACQUISITION AND PROCESSING**

Refer to OPR-P139-TC-04 Data Acquisition and Processing Report (DAPR)<sup>1</sup> for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods, submitted under a separate cover. Additional information to supplement sounding and survey data, and any deviations from the DAPR are included in this descriptive report.

### **B1. Equipment and Vessels**

Data were acquired by the R/V DAVIDSON, survey launches R2 and D2 and a skiff (DP). The ship was used to acquire mid-water multibeam soundings (MWMB) in depths generally greater than 40 meters, sound velocity profiles and bottom samples. Launch D2 acquired shallow-water multibeam sounding in depths generally less than 120 meters, sound velocity profiles and bottom samples. Launch R2 acquired high-resolution shallow water multibeam soundings in depths generally less than 60 meters, sound velocity profiles and bottom samples. The skiff acquired vertical-beam soundings for shoreline buffers and high-precision geographic positions for shoreline feature verification. Vessel configurations, equipment operation and data acquisition and processing were consistent with specifications described in the DAPR.

### **B2. Quality Control**

#### **B2.1 System Certification and Calibration**

Refer to OPR-P139-TC-04 Data Acquisition and Processing Report (DAPR) for a description of SAIC's quality assurance (QA) and quality control (QC) plan. A System Acceptance Test Report<sup>2</sup>, included as an appendix to the DAPR, describes system integration and initial calibration results for equipment and sensors utilized for this survey.

A system calibration survey was performed in Seward Harbor on September 27, 2004 (JD 271) to verify sensor performance as well as tide, sound velocity, sensor alignment and offset corrections.

#### **B2.2 Crosslines**

Multibeam echosounder crosslines totaled 11.23 linear nautical miles, comprising 3.93 % of SWMB hydrography. Crossline soundings were evaluated with respect to main scheme soundings in Caris HIPS subset area editor and gridded base surface models. In general, there was good agreement between soundings and no significant systematic or water level offsets were observed during sounding subset and base surface analysis.<sup>3</sup>

### B2.3 Junctions

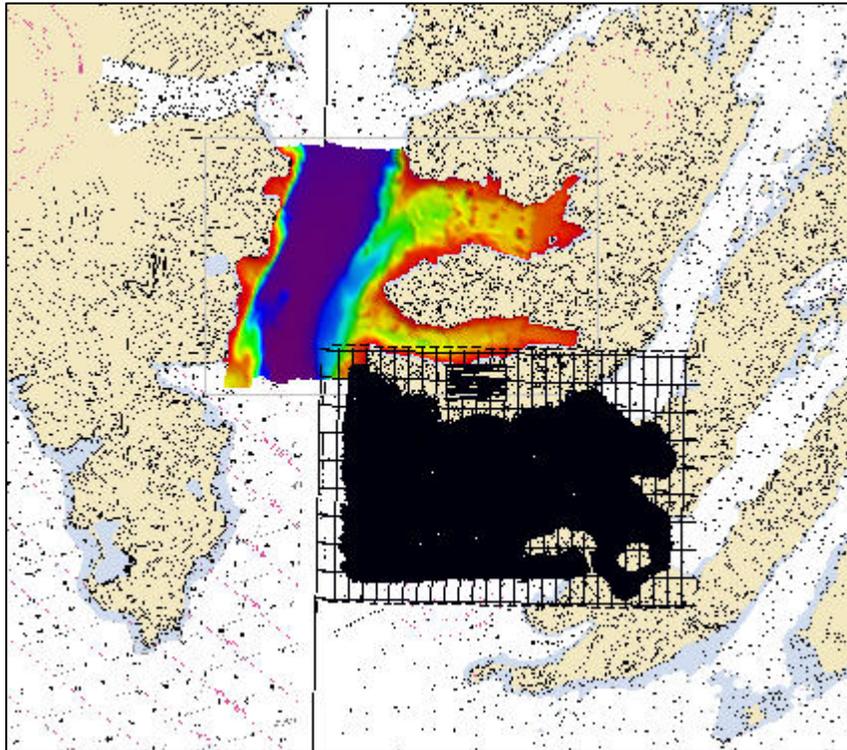
The following contemporary survey junction with H11391:

<b>Registry #</b>	<b>Scale</b>	<b>Date</b>	<b>Junction side</b>
H11172	1:10,000	2002	Southeast
H11390	1:10,000	Concurrent	North
H11392	1:10,000	Concurrent	South

Junction survey soundings were provided by the Pacific Hydrographic Branch in Microstation .dgn format. Junction analysis was performed in Caris HIPS Fieldsheet editor. Microstation .dgn files were converted to Caris maps and imported as background files for subsequent comparison with BASE surface soundings. Survey H11391 junctions well with this survey, with differences generally less than one fathom.<sup>4</sup>

H11391 junctions with survey H11390, conducted concurrently at the northern limits, and H11392, conducted concurrently at the southern limits. Complete coverage was acquired with concurrent surveys.

Final comparisons will be made after the application of verified tides.<sup>5</sup>



*Figure 2. H11391 Junction Survey.*

## **B2.4 Data Quality Factors**

Caris QC review BASE surfaces were created at 5-meter resolution for ship soundings and 2 meter resolution for the launch soundings. BASE surfaces were used to focus full-density sounding evaluations and editing in areas of high standard deviation and total propagated error (TPE). Sounding subsets were evaluated in areas of high topographic relief to ensure that the depth BASE surface accurately represented shoal soundings and features. Significant soundings were designated from full raw data to ensure representation in the final BASE surface models.<sup>6</sup>

### **B2.4.1 Sound Velocity Profiles**

ISS2000 applies sound velocity correction in real-time during echosounder acquisition. Sound velocity profiles were collected often to characterize the variable and complex water column conditions in the survey area. Surface sound velocity was monitored continuously on R2 with the Reson 8125 HRSWMB and on the DAVIDSON with the Reson 8111ER to ensure correct beam formation. Surface sound velocity was used by the 8125 system for correct beam formation on the flat-faced transducer for directional accuracy, and on the 8111ER for correct beam formation for pitch stabilization. Changes in surface sound velocity were also evaluated as an indicator of changes in the water column sound velocity. In general, there was good agreement of depths between overlapping outer beams of survey lines. There is no indication of significant sound velocity errors in the final base surface.<sup>7</sup>

### **B2.4.2 Water level correction**

ISS2000 applies predicted water-level correctors with CO-OPS supplied zoning in real-time during echosounder acquisition. Observed tides from the primary tide gauges are applied to soundings prior to NOAA quality review in CARIS HIPS/SIPS. Soundings from crosslines and overlapping lines were examined in 3-D sounding subsets and base surfaces to identify temporal variation of water level modeling. In general, there was no indication of significant water level correction errors visible in line-to-line comparisons or the final base surfaces.<sup>8</sup>

### **B2.4.3 Residual Sounding Fliers and Noise**

CARIS BASE surfaces were evaluated by NOAA hydrographers to focus data editing on areas of high standard deviation of depth. Full-density sounding subsets were reviewed where high standard deviation was indicated. Residual gross flyers and noise were identified in areas of unusually high standard deviation and flagged as rejected. The total range of standard deviation was reduced to a value that corresponded to general bathymetric relief for the survey area. Soundings from multiple lines were evaluated when possible to distinguish noise from bathymetric features. In general, NOAA quality review required minimal editing and any significant quality deficiencies were corrected before final submission.

#### **B2.4.4 Systematic Errors**

CARIS BASE surfaces were evaluated by NOAA hydrographers to identify systematic errors in data correctors including motion, attitude, tide and sound velocity. Sunlight illuminated surface digital terrain models (DTM) were reviewed to find errors in heave, pitch and roll correction. Standard deviation surface models were reviewed to find areas where disagreement occurred between multiple lines – an indication of inaccurate tide or sound velocity correction. There were no significant systematic errors observed during review of this survey.

#### **B2.4.5 Sounding Coverage**

Daily coverage was evaluated with DTM models created from preliminary, gridded sounding data. SAIC submitted 5-meter resolution, shoal-biased binned data for the ship and 2-meter resolution, shoal-biased data for the launches. Easting, Northing, depth data were imported into MapInfo and re-gridded in Vertical Mapper. DTMs were subsequently evaluated for significant features, and a preliminary assessment of coverage and data quality. Final sounding coverage was evaluated in CARIS using BASE surface DTM, TPE and sounding density models.

#### **B2.4.6 Swath Angle Filtering**

All soundings were filtered (flagged as offline) by SAIC processing software (ISS-2000) to within 55 degrees of nadir for multibeam echosounder bathymetry to increase confidence in sounding accuracy and minimize sound velocity errors. In some cases, outer-beam soundings were re-accepted for holidays and general bathymetry in deeper water to fill in small gaps in the final BASE surface. All data used to create the final base surfaces were filtered to meet IHO Order 1 quality tolerances.<sup>9</sup>

#### **B2.4.7 Total Propagated Error (TPE)**

Raw soundings were not filtered for TPE. BASE surfaces were created from soundings filtered for TPE values that met IHO Order 1 tolerance. TPE filtering increased the confidence of sounding accuracy based upon system parameter settings in the Caris Vessel Configuration File (.hvf). Caris configuration files were created from manufacturer system performance specifications and offsets provided by SAIC from the System Acceptance Test (SAT). Caris configuration files for the launches and ship were submitted to HSTP and PHB for review and validation. TPE was viewed in Caris surface models to evaluate sounding accuracy and confidence for significant features and final coverage. Total propagated error for the survey ranged from 0.25 – 2.12 meters. All soundings are qualified by an associated TPE confidence value.

### B3. Water Level Datum Reduction

HDSCS sounding data were reduced to mean lower-low water (MLLW) using verified observed tides from the primary station at Cordova (945-4050), adjusted for zoned range and amplitude correctors provided by CO-Ops as specified in the project instructions and illustrated in Figure 3.

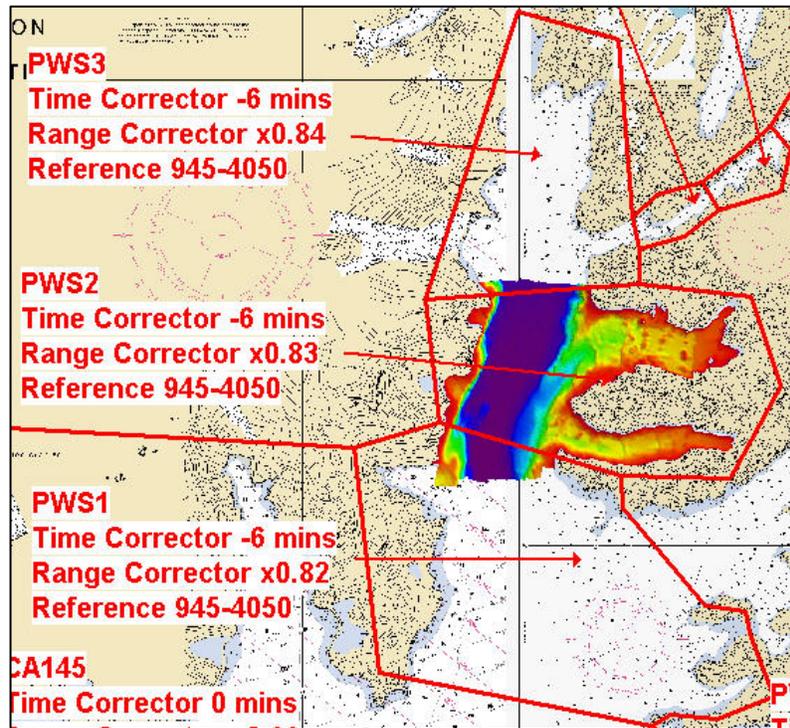


Figure 3. Tide zoning for H11391.

These data and correctors were also used to reduce soundings and heights of detached positions (DPs) to MLLW when acquired relative to a local water-level datum.

All other datum reduction procedures conform to those outlined in the DAPR.

### C. VERTICAL AND HORIZONTAL CONTROL

A complete description of vertical and horizontal control for survey H11391 can be found in the OPR-P139-TC-04 Horizontal and Vertical Control Report.<sup>10</sup> A summary of horizontal and vertical control for this survey is included in the following sections.

### **C1.1 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. Differential corrections from U.S. Coast Guard beacons at Potato Point (323 kHz) and Cape Hinchinbrook (288 kHz) were utilized during this survey. DGPS Confidence checks were performed daily by comparing positions acquired by primary (POS/MV) and secondary (Trimble MS 750) positioning systems on the ship and launches. Confidence checks were performed on the skiff by comparing Ceeducer DGPS positions with Trimble DGPS positions.

### **C1.2 Vertical 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 Cordova, AK (945-4050) will serve as control for datum determination and as the primary source for water level reducers for survey H11391.

The Pacific Hydrographic Branch will apply final approved (verified) tides to the survey data during final processing.<sup>11</sup> A request for delivery of final approved (verified) tides for this survey was forwarded to N/OPS1 on December 01, 2004 in accordance with the FPM and project letter instructions.<sup>12</sup>

## **D. RESULTS AND RECOMMENDATIONS**

### **D.1 Automated Wreck and Obstruction Information System (AWOIS) Investigations**

No AWOIS items were assigned to this survey.<sup>13</sup>

### **D.2 Chart Comparison**

Survey H11391 was compared with chart 16702 (11<sup>th</sup> Ed.; July 2003<sup>14</sup>, 1:40,000) and chart 16683 (9<sup>th</sup> Ed.; January 2000<sup>15</sup>, 1:81,436). Chart comparisons were performed in MapInfo using xyz (E,N,d) sounding data exported from the final QC base surface. Xyz data from the base surface were exported at 5-meter resolution from the finalized base surface. Base surface soundings were evaluated within an appropriate search radius of the charted depths and features. Chart comparison differences and comments were recorded as an attribute of a digital MapInfo radius table and compiled to a final chart comparison workspace and plot.<sup>16</sup>

#### **Chart 16702**

Depths from chart 16702 generally agree with the current survey, with differences 0.5 - 1 fathom or less.<sup>17</sup> In some instances, the present survey found shoaler soundings between charted soundings even though agreement at the position of the charted depths was good. This can be attributed to increased bottom coverage using SWMB methods. Significant shoaler soundings found in this survey are listed below.

The shoal soundings considered significant in comparison to the charted depth, but not considered dangerous to navigation is listed below.<sup>18</sup>

### Hogg Bay

The depth contours throughout Hogg Bay and Swanson Bay require revision based on present survey soundings.<sup>19</sup>

In the vicinity of a charted 27-fathom sounding at 60°04'34.81" N 148°13'29.18" W, the present survey revealed depths of 10-fathoms (18.79 m). This area was surveyed with 100% SWMB.

In the vicinity of a charted 28-fathom sounding at 60°04'25.63" N 148°13'30.63" W, the present survey revealed depths of 15-fathoms (27.78 m). This area was surveyed with 100% SWMB.

In the vicinity of a charted 14-fathom sounding at 60°04'09.46" N 148°13'31.0" W, the present survey revealed depths of 8.9-fathoms (16.28 m). This area was surveyed with 100% SWMB.

In the vicinity of a charted 25-fathom sounding at 60°04'52.81" N 148°15'01.22" W, the present survey revealed depths of 14.6 fathoms (26.83 m). This area was surveyed with 100% SWMB.

In the vicinity of a charted 53-fathom sounding at 60°04'01.08" N 148°16'45.22" W, the present survey revealed depths of 40-fathoms (40.69 m). This area was surveyed with 100% SWMB.

In the vicinity of a charted 53-fathom sounding at 60°04'28.85" N 148°15'35.92" W, the present survey revealed depths of 25-fathoms (45.30 m). This area was surveyed with 100% SWMB.

### Swanson Bay

Depth contours throughout Swanson Bay require revision based on present survey soundings.<sup>20</sup>

In the vicinity of a charted 31-fathom sounding at 60°02'20.79" N 148°13'48.85" W, the present survey revealed depths of 23-fathoms (43.01 m). This area was surveyed with 100% SWMB.

In the vicinity of a charted 29-fathom sounding at 60°02'25.92" N 148°17'59.86" W, the present survey revealed depths of 20-fathoms (36.95 m). This area was surveyed with 100% SWMB.

In the vicinity of a charted 50-fathom sounding at 60°02'36.96" N 148°19'11.85" W, the present survey revealed depths of 24-fathoms (43.96 m). This area was surveyed with 100% SWMB.

In the vicinity of a charted 62-fathom sounding at 60°02'25.49" N 148°19'00.71" W, the present survey revealed depths of 37-fathoms (67.31 m). This area was surveyed with 100% SWMB.

Port Bainbridge

In the vicinity of a charted 86-fathom sounding at 60°03'56.32" N 148°18'54.35" W, the present survey revealed depths of 71-fathoms (130.98 m). This area was surveyed with 100% SWMB.<sup>21</sup>

**Chart 16683**

Depths from charts 16683 generally agree with the current survey, with differences around 0.5 - 1 fathom or less.<sup>22</sup> A significantly shoaler sounding was surveyed in the vicinity of the charted 21-fathom in Lat. 60°04'54.81" N, Lon. 148°22'09.39" W. The present survey revealed depths of 8-fathoms (15.57 m).<sup>23</sup>

The depth contours on the western shore of Port Bainbridge require revision based on the present survey soundings.<sup>24</sup>

Final sounding comparisons, selection and designations will be made after the application of verified tides.

**D.3 Shoreline**

**D3.1 Shoreline Source Data**

Shoreline source data for this survey was compiled from RSD N/NGS3 photogrametric survey 92012-2. Photogrametry for this project was collected in 1992. A project completion report is included as digital Adobe .pdf document (CM92012.pdf) with the project data.

Digital vector shoreline was provided on the project CD as individual digital manuscripts (DM) in MapInfo format (.tab) files. Shoreline was delivered in two files: one with linear MHW and MLLW shoreline and one with point/line obstruction and rock features. The geographic datum for all source shoreline is NAD83.

**Survey 92012-2 (NAD 83), 1992**

<u>CFF</u>	<u>Scale</u>
DM-10298	1:20,000
DM-10299	1:20,000
DM-10301	1:20,000
DM-10302	1:20,000
DM-10303	1:20,000

N/NGS3 supplied shoreline digital manuscript objects were separated into S-57 feature classes through an evaluation of DM attributes. Refer to the DAPR for a full description of shoreline source data processing and acquisition procedures. Additional features from digital ENC S-57 exchange files (.000) were converted and imported into MapInfo using the ogr2ogr.exe utility and were used for reference purposes and chart evaluation.

The following ENC exchange set and electronic raster BSB charts were used for reference purposes for this survey:

<u>Chart Number</u>	<u>ENC ID</u>	<u>Edition</u>	<u>Scale</u>
16702	US5AK28M	11 <sup>th</sup> Ed.; July 2003	1:40,000
16683	US4AK2GM	9 <sup>th</sup> Ed.; January 2000	1:81,436

### **D3.2 Method of Shoreline Verification**

Few low-water shoreline windows were available during daylight hours for this survey; therefore, many shoreline features were not observed during shoreline verification. Submerged shoreline features were surveyed at higher levels of tide with launch multibeam echosounders, skiff single beam echosounder and visual examinations.

Shoreline verification was conducted near predicted low water, when possible, in accordance with the Project Letter Instructions, Standing Instructions and the FPM. The general limit of safe navigation for the survey launches and skiff was five to twenty meters offshore of the apparent low-water line. Water depths along this limit of safe navigation were approximately eight meters at Mean Lower-Low Water (MLLW). Significant features unsurveyable by launches were surveyed when possible with the skiff and annotated on hardcopy and digital shoreline fieldsheets.

Detached positions (DPs) acquired during shoreline verification surveys were recorded and attributed with a Trimble Pathfinder ProXRS differential-beacon global positioning system (DGPS) receiver. Generally, DPs were acquired to describe new features or changes to features in reference to the DM or chart. Existing features that were accurately positioned in source data were verified in the field and notes were annotated on hardcopy and digital fieldsheets. Features that were not observed by visual search were generally disproved or evaluated in echosounder or multibeam sounding coverage.

A detailed shoreline fieldsheet is provided in Caris Notebook HOB file with the survey data<sup>25</sup>, showing all detached positions with notes relating to each feature. Also, additions and changes to source and charted shoreline data were imported and processed in Caris Notebook. Refer to the DAPR for a complete description of shoreline acquisition and processing procedures.

### **D3.3 Source Shoreline Changes and New Features**

Shoreline features found during this survey generally matched those of the source and charted shoreline. Not all DM shoreline was verified in the field; however, in general the DM shoreline was very accurate and required little revision. The additions and changes observed are represented on the shoreline fieldsheet (Notebook HOB file) and also in the Survey Feature Report (Appendix I).<sup>26</sup>

### D3.4 Low-Water Shoreline

The low-water shoreline was not defined for this project. In most areas, the shoreline was steep and dropped off immediately to deep water.

### D3.5 Charted Features

The charted features are generally in good agreement with the present survey. Some discrepancies were found and are listed below.

1. A charted rock in the vicinity of Lat. 60°05'02.66" N, Lon. 148°15'16.64" W (Hogg Bay) was not found during shoreline verification. This item was not surveyed with 100 % SWMB, further investigation is recommended for disproval.<sup>27</sup>
2. A charted rock awash in the vicinity of Lat. 60°03'59.94" N, Lon. 148°15'22.50" W (Hogg Bay) was not found during shoreline verification. The SWMB survey revealed a shoal located 30 meters southwest of the charted rock awash. It is recommended that the charted rock awash be deleted and a new rock awash be charted in Lat. 60° 03'59.65" N, Lon. 148°15'23.69" W.<sup>28</sup>
3. A charted rock in the vicinity of Lat. 60°02'37.94" N, Lon. 148°17'43.41" W (Swanson Bay) was not found during shoreline verification. Investigation with 100 % SWMB did not reveal any prominent features or dangers to navigation. It is recommended that the charted rock be deleted and superseded by present survey soundings.<sup>29</sup>
4. Three charted foul areas in the vicinity of Lat. 60°02'25.40" N, Lon. 148°16'35.74" W (Swanson Bay) were surveyed with 100 % SWMB. No prominent features or dangers to navigation were found in the area. It is recommended that the charted foul be deleted and superseded by present survey soundings.<sup>30</sup>

### D3.6 Shoreline Recommendations

The Hydrographer recommends that the shoreline features included in the final Shoreline HOB file supersede and complement shoreline information compiled in the DM, CFF, T-Sheets and charts as noted.<sup>31</sup> These revisions are included in the final digital database as S-57 format feature objects. Field notes, including verification of source features, are submitted digitally as Notebook HOB and MapInfo files.

## D.4 Dangers to Navigation and Shoals

### D4.1 DTON

An uncharted shoal was found in the vicinity of Lat. 60-03-14.52 N, Lon. 148-18-11.32 W and was reported as a DtoN to MCD on March 28, 2005. Refer to DTON Report<sup>32</sup> (Appendix I) for detailed description of the item.<sup>33</sup>

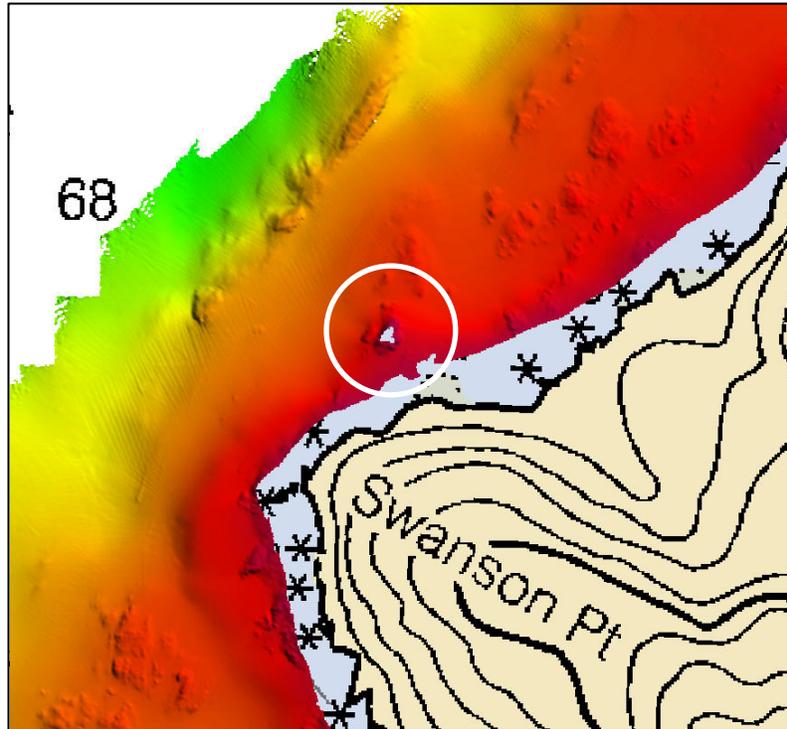


Figure 4. An uncharted shoal near Swanson Point.

### D4.2 Shoals

See above.

### D.5 Aids to Navigation

No aids to navigation (ATONs) are located within the limits of the present survey.<sup>34</sup>

### D.6 Coast Pilot Information

Refer to the Coast Pilot Review document in the “*Project\_Reports*” folder.<sup>35</sup>

**D.7 Miscellaneous**

**Bottom Samples**

Bottom samples were collected in accordance with the HSSDM and are depicted as SBDARE objects in Pydro PSS file and Notebook HOB file.<sup>36</sup>

**D.8 Statistics**

Vessels	Survey day	Linear nmi	SVP	Bottom Samples
DA, D2, R2	264	44.43	13	-
DA, D2, R2	265	86.45	20	-
D2, R2, Dolphin	266	49.65	13	-
D2, R2, Dolphin	267	41.97	11	-
D2, R2	268	1.76	2	-
DA	277	-	-	27
R2	278	14.00	6	-
R2	279	1.20	0	-
D2	282	17.95	3	-
DA	288	4.32	1	-
D2, R2	289	13.01	3	-
D2, R2	294	22.73	10	-
D2, R2	295	12.88	6	-
D2	296	2.51	0	-

Survey totals:

Survey days	Linear nmi	Square nmi	SVP	Bottom Samples
13	312.86	21.97	88	27

**BASE Surface Deliverables**

To meet the BASE surface collection requirements in section 4.2.6.3 of the Field Procedures Manual (FPM), four overlapping field sheets were created to accommodate the higher resolution BASE surfaces (figure 5). Each of the field sheets contains 0.5, 1, 2, and 5 meter BASE surfaces. It is recommended that all soundings be generated from the highest resolution BASE surface available in that particular area. All inshore regions and shoal features should be represented with 0.5 meter BASE surface to ensure the best possible sounding depiction on the chart. The use of 5 meter BASE surface is justified in deep waters and only when dataset cannot support higher resolution BASE surfaces. This survey does not contain designated soundings.

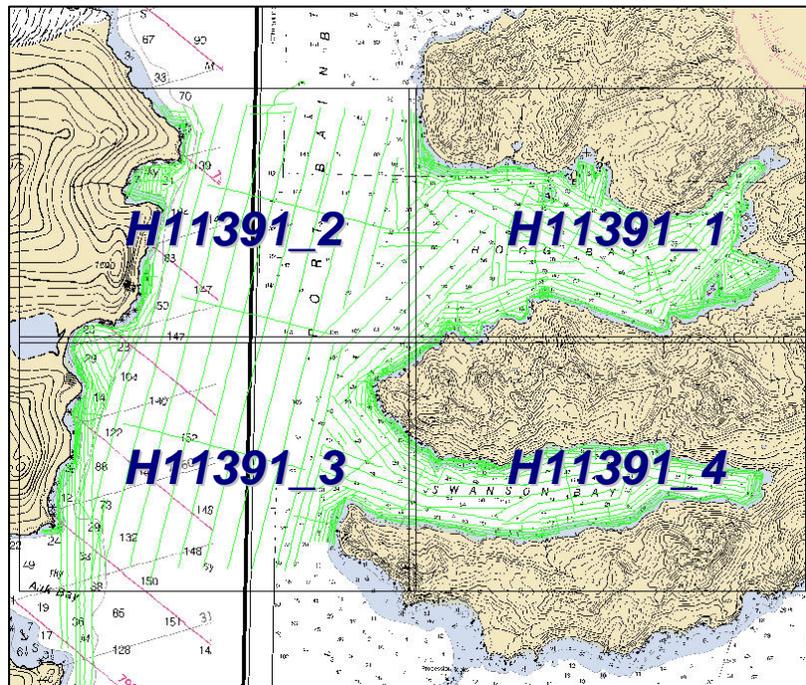


Figure 5. H11391 Field Sheet layout.

## D.9 Adequacy of Survey

This survey is considered complete and adequate to supersede prior surveys for requirements specified in the Project Letter Instructions.<sup>37</sup>

## Summary and Recommendations for Additional Work

The shoal observed at the entrance to Hogg Bay north of Swanson Point was not completely developed during this survey. Although the extents and position of the shoal were closely defined with multibeam data, a least depth was not acquired on the submerged feature. Survey data is adequate to update the chart at the current scale, but the feature warrants a complete investigation if future operations are conducted in the area.<sup>38</sup>

**E. APPROVAL**

As Lead Hydrographer, I have ensured that standard field surveying and processing procedures were followed in producing this examination in accordance with the Hydrographic Manual, Fourth Edition, Hydrographic Survey Guidelines, Field Procedures Manual and the NOS Hydrographic Surveys Specifications and Deliverables, as updated for 2004.

The digital data and supporting records have been reviewed by me, are considered complete and adequate for charting purposes, and are approved. All records are forwarded for final review and processing to N/CS34, Pacific Hydrographic Branch.

Survey H11391 is complete and adequate to supersede charted soundings in their common areas. No additional work is required for this survey.

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

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Data Acquisition and Processing Report for OPR-P139-TC-04	Mar. 23, 2005	N/CS34
Horizontal and Vertical Control Report for OPR-P139-TC-04	Mar. 23, 2005	N/CS34
Tides and Water Levels Package for OPR-P139-TC-04	Dec. 1, 2004	N/OPS1
Coast Pilot Report for OPR-P139-TC-04	Feb. 12, 2005	N/CS26

Approved and Forwarded:   
 David A. Sinson  
 Physical Scientist, NOAA  
 Lead Hydrographer

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

Assistant Survey Manager:   
 Toshihiko Uozumi  
 Physical Scientist, NOAA

- 
- <sup>1</sup> Filed with project records.
- <sup>2</sup> Filed with project records.
- <sup>3</sup> Concur with clarification. 3.93% is less than the required 5%, however data examination during the Survey Acceptance Review (SAR) of H11391 showed good agreement between soundings.
- <sup>4</sup> Concur.
- <sup>5</sup> Junction analysis' with H11390 and H11392 have been performed at PHB. Survey depths agree with in a half a meter or less.
- <sup>6</sup> H11391 did not contain any designated soundings.
- <sup>7</sup> Concur.
- <sup>8</sup> Concur.
- <sup>9</sup> Concur.
- <sup>10</sup> Filed with project records.
- <sup>11</sup> Final tides have been applied to the data.
- <sup>12</sup> Tide note is appended to this report.
- <sup>13</sup> Concur.
- <sup>14</sup> Chart comparison performed at PHB with 16702,1:40,000 (13th Ed.; Nov 05, NM 03/08/2008).
- <sup>15</sup> Chart comparison performed at PHB with 16683, 1:81,436 (11th Ed.; Jun 07, NM 03/08/08).
- <sup>16</sup> It was noted during the Survey Acceptance Review (SAR) that this MapInfo plot could not be located. This is of no consequence as further chart comparisons were performed at PHB.
- <sup>17</sup> Do not concur, differences between charted soundings and surveyed soundings are up to 28 fathoms.
- <sup>18</sup> All soundings charted on 16702 covered by the extents of H11931 are recommended for removal. New soundings derived from the 100% SWMB coverage of H11391 have been selected for charting.
- <sup>19</sup> Concur with hydrographers comments and comments below.
- <sup>20</sup> Concur with hydrographers comments and comments below.
- <sup>21</sup> Concur with hydrographers comment.
- <sup>22</sup> Concur.
- <sup>23</sup> All soundings charted on 16683 covered by the extents of H11931 are recommended for removal. New soundings derived from the 100% SWMB coverage of H11391 have been selected for charting.
- <sup>24</sup> Concur.
- <sup>25</sup> Filed with hydrographic records.
- <sup>26</sup> Feature report appended to this report. Note: feature report does not contain bottom samples.
- <sup>27</sup> Charted rock is recommended to be retained via blue note.
- <sup>28</sup> Concur. Charted rock at Lat. 60°03'59.94" N, Lon. 148°15'22.50" W has been recommended for removal via blue note. A rock at Lat. 60° 03'59.65" N, Lon. 148°15'23.69" W has been added to the survey.
- <sup>29</sup> Concur, retain charted rock.
- <sup>30</sup> Concur, remove foul areas.
- <sup>31</sup> Concur, .HOB files were used during compilation of H11391.
- <sup>32</sup> DTON report appended to this report.
- <sup>33</sup> MCD charted a dangerous rock with an unknown least depth at Lat. 60-03-14.52 N, Lon. 148-18-11.32 W. Cartographer concurs with this action. A blue note is included with the HCell to retain the rock as charted.
- <sup>34</sup> Concur.
- <sup>35</sup> Filed with project records.
- <sup>36</sup> All surveyed bottom samples are recommended for charting, and some currently charted bottom samples have been recommended to be retained.
- <sup>37</sup> Concur.
- <sup>38</sup> Concur.

# H11391 DTON Report

**Registry Number:** H11391  
**State:** Alaska  
**Locality:** Prince William Sound  
**Sub-locality:** Approaches to Port Bainbridge  
**Project Number:** OPR-P139-TC-04  
**Survey Date:** 10/20/2004

## Charts Affected

Number	Version	Date	Scale
16702	12th Ed.	11/01/2004	1:40000
16683	10th Ed.	02/01/2004	1:81436
16680	10th Ed.	07/10/1999	1:200000
16700	29th Ed.	07/01/2004	1:200000
16013	29th Ed.	11/01/2003	1:969761
531	22nd Ed.	03/01/2004	1:2100000
500	8th Ed.	06/01/2003	1:3500000
530	30th Ed.	03/23/2002	1:4860700
50	6th Ed.	06/01/2003	1:10000000

## Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Rock	[None]	60° 03' 14.897" N	148° 18' 12.316" W	---

## **1 - Item Data**

## 1.1) GP No. - 1 from H11391\_DtoN2\_point.shp

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 60° 03' 14.897" N, 148° 18' 12.316" W  
**Least Depth:** [None]  
**Timestamp:** 2004-294.12:00:00.000 (10/20/2004)  
**GP Dataset:** H11391\_DtoN2\_point.shp  
**GP No.:** 1  
**Charts Affected:** 16702\_1, 16683\_1, 16680\_1, 16700\_1, 16013\_1, 531\_1, 500\_1, 530\_1, 50\_1

#### Remarks:

An uncharted shoal located in Hogg Bay 200 meters NE of Swanson Point. The shoal was not fully developed with multibeam. The least depth is unknown. The shoal was not visible during shoreline verification of the area.

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
H11391_DtoN2_point.shp	1	0.00	000.0	Primary

#### Hydrographer Recommendations

It is recommended that a dangerous underwater rock of uncertain depth be charted in this location.

#### Office Notes

Concur. Chart 16702 13th Ed. Nov 05, shows that MCD charted a dangerous rock with an unknown least depth at 60° 03' 14.9" N, 148° 18' 12.3" W. Retain as charted.

### Feature Images

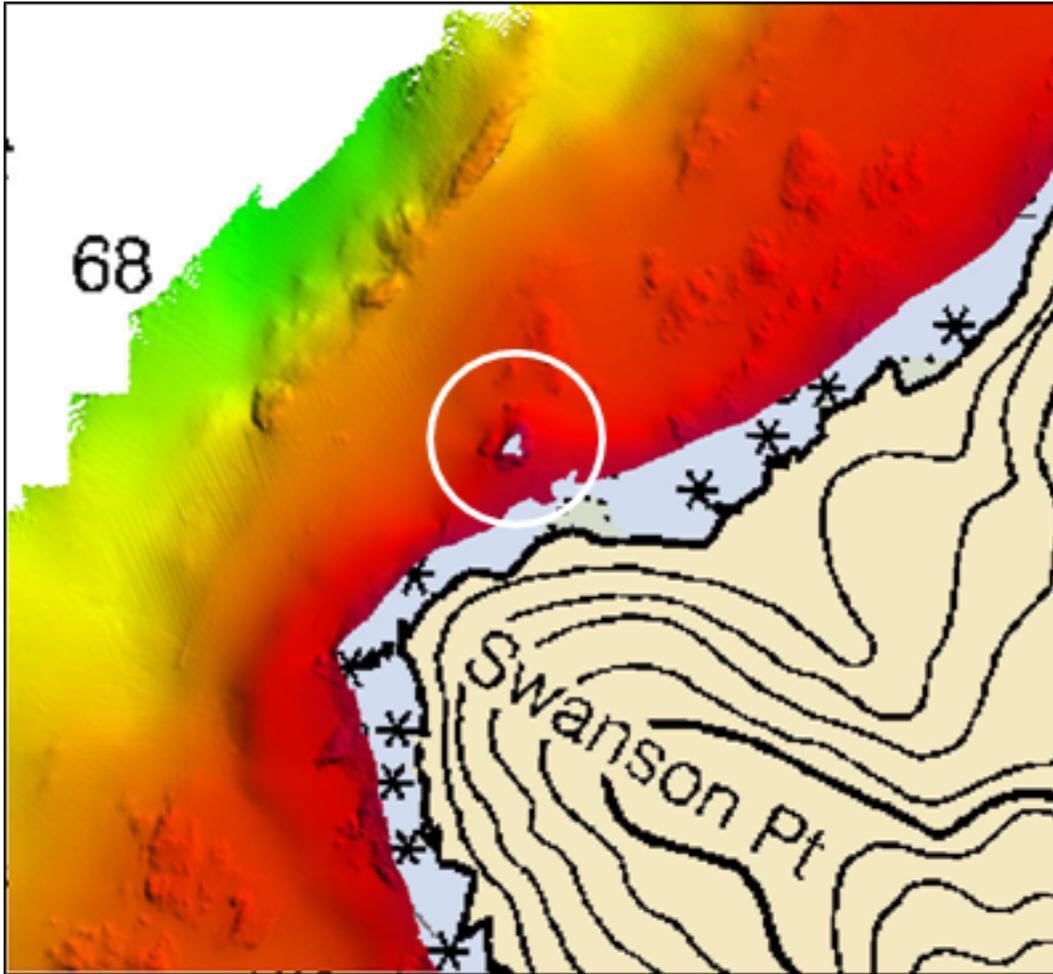


Figure 1.1.1

# H11391 Features Report

**Registry Number:** H11391  
**State:** Alaska  
**Locality:** Prince William Sound  
**Sub-locality:** Approaches to Port Bainbridge  
**Project Number:** OPR-P139-TC-04  
**Survey Dates:** 09/22/2004 - 09/23/2004

## Charts Affected

Number	Version	Date	Scale
16702	12th Ed.	11/01/2004	1:40000
16683	10th Ed.	02/01/2004	1:81436
16701	20th Ed.	09/01/2004	1:81436
16680	10th Ed.	07/10/1999	1:200000
16700	29th Ed.	07/01/2004	1:200000
16013	29th Ed.	11/01/2003	1:969761
531	22nd Ed.	03/01/2004	1:2100000
500	8th Ed.	06/01/2003	1:3500000
530	30th Ed.	03/23/2002	1:4860700
50	6th Ed.	06/01/2003	1:10000000

## Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	GP	[None]	60° 03' 29.696" N	148° 17' 11.994" W	---
1.2	Sounding	-1.75 m	60° 03' 58.828" N	148° 11' 38.422" W	---
1.3	Sounding	-1.55 m	60° 03' 30.053" N	148° 16' 39.990" W	---
1.4	Sounding	-3.16 m	60° 02' 28.651" N	148° 12' 34.286" W	---

## **1 - New Features**

## 1.1) GP No. - 2 from WATFAL\_point.shp

### Survey Summary

**Survey Position:** 60° 03' 29.696" N, 148° 17' 11.994" W  
**Least Depth:** [None]  
**Timestamp:** 2004-267.19:28:42.000 (09/23/2004)  
**GP Dataset:** WATFAL\_point.shp  
**GP No.:** 2  
**Charts Affected:** 16702\_1, 16683\_1, 16680\_1, 16700\_1, 16013\_1, 531\_1, 500\_1, 530\_1, 50\_1

**Remarks:**

dp26706 new waterfall

### Feature Correlation

Address	Feature	Range	Azimuth	Status
WATFAL_point.shp	2	0.00	000.0	Primary

### Hydrographer Recommendations

It is recommended that a waterfall be charted in this location.

### Office Notes

Do not concur. Do not chart.

## 1.2) Profile/Beam - 1/1 from h11391 / dolphin\_0 / 2004-266 / uwtrac\_font\_point.shp

### Survey Summary

**Survey Position:** 60° 03' 58.828" N, 148° 11' 38.422" W  
**Least Depth:** -1.75 m  
**Timestamp:** 2004-266.18:29:47.000 (09/22/2004)  
**DP Dataset:** h11391 / dolphin\_0 / 2004-266 / uwtrac\_font\_point.shp  
**Profile/Beam:** 1/1  
**Charts Affected:** 16702\_1, 16701\_1, 16700\_1, 16013\_1, 531\_1, 500\_1, 530\_1, 50\_1

#### Remarks:

dp26601 new rk

### Feature Correlation

Address	Feature	Range	Azimuth	Status
h11391/dolphin_0/2004-266/uwtrac_font_point.shp	1/1	0.00	000.0	Primary

### Hydrographer Recommendations

It is recommended that a rock be charted in this location.

#### Cartographically-Rounded Depth (Affected Charts):

1fm (16702\_1, 16701\_1, 16700\_1, 16013\_1, 530\_1)

0fm 5ft (531\_1)

-1.8m (500\_1, 50\_1)

### Office Notes

Concur. Chart rock.

### 1.3) Profile/Beam - 1/1 from h11391 / dolphin\_0 / 2004-267 / uwtrroc\_font\_point.shp

#### Survey Summary

**Survey Position:** 60° 03' 30.053" N, 148° 16' 39.990" W  
**Least Depth:** -1.55 m  
**Timestamp:** 2004-267.19:34:32.000 (09/23/2004)  
**DP Dataset:** h11391 / dolphin\_0 / 2004-267 / uwtrroc\_font\_point.shp  
**Profile/Beam:** 1/1  
**Charts Affected:** 16702\_1, 16683\_1, 16680\_1, 16700\_1, 16013\_1, 531\_1, 500\_1, 530\_1, 50\_1

#### Remarks:

dp26707 new rk

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h11391/dolphin_0/2004-267/uwtrroc_font_point.shp	1/1	0.00	000.0	Primary

#### Hydrographer Recommendations

It is recommended that a rock be charted in this location.

#### Cartographically-Rounded Depth (Affected Charts):

0 ¾fm (16702\_1, 16683\_1, 16680\_1, 16700\_1, 16013\_1, 530\_1)

0fm 5ft (531\_1)

-1.6m (500\_1, 50\_1)

#### Office Notes

Concur. Chart rock.

## 1.4) Profile/Beam - 1/1 from h11391 / dolphin\_0 / 2004-267 / obstrn\_pt\_font\_point.shp

### Survey Summary

**Survey Position:** 60° 02' 28.651" N, 148° 12' 34.286" W  
**Least Depth:** -3.16 m  
**Timestamp:** 2004-267.18:14:17.000 (09/23/2004)  
**DP Dataset:** h11391 / dolphin\_0 / 2004-267 / obstrn\_pt\_font\_point.shp  
**Profile/Beam:** 1/1  
**Charts Affected:** 16702\_1, 16701\_1, 16700\_1, 16013\_1, 531\_1, 500\_1, 530\_1, 50\_1

#### Remarks:

dp26701 new snag is stump

### Feature Correlation

Address	Feature	Range	Azimuth	Status
h11391/dolphin_0/2004-267/obstrn_pt_font_point.shp	1/1	0.00	000.0	Primary

### Hydrographer Recommendations

It is recommended that a stump be charted in this location.

#### Cartographically-Rounded Depth (Affected Charts):

-1 ¾fm (16702\_1, 16701\_1, 16700\_1, 16013\_1, 530\_1)  
 -1fm 4ft (531\_1)  
 -3.2m (500\_1, 50\_1)

### Office Notes

Concur. Chart snag.



**TIDE NOTE FOR HYDROGRAPHIC SURVEY**

**DATE:** April 25, 2005

**HYDROGRAPHIC BRANCH:** Pacific  
**HYDROGRAPHIC PROJECT:** OPR-P139-TC-2004  
**HYDROGRAPHIC SHEET:** H11391

**LOCALITY:** Approaches to Port Bainbridge, Alaska  
**TIME PERIOD:** September 20 - October 22, 2004

**TIDE STATION USED:** 945-4050 Cordova, Alaska  
Lat. 60° 33.5'N Lon. 145° 45.2'W  
**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters  
**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 3.559 meters

**REMARKS: RECOMMENDED ZONING**  
Use zone(s) identified as: PWS1, PWS2 & PWS3

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).

*Thomas V. Meyer* 5/3/05  
-----  
**CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION**





**H11391 HCell Report**  
Peter Holmberg, Physical Scientist  
Pacific Hydrographic Branch

**Introduction**

The primary purpose of the HCell is to directly update NOAA ENC's with new survey information in International Hydrographic Organization (IHO) format S-57. HCell compilation of survey H11391 utilized Office of Coast Survey HCell Specifications Version 2.0, April 2, 2007. HCell H11391 will be used to update charts 16702,1:40,000 (13th Ed.; Nov 05, NM 03/08/2008), 16683, 1:81,436 (11<sup>th</sup> Ed.; Jun 07, NM 03/08/08), US4AK2GM, and US5AK28M.

**1. Compilation Scale**

The density of soundings in the HCell are compiled as appropriate to emulate those soundings of Charts 16702, 1:40,000 and 16683 1:81,436. Position and density of non-bathymetric features included in the HCell have not been generalized from the scale of the hydrographic survey H11391, 1:10,000.

**2. Soundings**

**2.1 Source Data**

A 5 meter resolution Combined BASE surface, **H11391\_5m\_cmbd** was used as the basis for HCell production following Branch certification.

A survey-scale sounding (SOUNDG) feature object source layer was built from the **H11391\_5m\_cmbd** surface in CARIS BASE Editor. A shoal-biased selection was made at 1:10,000 survey scale using a radius table with values shown in **Table 1**.

Upper limit (m)	Lower limit (m)	Radius (mm)
0	10	3
10	20	4
20	40	4.5
50	300	5

**Table 1**

## 2.2 Sounding Feature Objects

In CARIS BASE Editor soundings were manually selected from the high density sounding layer from H11391, and imported into a new layer created to accommodate chart density depths. Manual selection was used to accomplish a density and distribution that more closely represents the seafloor morphology and that emulates density and distribution of soundings on charts 16702 and 16683 than is possible using automated methods. See section 10.1, Data Processing Notes, for details about the use of manual sounding selection for H11448. The sounding feature object source layer was exported as **H11391\_CS**, and imported into HOM.

## 3. Depth Areas

### 3.1 Source Data

Using the BASE surface **H11391\_5m\_cmbd** a single depth area was generated. No depth contours were delivered per OCS HCell Specifications ver.2.0.

### 3.2 Depth Area Feature Objects

One all-encompassing depth range, 0 meters to 275 meters, was used for all depth area objects below MLLW. Upon conversion to NOAA charting units, this depth range is 0 Fathoms and 0 feet to 150 Fathoms and 2 feet.

Several separate depth areas were created to encapsulate surveyed features outside of the main survey area from the Base surface. DRVALs 1 and 2 for these areas were derived from ENC's US4AK2GM, and US5AK28M.

## 4. Meta Areas

The following Meta object areas are included in HCell 11391:

M_QUAL	M_NSYS
M_COVR	M_CSCL

Meta area objects were constructed on the basis of perimeter lines delineating the surveyed limits, "islands of coverage" for point and features surveyed outside the hydrographic limits, and extents of data gaps inside the survey area. These perimeters were first used to create the Skin of The Earth (SOTE) layer, then were duplicated to the Meta object layers and attributed per the H-Cell Specifications, ver. 2.0.

H11391 does not contain an inset. M\_CSCL was used to delineate compilation of the portion of the HCell compiled to a scale of 1:81,436 for chart 16683. The remainder of the HCell is compiled to a scale of 1:40,000 for chart 16702.

## 5. Survey Features

All features from H11391 were submitted in .HOB format and have been fully reviewed and addressed. Features were included, excluded, modified, or blue noted in the HCell. All dispositions made by the cartographer are documented in either the end notes of the descriptive report and/or the features report.

All bottom samples from were H11391 overlapping ENC's US4AK2GM, and US5AK28M were imported into the HCell. All rock bottom samples from ENC's US4AK2GM, and US5AK28M were attributed with a WATLEV of 4, "covers and uncovers". This is incorrect; bottom samples (SBDAREs) should not have a WATLEV because they are not associated with depths. All WATLEVs for bottom samples imported from US4AK2GM, and US5AK28M into H11391 were removed.

## 6. Shoreline / Tide Delineation

Depth areas (DEPARE) were created for all SOTE features.

## 7. Attribution

All S-57 Feature Objects have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with OCS H-Cell Specifications, ver. 2.0.

## 8. Layout

### 8.1 CARIS HOM Layering Scheme

100	Chart scale soundings
101	Survey scale soundings
200	Group 1 objects (Skin of the Earth)
300	Point objects
600-603	Meta layers
800	Items used for creation of Blue Notes

### 8.2 Blue Notes

Notes regarding data sources are in CARIS HOM as layer 800 as Shapefile sets, **H11391bluenotes\_p** and **H11391\_bluenotes\_l** (with the appropriate extensions) for point and line figures, respectively.

## 9. Spatial Framework

### 9.1 Coordinate System

All spatial map and base cell file deliverables are in an LLDG geographic coordinate system, with WGS84 horizontal, MHW vertical, and MLLW (1983-2001 NTDE) sounding datums.

### 9.2 Horizontal and Vertical Units

During creation of sounding sets in CARIS BASE Editor, and creation of the HCell in CARIS HOM, units are maintained as metric with millimeter resolution. NOAA rounding is applied at the same time that conversion to chart units is made to the metric HCell base cell file, at the end of the HCell compilation process.

A CARIS environment variable, `uslXsounding_round`, controls the depth at which rounding occurs. Setting this variable to NOAA fathoms and feet displays all soundings equal to or greater than 11 fathoms as whole units. Depths shoaler than 11 fathoms are shown in fathoms and feet.

In an ENC viewer fathoms and feet display in the format `X.YZZZ`, where X is fathoms, Y is feet, and ZZZ is decimals of the foot. For fathoms and feet between 0 and 10 fathoms 4.5 feet (10.75 fms), soundings round to the deeper foot if the decimals of the foot are `X.Y75000` or greater. For fathoms and feet deeper or equal to 11 fathoms, soundings round to the deeper fathom if feet and decimals of the foot are `X.45000` (`X.Y75000`) or greater. Drying heights are in feet and are rounded using arithmetic methods. In an ENC viewer, heights greater than 6 feet will register in fathoms and feet using the above stated rules.

#### HOM Units

Sounding Units:	Meters rounded to the nearest millimeter
Spot Height Units:	Meters rounded to the nearest meter

#### Chart Unit Base Cell Units

Depth Units (DUNI):	Fathoms and feet
Height Units (HUNI):	Feet (or fathoms and feet above 6 feet)
Positional Units (PUNI):	Meters

## 10. QA/QC

### 10.1 Data Processing Notes

Manual chart scale sounding selections were made for this survey. Experience has shown that in areas where bathymetry is steep sided, as in the case of this steep edged channel, automated sounding selection is impractical. None of the default sounding suppression options offered in CARIS BASE Editor or HOM yields an acceptable density and distribution of depths, generally bunching soundings near shore with too sparse coverage seaward. While the customized options are more practical for this type of terrain, an inordinate amount of time must be spent in experimentation with variations on the algebraic terms in order to devise the most suitable formula, and manual adjustments are still required to the resulting sounding set.

### 10.2 ENC Validation Checks

H11391 was subjected to QA and Validation checks in HOM prior to exporting to the HCell base cell (000) file. Full millimeter precision was retained in the export of the metric S-57 base cell data set. This data set was converted to a chart unit 000 file. dKart Inspector 5.0 (Service Pack 1) was then used to further check the data set for conformity using the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and errors investigated and corrected where necessary.

## 11. Products

### 11.1 HSD, MCD and CGTP Deliverables

- H11391 Base Cell File, Chart Units, Soundings compiled to 1:40,000
- H11391 Base Cell File, Chart Units, Soundings compiled to 1:10,000
- H11391 Descriptive Report including end notes compiled during office processing and certification
- H11391 HCell Report
- Blue Notes shape files
- 000 Features File

### 11.2 File Naming Conventions

HOM file set prefix: *H11391\_hc*

MCD Chart units base cell file: *US511391\_CU.000*

MCD Chart units base cell file, survey scale soundings: *US511391\_SS.000*

Features File (for CGTP): *H11391\_Features.000*

### **11.3 Software**

HIPS 6.1:	Management and inspection of Combined BASE surfaces
BASE Editor 2.1:	Combination of Product Surfaces and initial creation of the S-57 bathymetry-derived features
HOM 3.3:	Assembly of the H-Cell, S-57 products, QA
GIS 4.4a:	Setting the sounding rounding variable
Pydro v7.3 (r2252)	Creation of DTON, and Feature reports
dKart Inspector 5.0:	Validation of the base cell file

### **12. Contacts**

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

Peter Holmberg, Physical Scientist, PHB, Seattle, WA; 206-526-6843;  
Peter.Holmberg@noaa.gov.

APPROVAL SHEET  
H11391

Initial Approvals:

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

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.

I have reviewed the H-Cell, 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.