

H11017

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.* RA-10-14-00

*Registry No.* H-11017

### LOCALITY

*State* Alaska

*General Locality* Southwest Prince William Sound

*Sublocality* Northern Portion of  
Latouche Passage

2000 - 2002

CHIEF OF PARTY  
Commander D.R. Herlihy, NOAA

### LIBRARY & ARCHIVES

DATE

**HYDROGRAPHIC TITLE SHEET****H-11017**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.

**RA-10-14-00**State AlaskaGeneral Locality Southwest Prince William SoundSublocality Northern Portion of Latouche PassageScale 1:10,000 Date of Survey 10/21-26/2000, 8/10-11/2003Instructions Dated 8/25/2000 Project No. OPR-P139-RAVessel RA-1(2121), RA-2(2122), RA-3(2123), RA-4(2124), RA-5(2125), and  
RA-6(2126)Chief of Party Commander D. R. Herlihy, NOAASurveyed by Ship personnel and physical scientists from Pacific Hydrographic BranchSoundings taken by echo sounder, hand lead, pole Knudsen 320, RESON 8101Graphic record scaled by RAINIER PersonnelGraphic record checked by RAINIER PersonnelEvaluation by L. Deodato Automated plot by HP DesignJet 1050CVerification by E. Domingo, R. Mayor, R. Davies, L. Deodato, K. SampadianSoundings in Fathoms at MLLWREMARKS: Time in UTC.**Revisions and annotations appearing as endnotes were generated  
during office processing..****All depths listed in this report are referenced to  
mean lower low water unless otherwise noted.**

# Descriptive Report to Accompany Hydrographic Survey H11017

Project OPR-P139-RA-00 Southwest Prince William Sound

Scale 1:10,000

October, 2000

**NOAA Ship RAINIER**

Chief of Party: Commander Daniel R. Herlihy, NOAA

## A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-P139-RA-00, dated August 25, 2000, and the Draft Standing Project Instructions dated April 6, 1998. The survey area is located in southwest Prince William Sound and includes the section of Elrington Passage from southern Sawmill Bay to the southern tip of Evans Island, and Latouche Passage from 1 nautical mile north of Montgomery Bay to the southern tip of Latouche Island. The survey's northern limit is latitude  $60^{\circ}02'43''\text{N}^1$  and the southern limit is latitude  $59^{\circ}56'57''\text{N}^2$ . The survey's western limit is longitude  $59^{\circ}59'15''\text{W}^3$  and the eastern limit is the  $147^{\circ}58'02''\text{W}^4$ .

Data acquisition was conducted from October 21 to October 27, 2000 (DN 295 to 301).

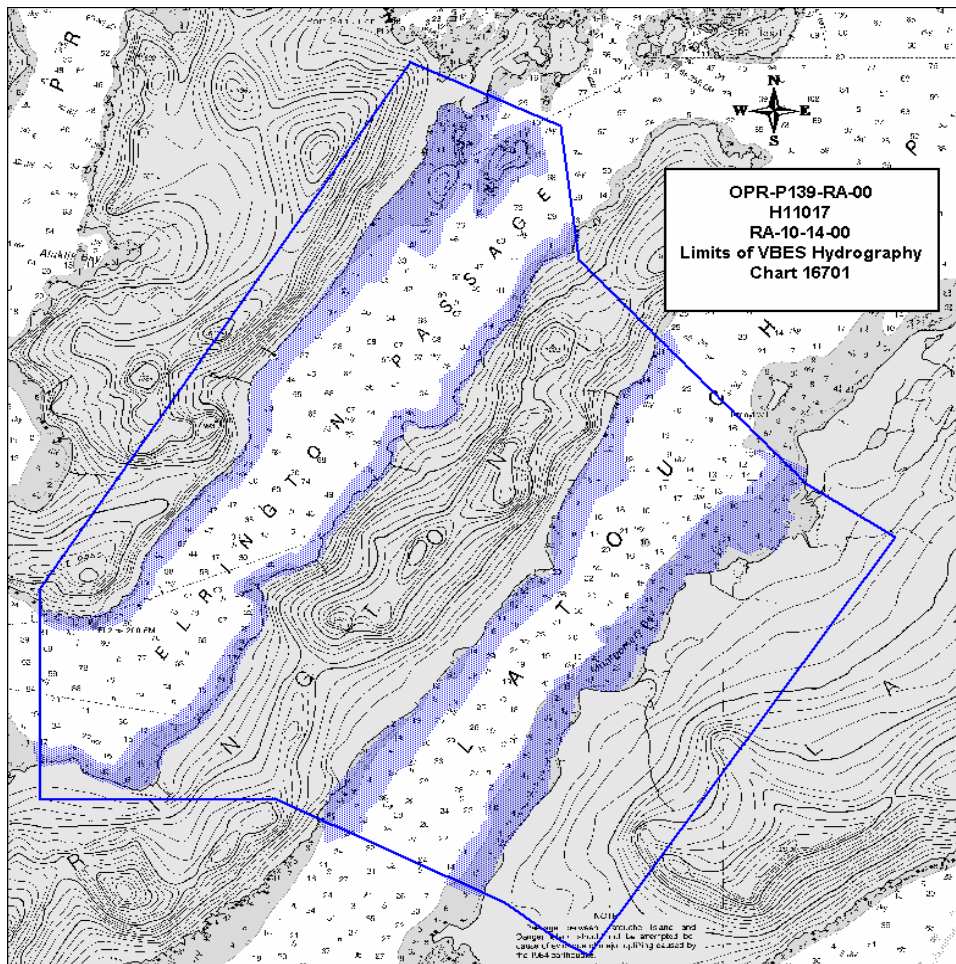


Figure 1. H11017 Limits of VBES Hydrography

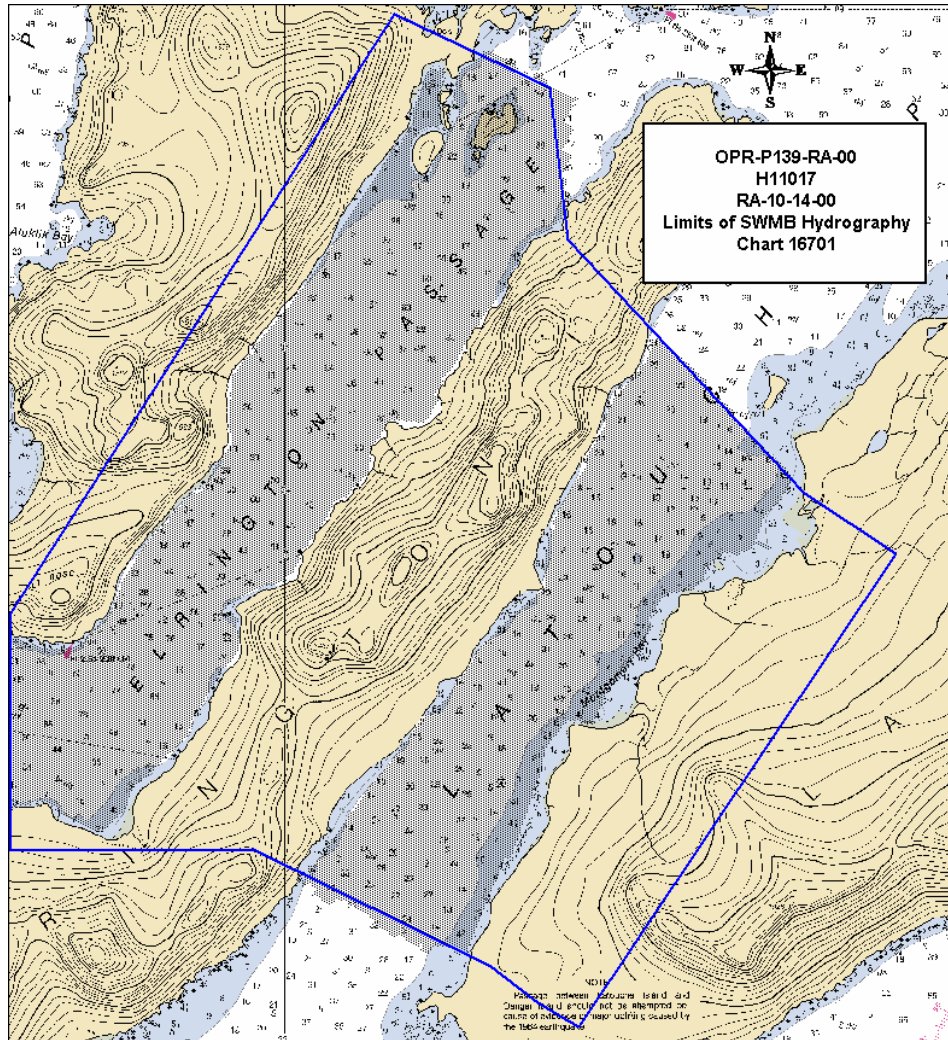


Figure 2. H11017 Limits of SWMB Hydrography

## B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition and processing systems, survey vessels, quality control procedures, and data processing methods, can be found in the *OPR-P139-RA-00 Data Acquisition and Processing Report* submitted under separate cover. Items specific to this survey and any deviations from the aforementioned report are discussed in the following sections.

### B1. Equipment and Vessels

Data were acquired by RAINIER's survey launches (vessel numbers 2121, 2122, 2123, 2124, 2125, and 2126). Vessels 2121, 2123, 2124 and 2126 were used to acquire shallow-water multibeam soundings and sound velocity profiles. Vessels 2122 and 2125 were used to acquire vertical-beam echo soundings. Vessel 2125 was also used to collect bottom samples. No unusual vessel configurations or problems were encountered on this survey.<sup>5</sup>



**B2. Quality Control**

**Crosslines**

VBES crosslines totaled 17.81 nautical miles, comprising 27.0% of mainscheme hydrography. VBES Crosslines agreed within 1 meter of mainscheme VBES hydrography

SWMB crosslines totaled 8.74 nautical miles, comprising 4.6% of SWMB hydrography. The Quality Control Report (CARIS HIPS) for the RESON checkline file averaged 89.12%; the Quality Control Report (CARIS HIPS) for the Seabeam checkline file averaged 89.70%. See Appendix V<sup>6</sup> for the detailed reports. Each report had a depth tolerance factor of 0.013, which conforms to International Hydrographic Organization Order I specifications as detailed in Special Publication S-44, Edition 4; and NOAA depth accuracy standards as set forth in the NOS Hydrographic Surveys Specification and Deliverables Manual (HSSDM).

**Junctions<sup>7</sup>**

The following contemporary survey junctions with H11017:

<u>Registry #</u>	<u>Scale</u>	<u>Date</u>	<u>Junction side</u>
H11013	1:10,000	2000	Northeast

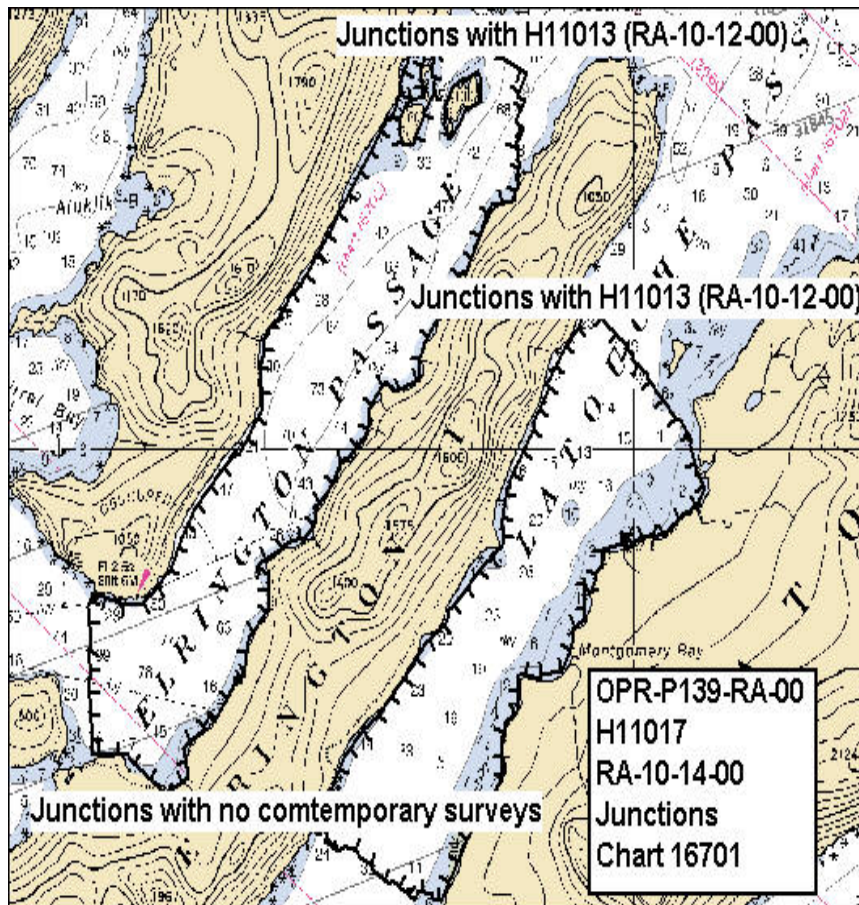


Figure 3. H11017 Survey Junctions

Survey H11017 junctions well with this survey, with differences generally less than two fathoms.<sup>8</sup>

Final comparisons will be made at the Pacific Hydrographic Branch (PHB) after the application of smooth tides<sup>9</sup>.

**Data Quality Factors**

No unusual conditions were encountered during the survey which affected the expected accuracy and quality of survey data.

**B3. Data Reduction**

HDCS data were reduced to mean lower-low water (MLLW) using unverified observed tides from station Cordova (945-4050), adjusted using a height ratio corrector of 0.88 and a time corrector of -6 minutes. These data were used in creating the tide corrector file "AX\_AY\_BA\_BE\_Observed.tid."

Data reduction procedures for survey H11017 conform to those detailed in the *OPR-P139-RA-00 Data Acquisition and Processing Report*.

**C. VERTICAL AND HORIZONTAL CONTROL**

A complete description of vertical and horizontal control for survey H11017 can be found in the *OPR-P139-RA-00 Horizontal and Vertical Control Report* submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

**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 US Coast Guard Beacons at Potato Point, AK, and Cape Hinchinbrook, AK, were the sources of differential correctors. Launch-to-launch DGPS performance checks were performed weekly in accordance with Section 3.2 of the FPM. Copies of the performance checks are included in the *OPR-P139-RA-00 Horizontal and Vertical Control Report*.

**Vertical Control**

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide stations at Cordova, Alaska (945-4050), and Valdez, Alaska (945-4240) will serve as control for datum determination. RAINIER personnel installed Sutron 8200 "bubbler" tide gauges at the following subordinate stations in accordance with Project Instructions:

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Perch Point	945-4561	30-day	12 September 2000	26 October 2000
Latouche	945-4713	30-day	12 September 2000	27 October 2000
Point Elrington	945-4814	30-day	25 September 2000	25 October 2000

Heavy surf and foul shoreline precluded the installation of a new station in San Juan Bay, Montague Island, as required by the Letter Instructions. After consultation with N/CS31 and N/OPS1, the following historical station was reoccupied in lieu of a new station at San Juan Bay:

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
MacLeod Harbor	945-4674	30-day	21 September 2000	27 October 2000

Raw water level data from these gauges were forwarded to N/OPS1 throughout the project period, with the final package submitted on November 27, 2000 in accordance with HSG 50 and FPM 4.7. The Pacific Hydrographic Branch will apply final approved (smooth) tides to the survey data during final processing. A request for delivery of final approved (smooth) tides for survey H11017 was forwarded to N/OPS1 on October 31, 2000 in accordance with FPM 4.8.<sup>10</sup>

## D. RESULTS AND RECOMMENDATIONS<sup>11</sup>

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

A total of one (1) AWOIS item was located within the limits of H11017 and investigated during this survey. Investigation methods, results, and charting recommendations have been entered into the Microsoft Access AWOIS database and are submitted with the digital data. A Printout of the AWOIS Database form<sup>12</sup> is included in Appendix VI<sup>13</sup> of this report.

### D.2 Chart Comparison

Survey H11017 was compared with chart 16702 (10<sup>th</sup> Ed.; June 13, 1998, 1:40,000) and chart 16701 (17<sup>th</sup> Ed.; July 25, 1998, 1:81,436).

Depths from charts 16701 and 16702 adequately agree with the current survey. Generally, soundings from H11017 are shoaler than charted soundings by one to five fathoms.<sup>14</sup> In areas where more significant discrepancies were noted, these are most likely the result of several factors including improved technology used in the current survey when compared with prior survey methods, including the use of SWMB, and the impact of the major earthquake of March 27, 1964.<sup>15</sup> The surveyed 10-fathom curve was generally found to be further seaward than charted.<sup>16</sup> Significant differences with chart 16702 are discussed below. No significant differences between chart 16701 and survey soundings were found which are not otherwise discussed under the comparison with chart 16702.<sup>17</sup>

#### Chart 16702

##### Elrington Passage

Soundings from survey H11017 were generally two to four fathoms shoaler, with some differences of seven fathoms or more.<sup>18</sup> The data reveal fewer discrepancies mid-channel than along the shoreline and around the edges of islands, where more disagreement between charted and present survey soundings were noted.<sup>19</sup> At the northern end of Elrington Passage, significant differences were found between charted and survey depths, particularly around the group of islands at the northern end of the survey. The present survey revealed depths of up to ten fathoms deeper than charted soundings in some areas and 25 fathoms shoaler in other areas (see Figure 4). More comparisons are listed in the Danger to Navigation (DTON)<sup>20</sup> section, Appendix I<sup>21</sup> of this survey report.

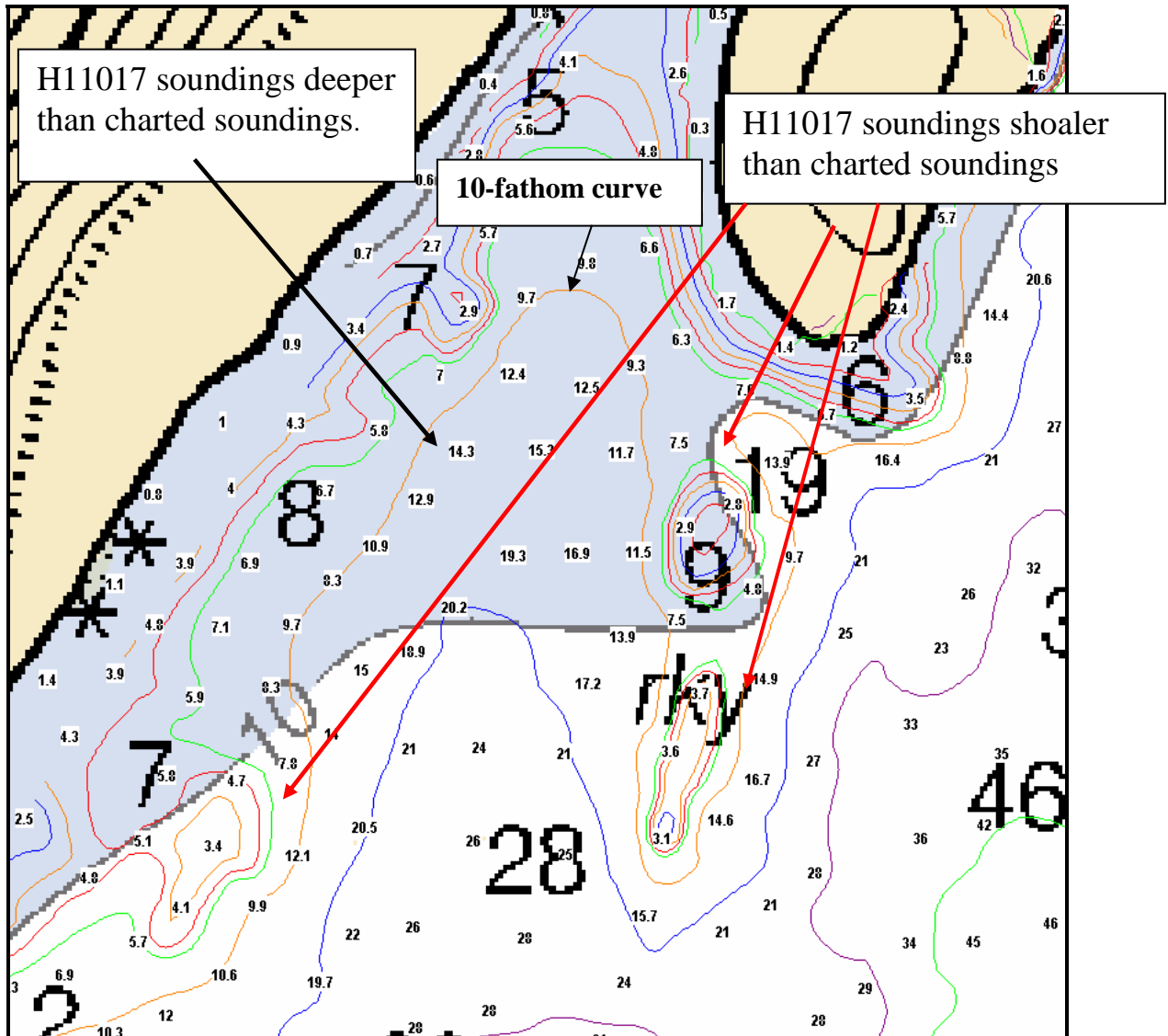


Figure 4. Significant variations between Chart 16702 and H11017 soundings in Elrington Passage.

In the vicinity of charted soundings varying from 7 to 9 fathoms, the present survey revealed several deeper depths ranging from 9.9 fathoms to 19.9 fathoms. This area of deeper soundings extends south from 60° 01' 49.489 "N 148° 03' 41.001 "W (440,854.2 E, 6,655,272.9 N) to 60° 01' 40.220"N 148° 03' 43.398 "W (440,812.5 E, 6,654,986.8 N) and is approximately 350 meters wide.<sup>22</sup> The surveyed 10-fathom curve in this area was shifted 340 meters in shore of the charted 10-fathom curve. A new shoal was positioned 50 meters east<sup>23</sup> (see DTONs <sup>24</sup> in Appendix I<sup>25</sup>). This area was covered by 100% SWMB.<sup>26</sup>

**Latouche Passage**

Depths from Survey H11017 were generally 2 to 4 fathoms shoaler than charted depths. Mid-channel shoaling shows some survey depths up to 5 fathoms shoaler than charted depths. Significant shoaling midchannel in Latouche Passage in the vicinity of 60°00'03.512"N, 148°00'38.759"W (443,624.9 E, 6,651,950.5 N) was also observed (see Figures 5 and 6). There is also region on the southeastern shore of Latouche Passage near Montgomery Bay where the surveyed 10-meter<sup>27</sup> curve was found to be



approximately 80 meters inshore of the charted 10-fathom curve. This area extends approximately 0.9<sup>28</sup> nautical miles south from 59°58'51.68"N, 148°01'31.19"W (442778.2E, 6649741.0N) to 59°58'08.0"N 148°02'27.89"W (442819.4 E, 6649780.0 N); see Figure 7. This area was covered with 100% SWMB.

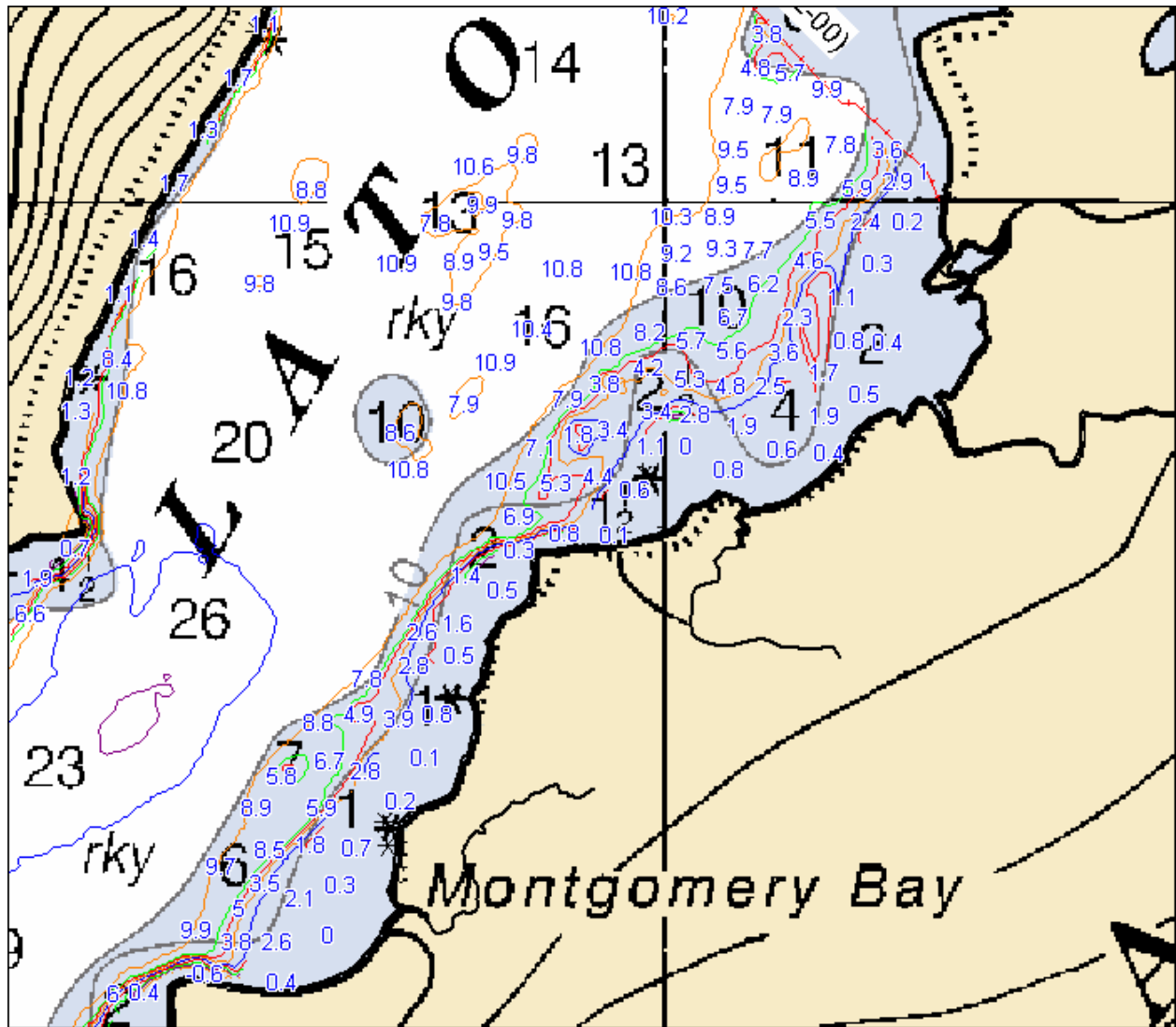


Figure 5. Mid-channel shoaling in Latouche Passage and changes to the 10-fathom curve.

In an area south of Izmaylov Island centered around 59°59'59.99"N 147°59'38.92"W, the present survey found depths four to five<sup>29</sup> fathoms shoaler than charted depths. This area was covered by 100% SWMB.<sup>30</sup>

In the vicinity of a charted 9-fathom sounding, the present survey revealed a depth of 12.3<sup>31</sup> fathoms at 59° 59' 20.510"N, 148° 00' 50.514"W (443,422.4 E, 6,650,623.1 N). In this area the surveyed 10-fathom curve was positioned 80 meters inshore of the charted 10-fathom curve. This area was covered by 100% SWMB.<sup>32</sup>

In the vicinity of a charted 21-fathom sounding, the present survey revealed depths between 15 and 19<sup>33</sup> fathoms near 59° 59' 40.198"N, 148° 01' 14.273"W (443,063.6 E, 6,651,237.8 N). This area was covered by 100% SWMB.<sup>34</sup>

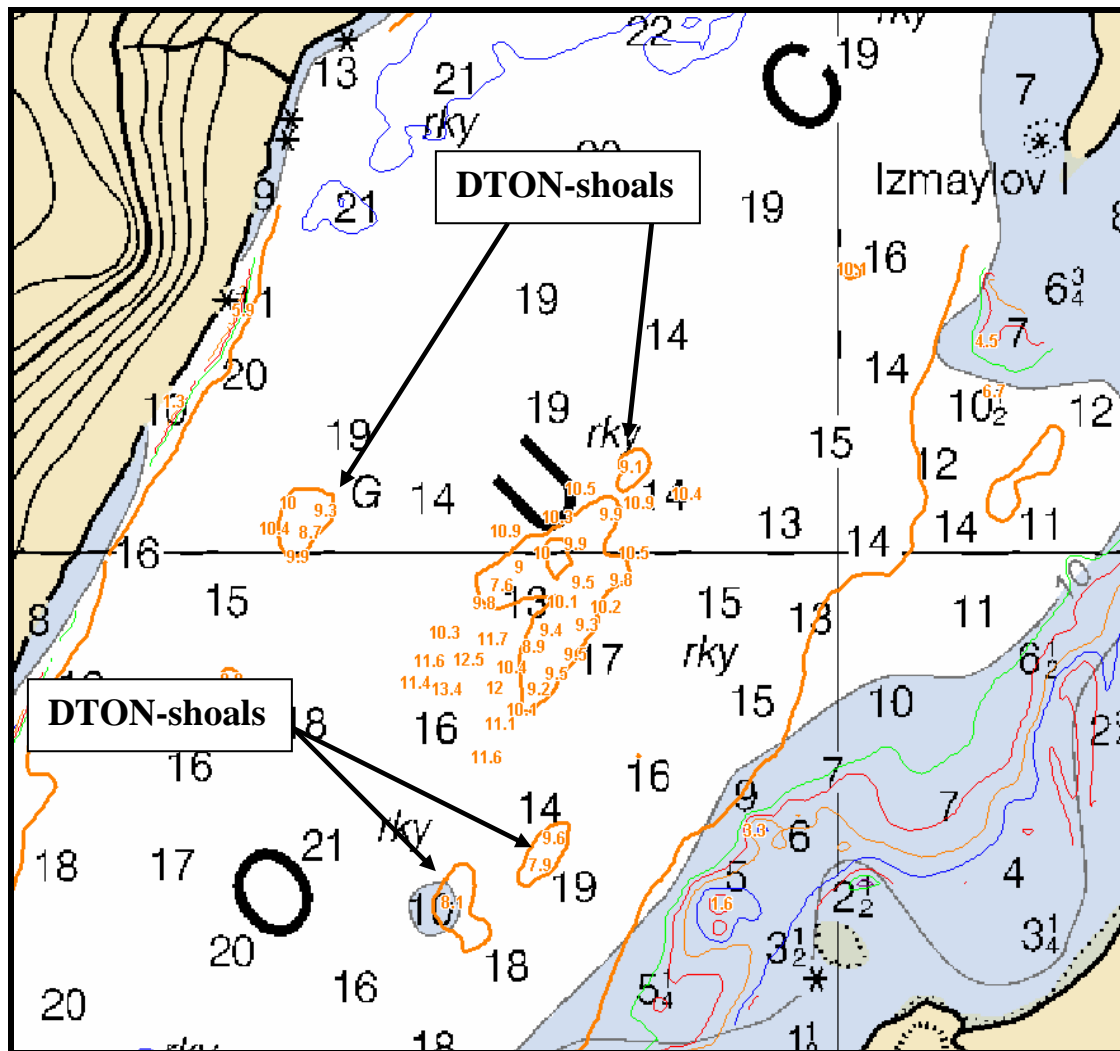


Figure 6. Shoal areas in Latouche Passage.

In the vicinity of a charted 14-fathom sounding, the present survey revealed a depth of 7.8<sup>35</sup> fathoms at 59° 59' 09.119"N, 148° 02' 20.113"W (442,028.3 E, 6,650,292.3 N). This area was steep and close to shore. The surveyed 10-fathom curve in this area was positioned 120 meters offshore from the charted 10-fathom curve. This area was covered by 100% SWMB.<sup>36</sup>

In the vicinity of a charted 14-fathom sounding, the present survey revealed a depth of 0.9 to 8.3<sup>37</sup> fathoms at 59° 58' 52.867"N, 148° 02' 59.800"W (441,405.2 E, 6,649,799.3 N). This area was very steep and close to shore. The surveyed 10-fathom curve in this area was positioned 100 meters offshore from the charted. This area was covered by 100% SWMB.<sup>38</sup>

In the vicinity of a charted 20-fathom<sup>39</sup> sounding, the present survey revealed depths of 0.9 to 14 fathoms at 59° 59' 24.310"N, 148° 02' 00.269"W (442,343.2 E, 6,650,757.4 N). This area was on a steep slope and is located close to a prominent point on shore. This area was on a steep slope and was covered by 100% SWMB.<sup>40</sup>

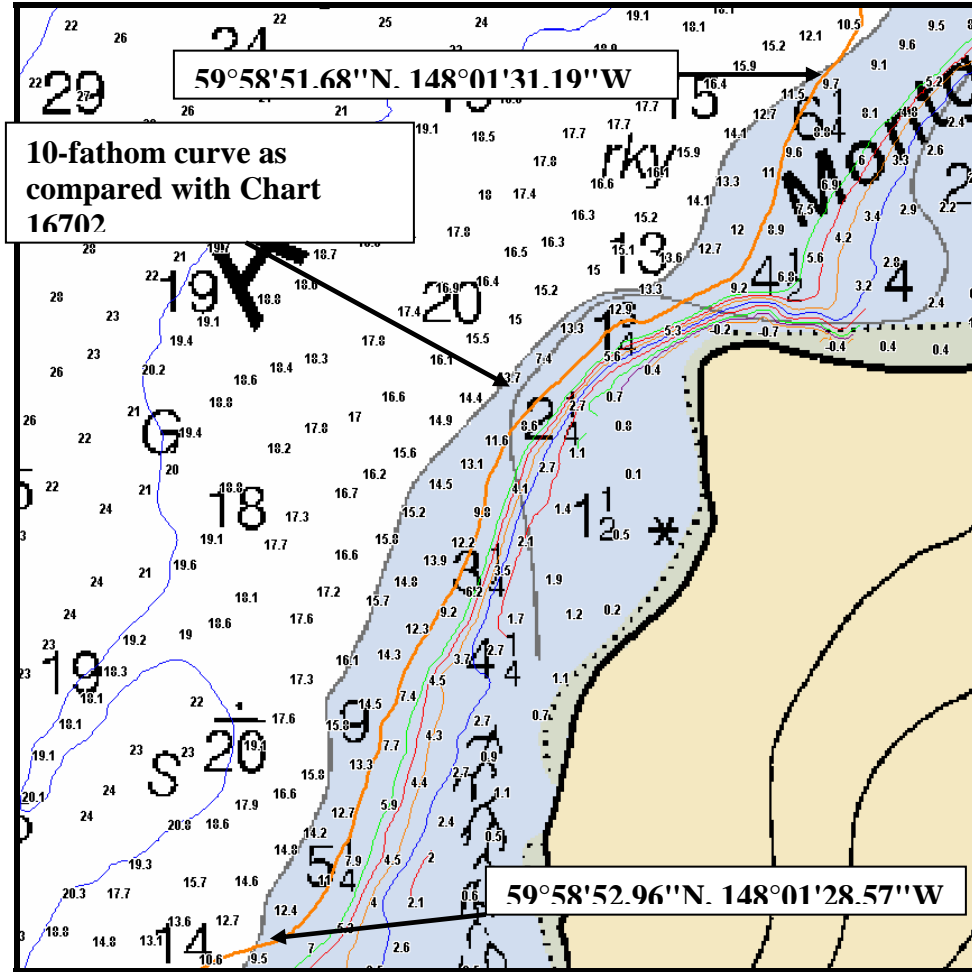


Figure 7. Surveyed 10-fathom curve compared with Chart 16702

In the vicinity of a charted 14-fathom sounding, the present survey revealed a depth of 7.9<sup>41</sup> fathoms at 60° 00' 38.818"N, 148° 00' 55.837"W (443,377.1 E, 6,653,046.7 N). This area was steep and close to shore and covered by 100% SWMB.<sup>42</sup>

Final sounding comparisons will be made at the Pacific Hydrographic Branch after the application of smooth tides.<sup>43</sup>

**Recommendations**

The Hydrographer recommends the final sounding plot supercede charts 16701 and 16702 as noted.<sup>44</sup> In several areas, charted soundings inshore of the limit of hydrography were deeper than soundings collected offshore at the limit of hydrography. The Hydrographer recommends removing these charted soundings,<sup>45</sup> when inshore and deeper than soundings recorded at the limits of hydrography, and replacing with blue tint on the chart to depict the areas as non-navigable (refer to Figure 8 for an example).<sup>46</sup>

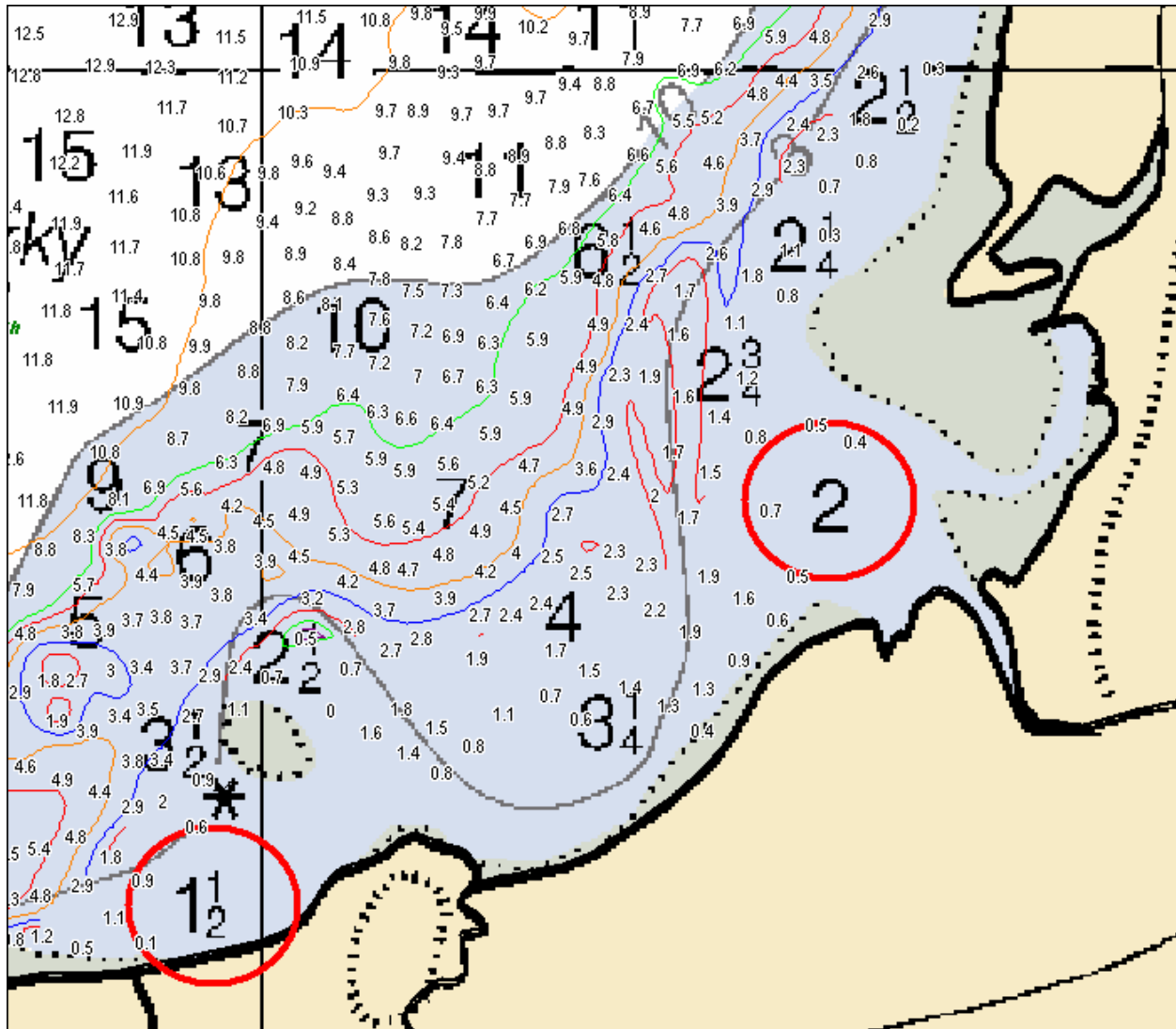


Figure 8: Replace deep soundings inshore of the limit of hydrography with blue tint

### D.3 Shoreline

Due to time constraints no shoreline verification was conducted within the limits of the survey H11017. The Hydrographer recommends retaining charted shoreline form 16702 until the shoreline from digital manuscript 10302 can be verified. Shoreline from DM 10302 is shown in black on the Final Field Sheet for orientation purposes only.<sup>47</sup>

### D.4 Dangers to Navigation

Thirty-five (35) Dangers to Navigation (DTON's) were found and reported to the Pacific Hydrographic Branch on December 3, 2001, for verification and submission to the U.S. Coast Guard. A copy of the Danger to Navigation Report is included in Appendix I.<sup>48</sup> The final report will be inserted by the Pacific Hydrographic Branch (PHB) following verification and submission to the U.S. Coast Guard.<sup>49</sup>



**D.5 Aids to Navigation**

One aid to navigation (ATON) was located and verified within the limits of survey H11017. A light at the southern tip of Evans Island, located at 59°59’06.84”N, 148°07’28.61”W, was found to be charted correctly and serve its intended purpose.<sup>50</sup>

**D.6 Miscellaneous**

Bottom samples were collected and are depicted on the Final Field Sheet.<sup>51</sup>

**E. APPROVAL**

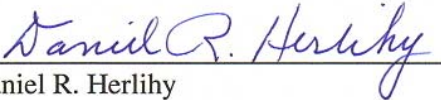
As Chief of Party, I have ensured that standard field surveying and processing procedures were followed in producing this examination in accordance with the Hydrographic Manual, Fourth Edition; the Hydrographic Survey Guidelines; the Field Procedures Manual, and the NOS Hydrographic Surveys Specifications and Deliverables, as updated for 2000.

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

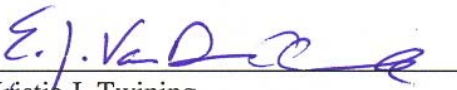
Survey H11017 is complete and adequate to supersede charted soundings in their common areas.<sup>52</sup> RAINIER is scheduled to continue project OPR-P139. The Hydrographer recommends that shoreline verification be conducted at that time.<sup>53</sup>


Listed below are supplemental reports submitted separately, which 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-RA-00	November 25, 2000	N/CS34
Horizontal and Vertical Control Report for OPR-P139-RA-00	April 20, 2001	N/CS34
Tides and Water Levels Package for OPR-P139-RA-00	November 27, 2000	N/OPS1
Coast Pilot Report for OPR-P139-RA-00	April 20, 2001	N/CS26

Approved and Forwarded:   
Daniel R. Herlihy  
Commander, NOAA  
Commanding Officer

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

Survey Sheet Manager:   
*For* Kristie J. Twining  
Lieutenant Junior Grade, NOAA

Field Operations Officer:   
Edward J. Van Den Ameele  
Lieutenant, NOAA

**Revisions Compiled During Office processing and Certification.**

<sup>1</sup> Revise GP to 60°02’30”N

<sup>2</sup> Revise GP to 59°57’15”N

<sup>3</sup> Revise GP to 148°08’10”W

<sup>4</sup> Revise GP to 147°59’06”W

<sup>5</sup> Concur

<sup>6</sup> Filed with the hydrographic data.

<sup>7</sup> The junction with survey H11013 is complete. A “Joins” note has been added to the smooth sheet where applicable. A ledge and a few soundings from the junction survey have been transferred within the common areas of H11017 to better delineate the bottom configuration.

<sup>8</sup> Concur. A comparison of depths with H11013 reflects excellent agreement. Depth differences within the common areas range from 0.5 to 1.0 fathom.

<sup>9</sup> Concur. Results of the comparison after application of approved tides are considered good.

<sup>10</sup> Approved tide note dated February 13, 2001 is attached.

<sup>11</sup> The present survey was compared to the following prior surveys.

<u>Survey</u>	<u>Year</u>	<u>Scale</u>	<u>Datum</u>
H2833	1906	1:40,000	Valdez
H4723	1927	1:10,000	Valdez
H8204	1955	1:10,000	NAD27

These prior surveys are the primary sources for chart 16702. Comparison with these older hydrographic surveys and the present survey depths generally reflects a consistent shoal bias of 1 to 4 fathoms with H2833, 1 to 10 fathoms with H4723, and 1 to 4 fathoms with H8204. These depth differences can be attributed to present state-of-the-art in positioning, sounding, and data acquisition techniques. Other differences are attributed to the Prince William Sound Earthquake in 1964. The 1964 earthquake caused a bottom uplift ranging from 4-32 feet. Additional information regarding differences is discussed in the hydrographer’s report, Section D.2, Chart Comparison. The evaluator considers the present survey adequate to supersede all prior surveys within the common area.

<sup>12</sup> Copy attached

<sup>13</sup> Filed with the hydrographic data

<sup>14</sup> Concur

<sup>15</sup> Concur

<sup>16</sup> Concur

<sup>17</sup> Concur

<sup>18</sup> Concur

<sup>19</sup> Concur

<sup>20</sup> Copies attached

<sup>21</sup> Filed with the hydrographic data

<sup>22</sup> Concur

<sup>23</sup> Concur. The shoal area has been reported in the danger to navigation letter attached to this report.

<sup>24</sup> Copies attached

<sup>25</sup> Filed with the hydrographic data

- <sup>26</sup> Concur with hydrographer's statements.
- <sup>27</sup> Strikethrough ~~meter~~ and replace with fathom
- <sup>28</sup> Strikethrough ~~0.9~~ and replace with 0.8
- <sup>29</sup> Strikethrough ~~four to five~~ and replace with two to three
- <sup>30</sup> Concur
- <sup>31</sup> Strikethrough ~~12.3~~ and replace with 12.7
- <sup>32</sup> Concur
- <sup>33</sup> Concur
- <sup>34</sup> Concur
- <sup>35</sup> Strikethrough ~~7.8~~ and replace with 7
- <sup>36</sup> Concur
- <sup>37</sup> Strikethrough ~~0.9 to 8.3~~ and replace with 0.8 to 4.5
- <sup>38</sup> Concur
- <sup>39</sup> This is the charted depth before the DTONs were applied to the chart.
- <sup>40</sup> Concur
- <sup>41</sup> Strikethrough ~~7.9~~ and replace with 7.8
- <sup>42</sup> Concur
- <sup>43</sup> Concur
- <sup>44</sup> Concur
- <sup>45</sup> Concur
- <sup>46</sup> Do not concur. Tint area is not based on survey limits and is already determined by MCD.
- <sup>47</sup> Concur with hydrographer's statements. Refer to the 2002 field work and descriptive report regarding shoreline verification (attached).
- <sup>48</sup> Filed with the hydrographic data
- <sup>49</sup> Copy attached
- <sup>50</sup> Concur
- <sup>51</sup> Concur
- <sup>52</sup> Concur
- <sup>53</sup> Shoreline verification was conducted in 2002. Results of this work have compiled on the smooth sheet and discussed in the 2002 descriptive report (attached).



RECRD  VESSLTERMS  CHART  AREA   
CARTOCODE  SNDINGCODE  DEPTH

LAT83  LONG83  NATIVDATUM   
LATDEC:  LONDEC:  GPQUALITY   
GPSOURCE

PROJECT  ITEMSTATUS  SEARCHTYPE   
RADIUS  INIT  ASSIGNED   
TECNIQ

Techniqnote

Histor HISTORY  
T9149/1957-- THREE DOLPHINS SHOWN IN THE FOLLOWING POSITIONS  
60-02-20.7 N 148-03-17.8 W  
60-02-22.9N 148-03-19.2 W  
60-02-24.6 N 148-03-16.9 W  
ALL SHOWN IN NAD 83

Fieldnote INVESTIGATION  
DATE(S): 10 / 28 /00 (DN: 301)  
VN: 2125 TIME: 18:58:00 and 18:59:19  
INVESTIGATION METHODS USED: (IE DI, 200% SIDE SCAN SONAR, ECHO SOUNDER) Visual and Echo sounder search.  
OBSERVED POSITION:  
Pos. # 50618 LAT. 060/02/23.912 N LON. 148/03/07.784 W (441385.3 E, 6656329.5 N)  
Pos. # 50619 LAT. 060/02/22.556 N LON 148/03/07.631 W (441387.0 E, 6656287.5 N)  
POSITION DETERMINED BY: DIFFERENTIAL GPS  
INVESTIGATION SUMMARY: Pile and Dolphin were positioned during shoreline acquisition. No other piles or dolphins were found.  
CHARTING RECOMMENDATION (HYDROGRAPHER): Chart pile and Dolpin according to position recorded during present survey.  
EVALUATOR COMMENTS:Chart as shown on SS.

Proprietar

YEARSUNK

NIMANUM

# Danger to Navigation Report

Hydrographic Survey Registry Number: H11017

Survey Title: State: Alaska  
Locality: Southwest Prince William Sound  
Sub-locality: Southern Portion of Latouche and Elrington Passages

Project Number: OPR-P139-RA-00

Survey Dates: October 22-27, 2000

Depths are reduced to Mean Lower Low Water using verified tides.  
Positions are based on the NAD83 horizontal datum.

## CHARTS AFFECTED:

Chart	Scale	Edition	Date
16701	1:81,436	17 <sup>th</sup>	July 25, 1998
16702	1:40,000	10 <sup>th</sup>	June 13, 1998

## DANGERS:

Feature	Depth(fms)	Latitude	Longitude
Sounding	0¼	59° 59' 24.311"N	148° 02' 00.270"W
Sounding	1¼	59° 59' 35.342"N	148° 00' 17.115"W
Sounding	1¼	59° 58' 24.338"N	148° 03' 47.070"W
Sounding	1¼	60° 02' 08.400"N	148° 03' 01.417"W
Sounding	1¼	60° 02' 12.636"N	148° 02' 12.576"W
Sounding	2½	60° 02' 03.179"N	148° 03' 27.452"W
Sounding	2¾	60° 02' 16.513"N	148° 03' 24.292"W
Sounding	2¾	60° 01' 43.289"N	148° 03' 30.919"W
Sounding	2¾	60° 01' 49.430"N	148° 03' 47.202"W
Sounding	3	59° 58' 13.340"N	148° 04' 05.522"W
Sounding	3¼	60° 01' 32.745"N	148° 04' 03.210"W
Sounding	3½	60° 01' 33.064"N	148° 03' 35.262"W
Sounding	3½	60° 01' 46.710"N	148° 03' 19.444"W
Sounding	3½	60° 01' 49.868"N	148° 02' 51.887"W
Sounding	3¾	60° 00' 17.514"N	147° 59' 37.368"W
Sounding	3¾	59° 59' 40.662"N	148° 00' 11.661"W
Sounding	3¾	59° 58' 42.799"N	148° 03' 07.281"W
Sounding	3¾	59° 58' 02.719"N	148° 04' 19.947"W
Sounding	4¼	59° 58' 19.063"N	148° 03' 54.975"W
Sounding	5¼	59° 58' 59.413"N	148° 01' 19.385"W
Sounding	5¼	59° 59' 09.091"N	148° 02' 25.732"W
Sounding	6¼	60° 01' 27.231"N	148° 04' 18.347"W

## Danger to Navigation Report

Sounding	7¼	59° 57' 33.985"N	148° 03' 00.425"W
Sounding	7½	60° 02' 22.023"N	148° 02' 04.890"W
Sounding	7¾	59° 59' 57.490"N	148° 00' 47.051"W
Sounding	7¾	59° 59' 38.513"N	148° 00' 40.914"W
Sounding	8¼	60° 01' 53.871"N	148° 03' 00.309"W
Sounding	8¼	60° 00' 39.821"N	148° 03' 16.518"W
Sounding	8½	59° 59' 35.478"N	148° 00' 54.290"W
Sounding	8¾	60° 00' 01.062"N	148° 01' 13.167"W
Sounding	8¾	60° 02' 20.637"N	148° 02' 47.543"W
Sounding	8¾	59° 59' 58.323"N	147° 59' 47.365"W
Sounding	9¼	59° 59' 51.164"N	148° 01' 23.937"W
Sounding	9¾	60° 00' 04.799"N	148° 00' 28.930"W
Sounding	10¼	60° 00' 19.454"N	147° 59' 58.298"W

### COMMENTS:

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch at (206) 526-6836.







**This graphic may not be up to date  
with all Notice to Mariners information.  
Do not paste onto NOAA charts.**

# Chart 16702

10th edition, June, 13, 1998  
Scale depicted: 1:40,000

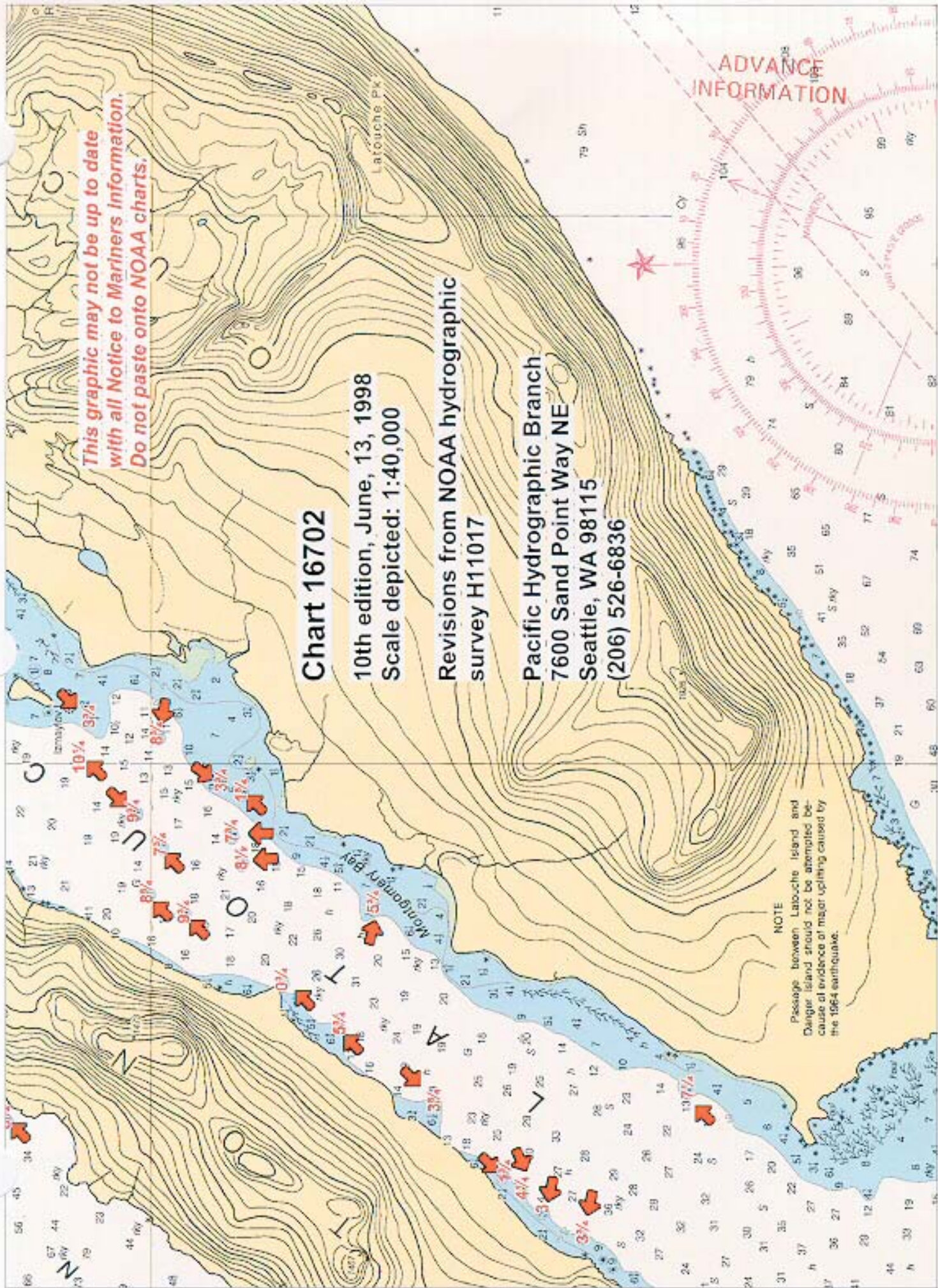
Revisions from NOAA hydrographic  
survey H11017

Pacific Hydrographic Branch  
7600 Sand Point Way NE  
Seattle, WA 98115  
(206) 526-6836

**ADVANCE  
INFORMATION**

**NOTE**

Passage between Latoche Island and  
Danger Island should not be attempted be-  
cause of evidence of major uplying caused by  
the 1964 earthquake.







TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: February 13, 2001

HYDROGRAPHIC BRANCH: Pacific  
HYDROGRAPHIC PROJECT: OPR-P139-RA-2000  
HYDROGRAPHIC SHEET: H-11017

LOCALITY: Prince William Sound, AK  
TIME PERIOD: October 21 - 27, 2000

TIDE STATION USED: 945-4674 MacLeod Harbor, AK  
Lat. 59° 53.3'N Lon. 147° 47.8'W  
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters  
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.150 meters

TIDE STATION USED: 945-4713 LaTouche, AK  
Lat. 60° 3.2'N Lon. 147° 54.4'W  
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters  
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.210 meters

TIDE STATION USED: 945-4814 Point Elrington, AK  
Lat. 59° 56.4'N Lon. 148° 13.8'W  
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters  
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.903 meters

REMARKS: RECOMMENDED ZONING

Use zone(s) identified as: PWS8, PWS13, PWS14, PWS16 & PWS17.

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.

Note 2: Use tide data from the appropriate station with applicable zoning correctors for each zone according to the order in which they are listed in the Tidezone corrector files. For example, tide station one (TS1) would be the first choice for an applicable zone followed by TS2, etc. when data are not available.

*Thomas V. New* 2/13/01  
-----  
CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION



# Final Tidal Zoning for OPR-P139-RA-2000 Prince William Sound, AK - Sheet H-11017

**PWS13**  
Time Corrector -6 mins  
Range Corrector x0.95<sup>b</sup>  
Reference 945-4713

**PWS14**  
Time Corrector -6 mins  
Range Corrector x0.97<sup>b</sup>  
Reference 945-4713

**PWS8**  
Time Corrector 0 mins  
Range Corrector x1.04  
Reference 945-4814

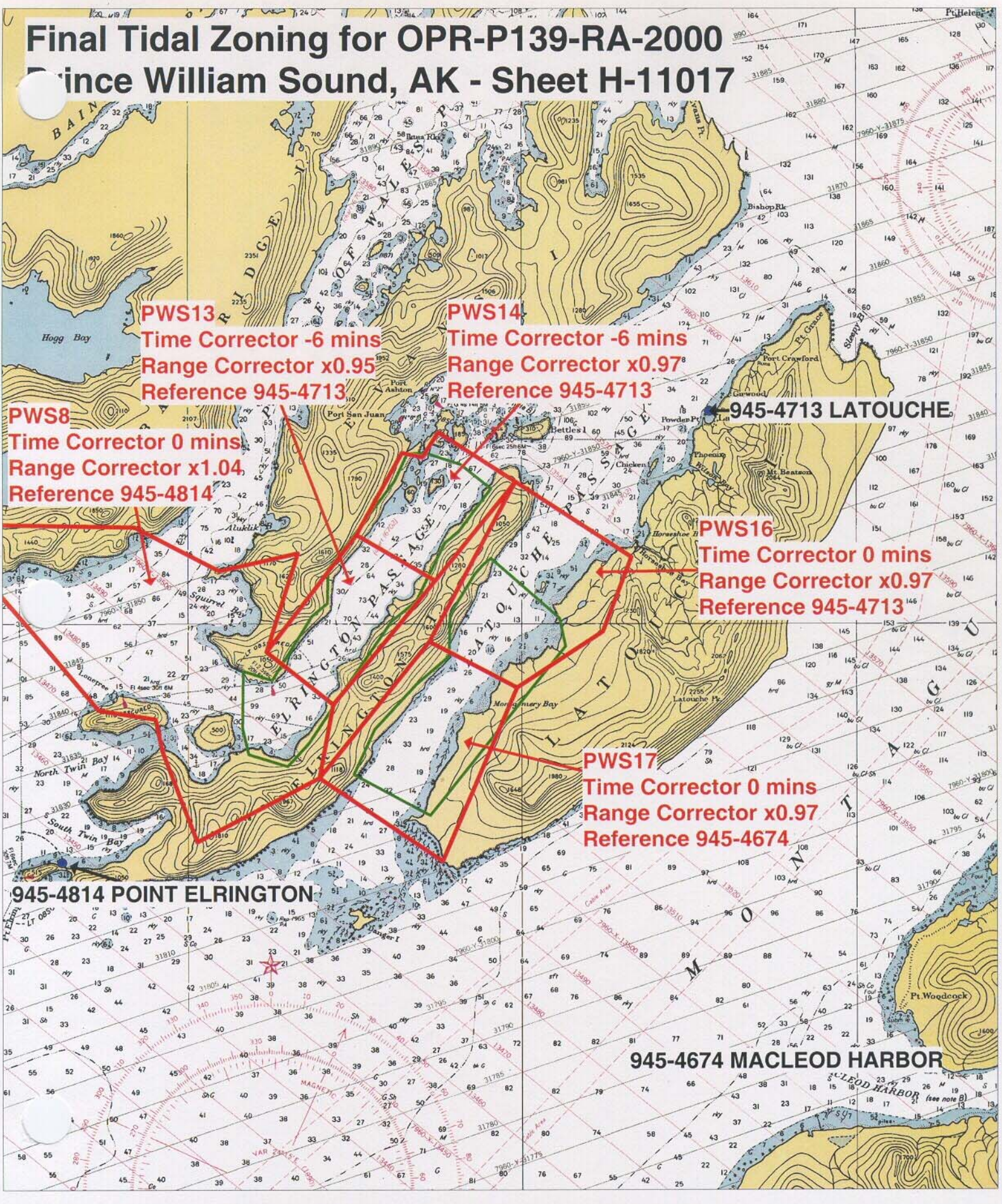
**945-4713 LATOUCHE**

**PWS16**  
Time Corrector 0 mins  
Range Corrector x0.97<sup>b</sup>  
Reference 945-4713

**PWS17**  
Time Corrector 0 mins  
Range Corrector x0.97<sup>b</sup>  
Reference 945-4674

**945-4814 POINT ELRINGTON**

**945-4674 MACLEOD HARBOR**





Final tide zone node point locations for OPR-P139-RA-2000,  
Sheet H-11017.

Format: Longitude in decimal degrees (negative value denotes  
Longitude West),  
Latitude in decimal degrees  
Tide Station (in recommended order of use)  
Average Time Correction (in minutes)  
Range Correction

	Tide Station Order	AVG Time Correction	Range Correction
Zone PWS8			
-148.101438 59.961313	945-4814	0	1.04
-148.094537 59.979726	945-4674	0	0.95
-148.1278 59.99291			
-148.112097 60.017595			
-148.151278 60.013188			
-148.193595 60.024143			
-148.271815 60.024853			
-148.27125 60.013442			
-148.211626 59.97828			
-148.183105 59.976066			
-148.179621 59.968014			
-148.162288 59.945242			
-148.101438 59.961313			
Zone PWS13			
-148.082975 60.022212	945-4713	-6	0.95
-148.1278 59.99291	945-4674	0	0.97
-148.094537 59.979726			
-148.043431 60.010746			
-148.082975 60.022212			
Zone PWS14			
-148.041876 60.047949	945-4713	-6	0.97
-148.04989 60.04162	945-4674	+6	1.00
-148.060097 60.042801			
-148.082975 60.022212			
-148.043431 60.010746			
-148.003257 60.035518			
-148.041876 60.047949			

Zone PWS16

-148.046422 59.995503	945-4713	0	0.97
-148.003257 60.035518	945-4674	+6	1.00
-147.945334 60.016621			
-147.959618 59.998027			
-148.002476 59.983918			
-148.046422 59.995503			

Zone PWS17

-148.046422 59.995503	945-4674	0	0.97
-148.101438 59.961313			
-148.039826 59.940341			
-148.002476 59.983918			
-148.046422 59.995503			



# Descriptive Report to Accompany Hydrographic Survey H11017

Project OPR-P139-RA-00  
Southwest Prince William Sound

Scale 1:10,000

July 2002

**NOAA Ship RAINIER**

Chief of Party: Captain James C. Gardner, NOAA

## A. AREA SURVEYED

This additional survey work was conducted to complete survey H11017 which was begun in 2000. The hydrography for this survey was completed in 2000 but the shoreline was not addressed at that time. The survey area is located in southwest Prince William Sound and includes Latouche Passage West of Latouche Island, and Elrington Passage East of Evans Island. This survey corresponds with sheet "BF" in OPR-P139-RA-00<sup>1</sup> dated Aug 25, 2000 the Letter Instructions.

Data acquisition was conducted from 10 July to 11 July 2002 (DN 191 to 192).<sup>2</sup>

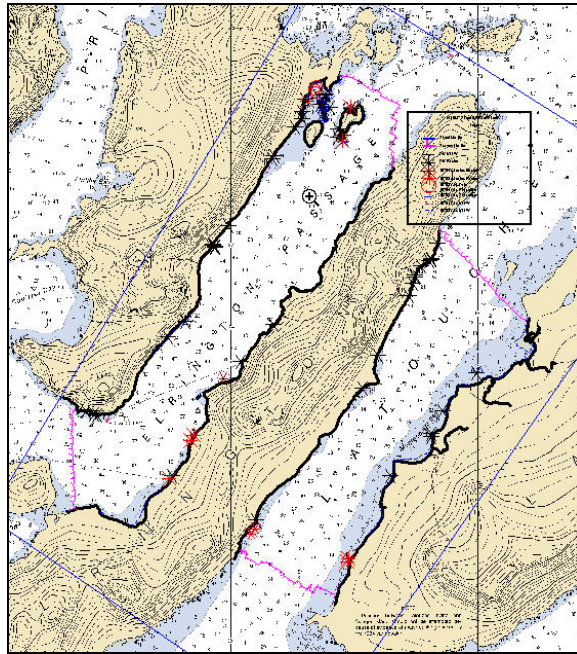


Figure 1. H11017 Limits of VBES Hydrography

**DATA ACQUISITION AND PROCESSING**

A complete description of data acquisition and processing systems, survey vessels, quality control procedures, and data processing methods, can be found in the *OPR-P139-RA-02 Data Acquisition and Processing Report* submitted under separate cover. Items specific to this survey and any deviations from the aforementioned report are discussed in the following sections.

**B1. Equipment and Vessels**

Vessels 2121, 2122, and 2127 were used to acquire vertical-beam echo soundings. No bottom samples were acquired during this survey. No unusual vessel configurations or problems were encountered on this survey.<sup>3</sup>

**B2. Quality Control**

**Crosslines**

No multibeam data was acquired. A shoreline VBES buffer line was the only sounding data acquired, and is only submitted to supplement hydrographic soundings collected in 2000 where nearshore coverage was not acquired.<sup>4</sup>

**Junctions<sup>5</sup>**

The following contemporary survey junctions with H11017:

<b>Registry #</b>	<b>Scale</b>	<b>Date</b>	<b>Junction side</b>
H11172	1:10,000	2002	West
H11166	1:10,000	2002	South
H11013 <sup>6</sup>	1:10,000	2000	Northeast

Final comparisons will be made at the Pacific Hydrographic Branch (PHB) after the application of smooth tides.<sup>7</sup>

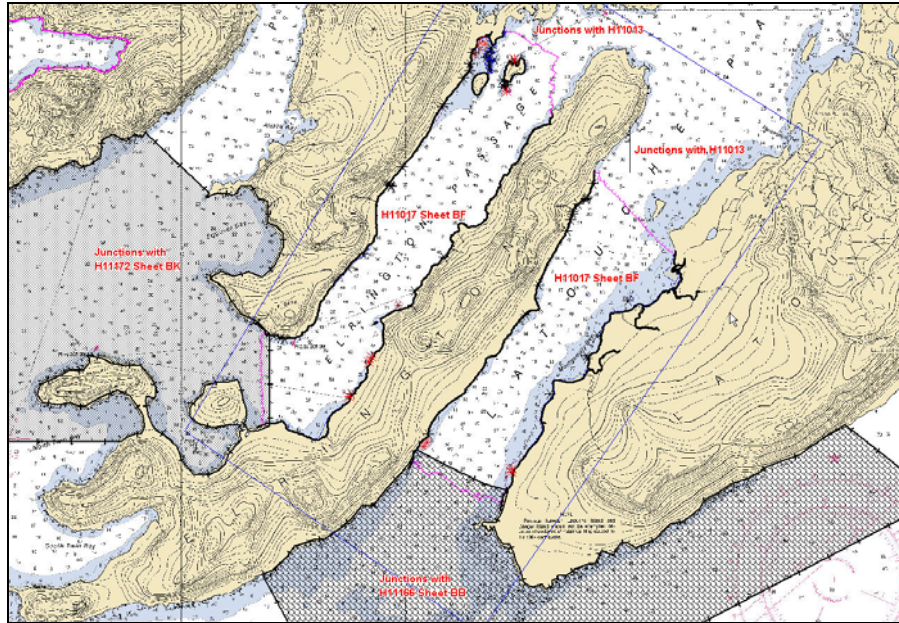


Figure 2. H11017 Survey Junctions

### Data Quality Factors

On day 223 RA1's buffer line of the North shore of Latouche Passage was found to be corrupt when data was transferred from the launch to the ship. This data was rejected and is not included with this survey. This does not affect the survey's expected accuracy and quality of survey data.<sup>8</sup>

### B3. Data Reduction

Data reduction procedures for survey H11017 conform to those detailed in the *OPR-P139-RA-02 Data Acquisition and Processing Report*.

## B. VERTICAL AND HORIZONTAL CONTROL

A complete description of vertical and horizontal control for survey H11017 can be found in the *OPR-P139-RA-02 Horizontal and Vertical Control Report* submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

### 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 Cape Hinchinbrook (292 kHz) and Potato Point (298 kHz) were utilized during this survey. Launch-to-launch DGPS performance checks were performed weekly in accordance with Section 3.2 of the FPM. Copies of the performance checks are included in the *OPR-P139-RA-02 Horizontal and Vertical Control Report*.

## 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) served as control for datum determination and as the primary source for water level reducers for survey H11017.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Guguak	945-4751	30-day	6 August 2002	12 September 2002
Latouche	945-4713	30-day	30 June 2002	12 September 2002
Point Elrington	945-4814	30-day	30 June 2002	12 September 2002
Bainbridge Point	945-4755	30-day	9 August 2002	9 September 2002

All data were reduced to MLLW using unverified observed tides from station Cordova, AK using the tide file 9454050.tid and correctors using the zone definition file P139RA2002CORP.zdf.

The Pacific Hydrographic Branch will apply final approved (smooth) tides to the survey data during final processing<sup>9</sup>. A request for delivery of final approved (smooth) tides for survey H11017 was forwarded to N/OPS1 on September 17, 2002 in accordance with FPM 4.8. A copy of the request is included in Appendix IV<sup>10</sup>.

## C. RESULTS AND RECOMMENDATIONS

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

No automated wreck and obstructions (AWOIS) are located within the limits of H11017<sup>11</sup>.

### D.2 Chart Comparison

Survey H11017 was compared with chart 16702 (10<sup>th</sup> Ed.; June 13, 1998, 1:40,000) and chart 16701 (18<sup>th</sup> Ed.; March 9, 2002, 1:81,436).

Depths from charts 16701 and 16702 adequately agree with the current single beam survey depths, with soundings from H11017 generally shoaler than charted soundings by half a fathom. There are no distinctive differences in the charted and observed depths<sup>12</sup>.

Final sounding comparisons will be made at the Pacific Hydrographic Branch after the application of smooth tides<sup>13</sup>.

## Recommendations

Buffer line soundings should supplement sounding data collected for H11017 in 2002 and should supercede charted soundings in their common area.<sup>14</sup>

### D.3 Shoreline

#### Shoreline Source

The cartographic feature file (CFF) DM-10303 and (CFF) DM-10302 from photogrammetric project 92012 was used as source shoreline for this survey.<sup>15</sup>

#### Shoreline Verification

Limited shoreline verification was conducted near predicted low water in accordance with the Standing Project Instructions and FPM sections 6.1 and 6.2. Detached positions (DPs) taken during shoreline verification were recorded in HYPACK and on DP forms<sup>16</sup>, and then processed in Pydro. These indicate revisions to features and to features not found on the verified shoreline. In addition, annotations describing shoreline were recorded on hard copy plots of digital shoreline. DP forms are included in Section I of the *Separates to be Included with Survey Data*.<sup>17</sup>

A detailed Detached Position (DP) plot, in both paper copy<sup>18</sup> and MapInfo format, is provided showing all detached positions with notes relating to each feature. The updated shoreline and features are also depicted on the final sounding plot. Verified CFF shoreline that did not require revision is in MapInfo table H11017\_Charted\_Shoreline and shown in black. New MHW features and changes to the MHW shoreline, CFF or charted, are displayed in red on the “H11017\_ShorelineUpdates” MapInfo table. Charted shoreline, when used for reference purposes or when source data were not available, is depicted in the MapInfo table “H11017\_Charted\_Shoreline.” and displayed in brown.

#### Source Shoreline Changes and New Features

The source shoreline generally agrees with field verification.

A new MLLW was positioned in Latouche Passage, Ak. The extents of the MLLW are defined by DP's 22234591, (Lat. 59° 59' 36.93" N Long. 147° 59' 57.21" W[444254.03 E, 6651122.48 N]), 22234592, and 22234593. Chart MLLW as shown on DP plot.<sup>19</sup>

A new ledge in Latouche Passage, Ak was positioned with DP 22233384 Lat. 59° 58' 58.85" N Long. 148° 00' 58.65" W(443278.43 N, 6649957.52 E) and DP 22233385. Chart ledge as shown on DP plot.<sup>20</sup>

A new ledge exist in Elrington Passage, Ak. Was positioned by DP 722212 Lat. 60° 02' 21.35" N Long. 148° 03' 05.66" W(441416.28 N, 6656248.17 E). Chart ledge as shown on DP plot.<sup>21</sup>



A new ledge was positioned by DP 2222191 at location Lat. 59° 58' 27.25" N, Long . 148° 06' 16.32" W(438345.63 N, 6649056.42 E) and northern seaward most extent marked by DP 2222192. Chart ledge as shown on DP plot.<sup>22</sup>

A new ledge was positioned by DP 2231147 at location Lat. 59° 57' 32.88" N 148° 02' 43.13" W(441618.19 N, 6647324.20 E) and 2231146. Chart ledge as shown on DP plot.<sup>23</sup>

### Charted Features

Three charted (16702) Piles along the east side of Evans Island were disproved with a 5-minute visual search, a star pattern using VBES was used to search the area, and the bottom was visible during the search. In addition 100% SWMB coverage was observed in 2000.

Hydrographer recommends removal of charted piles at the following locations:<sup>24</sup>

Position Lat. 60° 02' 24.44" N Long. 148° 03' 16.64" W

Position Lat. 60° 02' 22.83" N Long. 148° 03' 18.92" W

Position Lat. 60° 02' 20.65" N Long. 148° 03' 17.60 "W

The following rocks at the listed DP (detached Position) location have been disproved<sup>25</sup> using 5 minute visual, a star pattern VBES search pattern, and DP of supposed position, with a clear visibility of the bottom at all times.

DP	Position
2222219	Lat. 59° 58' 50.80" N Long. 148° 05' 50.28" W, (438345.63 N, 6649056.42 E)
2222223	Lat. 59° 58' 53.85" N Long. 148° 05' 47.35" W, (438808.48 N, 6649871.69 E)]
2222266	Lat. 59° 59' 28.08" N Long. 148° 05' 09.79" W, (439408.14 N, 6650920.87 E)
22231145	Lat. 59° 57' 37.00" N Long. 148° 02' 40.30" W, (441670.47 N, 6647447.89 E)
22231144	Lat. 59° 57' 38.64" N Long. 148° 02' 38.74" W, (441695.40 N, 6647498.12 E)]

### Recommendations

The Hydrographer recommends that the shoreline as depicted on the DP plot and final sounding plot supersede and complement shoreline information compiled on the DM and charts as noted.<sup>26</sup> These revisions are recorded in the MapInfo digital files named "H11017\_Shoreline" and "H11017\_ShorelineUpdates". In addition, field notes made by the Hydrographer, including verification of source features and descriptions of shoreline classification, are submitted in the digital MapInfo file "H11017\_ShorelineNotes."

#### D.4 Dangers to Navigation

No DTONs were found.<sup>27</sup>

#### D.5 Aids to Navigation

One aid to navigation (ATON) is located within the limits of H11017. No DP was taken, but ATON Light #25970 was observed in its charted location.<sup>28</sup>



**D.6 Miscellaneous**

Bottom samples were not collected.<sup>29</sup>

**E. APPROVAL**

As Chief of Party, 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 2002.

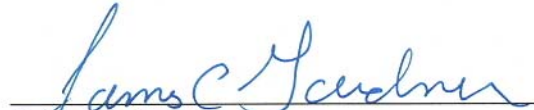
The digital data and supporting records have been reviewed by me, are considered complete and adequate for charting purposes, and are approved. All records are forwarded for final review and processing to N/CS34, Pacific Hydrographic Branch.

Survey H11017 is complete and adequate to supersede charted soundings in their common areas. No additional work is required for this survey.<sup>30</sup>

Listed below are supplemental reports submitted separately, which 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-RA-02	Nov. 25, 2000	N/CS34
Horizontal and Vertical Control Report for OPR-P139-RA-02	April 20, 2001	N/CS34
Tides and Water Levels Package for OPR-P139-RA-02	Nov. 27, 2000	N/OPS1
Coast Pilot Report for OPR-P139-RA-02	TBD	N/CS26

Approved and Forwarded:



3-19-03

James C. Gardner  
Captain, NOAA  
Commanding Officer

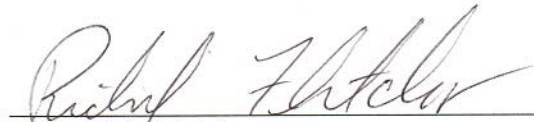
In addition, the following individuals were also responsible for overseeing data acquisition and processing of this survey:

Survey Sheet Manager:



Michael S. Snow  
Lieutenant Junior Grade, NOAA

Field Operations Officer:



Richard A. Fletcher  
Lieutenant Commander, NOAA

### Revisions Compiled During Office Processing and Certification

---

<sup>1</sup> Concur

<sup>2</sup> Concur

<sup>3</sup> Concur with hydrographer's statements.

<sup>4</sup> Concur

<sup>5</sup> The junction with surveys H11166 and H11177 are complete. Soundings and depth curves are in good agreement. A "JOINS" note has been added to the smooth sheet where applicable.

<sup>6</sup> Refer to endnote 7 in the descriptive report for 2000 survey work.

<sup>7</sup> Concur. The comparison with H11166 and H11171 reflects good agreement after application of approved tides.

<sup>8</sup> Concur

<sup>9</sup> Concur. Approved tide note dated October 10, 2003 is attached.

<sup>10</sup> Filed with the hydrographic data

<sup>11</sup> Do not concur. See endnote 11 in the descriptive report for 2000 survey work.

<sup>12</sup> Do not concur. Refer to the 2000 descriptive report for a comparison with the chart and prior surveys.

<sup>13</sup> Concur. See endnote 12.

<sup>14</sup> Concur. Chart the buffer line and shoreline verification information based on the smooth sheet information.

<sup>15</sup> Concur. This photogrammetric shoreline source has been compiled to the smooth sheet and revised as necessary based on the information provided by the hydrographer during shoreline verification.

<sup>16</sup> Filed with the hydrographic data

<sup>17</sup> Filed with the hydrographic data

<sup>18</sup> Filed with the hydrographic data

<sup>19</sup> Concur with clarification. Chart this area based on the smooth sheet information.

<sup>20</sup> Concur with clarification. Chart this area based on the smooth sheet information.

<sup>21</sup> Concur with clarification. Chart this area based on the smooth sheet information.

<sup>22</sup> Concur with clarification. Chart this area based on the smooth sheet information.

<sup>23</sup> Concur with clarification. Chart this area based on the smooth sheet information.

<sup>24</sup> Concur with clarification. These items were discussed under section **D.1** of the 2000 survey work (AWOIS 52611). Chart this area based on the smooth sheet information.

<sup>25</sup> Concur

<sup>26</sup> Concur with clarification. Shoreline verification conducted by the hydrographer has been analyzed during office processing and shown on the smooth sheet as warranted.

<sup>27</sup> Concur for the 2002 survey work. Dangers to navigation were submitted in 2000 and are attached to the 2000 descriptive report.

<sup>28</sup> Concur. Same ATON was also discussed in 2000 survey work.

<sup>29</sup> Concur

<sup>30</sup> Concur



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL OCEAN SERVICE  
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: October 10, 2003

HYDROGRAPHIC BRANCH: Pacific  
HYDROGRAPHIC PROJECT: OPR-P139-RA-2002  
HYDROGRAPHIC SHEET: H11017 (Revised)

LOCALITY: Prince William Sound, AK  
TIME PERIOD: August 10-11, 2002

TIDE STATION USED: 945-4713 LaTouche, AK  
Lat. 60° 03.3'N Lon. 147° 54.4'W  
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters  
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.255 meters

REMARKS: RECOMMENDED ZONING  
Use zone(s) identified as: PWS8, PWS13, PWS14, PWS16 & PWS17.

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 new 1983-2001 National Tidal Datum Epoch (NTDE).

*Fan [Signature]*

CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION



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-148.003257 60.035518  
-147.945334 60.016621  
-147.959618 59.998027  
-148.002476 59.983918  
-148.046422 59.995503

Zone PWS17

945-4713

0

0.94

-148.046422 59.995503  
-148.101438 59.961313  
-148.039826 59.940341  
-148.002476 59.983918  
-148.046422 59.995503



**Final tide zone node point locations for OPR-P139-RA-2002, H11017-rev**


Format:                    Tide Station (in recommended order of use)  
                               Average Time Correction (in minutes)  
                               Range Correction  
                               Longitude in decimal degrees (negative value denotes  
                               Longitude West),  
                               Latitude in decimal degrees

	Tide Station Order	AVG Time Correction	Range Correction
Zone PWS8	945-4713	0	0.92
-148.101438 59.961313			
-148.094537 59.979726			
-148.1278 59.99291			
-148.112097 60.017595			
-148.151278 60.013188			
-148.193595 60.024143			
-148.271815 60.024853			
-148.27125 60.013442			
-148.211626 59.97828			
-148.183105 59.976066			
-148.179621 59.968014			
-148.162288 59.945242			
-148.101438 59.961313			
Zone PWS13	945-4713	0	0.94
-148.082975 60.022212			
-148.1278 59.99291			
-148.094537 59.979726			
-148.043431 60.010746			
-148.082975 60.022212			
Zone PWS14	945-4713	0	0.97
-148.041876 60.047949			
-148.04989 60.04162			
-148.060097 60.042801			
-148.082975 60.022212			
-148.043431 60.010746			
-148.003257 60.035518			
-148.041876 60.047949			
Zone PWS16	945-4713	0	0.97
-148.046422 59.995503			

APPROVAL SHEET  
H11017


Initial Approvals:

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, and verification or disproval of charted data. The survey records and digital data comply with NOS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

  
\_\_\_\_\_  
Russ Davies  
Cartographer, Cartographic Team  
Pacific Hydrographic Branch

Date: 11/04/04

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

  
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Donald W. Haines  
LCDR, NOAA  
Chief, Pacific Hydrographic Branch

Date: 23 NOV 2004

