

H-11097

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.* ..... OPR-0331-KR

*Registry No.* ..... H-11097

### LOCALITY

*State* ..... ALASKA

*General Locality* ..... Kasaan Bay

*Sublocality* ..... Grindall Island to Kasaan Peninsula

2002

### CHIEF OF PARTY

Frederick W. Iversen

### LIBRARY & ARCHIVES

DATE .....

**HYDROGRAPHIC TITLE SHEET**

**H-11097**

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.

State Alaska

General Locality Kasaan Bay

Sublocality Grindall Island to Kasaan Peninsula

Scale 1:10,000

Date of Survey June 8-August 9,2002

Instructions Dated 1/29/2002

Project No. OPR-O331-KR-02

Vessel Luna Sea and Royal Fish

Chief of Party Frederick W. Iversen

Surveyed by Terra Surveys, LLC personnel

Soundings taken by echo sounder, hand lead, pole Reson 8101 & 8124

Graphic record scaled by N/A

Graphic record checked by N/A

Evaluation by B Taylor

Automated plot by HP Design Jet 1055cm+

Verification by G Nelson

Soundings in Fathoms and tenths

at

MLLW

REMARKS: Time in UTC.

**Revisions and annotations appearing as endnotes were generated during office**

**processing. All separates are filed with the project data. As a result, page numbering-**

**may be interrupted or non-sequential.**

**Terra Surveys**

**1930 Whiting Circle**

**Palmer, AK 99645**

Descriptive Report to Accompany Hydrographic Survey H-11097

Sheet A

Scale 1:10,000

June 8-August 9, 2002

Terra Surveys, LLC

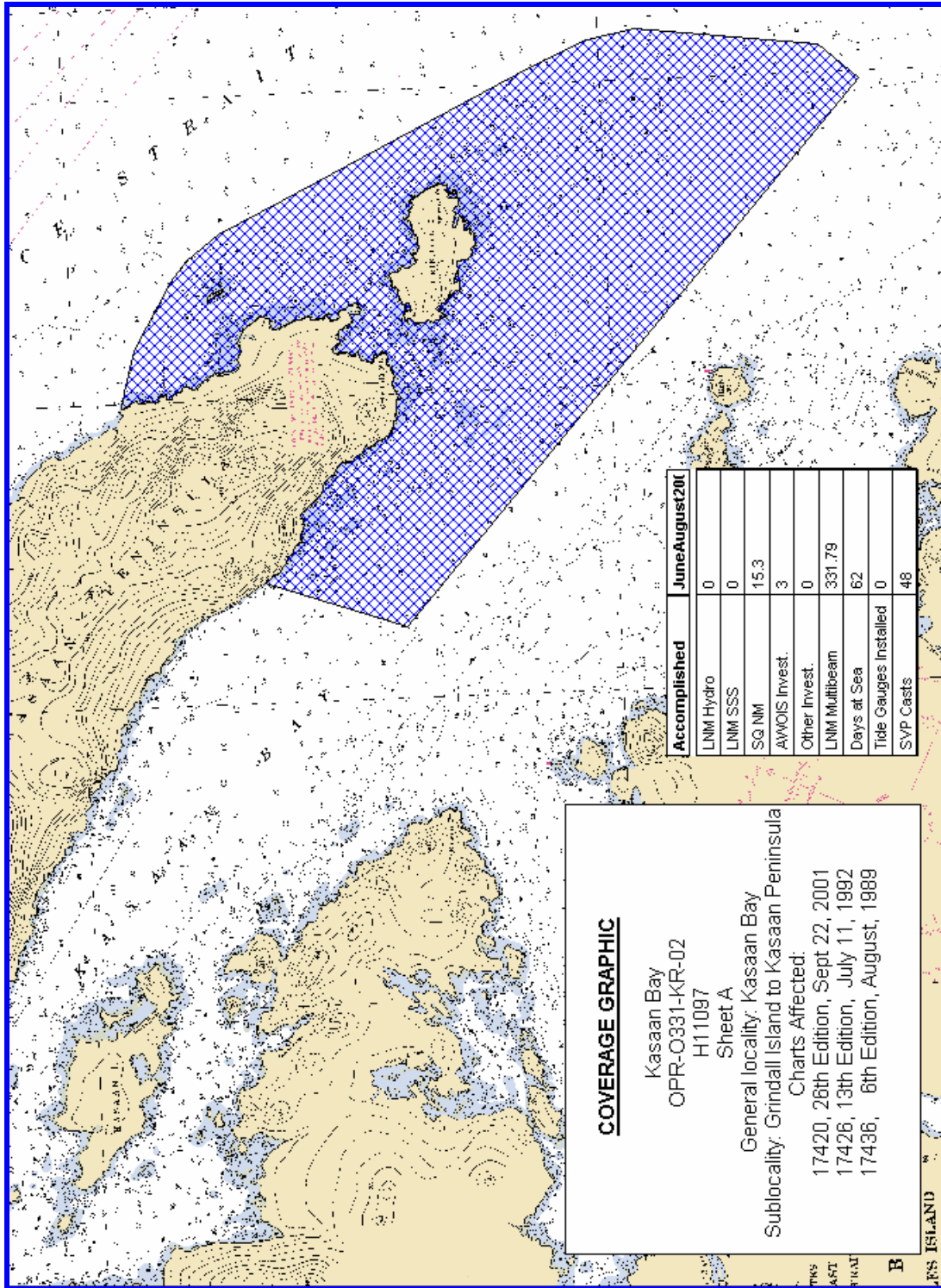
Lead Hydrographer: Frederick W. Iversen

**A. AREA SURVEYED**

This navigable area survey was conducted in accordance with Hydrographic Project Instructions OPR-O331-KR-02, Kasaan Bay, Alaska dated January 29, 2002.

The purpose of this contract was to provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of this area. Kasaan Bay consists of abruptly irregular bathymetry ranging in depths<sup>1</sup> 1 fathom above datum to as deep as 278 fathoms in the eastern entrance to the bay. The bottom type is also variable ranging from hard bedrock to silty mud flats. The Inter-Island Ferry's Prince of Wales, transports passengers twice a day from Ketchikan to Hollis and return. The ferry's transit lies in the northern half of the channel between Patterson Island and Grindall Island at the entrance, and then north of Kasaan Island and into Hollis ferry terminal. Kasaan Bay is also used commercially by fisherman and crabbers. The project area is approximately 15.3 square nautical miles and extends from Grindall Island to Kasaan Peninsula.<sup>2</sup>

Two shallow water multibeam sonar systems were used to locate and determine the least depth over the obstructions, wrecks and shoals as well as to determine the least depths over the entire project area. This survey has a maximum depth of 279 fathoms below datum and a minimum depth of 0.9 fathom above datum.



**COVERAGE GRAPHIC**  
 Kasaan Bay  
 OPR-0331-KR-02  
 H11097  
 Sheet A  
 General locality: Kasaan Bay  
 Sublocality: Grindall Island to Kasaan Peninsula  
 Charts Affected:  
 17420, 26th Edition, Sept 22, 2001  
 17426, 13th Edition, July 11, 1992  
 17436, 8th Edition, August, 1989

Accomplished	June	August	201
LNIM Hydro	0		
LNIM SSS	0		
SG NM	15.3		
AWOIS Invest.	3		
Other Invest.	0		
LNIM Multibeam	331.79		
Days at Sea	62		
Tide Gauges Installed	0		
SVP Casts	48		

## Section B Data Acquisition and Processing

### B.1 Equipment

#### *Luna Sea*

Approximately seventy percent of the soundings for this survey were acquired from the motor vessel *Luna Sea*, with the remaining data collected from the jet boat *Royal Fish*. The *Luna Sea* is a 35-foot aluminum hull boat with a 12.1-foot beam and a 2.25-foot draft. Major systems used on the *Luna Sea* are listed on the following table.

<b>VESSEL <i>Luna Sea</i></b> LOA: 35 FT, BEAM 12.1 FT, DRAFT: 2.25 FT	
<b>Equipment</b>	<b>Manufacturer &amp; Model</b>
<b>Multibeam sonar</b>	Reson SeaBat 8101
Positioning	Seatex Seapath 200 RTK
Sound velocity	Applied Microsystems 3317 4479
Vessel attitude	Seatex MRU 5

#### *Royal Fish*

The *Royal Fish* is a custom built Almar all-welded aluminum boat. Its overall length is 24 feet, with a beam of 8 feet and a draft of 1.5 feet. Major systems used on the *Royal Fish* are listed on the following table.

<b>VESSEL <i>Royal Fish</i></b> LOA: 24 FT, BEAM 8 FT, DRAFT: 1.5 FT	
<b>Equipment</b>	<b>Manufacturer &amp; Model</b>
<b>Multibeam sonar</b>	Reson SeaBat 8124
Positioning	Seatex Seapath 200
Sound velocity	Applied Microsystems 3279 4425
Vessel attitude	Seatex MRU 5 E

Equipment performance details are provided in the Project-Wide Report, Sections A, Equipment and B, Quality Control.<sup>3</sup>

## B2. Quality Control

### Line Spacing and Orientation

In general, the survey limits were constrained by the shoreline. This necessitated running shore “buffer” lines. There were slow, winding lines following the 4-meter curve. The Royal Fish typically ran several of these lines to build a buffer zone along the shore. At this point the Luna Sea could run the regular main-scheme lines into and along this zone with an increased margin of safety. Buffer lines were run at higher tides, giving us a significantly better swath width and greater success of reaching the 4-meter curve. A line heading was chosen to coincide with the main channel and/or contours and in most instances held through the remainder of the block or sheet. After the first line was run, the next line was set-up so that sufficient overlap would be achieved using the pre-decided beam angle filtering. Typically only 60° off nadir on the starboard and port channels were displayed to the coverage map in the collection software. Overlap was based on this.

### Crosslines

The internal consistency and integrity of the survey data was found to be good. All of the soundings that appear on the smooth sheet meet or exceed the accuracy requirements in the specifications.<sup>4</sup>

Survey H-11097 (Sheet A) had 200.0 nautical miles of main scheme lines and 16.4 NM of crosslines. This equates to 8.2% of the mainscheme lines and exceeds the<sup>5</sup> requirements of 5%.

There were 15 crosslines and 136 mainscheme lines in Sheet A. This resulted in 215 crossings. In addition to the mainscheme lines, a total of 366 shoreline buffer lines (112.7 NM) were collected along with an additional 9 crosslines (2.6 NM) in these areas. This resulted in an additional 95 crossings. A total of 25 crossings were analyzed, 18 from the Luna Sea and 7 from the Royal Fish. These varied spatially, and temporally, which complies with the requirements of the SOW.

Statistical analysis of the crossline comparisons was accomplished using the Caris HIPS Quality control report tool (MakeHist). This tool is used to compare the sounding data from the crossline against a reference DTM surface. The procedure was to compare the near-nadir beams of the mainscheme lines to the nearest unsmoothed soundings obtained from the crosslines. In addition, the nadir or near-nadir depths of the crosslines were compared to the nearest unsmoothed mainscheme soundings. In most cases the mainscheme line was selected to be close in time to the crossline in order to minimize any failed intersections due to bottom change as opposed to sounder error. The output from this tool is a text report containing statistical results of the differences between the crossline data and the mainscheme line data. The statistics are grouped by sonar beam number and can be found in Separate V<sup>6</sup> of this report. A spreadsheet is included which summarizes the range of beams within each crossline comparison which meet or exceed the 95% compliance standard.

The crossline reports generated with the Caris program use a class file that was developed from the NOAA specifications for this project. The table below shows the parameters for this class file.

Min. Depth	Max. Depth	Allowable Error
0.0m	-10.00m	0.504m
-10.00m	-20.00m	0.537m
-20.00m	-30.00m	0.596m
-30.00m	-40.00m	0.676m
-40.00m	-60.00m	0.821m
-60.00m	-80.00m	1.038m
-80.00m	-100.00m	1.272m
-100.00m	-140.00m	1.638m
-140.00m	-200.00m	2.266m
-200.00m	-1000.00m	1.31%

*Each error in the file is for a depth mid-way between each group (ex. -10.00 to -20.00 uses -15 depth to compute an allowable error of .54). From -50m and deeper, a slope was computed. The computed allowable errors met NOAA specifications for this project.*

Two histograms were made from the final smoothsheet soundings. The graphs show sounding distribution by beam number. Two multi-beam echo sounders were used on H-11097, Sheet A. One was a Reson 8101 with 101 beams and the other a Reson 8124 with 80 beams. The beams for the 8101 sounder are numbered from port to starboard, 1-101 with beam 51 representing the nadir beam. Likewise the 8124 sounder is numbered from port to starboard, 1-80, with beam 41 representing the nadir beam.

### **8101 Histogram (*Luna Sea*)**

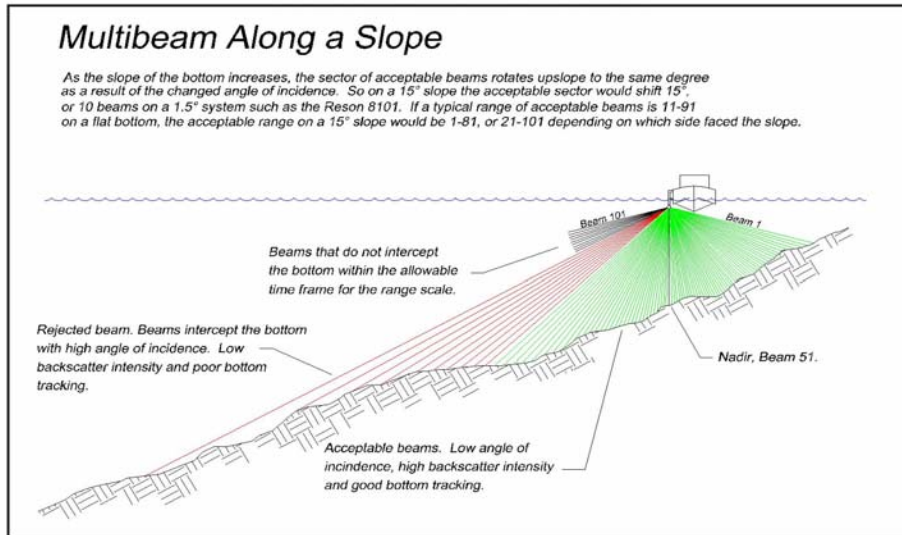
The distribution of smoothsheet soundings across the range of beams is well distributed. Areas that show anomalies are at nadir (beams 48-53), beam 90 and the outer beams of the port (1-9) and starboard side (96-101).

The above-average nadir beam selections<sup>7</sup> is something Terra Surveys, LLC has seen before and are<sup>8</sup> systematic to this sounder. It is called the nadir spiking effect and it can be seen as an artifact in the sun-illuminated DTM image. When two lines from this sounder are compared using the crossline analysis tool, the number of acceptable soundings of these beam numbers (48-53) is usually less than<sup>9</sup> 5% of their neighbors, but still within acceptable tolerance. The shoal biasing of all cells brings these shoaler soundings into the final data set.

The high number of beam 90 soundings is a result of the filtering parameters used during cleaning. Most lines had an initial beam angle filter of 60 degrees applied. Beams 11 and 90 then became the outermost beams on the port and starboard side respectively. When the Luna Sea ran shore-buffer lines, it was typically with the starboard side to the beach, making beam 90 the shoalest beam for most profiles.

The occurrence<sup>10</sup> of soundings from outer beams significantly tapers off from beam 10 to beam 1 on the port side and beam 96 to beam 101 on the starboard side, of which fewer exist on<sup>11</sup> the port side due to hull and engine noise. Outer beams were only used in localized areas of excellent data quality. Excellent data quality was found in areas with bottom types that produced strong returns, shoal areas where the effects of roll and sound velocity artifacts were reduced, and along steep terrain where the outermost beams had a better angle of incidence on the up-hill side. This was often the case, due to the steep slopes encountered through most of the survey. This effect is shown in the following figure:





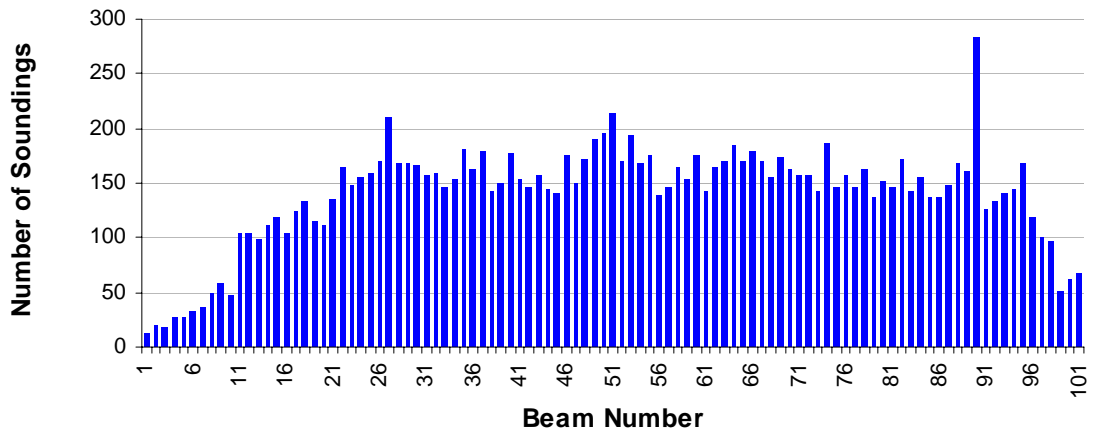
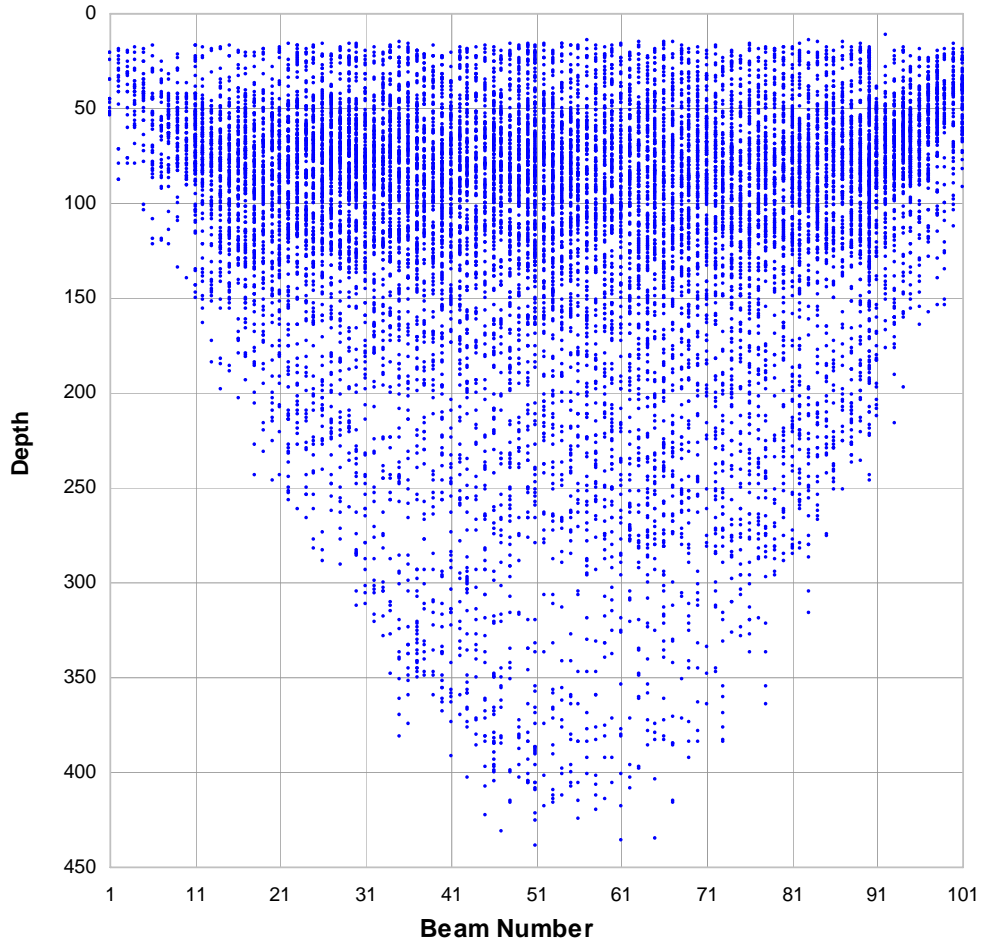
The statistics from crossline analysis did not support the use of the outermost beams in several of the depth ranges. This can be seen in the Crossline Summary, Section V. of the Separates<sup>12</sup>, where some outer beams used fall short of the 95% confidence level. It is held that the problem was the lack<sup>13</sup> suitable areas within the sheet to run crosslines, smooth and gently sloping seafloor, and not in the quality of mainscheme data. The radically changing bottom and steep slopes meant that much of the depth error budget could be spent by positional errors well within specifications. For example, 2 meters of position error could result in 1 meter of depth error on a 30 degree slope. This position error is not accounted for in the depth error budget laid out in the Technical Specifications and Deliverables Section 5.4.5<sup>14</sup>. The statistical analysis of crosslines in Sheet D, an area of less drastic bottom changes, demonstrate the reliability of the sounding equipment and methodology used throughout the survey.<sup>15</sup>

### 8124 Histogram (*Royal Fish*)

This chart shows large spikes in the outer beams. The *Royal Fish* was used for all of the shallow-water surveying. A review of the smoothsheet shows that most shoreline soundings were from the 8124's outer beams. This is a result of surveying parallel to the shore with the *Royal Fish*, thus causing the outer beams to collect the shoalest soundings.

The *Royal Fish* was also used to collect data along the northeast edge of the sheet where depths ranged from 200 - 500m. It was found that the Reson 8124 on the *Royal Fish* was able to track the bottom better than the Reson 8101 on the *Luna Sea* at these depths. No crossline data was available from the *Royal Fish* at these depths.

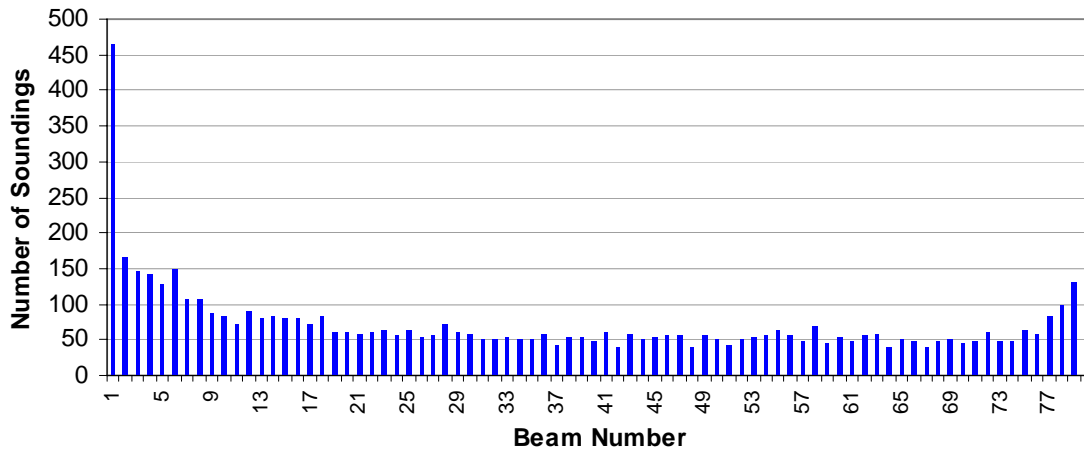
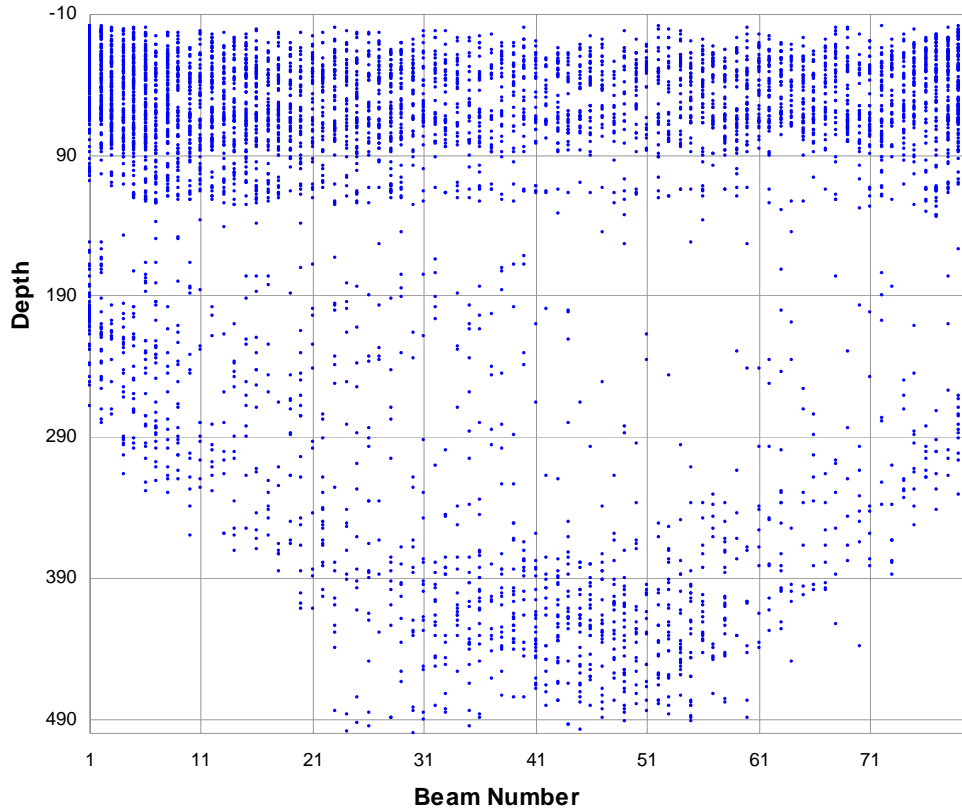
### Sheet A Smooth Sheet Sounding Distribution Luna Sea



**Beam # vs. # of Soundings on Smoothsheet by Vessel****LUNA SEA**

<b>Beam</b>	<b>Count</b>	<b>% of Total</b>	<b>Beam</b>	<b>Count</b>	<b>% of Total</b>
1	13	0.09	52	171	1.21
2	20	0.14	53	194	1.37
3	18	0.13	54	169	1.20
4	28	0.20	55	176	1.25
5	28	0.20	56	139	0.98
6	33	0.23	57	146	1.03
7	37	0.26	58	165	1.17
8	50	0.35	59	153	1.08
9	59	0.42	60	175	1.24
10	47	0.33	61	143	1.01
11	104	0.74	62	165	1.17
12	105	0.74	63	170	1.20
13	98	0.69	64	184	1.30
14	111	0.79	65	170	1.20
15	118	0.84	66	180	1.27
16	104	0.74	67	170	1.20
17	124	0.88	68	156	1.10
18	133	0.94	69	173	1.22
19	115	0.81	70	163	1.15
20	112	0.79	71	157	1.11
21	135	0.96	72	158	1.12
22	165	1.17	73	143	1.01
23	149	1.05	74	187	1.32
24	156	1.10	75	147	1.04
25	159	1.13	76	158	1.12
26	170	1.20	77	147	1.04
27	210	1.49	78	162	1.15
28	168	1.19	79	137	0.97
29	169	1.20	80	152	1.08
30	166	1.18	81	146	1.03
31	158	1.12	82	172	1.22
32	159	1.13	83	143	1.01
33	147	1.04	84	155	1.10
34	154	1.09	85	138	0.98
35	181	1.28	86	137	0.97
36	163	1.15	87	148	1.05
37	180	1.27	88	168	1.19
38	143	1.01	89	161	1.14
39	150	1.06	90	284	2.01
40	178	1.26	91	127	0.90
41	153	1.08	92	133	0.94
42	146	1.03	93	140	0.99
43	157	1.11	94	144	1.02
44	144	1.02	95	168	1.19
45	141	1.00	96	118	0.84
46	175	1.24	97	101	0.71
47	150	1.06	98	97	0.69
48	172	1.22	99	52	0.37
49	190	1.34	100	63	0.45
50	195	1.38	101	68	0.48
51	214	1.51			
			<b>Vessel Total</b>	<b>14127</b>	

### Sheet A Smoothsheet Sounding Distribution Royal Fish



**Beam # vs. # of Soundings on Smoothsheet by Vessel**

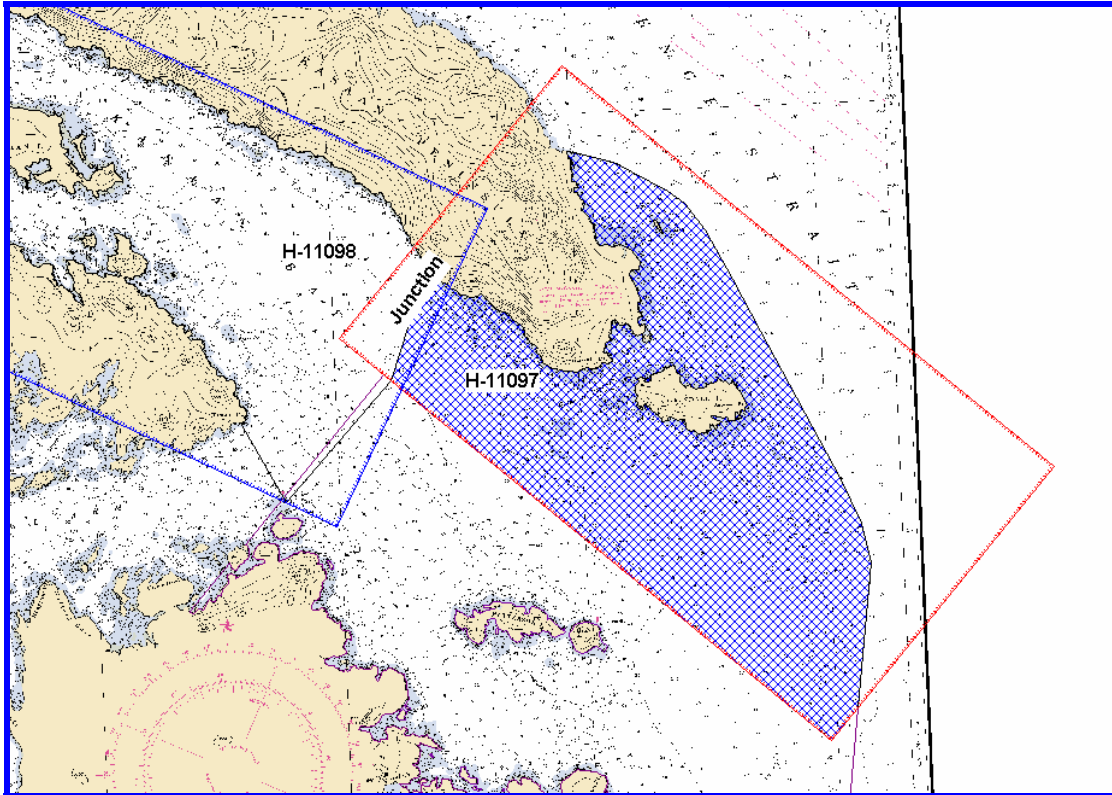
<b>ROYAL FISH</b>								
<b>Beam</b>	<b>Count</b>	<b>% of Total</b>	<b>Beam</b>	<b>Count</b>	<b>% of Total</b>			
1	466	7.76	50	52	0.87			
2	165	2.75	51	44	0.73			
3	146	2.43	52	52	0.87			
4	142	2.37	53	54	0.90			
5	128	2.13	54	55	0.92			
6	150	2.50	55	64	1.07			
7	107	1.78	56	57	0.95			
8	107	1.78	57	49	0.82			
9	88	1.47	58	69	1.15			
10	84	1.40	59	46	0.77			
11	72	1.20	60	53	0.88			
12	90	1.50	61	49	0.82			
13	80	1.33	62	55	0.92			
14	83	1.38	63	59	0.98			
15	81	1.35	64	39	0.65			
16	80	1.33	65	50	0.83			
17	72	1.20	66	47	0.78			
18	84	1.40	67	41	0.68			
19	62	1.03	68	47	0.78			
20	62	1.03	69	51	0.85			
21	59	0.98	70	46	0.77			
22	62	1.03	71	48	0.80			
23	65	1.08	72	61	1.02			
24	56	0.93	73	47	0.78			
25	64	1.07	74	49	0.82			
26	54	0.90	75	65	1.08			
27	57	0.95	76	59	0.98			
28	73	1.22	77	83	1.38			
29	61	1.02	78	99	1.65			
30	60	1.00	79	132	2.20			
31	51	0.85	80	335	5.58			
32	51	0.85	<b>Vessel Total</b>		<b>6002</b>			
33	53	0.88						
34	50	0.83						
35	51	0.85						
36	60	1.00						
37	44	0.73						
38	54	0.90						
39	54	0.90						
40	48	0.80						
41	61	1.02						
42	39	0.65						
43	59	0.98						
44	50	0.83						
45	53	0.88						
46	55	0.92						
47	56	0.93						
48	41	0.68						
49	55	0.92						

**Vessel Summary**

<b>Vessel</b>	<b>Sounding Count</b>	<b>% of Total Soundings</b>
Luna Sea	14127	70%
Royal Fish	6002	30%
<b>Totals</b>	<b>20129</b>	<b>100%</b>

### Contemporary Survey Junctions

The western limits of this survey junctions<sup>16</sup> H-11098 (2002, Scale 1:10,000) along it's easterly limits. The smoothsheet for H-11098 was plotted at the same scale as this survey and the soundings for both surveys agreed well.<sup>17</sup> There are no recommendations and no adjustments were made.



*The junction location of H-11079<sup>18</sup> and H-11098*

### Quality Control Checks

All of the quality control methods and procedures are detailed in the project wide Data Acquisition and Processing Report.<sup>19</sup> There were no unique problems that pertain to this survey. A table of Line Statistics is included in Separate V, Crossline Comparisons<sup>20</sup> that details all required aspects of quality control on each line.

### **B3. Corrections To Echo Soundings**

Hydrographic Survey H-11097 was performed with three other surveys in Project OPR-O331-KR-02. Changes to the corrections to echo soundings affect all four surveys in the area and is<sup>21</sup> described in the project wide Data Acquisition and Processing Report.<sup>22</sup>

#### **Tide Issues unique to H-11097**

The survey began on DN 159. Tide station Kasaan (945-0581) began collecting data on DN 155, prior to data collection. The data collected was reduced using Kasaan (945-0581).

#### **Luna Sea Pole Movement and Solution**

During the processing phase of subset mode, an anomaly in the *Luna Sea*'s data was detected. A series of patch tests pointed toward pole movement as the most likely cause. As a solution, the lead processor went over each day's data and tested the roll throughout that day. The roll offset was then adjusted accordingly in the same way a roll patch line would be done and changed in the vessel configuration file. Throughout the survey, the roll offset varied by as much as 1 degree. This issue was ultimately resolved by affixing bolts on the upper and lower alignment tubes to keep consistency in pole mount position. Refer to Section C of the DAPR<sup>23</sup> for more information. All the data processed with the roll offset adjustments met or exceeded the prescribed accuracy standard of the 95% confidence level.

### C. Vertical and Horizontal Control

Soundings for this survey were tide adjusted using data from NOAA tertiary station Kasaan (945-0581). It was installed by Terra Surveys, LLC and John Oswald Consulting (JOC) for this project. Ketchikan preliminary water level data were downloaded from the NOAA web site (<http://www.co-ops.nos.noaa.gov>) daily. Verified tide data and final zoning from these gauges were processed by JOC. The final zoning methodology is described in further detail in the project wide Vertical and Horizontal Control Report.<sup>24</sup>

The horizontal control datum for this survey is North American Datum of 1983 (NAD 83). The projection used during collection was UTM, Zone 8. United States Coast Guard Stations (USCG) *Annette Island* was used to send correctors to the survey vessels. A 24-hour observation on NGS station *ANN RESET* was used as a fixed point DGPS performance check on *Annette Island*. The observation survey showed the position on *ANN RESET* met the required accuracy standards. The 24-hour observation survey is detailed in the project wide Vertical and Horizontal Control Report. A summary of the daily DGPS confidence checks can be found in the project wide Vertical and Horizontal Control Report as well.

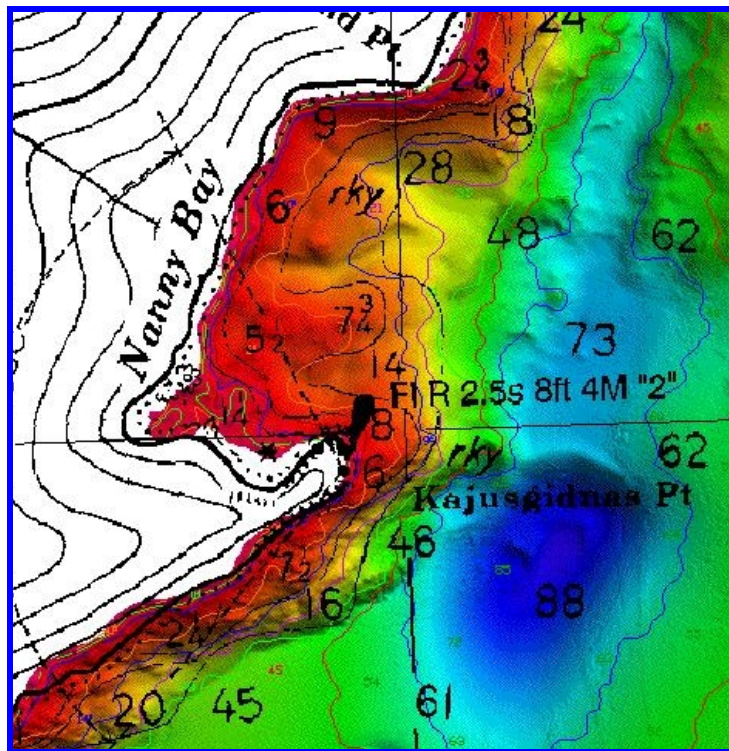


**D1. Chart Comparison<sup>25</sup>**

There was no Local Notice to Mariners that affected the survey area. Notice number 36 (Monthly Edition-September 2002) was the last notice reviewed for this project.

This survey was compared in AutoCAD Map and MicroStation to the following charts:

Chart	Scale	Edition	Date
17420	1:229,376	26 <sup>th</sup>	Sept. 22, 2001
17426	1:40,000 & 1:10,000	13 <sup>th</sup>	July 11,1992
17436	1:40,000	6 <sup>th</sup>	August 19, 1989



*A typical chart comparison combining 2002 weeded soundings, a digital terrain model and a monochrome chart.*



**Chart 17436**

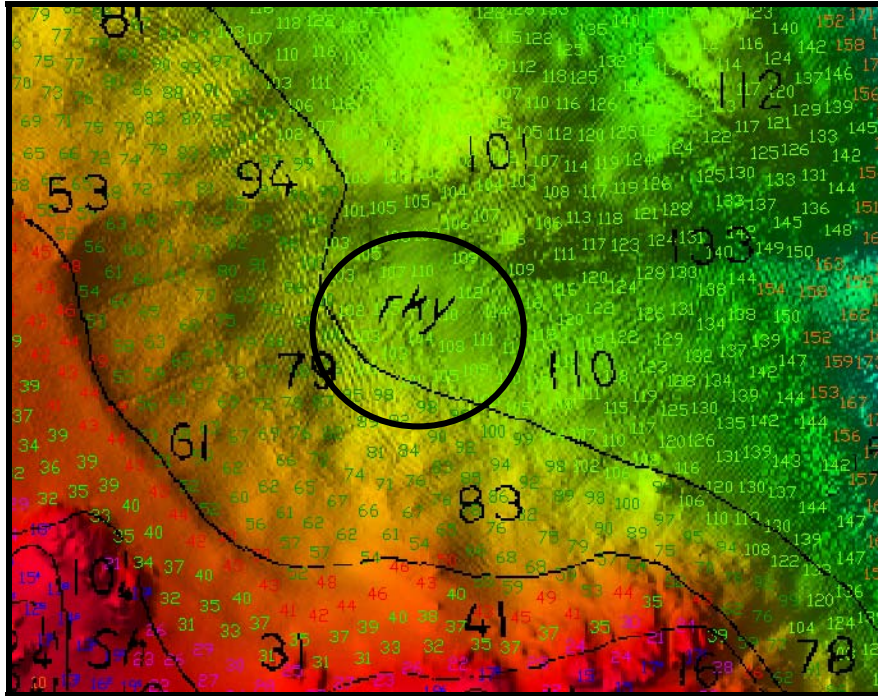
No significant changes were found and no recommendations were made.

**Chart 17426**

This chart comparison showed many changes within the survey and are<sup>28</sup> discussed on the following pages. As a result, a Danger to Navigation report was generated and can be found in Appendix I of this report.

## Rocky areas

There are two areas charted as rky(rocky) within the survey limits. A review of the soundings and digital terrain model shows that the area shown below is not rocky.



*A portion of monochrome Chart 17426, overlaid with 2002 soundings and the digital terrain model.*

## Recommendations

Based on the results of survey H-11097, the Hydrographer recommends removing the rky (rocky) symbol at 55°27'16"N and 132°07'14"W.<sup>29</sup>

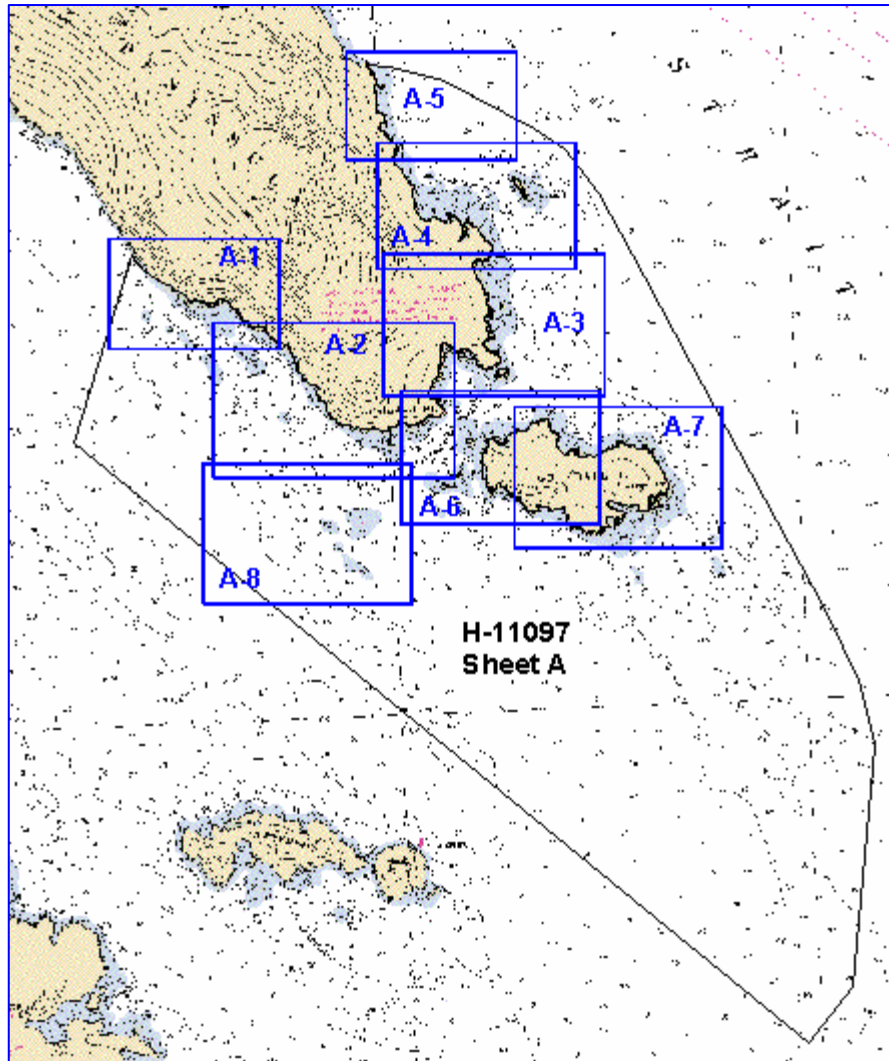
## New Rocky Areas

There are 78 new Rky(rocky) symbols identified in this survey. Their vicinities can be found circled in the following chartlet.<sup>30</sup> Additional new rocks are discussed in the chart comparison under additional findings.



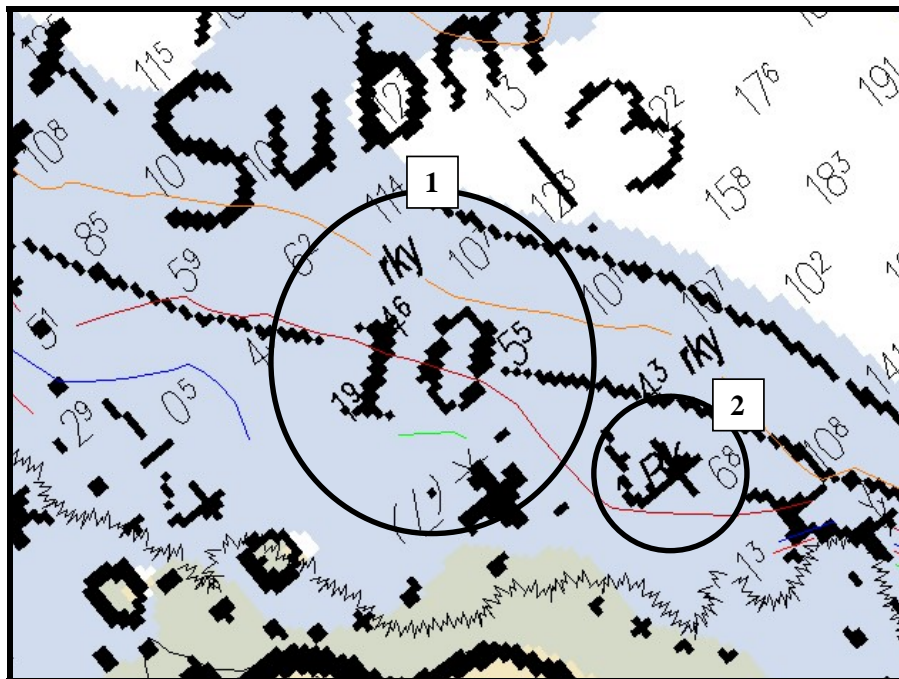
**Additional Findings**

There were numerous disagreements between Chart 17426 and survey H-11097.<sup>31</sup> The following tables and chartlets highlight areas that were shallower than the charted depths. Areas 11 fathoms and less were given the most attention. Refer to the vicinity map below for the locations of the compared areas.<sup>32</sup>



*Location index for compared areas of survey H-11097 and chart 17426*

Vicinity	Comment	Location Index
<b>Area 1</b> 55°28'27"N and 132°08'44"W	5 fathom curve labeled as 10-fathom curve. A Danger to Navigation report was generated. This area is also rocky and not noted as such on the chart.	A-4
<b>Area 2</b> 55°28'23"N and 132°08'42"W	A 1 fathom rock sounding in the same position as a charted 4 fathom sounding.	A-4

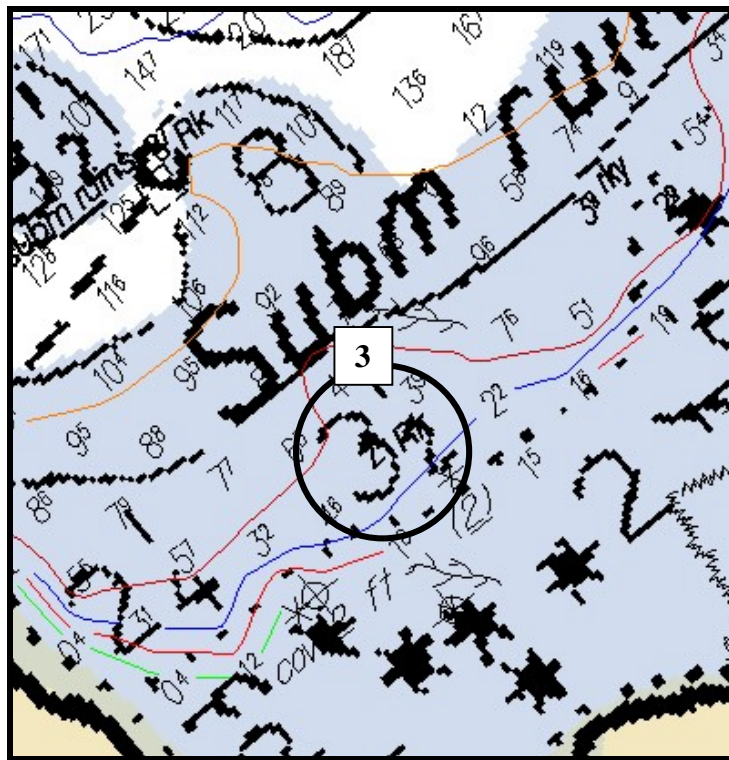


Portion of chart 17426 compared to survey H-11097 soundings and contours

**Recommendations**

Based on the results of survey H-11097, the Hydrographer recommends correcting the 5-fathom curve label at 55°28'27"N and 132°08'44"W and adding the rky(rocky) symbol in this area.<sup>33</sup> Also, a Rk(rock) symbol should be added at 55°28'23"N and 132°08'42"W.<sup>34</sup>

Vicinity	Comment	Location Index
<p><b>Area 3</b> 55°28'35"N and 132°09'19"W</p>	<p>A 2.4 fathom rock sounding in the same position as a charted 3 ½ fathom sounding.</p>	<p>A-4</p>



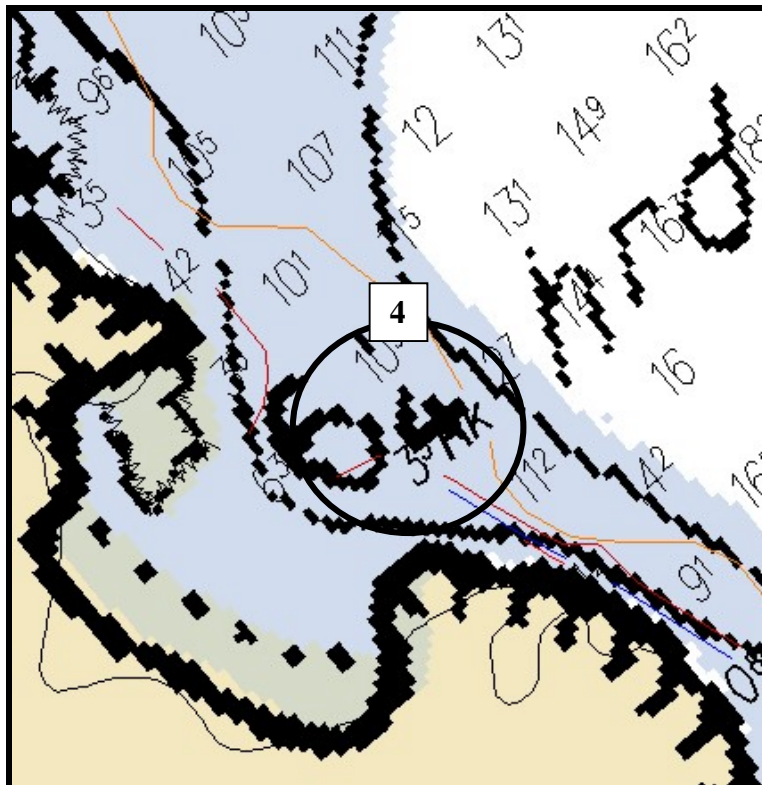
*Portion of chart 17426 compared to survey H-11097 soundings and contours*

**Recommendations**

Based on the results of survey H-11097, the Hydrographer recommends adding a Rk (rock) symbol and changing the sounding value to 2 ½ on the chart at 55°28'35"N and 132°09'19"W<sup>35</sup>



Vicinity	Comment	Location Index
<p><b>Area 4</b> 55°27'32"N and 132°08'36"W</p>	<p>A 3.5 fathom rock sounding in the same position as a charted 6 ¼ fathom sounding.</p>	<p>A-3</p>

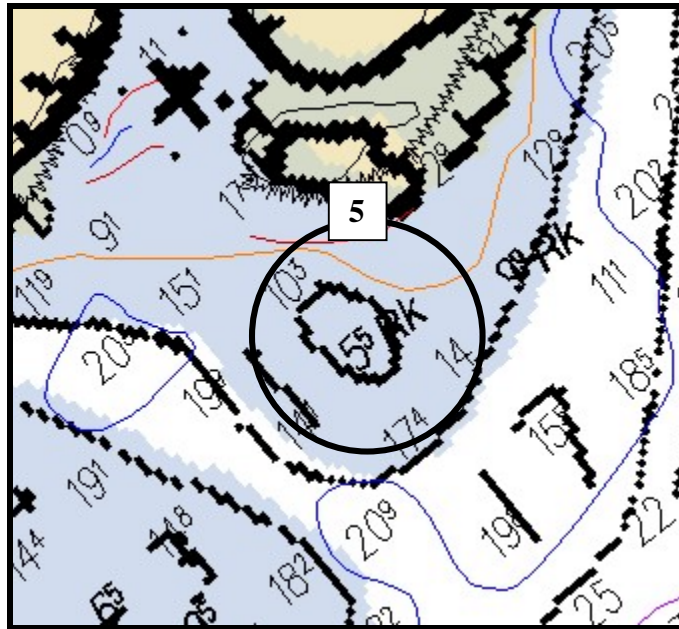


Portion of chart 17426 compared to survey H-11097 soundings and contours

**Recommendations**

Based on the results of survey H-11097, the Hydrographer recommends adding a Rk(rock) symbol and changing the sounding value to 3 ½ on the chart at 55°27'32"N and 132°08'36"W.<sup>36</sup>

Vicinity	Comment	Location Index
<p><b>Area 5</b> 55°27'17"N and 132°08'41"W</p>	<p>A 5.5 fathom rock sounding in the same position as a charted 10 fathom sounding.</p>	<p>A-3</p>

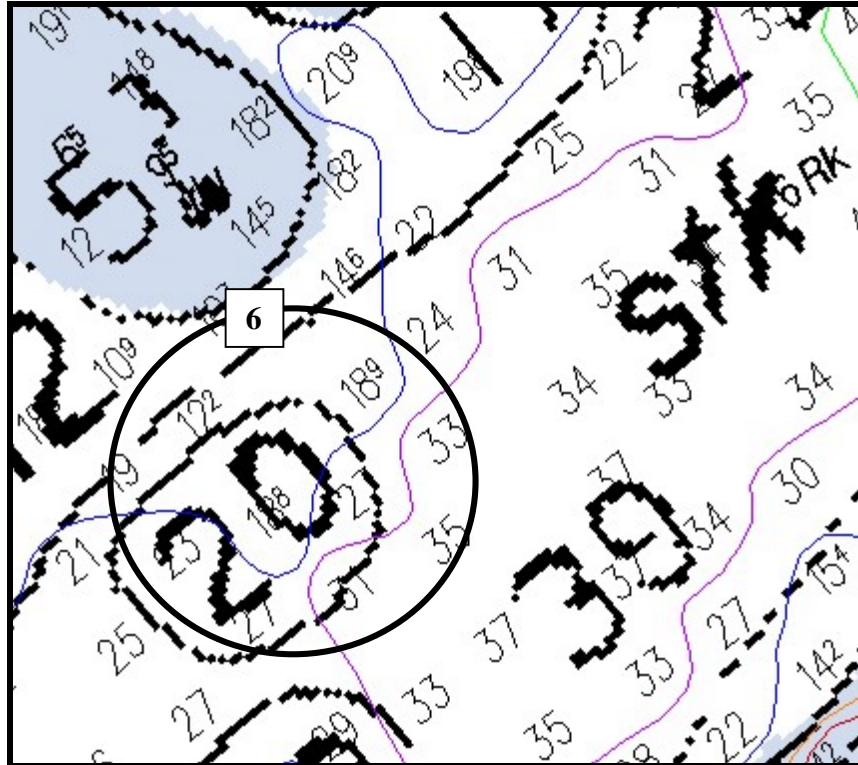


*Portion of chart 17426 compared to survey H-11097 soundings and contours*

**Recommendations**

Based on the results of survey H-11097, the Hydrographer recommends adding a Rk(rock) symbol and changing the sounding value to 5 ½ on the chart at 55°27'17"N and 132°08'41"W. <sup>37</sup>

Vicinity	Comment	Location Index
<p><b>Area 6</b> 55°27'11"N and 132°08'54"W</p>	<p>A 12.2 fathom sounding on the seaward side of the 20-fathom curve. The curve is advancing 70 meters seaward in this area.</p>	<p>A-6</p>

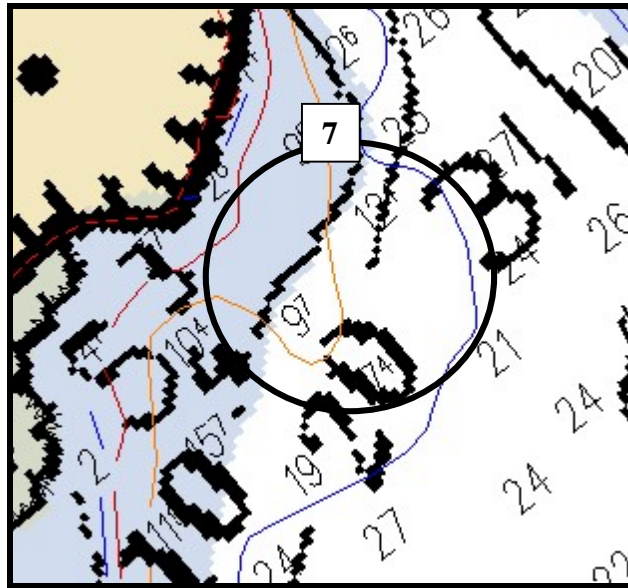


Portion of chart 17426 compared to survey H-11097 soundings and contours

**Recommendations**

Based on the results of survey H-11097, the Hydrographer recommends adjusting the 20-fathom contour line seaward at 55°27'11"N and 132°08'54"W.<sup>38</sup>

Vicinity	Comment	Location Index
<p><b>Area 7</b> 55°27'01"N and 132°09'24"W</p>	<p>A 9.7 fathom sounding on the seaward side of the 10 fathom charted curve. The 10 fathom curve is approaching the 20 fathom charted curve in this area.</p>	<p>A-2 A-6</p>

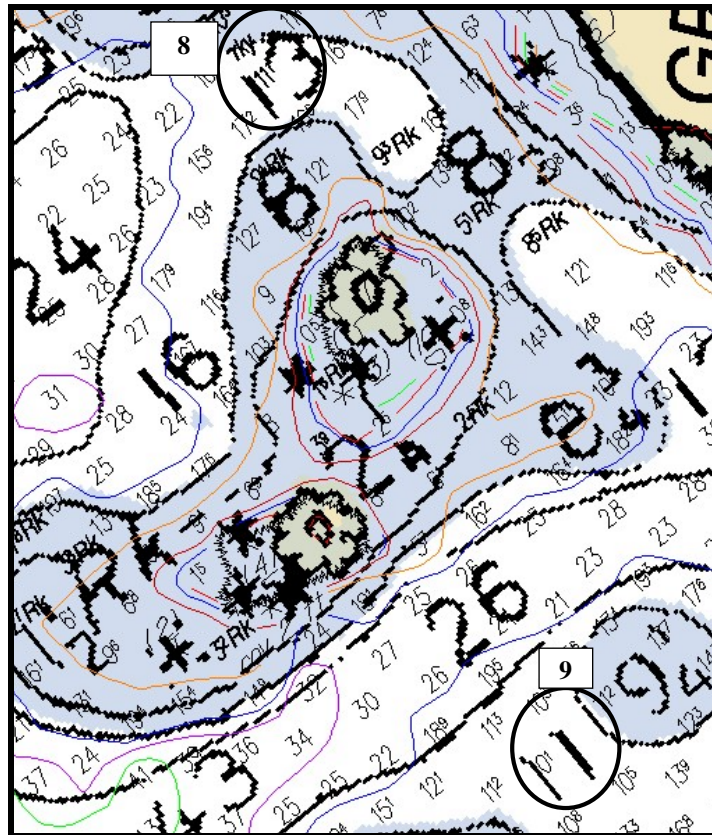


*Portion of chart 17426 compared to survey H-11097 soundings and contours*

**Recommendations**

Based on the results of survey H-11097, the Hydrographer recommends adjusting the 10-fathom and 20-fathom contour lines seaward at 55°27'01"N and 132°09'24"W.<sup>39</sup>

Vicinity	Comment	Location Index
<b>Area 8</b> 55°26'46"N and 132°09'04"W	A 11 fathom sounding in the same position as a charted 13 fathom sounding.	A-6
<b>Area 9</b> 55°26'25"N and 132°09'18"W	A 10.1 fathom sounding in the same position as a charted 11 fathom sounding.	A-6

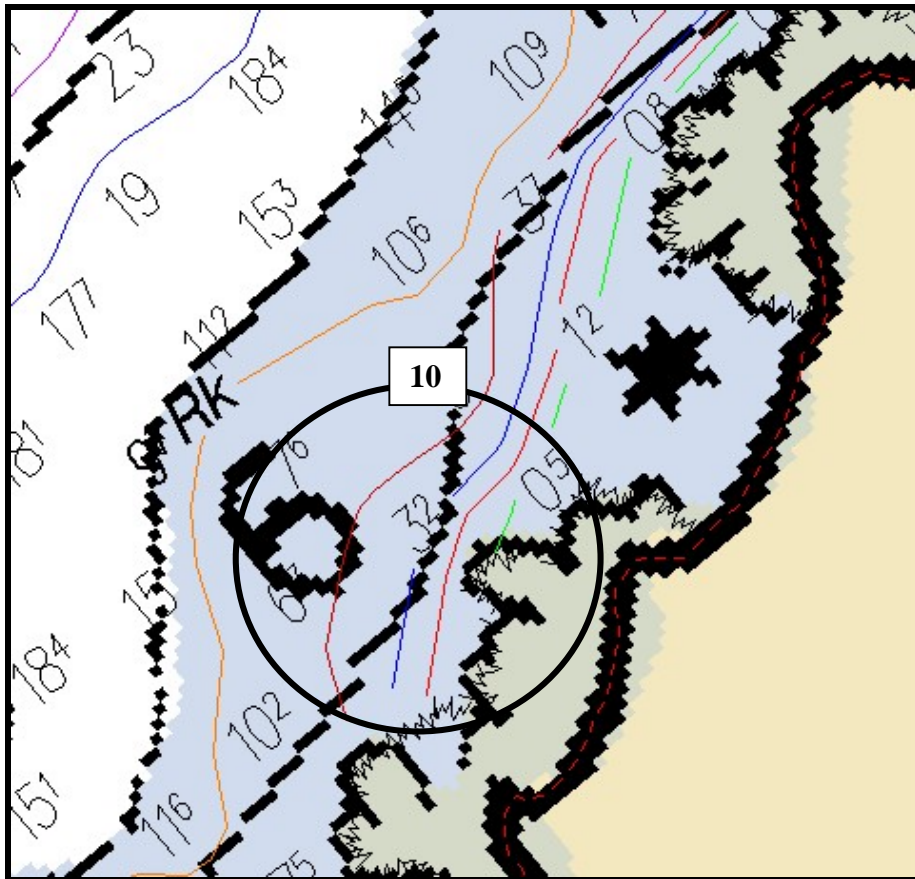


Portion of chart 17426 compared to survey H-11097 soundings and contours

**Recommendations**

Based on the results of survey H-11097, the Hydrographer recommends changing the charted 13 fathom sounding to an 11.1 fathom sounding at 55°26'46"N and 132°09'04"W, and changing the charted 11 fathom sounding to a 10.1 fathom sounding at 55°26'25"N and 132°09'18"W.<sup>40</sup>

Vicinity	Comment	Location Index
<p><b>Area 10</b> 55°26'50"N and 132°07'21"W</p>	<p>A 3.2 fathom sounding seaward of the charted 5 fathom curve. The surveyed curve is advancing seaward 30 meters in this area.</p>	<p>A-7</p>

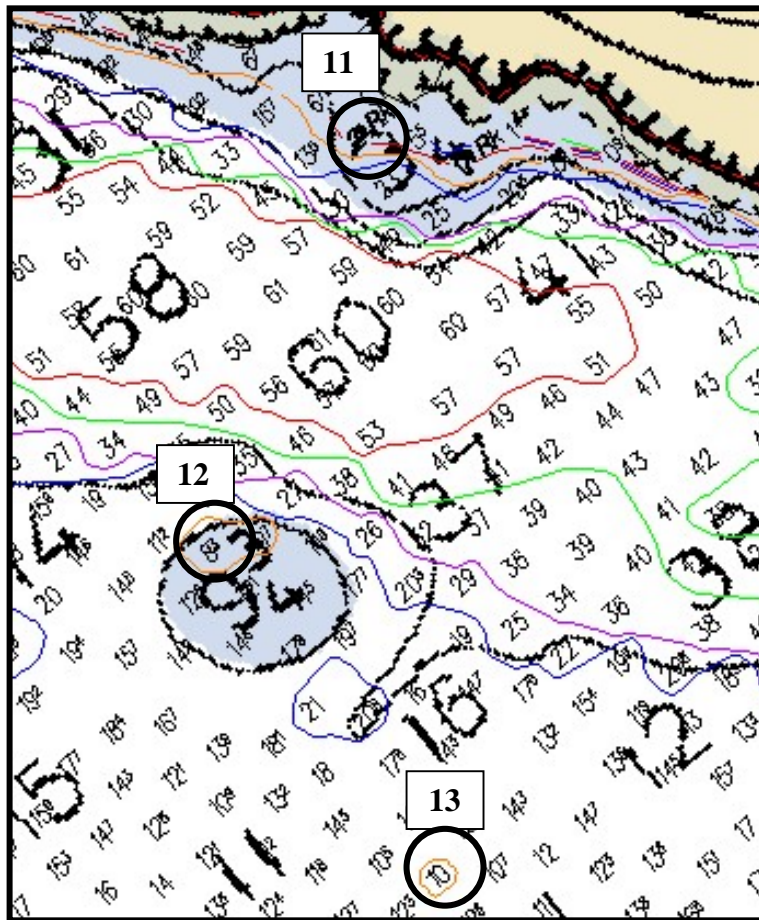


Portion of chart 17426 compared to survey H-11097 soundings and contours

**Recommendations**

Based on the results of survey H-11097, the Hydrographer recommends adjusting the 5 fathom curve seaward 30 meters at 55°26'50"N and 132°07'21"W.<sup>41</sup>

Vicinity	Comment	Location Index
<b>Area 11</b> 55°27'15"N and 132°10'57"W	A 2.5 fathom rock sounding at the same location as a charted 3 ¼ fathom sounding.	A-2
<b>Area 12</b> 55°27'08"N and 132°11'17"W	A 8.3 fathom sounding near a 9 ¾ fathom charted sounding.	A-2
<b>Area 13</b> 55°26'56"N and 132°11'19"W	A 10 fathom curve not charted. A review of the digital terrain model does not show a rock at this location. (Rocks are clearly visible throughout the survey).	A-2

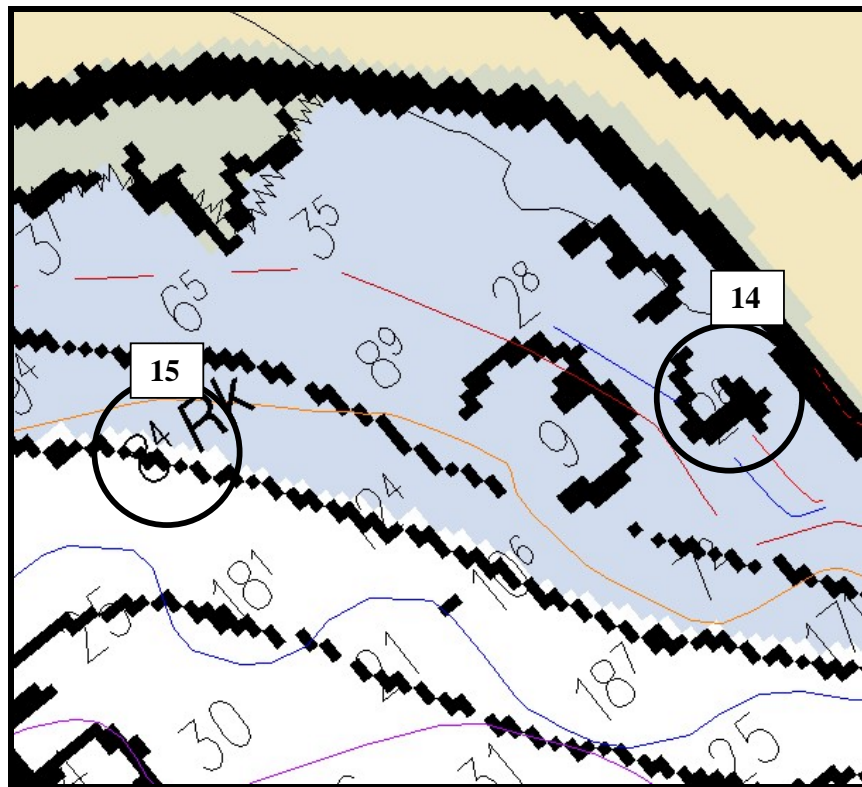


Portion of Chart 17426 compared to survey H-11097 soundings and contours





Vicinity	Comment	Location Index
<b>Area 14</b> 55°27'28"N and 132°11'07"W	A 2.6 fathom sounding near a charted 3 ¾ fathom sounding.	A-2
<b>Area 15</b> 55°27'32"N and 132°11'16"W	A 8.4 fathom rock sounding on the charted 10 fathom curve.	A-2

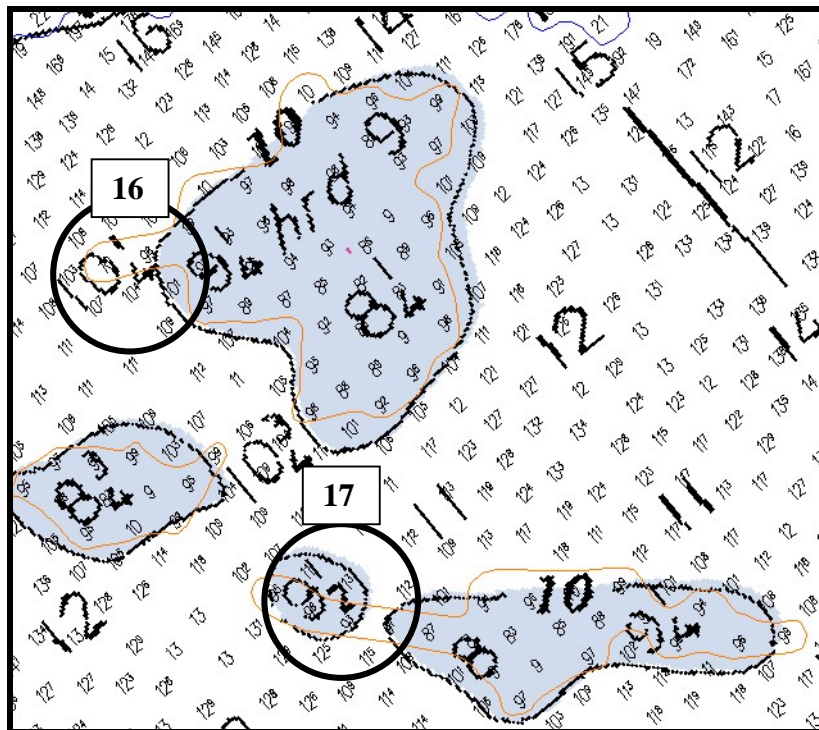


Portion of chart 17426 compared to survey H-11097 soundings and contours

**Recommendations**

Based on the results of survey H-11097, the Hydrographer recommends changing the 3 ¾ Fathom sounding to a 2 ½ fathom sounding at 55°27'28"N and 132°11'07"W<sup>45</sup> and adding a Rk(rock) symbol with a 8.4 fathom sounding at 55°27'32"N and 132°11'16"W.<sup>46</sup>

Vicinity	Comment	Location Index
<p><b>Area 16</b> 55°26'27"N and 132°10'36"W</p>	<p>A 10 fathom sounding at the same location as a charted 10 ¼ fathom sounding. The surveyed sounding extends the 10 fathom curve to the North West 90 meters.</p>	<p>A-8</p>
<p><b>Area 17</b> 55°26'08"N and 132°10'38"W</p>	<p>A 9.1 fathom sounding on the charted 10 fathom curve. The surveyed sounding connects to a charted 10 fathom curve to the North West, removing a channel.</p>	<p>A-8</p>

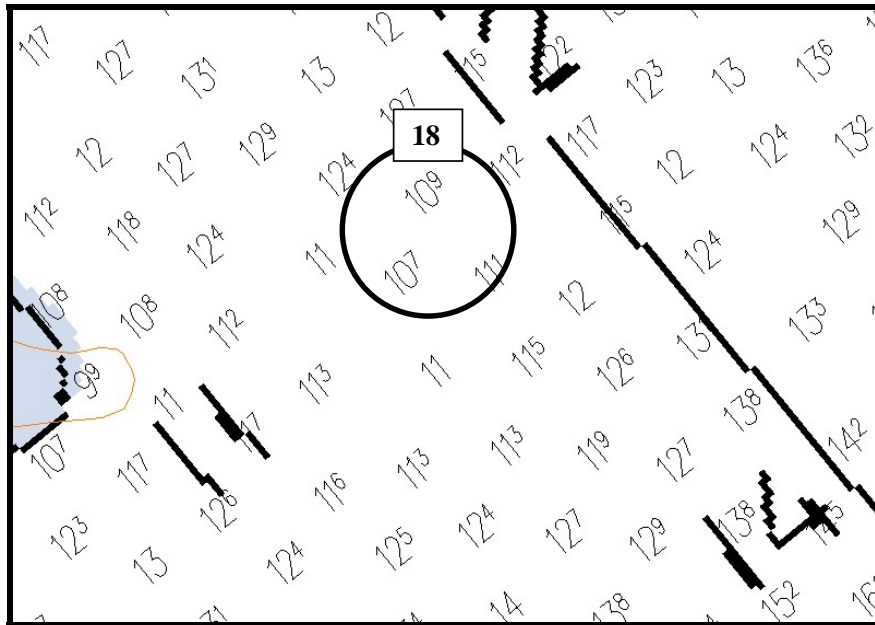


Portion of chart 17426 compared to survey H-11097 soundings and contours

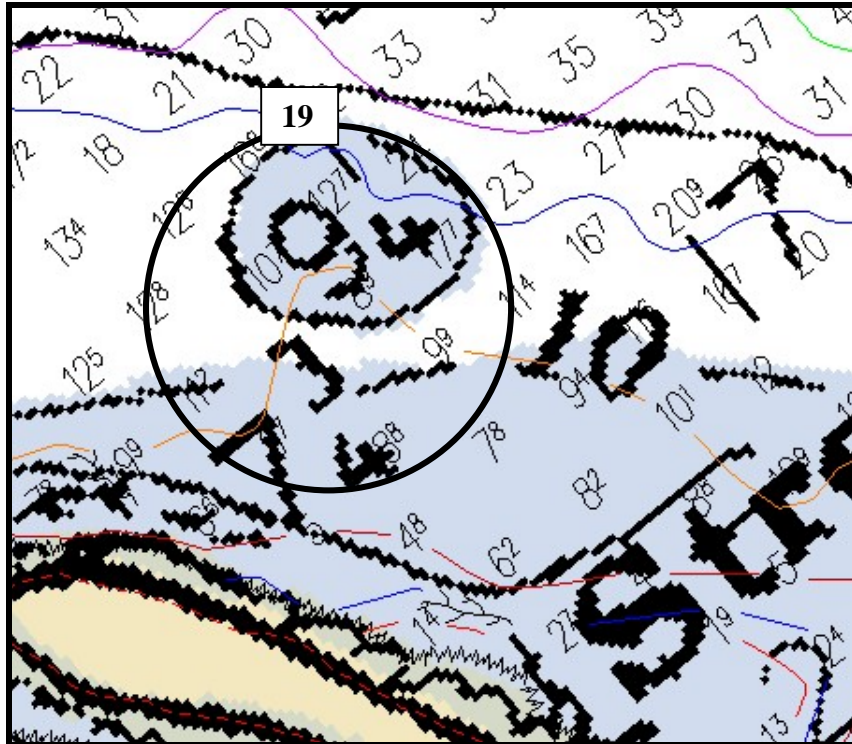
**Recommendations**

Based on the results of survey H-11097, the Hydrographer recommends adjust the 10 fathom curve to encompass the 10 fathom sounding at 55°26'27"N and 132°10'36"W, and adjusting the 10 fathom curve to encompass the 9.1 fathom sounding at 55°26'08"N and 132°10'38"W. The latter adjustment should combine two separate smaller curves into one larger curve.<sup>47</sup>

Vicinity	Comment	Location Index
<p><b>Area 18</b> 55°25'54"N and 132°10'06"W</p>	<p>A 10.7 fathom sounding surrounding by charted 11, 12 and 14 fathom soundings.</p>	<p>A-8</p>



Vicinity	Comment	Location Index
<p><b>Area 19</b> 55°28'43"N and 132°08'05"W</p>	<p>The ten fathom curve is advancing. In addition the charted 10 fathom curve surrounding a 9 ¼ fathom sounding appears incorrect.</p>	<p>A-4</p>

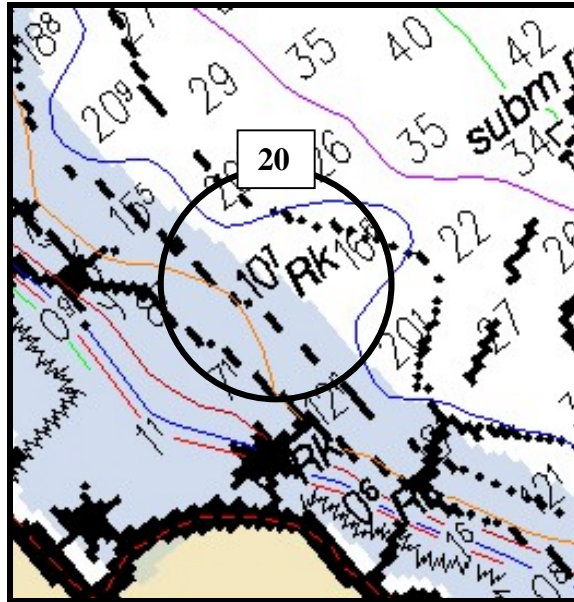


*Portion of chart 17426 compared to survey H-11097 soundings and contours*

**Recommendations**

Based on the results of survey H-11097, the Hydrographer recommends removing the 9 ¼ fathom sounding and it’s surrounding 10 fathom curve and adjusting the 10 fathom curve around Streets Island at 55°28’43”N and 132°08’05”W.<sup>49</sup>

Vicinity	Comment	Location Index
<b>Area 20</b> 55°29'14"N and 132°09'49"W	A 10.7 fathom rock not charted.	A-5



*Portion of chart 17426 compared to survey H-11097 soundings and contours*

**Recommendations**

Based on the results of survey H-11097, the Hydrographer recommends adding a Rk(rock)symbol and 10.7 fathom sounding at 55°29'14"N and 132°09'49"W.<sup>50</sup>

# AWOIS Investigations

LAT83	55/29/50.24	LONG83	132/29/47.65	NATVDATUM	31
LATDEC:	55.497288888889	LONDEC:	132.49656944444	GPQUALITY	High
				GPSOURCE	Scaled
PROJECT	OPR-0331	ITEMSTATUS	Assigned	SEARCHTYPE	Full
RADIUS	125	INIT	MBH	ASSIGNED	6/5/2001
TECNIQ	VS,BD,DI,SD				
Techniqnote	SEARCH THE AREA AS SHOWN ON THE AWOIS GRAPHIC.				
History	H08532 (1960)--TWO PILINGS (APPROX. 15-20 METERS APART) CHARTED AS ONE PILING WERE FOUND BY THIS HYDROGRAPHIC SURVEY. (ENTERED 6/01 BY MBH)				
Fieldnote	INVESTIGATION DATE(S): // (DN: ) HYDROGRAPHIC SURVEY NUMBER: VN: TIME: INVESTIGATION METHODS USED: (IE DI, 200% SIDE SCAN SONAR, ECHO SOUNDER) SURVEYED POSITION: LAT. LON. POSITION DETERMINED BY: DIFFERENTIAL GPS INVESTIGATION SUMMARY: CHARTING RECOMMENDATION (HYDROGRAPHER): EVALUATOR COMMENTS:				
Proprietary	YEARSUNK	NIMANUM			

**AWOIS Items Summary**

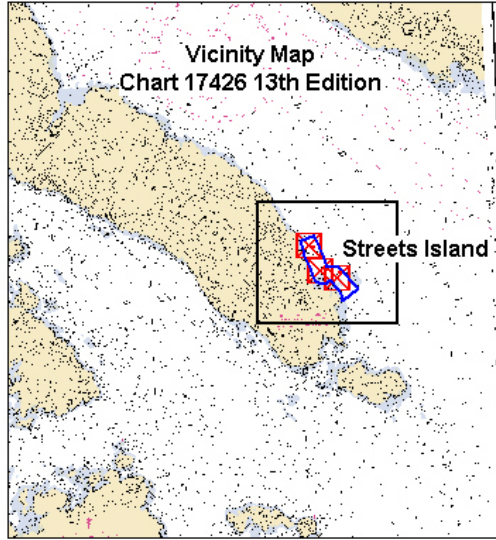
This contract requires full investigation of three AWOIS items. The table below is a summary of the items and their results. The next page shows a location map, followed by individual reports.

<b>Record</b>	<b>Description</b>	<b>Comment</b>
52760	Submerged ruins	Full investigation with 200% SWMB coverage. Topographic relief detected, additional diving investigation may be required.
52761	Submerged ruins	Full investigation with 200% SWMB coverage. Topographic relief detected, additional diving investigation may be required.
52762	Submerged ruins	Full investigation with 200% SWMB coverage. Topographic relief detected, additional diving investigation may be required.

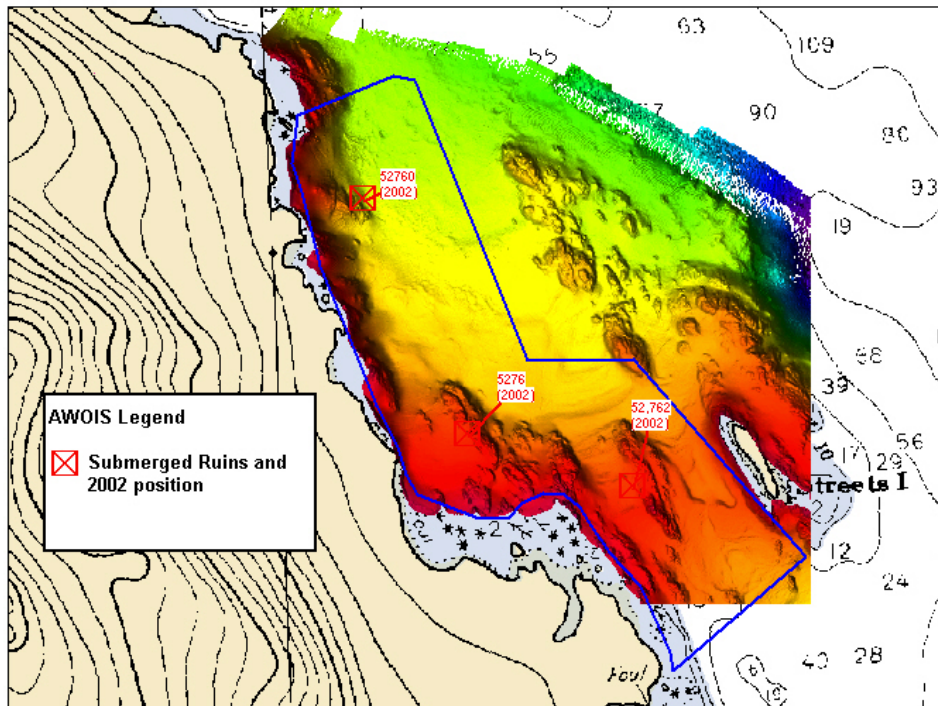
**Historical and 2002  
AWOIS Positions**

**H-11097 Sheet A**

**52760  
52761  
52762**



Location map with digital terrain model showing 200% SWMB coverage





## Item Investigation Report

Item Description (as charted): Submerged Ruins

Source: AWOIS record number 52760

Charted Position: Lat 55°29'13.02"N Long 132°09'39.56"W

Charts Affected: 17420 26<sup>th</sup> edition September 22, 2001  
17426 13<sup>th</sup> edition July 11, 1992

### Investigation

Date(s)/Day Number(s): 6/14/02 DN 165 Survey Vessel Name: Luna Sea

Position Numbers/Time: 52760/18:07:21 UTC

Investigation Method: Shallow Water Multibeam Sonar

Surveyed Position (NAD83): Lat 55°29'13.02"N Long 132°09'39.56"W

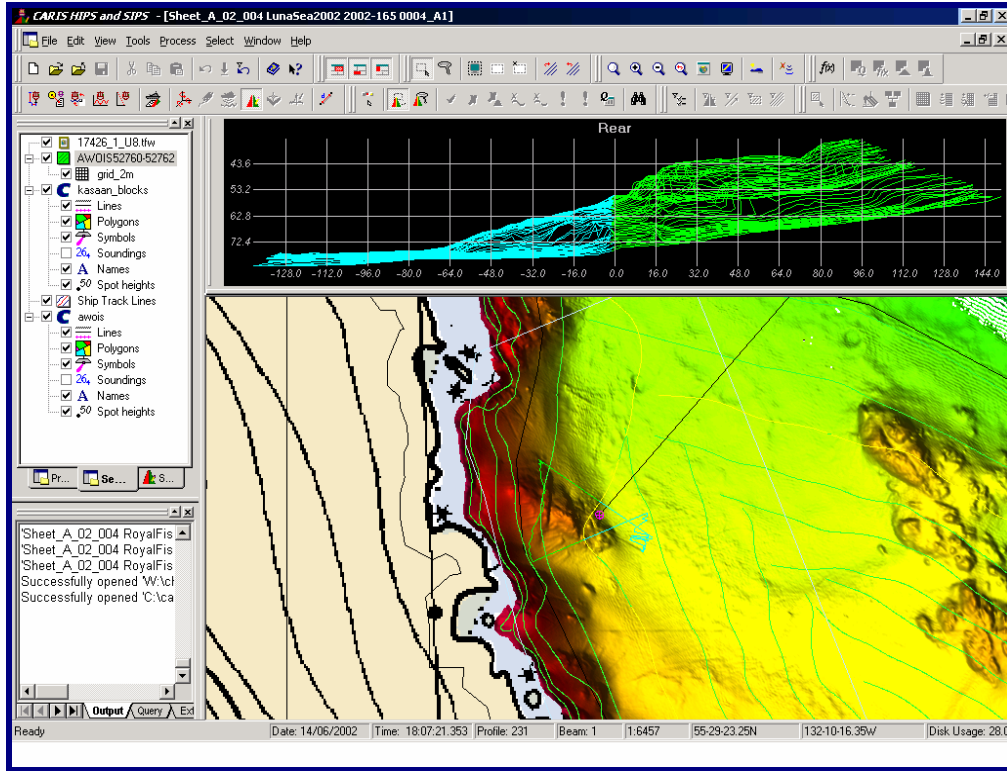
Position Determined By: Differential GPS

Investigation Summary: The search area has 200% SWMB coverage. A review of the digital terrain model detected some topographic relief. A review of the bottom profile in CARIS did not show any obvious evidence of ruins. Further investigation with divers or SS sonar would be required to determine if these ruins still exist.

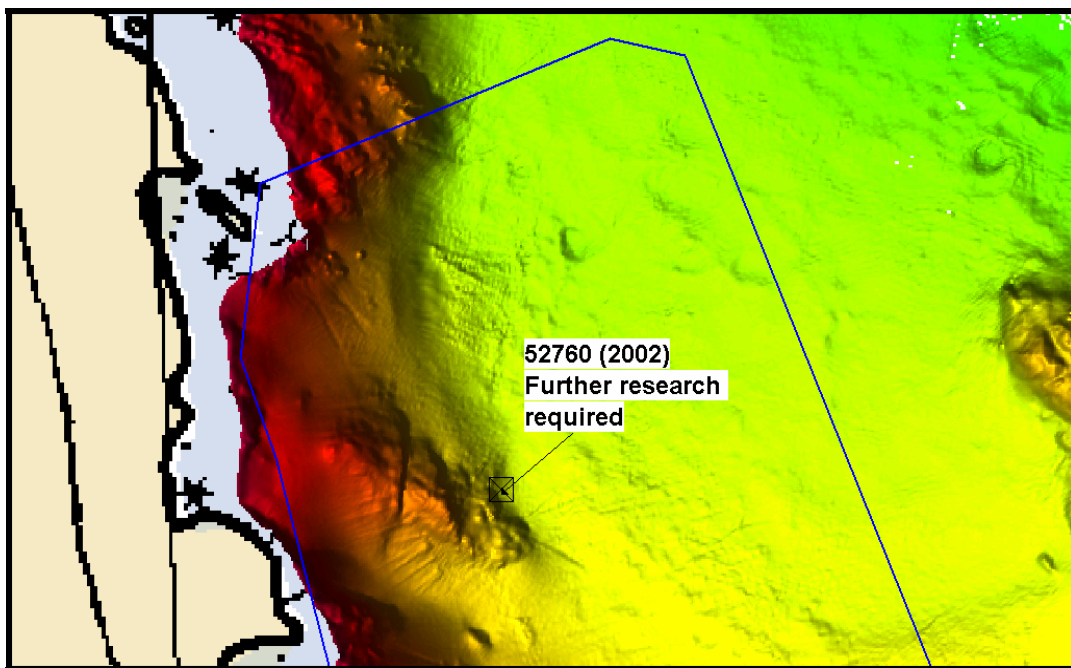
### Charting Recommendation

Based on the results of survey H-11097, the hydrographer recommends retention of the submerged ruin symbol until further investigation disproves its presence.<sup>51</sup>

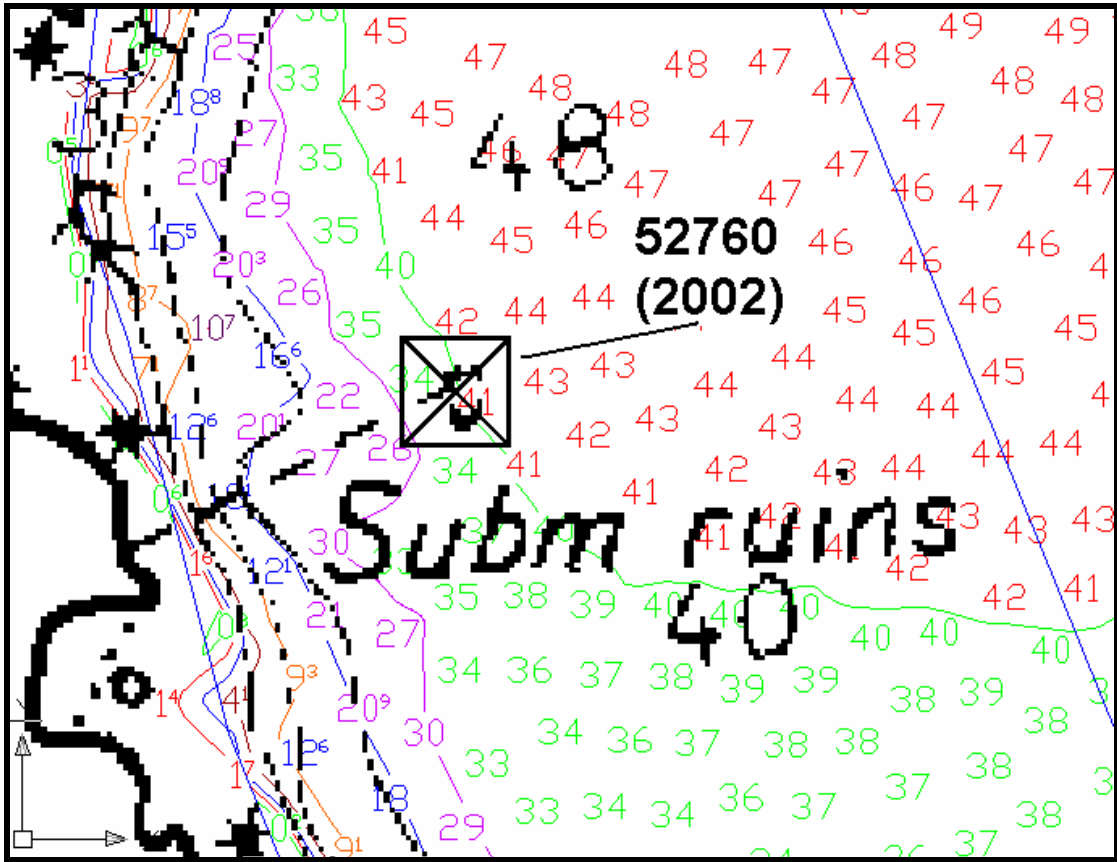
Recommended Least Depth: 40 fathoms below mean low water



*200% SWMB coverage over AWOIS item 52760 as viewed in CARIS HIPS*



*AWOIS item 52760, 2002 bathymetry and 2002 search position; Chart 17426*



*2002 Smooth sheet soundings on monochrome chart 17426, used to determine the recommended least depth of 40 fathoms for AWOIS item 52760*

## Item Investigation Report

Item Description (as charted): Submerged Ruins

Source: AWOIS record number 52761

Charted Position: Lat 55°28'43.25"N Long 132°09'18.68"W

Charts Affected: 17420 26<sup>th</sup> edition September 22, 2001  
17426 13<sup>th</sup> edition July 11, 1992

### Investigation

Date(s)/Day Number(s): 6/11/02 DN 162 Survey Vessel Name: Royal Fish

Position Numbers/Time: 52761/00:08:46 UTC

Investigation Method: Shallow Water Multibeam Sonar

Surveyed Position (NAD83): Lat 55°28'43.25"N Long 132°09'18.68"W

Position Determined By: Differential GPS

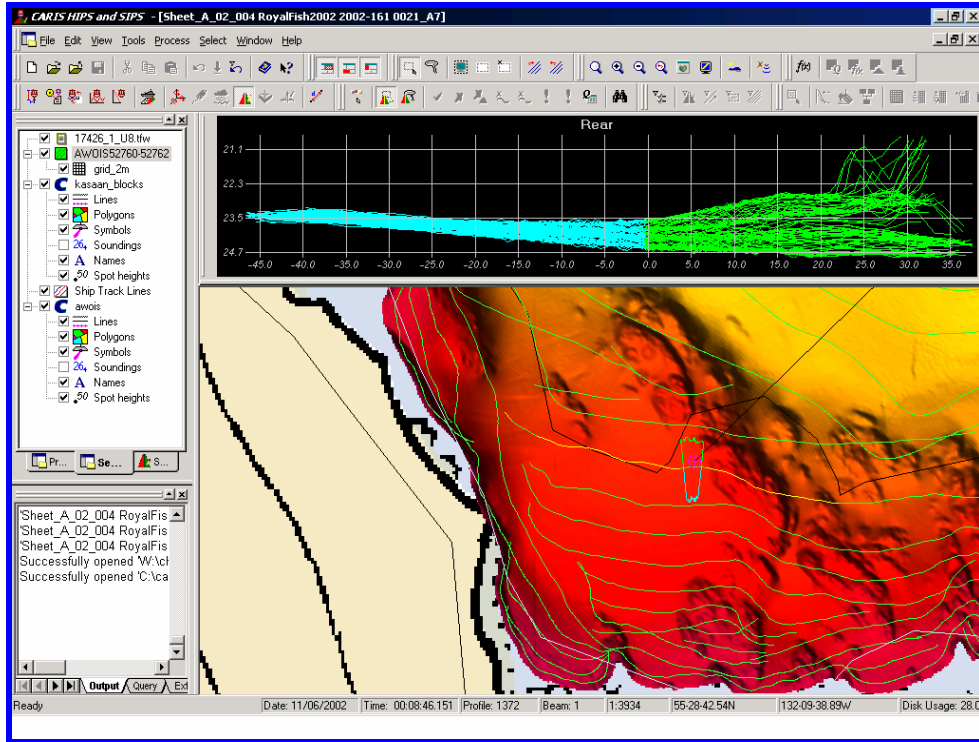
Investigation Summary: The search area has 200% SWMB coverage. A review of the digital terrain model detected some topographic relief. A review of the bottom profile in CARIS did not show any obvious evidence of ruins. Further investigation with divers or SS sonar would be required to determine if these ruins still exist.

### Charting Recommendation

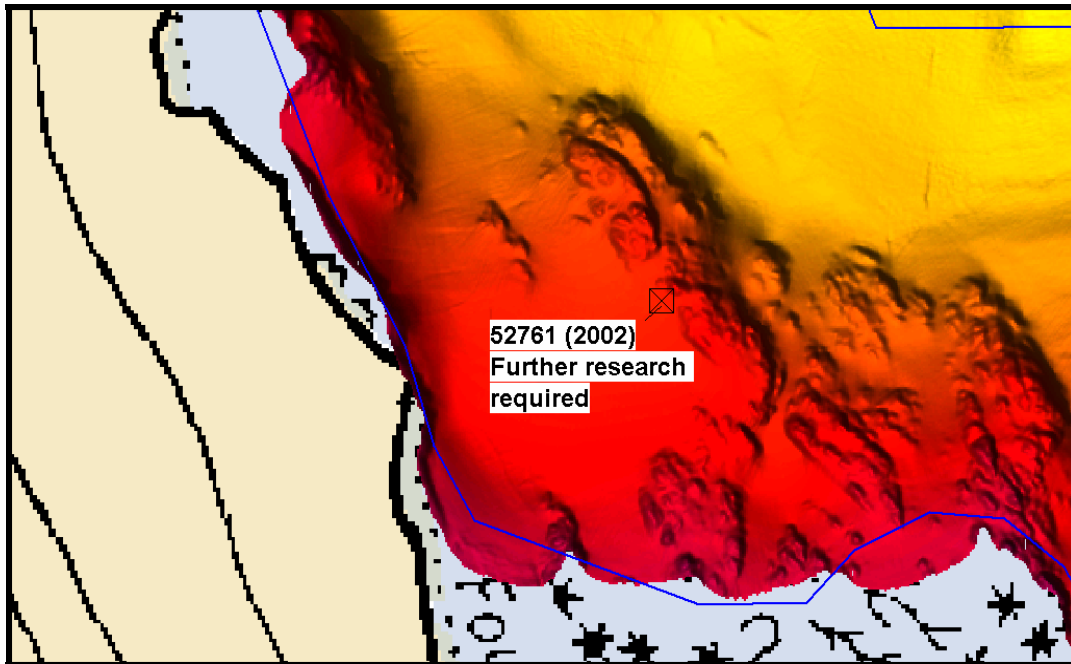
Based on the results of survey H-11097, the hydrographer recommends retention of the submerged ruin symbol until further investigation disproves its presence.<sup>52</sup>

Area has full coverage.

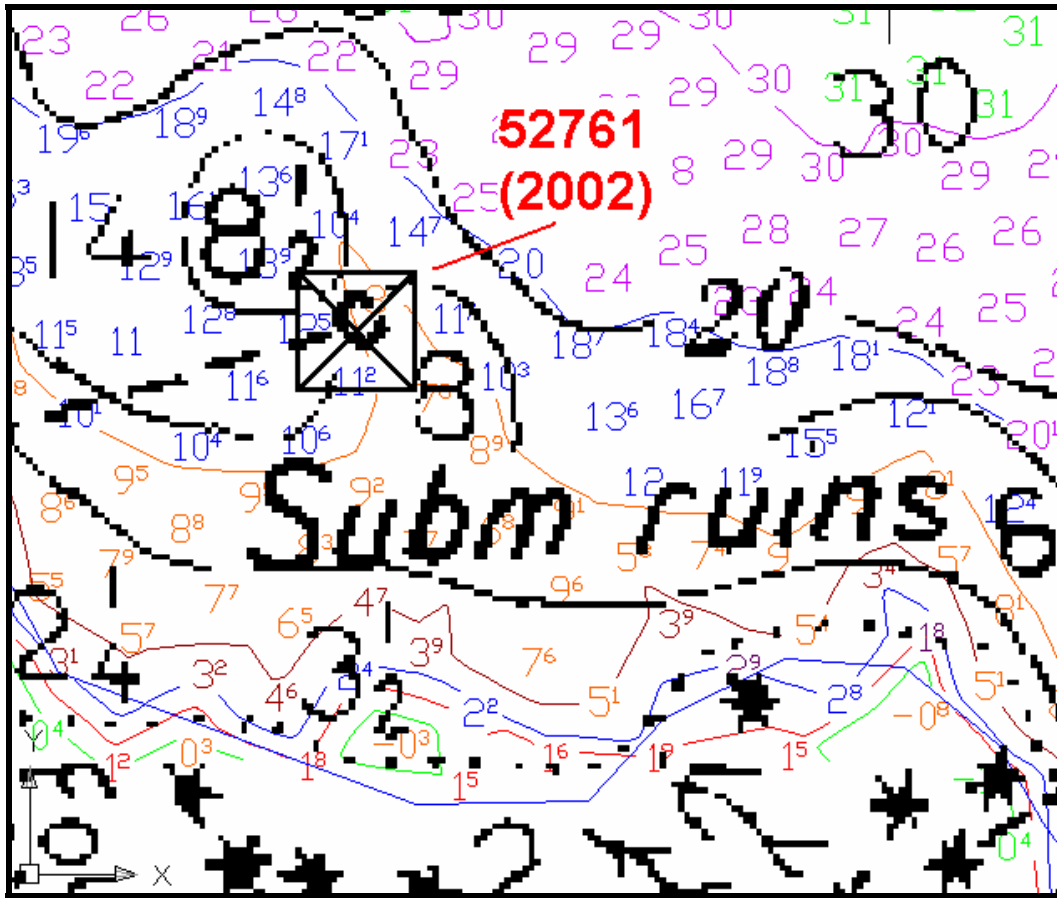
Recommended Least Depth: 8 fathoms below mean low water



*200% SWMB coverage over AWOIS item 52761 as viewed in CARIS HIPS*



*AWOIS item 52761, 2002 bathymetry and 2002 search position; Chart 17426*



*2002 Smooth sheet soundings on monochrome chart 17426, used to determine the recommended least depth of 8 fathoms for AWOIS item 52761*

## Item Investigation Report

Item Description (as charted): Submerged Ruins

Source: AWOIS record number 52762

Charted Position: Lat 55°28'35.87"N Long 132°08'43.22"W

Charts Affected: 17420 26<sup>th</sup> edition September 22, 2001  
17426 13<sup>th</sup> edition July 11, 1992

### Investigation

Date(s)/Day Number(s): 07/02/02 DN 183 Survey Vessel Name: Royal Fish

Position Numbers/Time: 52762/18:38:11 UTC

Investigation Method: Shallow Water Multibeam Sonar

Surveyed Position (NAD83): Lat 55°28'35.87"N Long 132°08'43.22"W

Position Determined By: Differential GPS

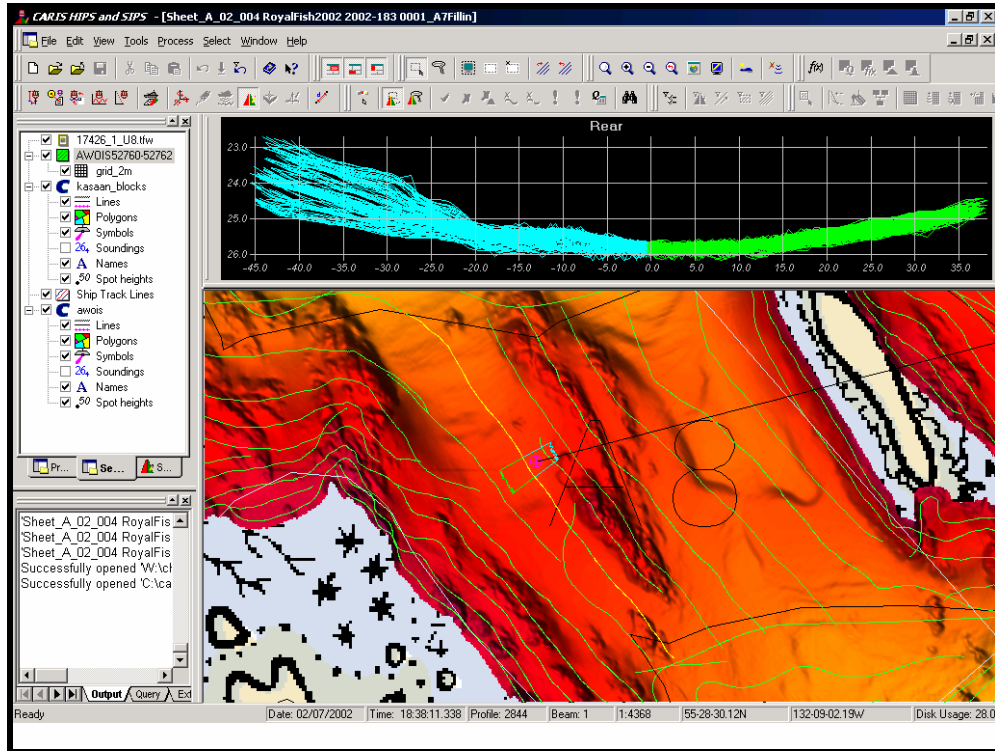
Investigation Summary: The search area has 200% SWMB coverage. A review of the digital terrain model detected some topographic relief. A review of the bottom profile in CARIS did not show any obvious evidence of ruins. Further investigation with divers or SS sonar would be required to determine if these ruins still exist.

Area has full coverage.

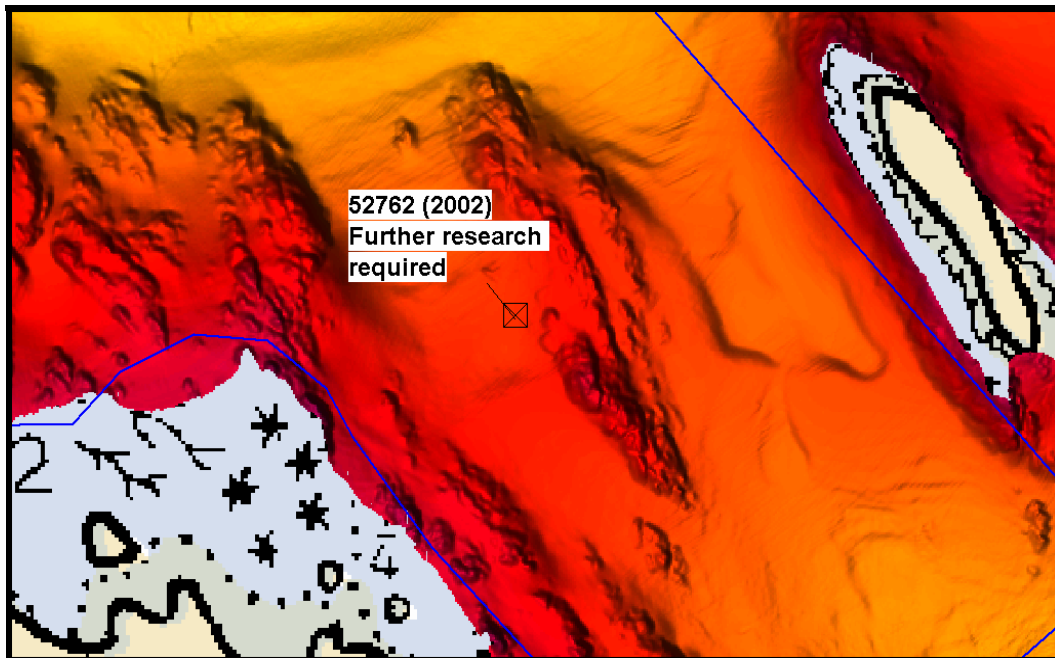
### Charting Recommendation

Based on the results of survey H-11097, the hydrographer recommends retention of the submerged ruin symbol until further investigation disproves its presence.<sup>53</sup>

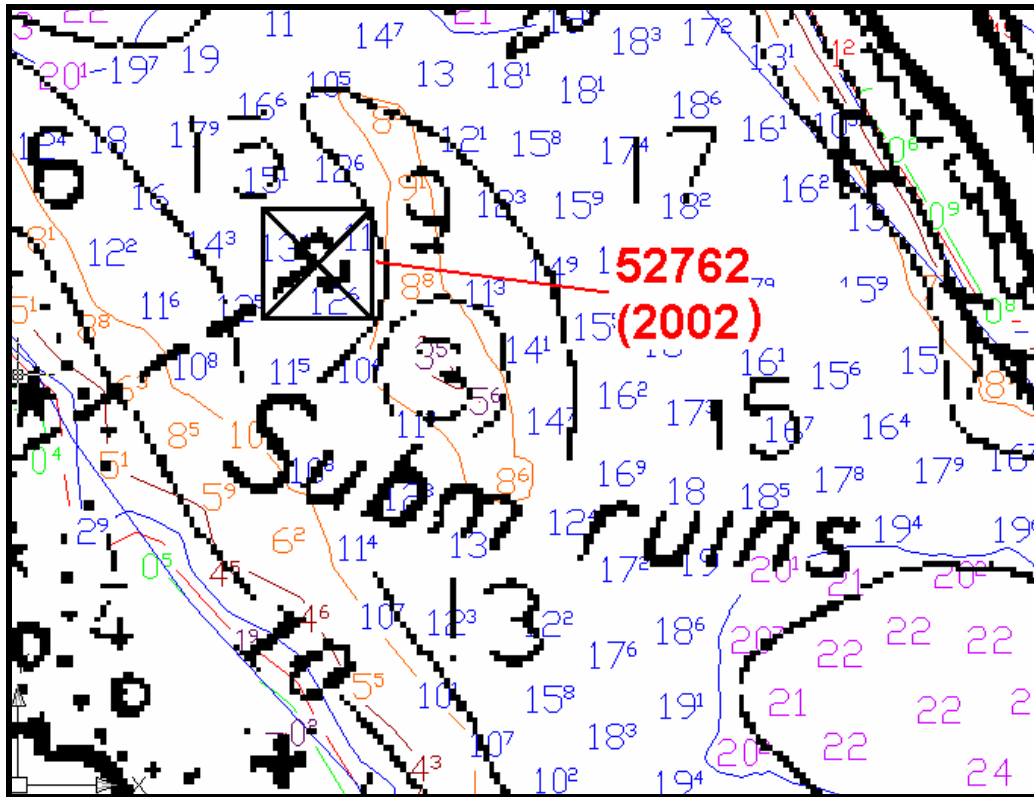
Recommended Least Depth: 11 fathoms below mean low water



**200% SWMB coverage over AWOIS item 52762 as viewed in CARIS HIPS**





*AWOIS item 52762, 2002 bathymetry and 2002 search position; Chart 17426*

*2002 Smooth sheet soundings on monochrome chart 17426, used to determine the recommended least depth of 11 fathoms for AWOIS item 52762*

## D2. Additional Results

### Shoreline Investigation

Shoreline and nearshore investigation was required for this contract. A total of 13 PITBIs (Potential Items to Be Investigated) were identified and submitted for review in this survey. These items range from new items not charted, both cultural and natural, to items not charted correctly. Items (most notably rocks) not charted correctly were out of position from 23 to 27 meters. These 13 items were not approved for further investigation. New or items not charted correctly that are not navigationally significant are not shown on the smoothsheet, with the exception of rocks identified from the bathymetry. Traditional shoreline verification was required for any feature seaward of the 4-meter curve. A table of these items and their detached positions is included at the end of this section.<sup>54</sup>

The provided shoreline remote sensing data (RSD) was of known poor quality. Once the fieldwork began it became apparent that it was of very poor quality. More often than not,<sup>55</sup> the shoreline disagreed with the RSD, and agreed with the chart. In any one area, there was a mixture of the shoreline matching the chart, the RSD or neither. The field crews worked with shoreline maps showing both sets of data (RSD and charted) and sketched the ground truth changes onto these maps. Navigation was achieved through HYPACK software showing the position of the boat in its relationship to both sets of data simultaneously. Changes to the RSD shoreline data are shown in red dashed lines on the smoothsheet<sup>56</sup>

### **Shoreline Recommendations**

Based on the results of shoreline investigation survey H-11097, the Hydrographer recommends further investigation of the PITBIs(Potential Items to be Investigated).<sup>57</sup>

**Aids to Navigation:**

There were no navigation aids to report on within the Sheet A project parameters.<sup>58</sup>

## The Inter-island Ferry

The Inter-island ferry system began operation between Ketchikan and Hollis with the *MV Prince of Wales* in January 2002. The inter-island ferry dock, located in Clark Bay, was positioned during this hydrographic survey and its data is enclosed in this package. The vessel's length is 198 feet with a beam of 51 feet, a draft of 12 feet and capable of making 15 knots. This will ultimately be a two-ferry system. The first ferry, *MV Prince of Wales*, provides passenger and vehicle transportation from Hollis to Ketchikan. The second one will provide passenger and vehicle ferry transportation from Coffman Cove, on the northern end of Prince of Wales Island, to Wrangell and Petersburg. Construction for the second ferry, the *M/V Stikine*, is to begin in 2002, with service as early as 2003. Refer to the route map on the following page. Maintaining the current charts accurately is necessary for the safety of this ferry service.<sup>59</sup>








*MV Prince of Wales*







*Proposed Inter-Island Ferry Route for 2003*

**TVI Reports<sup>60</sup>**  
**Traditional Verification Items Report**

## Summary of Sheet A Traditional Shoreline Verification






TARGET ID	VERIFIED	LATITUDE N	LONGITUDE W	UTM		UTM NORTHING	HEIGHT (+) OR DEPTH (-) AT MLLW (Meters)	HEIGHT (+) AT MHW (Meters)	SUBSHEET	PICTURE ID	PICTURE
2825 <sup>61</sup>	Yes	55° 26' 49.95"	132° 9' 56.11"	679265.09	6148211.21	+0.34	N/A	ASL-2	MVC-066F		
2840 <sup>62</sup>	Yes	55° 26' 49.91"	132° 10' 0.31"	679191.33	6148207.06	+2.39	N/A	ASL-2	MVC-067F		
2862 <sup>63</sup>	Yes	55° 26' 53.04"	132° 10' 5.30"	679099.78	6148300.16	+0.92	N/A	ASL-2	MVC-068F		
2939	Yes	55° 26' 56.71"	132° 10' 14.96"	678925.43	6148406.75	+3.09	N/A	ASL-2	MVC-069F		
7458	Yes	55° 27' 29.73"	132° 11' 37.38"	677436.77	6149368.38	+0.45	N/A	ASL-2	P7250117		

## Summary of Sheet A Traditional Shoreline Verification



TARGET ID	VERIFIED	LATITUDE N	LONGITUDE W	UTM		UTM NORTHING	HEIGHT (+) OR DEPTH (-) AT MLLW (Meters)	HEIGHT (+) AT MHW (Meters)	SUBSHEET	PICTURE ID	PICTURE
				EASTING	NORTHING						
8441 <sup>64</sup>	Yes	55° 26' 57.51"	132° 8' 43.82"	680525.06	6148496.88	+0.86	N/A	ASL-6	P7260123		
8477	Yes	55° 26' 50.88"	132° 8' 55.50"	680328.40	6148283.50	+1.36	N/A	ASL-6	P7260124		
8558	Yes	55° 26' 37.63"	132° 9' 12.76"	680041.91	6147861.84	+0.87	N/A	ASL-6	P7260125		
8596	Yes	55° 26' 35.11"	132° 9' 28.46"	679769.32	6147772.57	+0.61	N/A	ASL-6	P7260126		
7932	Yes	55° 26' 10.58"	132° 7' 12.79"	682183.81	6147112.68	+0.02	N/A	ASL-7	No Picture	No Picture	



## Summary of Sheet A Traditional Shoreline Verification

TARGET ID	VERIFIED	LATITUDE N	LONGITUDE W	UTM		UTM NORTHING	HEIGHT (+) OR DEPTH (-) AT MLLW (Meters)	HEIGHT (+) AT MHW (Meters)	SUBSHEET	PICTURE ID	PICTURE
				EASTING	NORTHING						
2470	Yes	55° 27' 59.82"	132° 8' 31.79"	680657.16	6150430.89	+2.31	N/A	ASL-3	MVC-062F		
2516 <sup>65</sup>	Yes	55° 27' 51.14"	132° 8' 31.98"	680664.88	6150162.62	+0.80	N/A	ASL-3	MVC-063F		
2588	Yes	55° 27' 46.97"	132° 8' 30.20"	680701.37	6150034.94	+0.80	N/A	ASL-3	MVC-064F		
7967	Yes	55° 26' 17.10"	132° 7' 4.03"	682329.31	6147320.69	+3.94	N/A	ASL-7	P7260120		
8059 <sup>66</sup>	Yes	55° 26' 24.20"	132° 6' 33.70"	682853.12	6147562.22	+6.79	+2.29	ASL-7	P7260121		

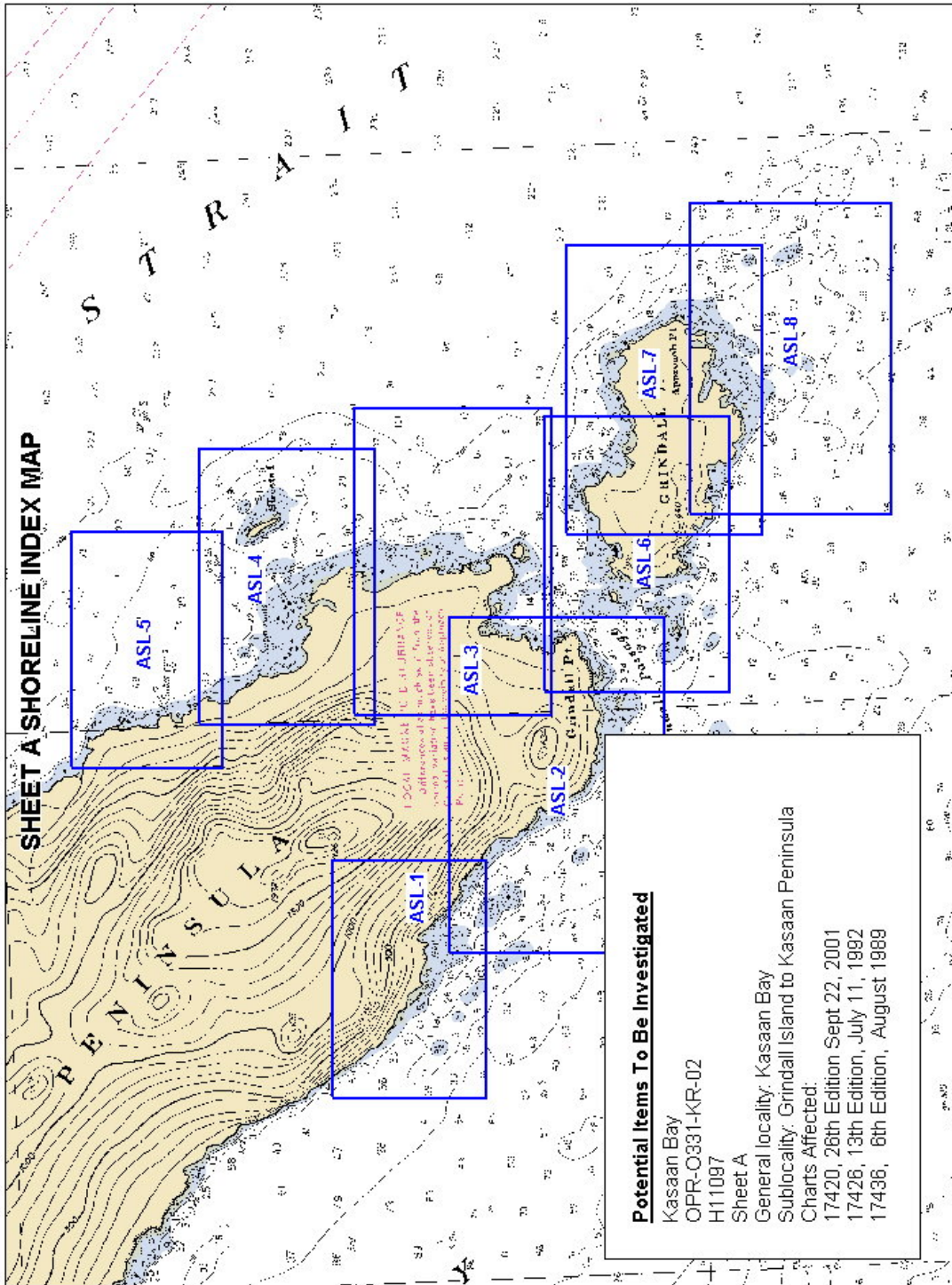
### Summary of Sheet A Traditional Shoreline Verification

TARGET ID	VERIFIED	LATITUDE N	LONGITUDE W	UTM		UTM NORTHING	HEIGHT (+) OR DEPTH (-) AT MLLW (Meters)	HEIGHT (+) AT MHW (Meters)	SUBSHEET	PICTURE ID	PICTURE
				EASTING	NORTHING						
8075 <sup>67</sup>	Yes	55° 26' 26.29"	132° 6' 31.43"	682890.29	6147628.27	-0.08	N/A	ASL-7	P7260122		
8666	Yes	55° 26' 36.57"	132° 9' 7.78"	680130.87	6147832.56	+7.44	+2.94	ASL-6	P7260127		

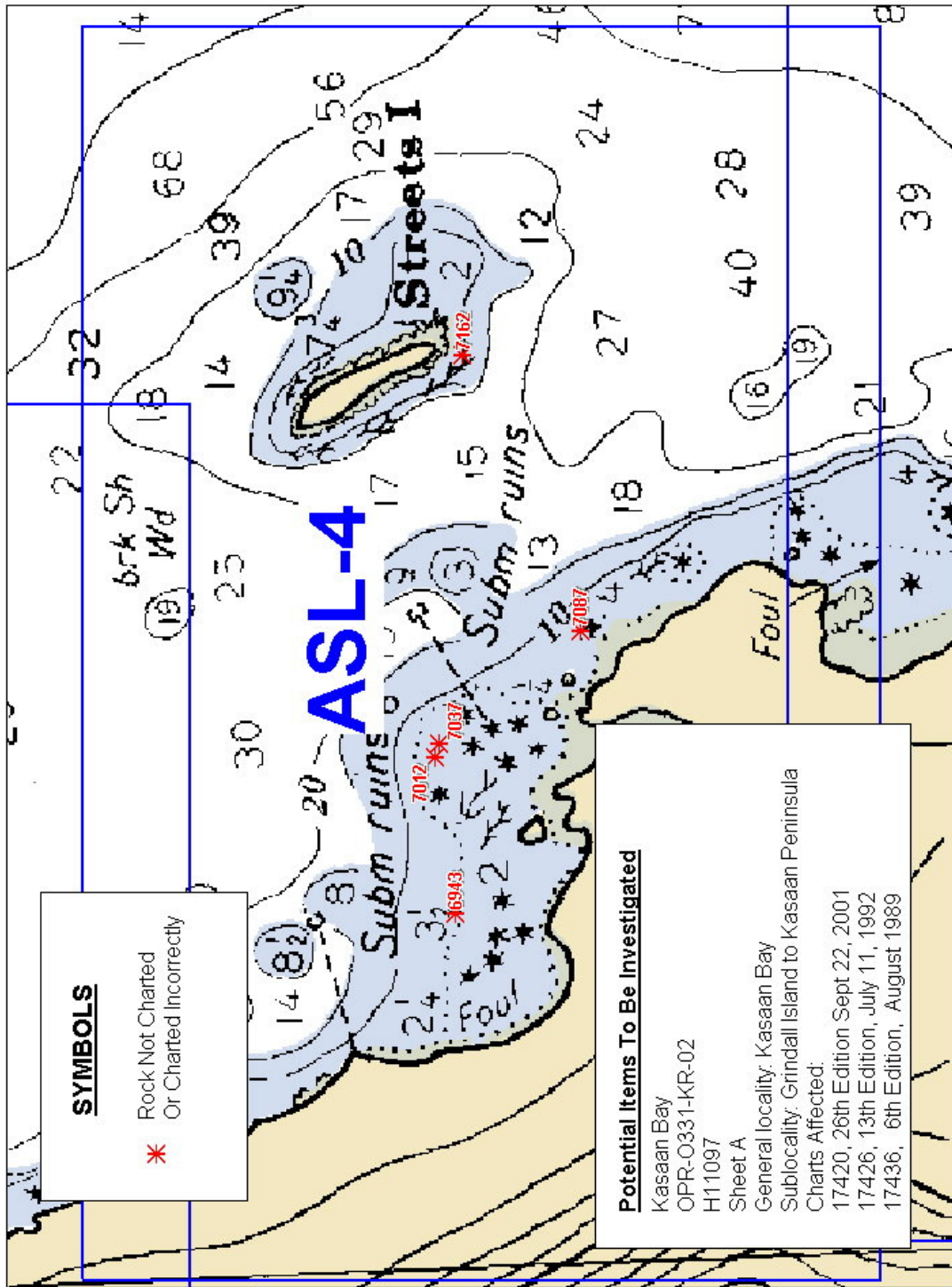
**PITBI Reports<sup>68</sup>**  
**(Potential Item to Be Investigated)**

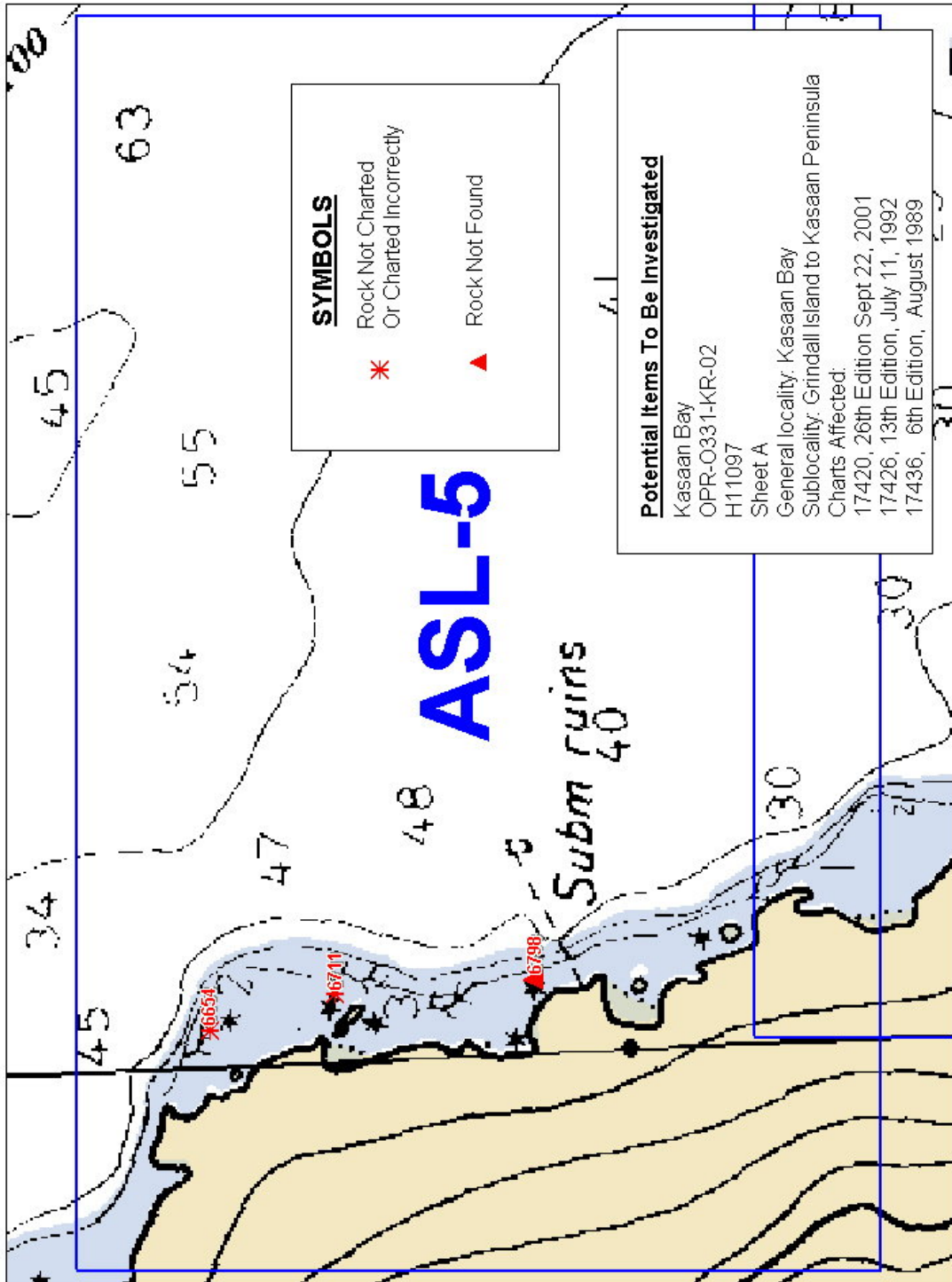
## Sheet A Potential Items To Be Investigated

Shoreline sheet	DN	Target	Easting UTM	Northing UTM	Latitude N	Longitude W	Description
ASL-2	206	7488	677312.71	6149554.4	55.46	-132.196	Rock not charted
ASL-1	206	7561	676970.88	6150053.03	55.4646	-132.201	Rock not charted
ASL-5	206	6711	679126.74	6152962.84	55.4899	-132.165	Rock position SE, 23 m of charted rock
ASL-5	206	6654	679063.76	6153184.65	55.4919	-132.166	Rock not charted
ASL-5	206	6798	679153.69	6152612.42	55.4867	-132.165	Disproval-Rock not found
ASL-4	206	6943	679802.29	6151460.92	55.4762	-132.155	Rock not charted
ASL-4	206	7012	680124.71	6151501.88	55.4764	-132.15	Rock not charted
ASL-4	206	7037	680151.48	6151493.49	55.4763	-132.149	Rock not charted
ASL-4	206	7087	680384.63	6151204.98	55.4737	-132.146	Rock position NW, 27 m of charted rock
ASL-4	206	7162	680948.39	6151447.45	55.4756	-132.137	Rock not charted
ASL-3	206	7403 <sup>69</sup>	680007.73	6149489.72	55.4584	-132.153	Disproval-Piling not found
ASL-8	206	N/A	683065.87	6145862.23	55.4247	-132.1071 <sup>70</sup>	South, North Extents of RSD
ASL-8	206	N/A	682157.09	6146914.27	55.4345	-132.1207 <sup>71</sup>	Danger area not found

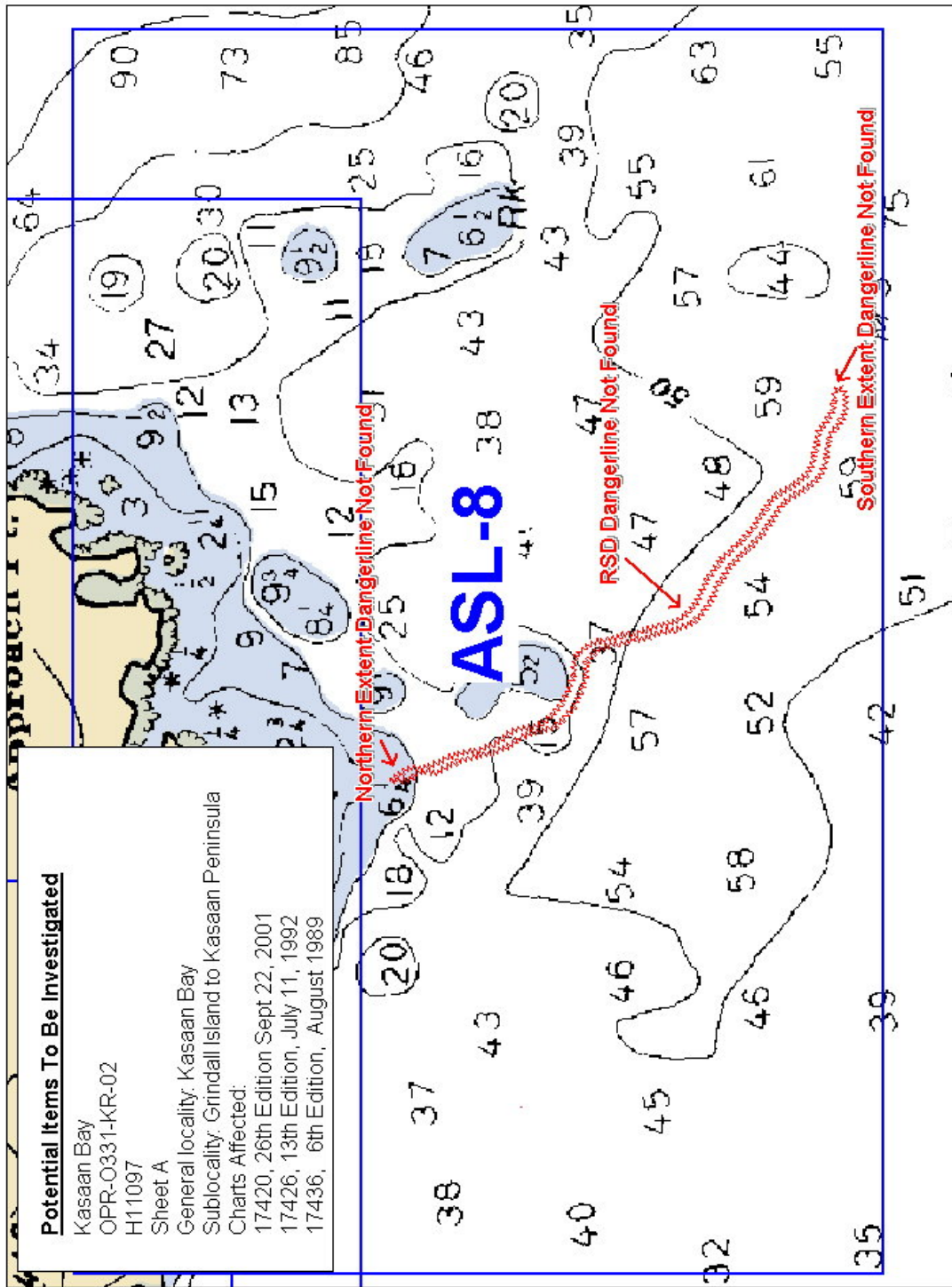










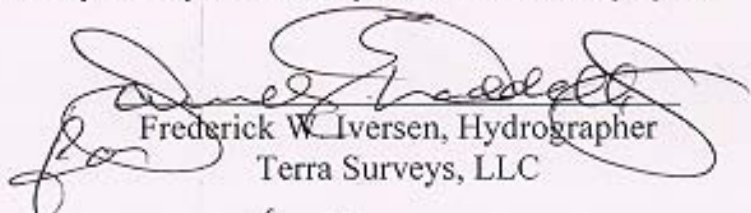


LETTER OF APPROVAL  
REGISTRY NO. H-11097

This Report and the accompanying smooth sheet are respectfully submitted.

Field operations contributing to the accomplishment of survey H-11097 were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report, smooth sheet, digital data, and accompanying records have been closely reviewed and are considered complete and adequate as per the Statement of Work. Other reports submitted with this survey include Data Acquisition and Processing Report, Vertical and Horizontal Report, and the Shoreline Verification Field Notes.

I believe this survey is complete and adequate for its intended purpose.



Frederick W. Iversen, Hydrographer  
Terra Surveys, LLC

Date 4/3/03

**APPENDIX I**

**Danger To Navigation Reports**

This survey produced two Danger to Navigation reports.<sup>72</sup> The report and the associated correspondence are included in this appendix. A list of the correspondence is below.

Date

January 4, 2002

Recipient

Commander Coast Guard District  
CC: Gary Nelson NOAA (COTR)

### Danger to Navigation Report

Hydrographic Survey Registry Number: H-11097

Survey Title: State: Alaska Locality: Kasaan Bay Sub-locality: Grindall  
Island to Kasaan Peninsula

Project Number: OPR-0331-KR-02

Survey Dates: June 8, 2002 - Present

CHARTS AFFECTED:

Chart	Scale	Edition	Date
17426	1:40,000	13 <sup>th</sup>	July 11, 1992

DANGERS:

Feature	Depth(fms)	Latitude	Longitude
Contour	5	55/28/26.8(N)	132/08/44.2(W)

COMMENTS:

A 5-fathom contour is incorrectly labeled as a 10-fathom contour near latitude 55/28/26.8N, longitude 132/08/44.2W.

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch (N/CS34),  
at 526-6836.

## Danger to Navigation Report

**Hydrographic Survey Registry Number: H11097**

**Survey Title: State: AK Locality: Kasaan Bay Sub-locality: Grindall Island to Kasaan Peninsula**

**Project Number: OPR-O331-KR-02**

**Survey Dates: 06/08/02 - 08/09/02**

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

**CHARTS AFFECTED:**

<b>Chart</b>	<b>Scale</b>	<b>Edition</b>	<b>Date</b>
17420	1:229,376	26 <sup>th</sup>	9/22/01
17426	1:40,000	13 <sup>th</sup>	7/11/92

**DANGERS:**

<b>Feature</b>	<b>Depth (fms)</b>	<b>Latitude (N)</b>	<b>Longitude (W)</b>
Sounding	8 ¼	55° 27' 37.9"	132° 08' 23.4"
Sounding	6 ¼	55° 27' 04.1"	132° 09' 01.3"
Sounding	9 ¼	55° 27' 17.4"	132° 09' 00.7"
Sounding	5	55° 26' 32.7"	132° 09' 04.9"
Sounding	5 ¼	55° 26' 46.9"	132° 09' 53.5"
Sounding	8 ¼	55° 27' 08.6"	132° 11' 17.5"
Sounding	½	55° 27' 36.0"	132° 11' 42.9"
Sounding	8 ¼	55° 27' 38.1"	132° 12' 21.4"
Sounding	9 ¼	55° 27' 44.9"	132° 12' 35.0"

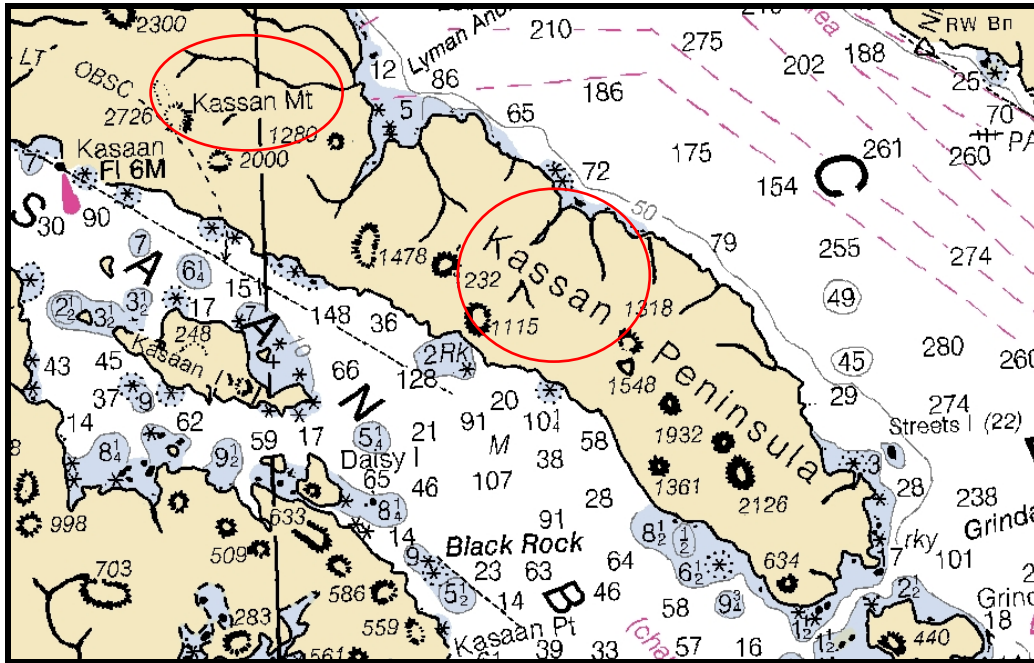
**COMMENTS:**

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

**APPENDIX II**

**List of Geographic Names**

The geographic names Kasaan Peninsula and Kasaan Mountain were found to be misspelled as *Kassan Peninsula* and *Kassan Mountain* on Chart 17420. Local knowledge and all other references found for the area support the proper spelling as Kasaan Peninsula and Kasaan Mountain.<sup>73</sup>

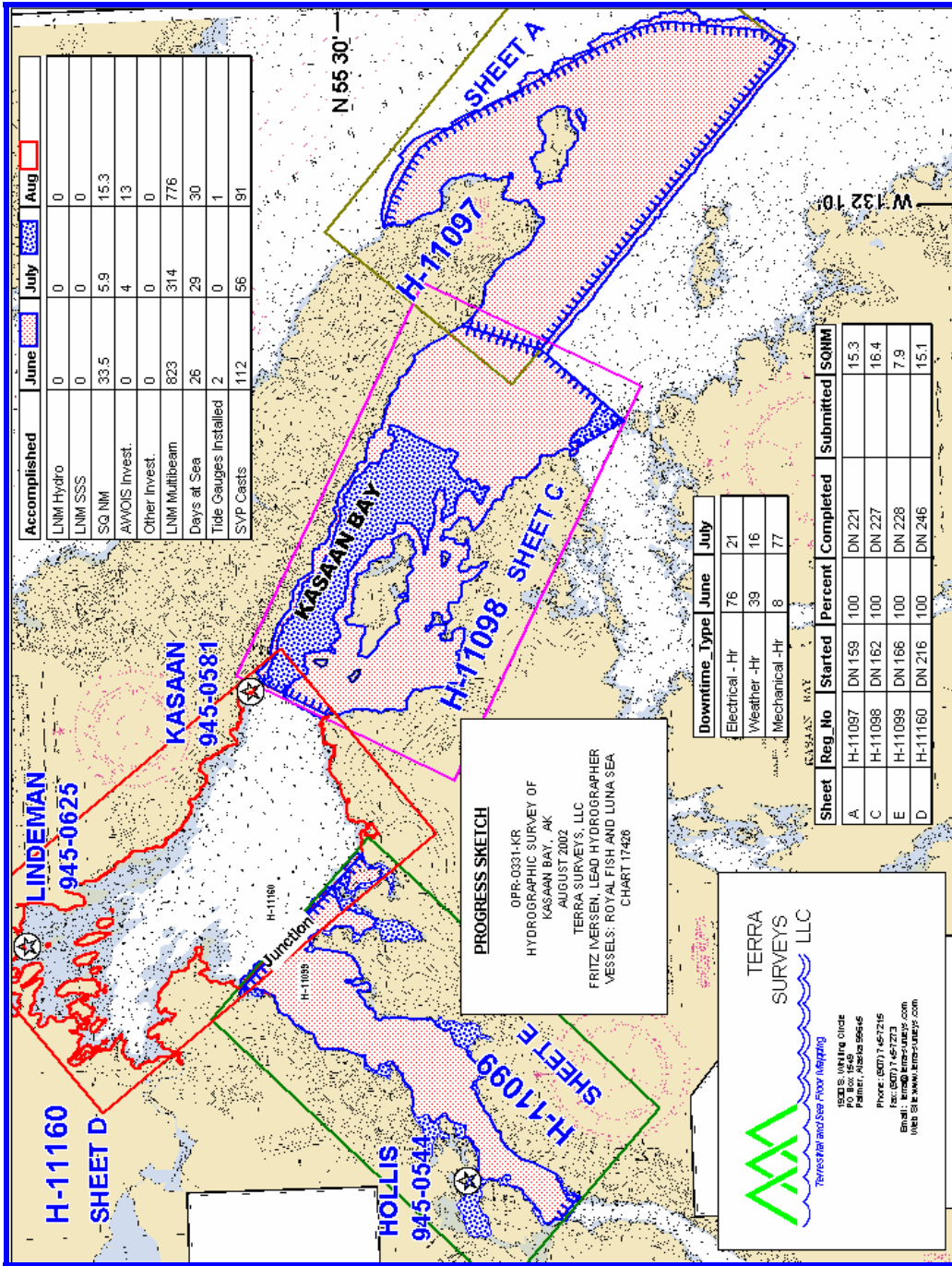


Portion of Chart 17420 showing the misspelling of geographical names



**APPENDIX III**

**Progress Sketch**



**APPENDIX IV**

**Tides and Water Levels**

## 2002 FIELD and FINAL TIDE NOTE

## Hydrographic Sheet: H11097

## Sheet A

Grindall Island to Kasaan Peninsula  
Kasaan Bay, Alaska

NOAA Project No:	OPR-0331-KR-2002 Kasaan Bay, Alaska				
NOAA Contract No:	50-DGNC-0-90003				
The NOS Ketchikan, AK tide station (945-0460) served as control for the subordinate stations on this project. Datum determinations were made for the tertiary subordinate stations: Kasaan Bay (945-0581), and Hollis Anchorage (945-0544). The NTDE 1960-78 was utilized.					
Location and Time Meridian	Name:	Lat (NAD 83)	Long (NAD 83)	Time Meridian:	
	Kasaan Bay	55° 32' 05"	132° 23' 48"	0° (UTC)	
	Hollis Anchorage	55° 28' 45"	132° 38' 30"	0° (UTC)	
Time Period and Datum Reference	Name:	Established:	Removed:	MLLW	MHW units
	Kasaan Bay	6/4/2002	9/5/2002	0.000	4.496 meters
	Hollis Anchorage	6/1/2002	9/4/2002	0.000	4.553 meters
Tide observer	Terra Surveys, LLC 1930 South Whiting Circle Palmer, AK 99645 (907) 745-7215				
Gauges	Design Analysis H350XL/355 bubbler systems.				
Installation	Each gauge was secured inside a waterproof case, and fastened vertically inside of an enclosed Rubbermaid Garden Toolshed.  Refer to the tide station package for additional site specific details of installation.				
Tide staff	No tide staff was installed. Leveling was performed from a tidal benchmark to the water surface. The water height was read using a metric rod with a stilling well attached to remove interference from waves.				
Benchmarks	The following benchmarks were installed at these sites: Kasaan Bay: 0581 A 2002, 0581 B 2002, 0581 C 2002, 0581 D 2002 Hollis Anchorage: none  The following benchmarks were recovered at these sites: Kasaan Bay: BM 2 1911, BM 7 1963 Hollis Anchorage: BM 1 1924, BM 2 1924, BM 3 1924, BM 4 1953, BM 5 1960				
Levels	Benchmarks were leveled at the installation and removal of the tidal station. The benchmarks and station datums were connected through frequent measurements to the water. The level runs closed within NOS tolerance.				
Final Tidal Zoning	This sheet is covered by tide zones SA102, SA104 and SA100.				
Reduction of Hydrographic data	Terra Surveys, LLC (the prime contractor) was provided with preliminary datums developed by LCMF during June 2002 based upon a short series simultaneous comparison between Ketchikan and the primary subordinate station. Six minute tide data reduced to MLLW and smoothed with a 5th order 5 hour polynomial curve fit was provided to Terra Surveys throughout the field season. In September 2002, LCMF finalized datums and forwarded all data necessary to reduce hydrographic soundings to the prime contractor.				

**APPENDIX V**

**Supplemental Survey Records and Correspondence**

Subject:  
Terra Surveys Inc. OPR-0331-KR-02 Kasaan Shoreline Verification  
Processing Procedures  
From:  
Anne Dollard <[Adollard@terrasond.com](mailto:Adollard@terrasond.com)>  
Date:  
Thu, 02 Feb 2006 15:44:11 -0900  
To:  
[beth.taylor@noaa.gov](mailto:beth.taylor@noaa.gov)  
To:  
[beth.taylor@noaa.gov](mailto:beth.taylor@noaa.gov)

**Terra Surveys Inc. OPR-0331-KR-02 Kasaan Shoreline Verification  
Processing Procedures**

In response to recent phone conversations and E mails with NOAA rep Beth Taylor, who is reviewing our work; find a summary below to further clarify Terra Surveys processing procedures in regard to shoreline verification.

The RSD data and charted features often varied and disagreed. We found the following scenarios we had to treat in different ways:

- RSD rocks where there was no charted rock
- Charted rocks where there was no RSD rock
- New rocks not represented by Chart or RSD
- Rocks (near a charted rock) not charted correctly

The table of Traditional Shoreline Verification Items (TVI) listed in each Sheet's Descriptive Report, Section D2 Additional Results lists the position of the boat where the target was taken, **not** the actual position of the item corrected for range and bearing. The plotted positions of features on the smoothsheet are **either** the verified RSD position or the target position when the range and bearing are at or near zero from the boat. The reasoning for this was to preserve the RSD data whenever possible without having to compute all new positions. The TVI positions **that are plotted on the smoothsheet** essentially have the same position as the corresponding RSD values when the range and bearing were at or near zero, and are interchangeable. Refer to the delivered velum overlay for an overall comparison of RSD, Charted and Target positions.

Apologies for the confusion.

Anne Dollard  
TerraSond Ltd.

RECRD 52760 VESLTERMS OBSTRUCTION CHART 17426 AREA 0  
 CARTOCODE 067 SENDINGCODE DEPTH

NATIVLAT 55/29/13.02 NATIVLON 132/09/39.56 NATIVDATUM 31  
 LAT83 55/29/13.02 LONG83 132/09/39.56 GPQUALITY Low  
 55 29 13.02 9 39.56 Update GP  
 LATDEC 55.48695 LONDEC 132.1609888889 GPSOURCE Scaled

PROJECT OPR-0331 ITEMSTATUS Assigned SEARCHTYPE Full  
 RADIUS INIT MBH ASSIGNED 6/5/2001  
 TECNIQ MB,S2,ES,DI,SD

Techniqnote SEARCH THE AREA AS SHOWN ON THE AWOIS GRAPHIC.

History THE AWOIS POSITION IS THE SCALED OFFSHORE END OF THE SUBMERGED RUINS.  
 SOURCE UNKNOWN--THE SUBMERGED RUIN FEATURE APPEARS ON THE FIRST EDITION OF THE CHART PRINTED IN 1927 - OF THE NUMEROUS SOURCES NOTED IN THE HISTORY, THE MOST LIKELY WOULD BE FROM THE TOPO SOURCES OF 1911, 1922, AND 1924 USED TO CONSTRUCT THE FIRST EDITION. (ENTERED 6/01 BY MBH)

Fieldnote Investigation  
 Date(s)/Day Number(s): 6/14/02 DN 165 Survey Vessel Name: Luna Sea  
 Hydrographic Survey Number: H11097  
 Position Numbers/Time: 52760/18:07:21 UTC  
 Investigation Method: Shallow Water Multibeam Sonar  
 Surveyed Position (NAD83): Lat 55 29'13.02"N Long 132 09'39.56"W  
 Position Determined By: Differential GPS  
 Investigation Summary: The search area has 200% SWMB coverage. A review of the digital terrain model detected some topographic relief. A review of the bottom profile in CARIS did not show any obvious evidence of ruins. Further investigation with divers or SS sonar would be required to determine if these ruins still exist.  
 Charting Recommendation:  
 Based on the results of survey H-11097, the hydrographer recommends retention of the submerged ruin symbol until further investigation disproves its presence.  
 Recommended Least Depth: 40 fathoms below mean low water

Proprietary Evaluator comment: The hydrographer found no conclusive evidence of ruins, and PHB review of the data showed no evidence of the ruins. Smooth sheet portrayal of the ruins originated from the chart, not the survey. The evaluator recommends removing submerged ruins symbol and notation from all affected charts. Chart the area according to survey H11097.

YEARSUNK NIMANUM SYSTEMNUM 13181 Print Record

RECD 52761 VESLTERMS OBSTRUCTION CHART 17426 AREA 0  
 CARTOCODE 067 SNDINGCODE DEPTH

NATIVLAT 55/28/43.25 NATVLON 132/09/18.68 NATVDATUM 31  
 LAT83 55/28/43.25 LONG83 132/09/18.68 Update GP GPQUALITY Low  
 55 28 43.25 132 9 18.68 GPSOURCE Scaled  
 LATDEC 55.478680555556 LONDEC 132.15518888889

PROJECT OPR-0331 ITEMSTATUS Assigned SEARCHTYPE Full  
 RADIUS INIT MBH ASSIGNED 6/5/2001  
 TECNIQ MB,S2,ES,DI,SD

Techniqnote SEARCH THE AREA AS SHOWN ON THE AWOIS GRAPHIC.

History THE AWOIS POSITION IS THE SCALED OFFSHORE END OF THE SUBMERGED RUINS.  
 SOURCE UNKNOWN--THE SUBMERGED RUIN FEATURE APPEARS ON THE FIRST EDITION OF THE CHART PRINTED IN  
 1927 - OF THE NUMEROUS SOURCES NOTED IN THE HISTORY, THE MOST LIKELY WOULD BE FROM THE TOPO  
 SOURCES OF 1911, 1922, AND 1924 USED TO CONSTRUCT THE FIRST EDITION. (ENTERED 6/01 BY MBH)

Fieldnote Investigation

Date(s)/Day Number(s): 6/11/02 DN 162 Survey Vessel Name: Royal Fish

Hydrographic Survey Number: H11097

Position Numbers/Time: 52761/00:08:46 UTC

Investigation Method: Shallow Water Multibeam Sonar

Surveyed Position (NAD83): Lat 55 28'43.25"N Long 132 09'18.68"W

Position Determined By: Differential GPS

Investigation Summary: The search area has 200% SWMB coverage. A review of the digital terrain model detected some  
 topographic relief. A review of the bottom profile in CARIS did not show any obvious evidence of ruins. Further investigation with  
 divers or SS sonar would be required to determine if these ruins still exist.

Charting Recommendation:

Based on the results of survey H-11097, the hydrographer recommends retention of the submerged ruin symbol until further  
 investigation disproves its presence.  
 Area has full coverage.

Recommended Least Depth: 8 fathoms below mean low water

Proprietary

Evaluator comment: The hydrographer found no conclusive evidence of ruins, and PHB review of the data  
 showed no evidence of the ruins. Smooth sheet portrayal of the ruins originated from the chart, not the survey. The evaluator  
 recommends removing submerged ruins symbol and notation from all affected charts. Chart the area according to survey H11097.



RECRD 52762 VESLTERMS OBSTRUCTION CHART 17426 AREA 0  
 CARTOCODE 067 SNDINGCODE \_\_\_\_\_ DEPTH \_\_\_\_\_

NATIVLAT 55/28/35.87 NATIVLON 132/08/43.22 NATIVDATUM 31  
 LAT83 55/28/35.87 LONG83 132/08/43.22 GPQUALITY Low  
55 28 35.87 132 8 43.22 Update GP \_\_\_\_\_  
 GPSOURCE Scaled  
 LATDEC 55.476630555556 LONDEC 132.14533888889

PROJECT OPR-0331 ITEMSTATUS Assigned SEARCHTYPE Full  
 RADIUS \_\_\_\_\_ INIT MBH ASSIGNED \_\_\_\_\_  
 TECNIQ MB,S2,ES,DI,SD \_\_\_\_\_  
 Techniqnote SEARCH THE AREA AS SHOWN ON THE AWOIS GRAPHIC.

History  
 THE AWOIS POSITION IS THE SCALED OFFSHORE END OF THE SUBMERGED RUINS.  
 SOURCE UNKNOWN—THE SUBMERGED RUIN FEATURE APPEARS ON THE FIRST EDITION OF THE CHART PRINTED IN  
 1927 - OF THE NUMEROUS SOURCES NOTED IN THE HISTORY, THE MOST LIKELY WOULD BE FROM THE TOPO  
 SOURCES OF 1911, 1922, AND 1924 USED TO CONSTRUCT THE FIRST EDITION. (ENTERED 6/01 BY MBH)

Fieldnote  
 Investigation  
 Date(s)/Day Number(s): 07/02/02 DN 183 Survey Vessel Name: Royal Fish  
 Hydrographic Survey Number: H11097  
 Position Numbers/Time: 52762/18:38:11 UTC  
 Investigation Method: Shallow Water Multibeam Sonar  
 Surveyed Position (NAD83): Lat 55 28'35.87"N Long 132 08'43.22"W  
 Position Determined By: Differential GPS  
 Investigation Summary: The search area has 200% SWMB coverage. A review of the digital terrain model detected some topographic relief. A review of the bottom profile in CARIS did not show any obvious evidence of ruins. Further investigation with divers or SS sonar would be required to determine if these ruins still exist.  
 Area has full coverage.  
 Charting Recommendation:  
 Based on the results of survey H-11097, the hydrographer recommends retention of the submerged ruin symbol until further investigation disproves its presence.  
 Recommended Least Depth: 11 fathoms below mean low water

Proprietary  
 Evaluator comment: Evaluator comment: The hydrographer found no conclusive evidence of ruins, and PHB review of the data showed no evidence of the ruins. Smooth sheet portrayal of the ruins originated from the chart, not the survey. The evaluator recommends removing submerged ruins symbol and notation from all affected charts. Chart the area according to survey H11097.

### Revisions Compiled During Office Processing and Certification

<sup>1</sup> Insert “from.”

<sup>2</sup> Concur with clarification. The survey area encompasses Grindall Island. See coverage graphic following.

<sup>3</sup> Filed with the project reports.

<sup>4</sup> Concur. The data is considered adequate to supersede all prior surveys and miscellaneous charted data in the common areas except as noted in this report and the Hdrawing.

Note that in an area around Lat 55/26/59.4N and Lon 132/9/51.8W on the smooth sheet, the hydrography as depicted did not reach the 4-meter curve. The area is marked on the Hdrawing with an isolated supersession limit line. Do not supersede contours and soundings within this area.

<sup>5</sup> Insert “SOW.”

<sup>6</sup> Filed with the project reports.

<sup>7</sup> Strikethrough ~~selections~~, replace with “selection.”

<sup>8</sup> Strikethrough ~~are~~, replace with “is.”

<sup>9</sup> Strikethrough ~~then~~, replace with “than.”

<sup>10</sup> Strikethrough ~~occurrence~~, replace with “selection.”

<sup>11</sup> Strikethrough ~~of which fewer exist~~, begin new sentence “Among the outer beam soundings, fewer were selected from.”

<sup>12</sup> Filed with the project reports.

<sup>13</sup> Insert “of”.

<sup>14</sup> Filed with the project reports.

<sup>15</sup> Concur. Data meets specifications and is acceptable for charting.

<sup>16</sup> Insert “with”.

<sup>17</sup> Concur. In PHB processing, H11097 was also compared with H11236 (OPR-0331-KR, 2003) in the junction area along H11097’s southern limit. The junction showed excellent correlation. All data sets have been considered in compiling contours and soundings to H11097.

<sup>18</sup> Strikethrough ~~H-11079~~, replace with H-11097.

<sup>19</sup> Filed with the project reports.

<sup>20</sup> Filed with the project reports.

<sup>21</sup> Strikethrough ~~is~~, replace with “are”.

<sup>22</sup> Filed with the project reports.

<sup>23</sup> Data Acquisition and Processing Report, filed with the project reports.

<sup>24</sup> Filed with the project reports. Also see Final Tide Note attached to this report.

<sup>25</sup> Office comparison was also made to Chart 17426, 14<sup>th</sup> Edition, Chart 17436, 8<sup>th</sup> Edition and Chart 17420, 27<sup>th</sup> Edition, continuous maintenance rasters.

<sup>26</sup> Strikethrough ~~shift performed to compare depths~~, replace with “comparison of contours and soundings performed”.

<sup>27</sup> Concur.

<sup>28</sup> Strikethrough ~~are~~, replace with “is”.

<sup>29</sup> Concur with clarification. Infer “Latitude” and “Longitude” wherever they have been omitted from degrees, minutes and seconds in this report.

<sup>30</sup> *Rky* areas found in H11097 have been shown on the Hdrawing where scale and sounding placement permit.

<sup>31</sup> Concur. Charted depths were generally -2 fathoms to +2 fathoms different from survey depths offshore of the 10-fathom curve. Larger differences are readily apparent inshore.

Also note that there were errors in the depiction of contours on the smooth sheet.

Errors have been corrected on the Hdrawing.

<sup>32</sup> The evaluator concurs with the hydrographer's statements except as noted below.

Chart these areas as shown on the smooth sheet. Use smooth sheet positions, not general positions given for the discussions below.

<sup>33</sup> Concur.

<sup>34</sup> Concur with clarification. Chart 1 fathom *Rk* at smooth sheet position.

<sup>35</sup> Concur with clarification. Chart 2 fathom, 2 foot *Rk* at smooth sheet position.

<sup>36</sup> Concur with clarification. Chart 3 fathom, 3 foot *Rk* at smooth sheet position.

<sup>37</sup> Concur with clarification. Chart 5 fathom, 3 foot *Rk* at smooth sheet position.

<sup>38</sup> Concur. Chart this area based on smooth sheet information.

<sup>39</sup> Concur. Chart this area based on smooth sheet information.

<sup>40</sup> Concur with clarification. Chart these areas based on smooth sheet information.

<sup>41</sup> Concur. Chart this area based on smooth sheet information.

<sup>42</sup> Concur with clarification. A nearby shoaler sounding was selected for the Hdrawing.

Chart according to the Hdrawing.

<sup>43</sup> Concur with clarification. The sounding was reported as a Danger to Navigation and is charted as 8 fathoms. Chart as 8 fathoms 2 feet in smooth sheet position.

<sup>44</sup> Concur. Chart this area based on smooth sheet information.

<sup>45</sup> Concur with clarification. Scale precludes depiction of the 2 fathom 3 foot sounding at its smooth sheet position. Chart area according to the Hdrawing.

<sup>46</sup> Concur with clarification. Chart 8 fathom 2 foot *Rk* at smooth sheet position.

<sup>47</sup> Concur. Chart this area based on smooth sheet information.

<sup>48</sup> Concur. Chart this area based on smooth sheet information.

<sup>49</sup> Concur with clarification. Chart 8 fathom 5 foot sounding at smooth sheet position.

Chart the area based on smooth sheet information.

<sup>50</sup> Concur. Chart this area based on smooth sheet information.

<sup>51</sup> Do not concur. The ruins symbol portrayed on the smooth sheet originated from the chart and is not source information from the present survey. The ruins are not evident in the DTM or smooth sheet. The evaluator recommends removing the charted ruins symbols and *subm ruins* notation. See AWOIS report attached to this report.

<sup>52</sup> Do not concur. The ruins symbol portrayed on the smooth sheet originated from the chart and is not source information from the present survey. The ruins are not evident in the DTM or smooth sheet. The evaluator recommends removing the charted ruins symbols and *subm ruins* notation. Chart least depth of 8 fathoms 4 feet as *Rk*, as depicted on the Hdrawing and smooth sheet. See AWOIS report attached to this report.

<sup>53</sup> Do not concur. The ruins symbol portrayed on the smooth sheet originated from the chart and is not source information from the present survey. The ruins are not evident in the DTM or smooth sheet. The evaluator recommends removing the charted ruins symbols and *subm ruins* notation. See AWOIS report attached to this report.

<sup>54</sup> Chart these items according to the smooth sheet except as noted.

<sup>55</sup> Strikethrough ~~then~~, replace with "than".

<sup>56</sup> Concur. Observed changes from RSD shoreline ranged from zero to about 50 meters. MHWL changes are shown as dashed red lines on Level 1 of the Hdrawing.

<sup>57</sup> Investigate itemized features as national survey priorities and budget allow.

<sup>58</sup> Concur.

<sup>59</sup> Resurvey as national survey priorities and budget allow.

<sup>60</sup> The evaluator concurs with the hydrographer's findings as listed below, except as endnoted. Note that positions listed in the following table are Detached Positions of the vessel at the time of observation and are not corrected for range and bearing. The evaluator recommends charting features according to the smooth sheet except as noted. For further information, see the hydrographer's supplemental email, attached to this report.

<sup>61</sup> Concur with clarification. The item is shown as a rock on the smooth sheet, but the item investigation report describes it as the SE extent of a foul area. Therefore, the smooth sheet ledge has been extended on the Hdrawing to incorporate the rock. Chart according to the Hdrawing.

<sup>62</sup> Concur with clarification. The item is shown as a rock on the smooth sheet, but the item investigation report describes it as the mid-S extent of a foul area. Therefore the smooth sheet ledge has been extended on the Hdrawing to incorporate the rock. Chart according to the Hdrawing.

<sup>63</sup> Concur with clarification. The item is shown as a rock on the smooth sheet, but the item investigation report describes it as the SW extent of a foul area. Therefore the smooth sheet ledge has been extended on the Hdrawing to incorporate the rock. Chart according to the Hdrawing.

<sup>64</sup> Concur with clarification. The depth of 0.86m (2.82 ft) above MLLW disagrees with the smooth sheet depth of 4ft above MLLW. Chart area based on the smooth sheet.

<sup>65</sup> Concur with clarification. The item report mentions a charted rock near the Detached Position. There is no rock charted on 17426, 14<sup>th</sup> Edition, CMR, near the DP. Chart ledgeline as depicted on the smooth sheet.

<sup>66</sup> Concur. Chart according to the smooth sheet.

<sup>67</sup> Concur with clarification. The depth of 0.08m (0.26 ft) below MLLW disagrees with the smooth sheet depth of 2 ft above MLLW. Chart area based on the smooth sheet.

<sup>68</sup> Chart these areas according to the smooth sheet.

<sup>69</sup> Concur with clarification. The piling is not charted on 17246, 14<sup>th</sup> Edition CMR.

<sup>70</sup> Concur. Remove charted *Breakers* notation and danger line.

<sup>71</sup> Concur. Remove charted *Breakers* notation and danger line.

<sup>72</sup> Concur with clarification. Ten dangers to navigation were submitted after PHB review. Differences between charted DtoNs, the smooth sheet, and the Hdrawing are discussed below.

✚ DtoN Sounding, 6¼ fm, Lat 55° 27' 04.1"N, Lon 132° 09' 01.3"W was not selected for the Hdrawing. A nearby shoaler sounding was chosen instead. Chart according to the Hdrawing.

✚ DtoN Sounding, 9¼ fm, Lat 55° 27' 17.4"N, Lon 132° 09' 00.7"W was not selected for the Hdrawing. A nearby shoaler sounding was chosen instead. Chart according to the Hdrawing.

✚ DtoN Sounding, 5¼ fm, Lat 55° 26' 46.9"N, Lon 132° 09' 53.5"W was not charted. Chart according to the smooth sheet.

✚ DtoN Sounding, ½ fm, Lat 55° 27' 36"N, Lon 132° 11' 42.9"W appears on the smooth sheet as a rock. Chart 0fm 3ft *Rk* in smooth sheet position.

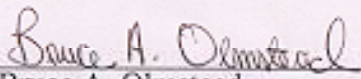
✚ DtoN Sounding, 9¼ fm, Lat 55° 27' 44.9"N, Lon 132° 12' 35"W was not selected for the Hdrawing. A nearby shoaler sounding was chosen instead. Chart according to the Hdrawing.

<sup>73</sup> Concur. Correct spelling on Chart 17420.

APPROVAL SHEET  
H11097


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.

  
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Bruce A. Olmstead  
Cartographic Team  
Pacific Hydrographic Branch

Date: 2 / 14 / 2006

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  
CDR, NOAA  
Chief, Pacific Hydrographic Branch

Date: 16 FEB 2006

