

H11430

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey HYDROGRAPHIC/LIDAR

Field No. OPR-P183-KRL-05

Registry No. H11430

LOCALITY

State Alaska

General Locality Southwest Alaska Peninsula, Shumagin Islands

Sublocality Eagle Harbor

2005

CHIEF OF PARTY

..... Mark Sinclair Darren Stephenson

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DATE

HYDROGRAPHIC TITLE SHEET

NOAA FORM 77-28 U.S. DEPARTMENT OF COMMERCE (11-72) NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION HYDROGRAPHIC TITLE SHEET	REGISTRY NO. H11430
INSTRUCTIONS – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office	FIELD No. N/A
<p>State: <u>Alaska</u></p> <p>General Locality: <u>Southwest Alaska Peninsula, Shumagin Islands</u></p> <p>Sub-Locality: <u>Eagle Harbor</u></p> <p>Scale: <u>1:10,000</u> Date of Survey: <u>April 29 to August 12, 2005</u></p> <p>Instructions dated: <u>April 18, 2005</u> Project No: <u>OPR-P183-KRL-05</u></p> <p>Vessel: <u>Tenix LADS Aircraft, VH – LCL</u></p> <p>Hydrographer: <u>M.J. Sinclair</u> Chief of Party: <u>D.J. Stephenson</u></p> <p>Surveyed by: <u>S.R. Ramsay, M.S. Hawkins, T.M. Farrow, J.K. Young, B.C. McWilliams, S.G. Denton, A.P. Reed and J. Weick</u></p> <p>Soundings taken by echo sounder, hand lead, pole: <u>Laser Airborne Depth Sounder</u></p> <p>Graphic record scaled by: <u>V. Sicari and L.R. Chamberlain</u></p> <p>Graphic records checked by: <u>S.R. Ramsay and J.G. Guilford</u></p> <p>Protracted by: <u>N/A</u> Automated plot: <u>HP Design Jet 800PS</u></p> <p>Verification by: <u>T. Wozumi, K. Reser</u></p> <p>Soundings in: <u>Fathoms at MLLW</u></p>	
<p>REMARKS: <u>Contract # NC-NJ3000-4-00010 01.</u></p> <p>Contractor: <u>Tenix LADS Incorporated, 925 Tommy Munro Drive, Suite J, Biloxi, MS 39532.</u></p> <p>Sub contractor: <u>John Oswald and Associates, 12001 Audubon Dr. Anchorage, AK 99516.</u></p> <p>Times: <u>All times are recorded in UTC.</u></p> <p>Purpose: <u>The purpose of this survey is to provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area.</u></p> <p><u>Projection is UTM Zone 4.</u></p>	

DESCRIPTIVE REPORT TO ACCOMPANY**HYDROGRAPHIC SURVEY H11430****SCALE 1:10,000, SURVEYED IN 2005****TENIX LADS AIRCRAFT, VH-LCL****TENIX LADS, INC. (TLI)****MARK SINCLAIR, HYDROGRAPHER****PROJECT****Project Number:** OPR-P183-KRL-05**Original:** DG 133C-03-CQ-0011**Date of Instructions:** April 18, 2005**Task Order:** T0007

Date of Supplemental Instructions: May 7, 2003 email regarding meeting with PHB, NOAA and November 24, 2004 e-mail regarding SOW revision.

Sheet Number: AA**Registry Number:** H11430**PURPOSE¹**

To provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area.

A. AREA SURVEYED

The LADS Mk II aircraft operated out of Sand Point Airport from April 29 to August 12, 2005. During this period twenty-four survey sorties were flown under Task Order 7 OPR-P183-KRL-05, Southwest Alaska Peninsula, Shumagin Islands, Alaska. Survey operations covered six smooth sheets. This Descriptive Report describes Sheet AA, which covers Eagle Harbor area Northwest of Nagai Island (see Figure 1).

Environmental factors such as wind strength and direction, cloud cover, high ground and water clarity influenced the area of data acquisition on a daily basis. See section B.2 Quality.

The planned and actual linear miles sounded for the areas are provided at Appendix III. The sheet limits are as follows for Sheet AA:

	Latitude (NAD 83)	Longitude (NAD 83)
NW corner	55°.11943305 160	°.23645526
NE corner	55°.16688751 160	°.15073071
SW corner	55°.08794254 160	°.01797993
SE corner	55°.04058080 160	°.10371097

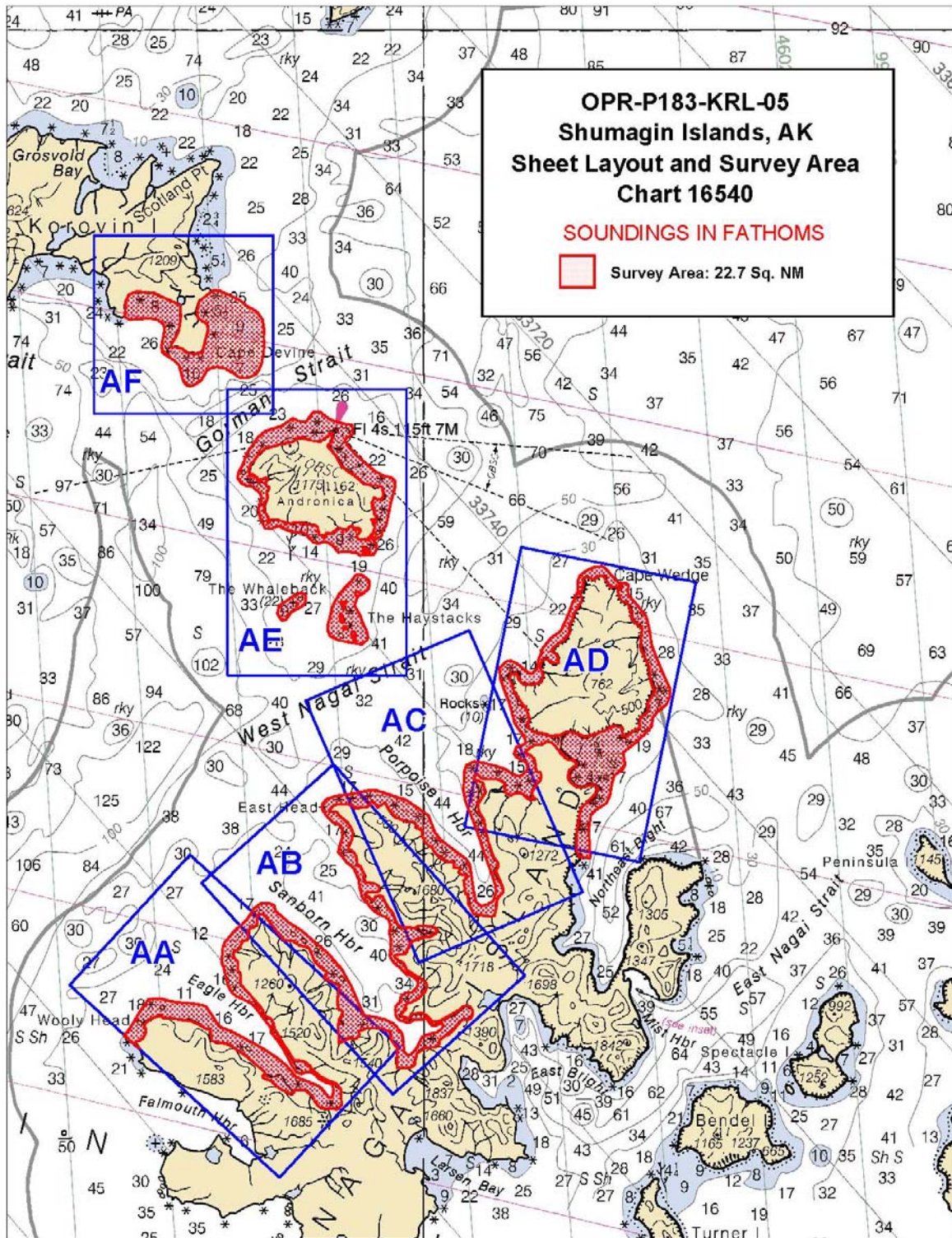


Figure 1 - Survey Area for Task Order 7 OPR-P183-KRL-05

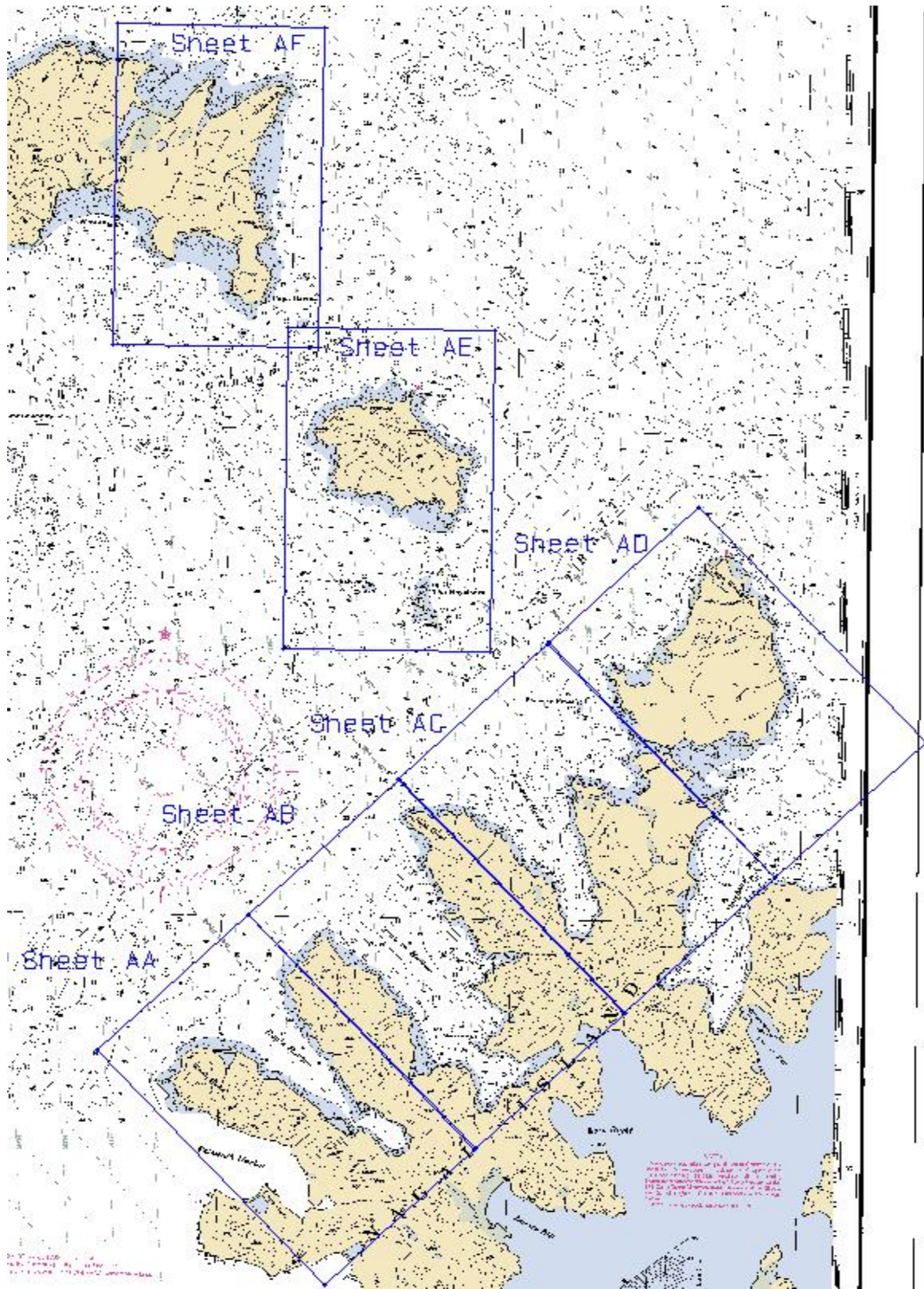


Figure 2 – Amended Sheet limits for Task Order 7 OPR-P183-KRL-05

B. ACQUISITION AND PROCESSING

Refer to the Data Acquisition and Processing Report for a detailed description of the equipment, processing and quality control procedures. A general description and items specific to this survey are discussed in the following sections.

B.1 EQUIPMENT

Data collection was conducted using the LADS Mk II Airborne System, data processing using the LADS Mk II Ground System and data visualization, quality control and final products using Caris HIPS 5.3, GMT/VTK, Terramodel and MicroStation version 8.

A prototype Digital Imagery capture system was installed at the commencement of this survey, which allowed digital images from the downward looking video to be captured.

B.1.1 Airborne System

The LADS Mk II Airborne System (AS) consists of a Dash 8-200 series aircraft, which has a transit speed of 250 knots at altitudes of up to 25,000 feet and an endurance of up to eight hours. Survey operations are conducted from heights between 1,200 and 2,200 feet at ground speeds between 140 and 175 knots. The aircraft is fitted with a Nd: YAG laser which is eye safe in accordance with ANSI Z136.1-2000, American National Standard for Safe Use of Lasers. The laser operates at 900 Hertz from a stabilized platform to provide 5x5 or 4x4 meter laser spot spacing in the main line sounding mode of operation. These two modes of data capture resolution require an over ground aircraft speed of 175 and 140 knots respectively. The electro-mechanical scanner also provides examination modes of sounding with laser spot spacings of 3x3 and 2x2 meters and swath widths of 100 and 50 meters respectively.

Green laser pulses are scanned beneath the aircraft in a rectangular pattern. The pulses are reflected from the land, sea surface, within the water column and from the seabed. The green returned laser energy is captured by the green receiver and then digitized and logged onto digital linear tape. An infra-red beam is also directed vertically beneath the aircraft. The height of the aircraft is determined by the infra-red laser return, which is supplemented by the inertial height from the Attitude and Heading Reference System and GPS height. The LADS Mk II system can operate by day and night. The depth penetration of the system may be improved at night by removing the daylight filter from the receiving optics. Survey operations may be restricted at night by elevations in or near the survey area, which may invoke civil aviation lowest safe altitude rules. Real-time positioning is obtained by either an Ashtech GG24 GPS receiver providing autonomous GPS. Ashtech Z12 GPS receivers are also provided as part of the Airborne System and Ground Systems to log KGPS data on the aircraft and at a locally established GPS base station.

B.1.2 Ground System

The LADS Mk II Ground System (GS) 'Forrest' was used to conduct data processing in the field. Forrest consists of a portable Compaq Alpha ES40 Series 3 processor server with 1 GB

EEC RAM, 764 GB disk space, digital linear tape (DLT) drives and magazines, digital audio tape (DAT) drive, CD ROM drive and is networked to up to 12 Compaq 1.5 GHz PCs and a HP 800ps Design Jet Plotter, printers and QC workstations. Forrest was transported to the deployment site. Quality control checks and editing of the data were also conducted on Ground System Forrest. GS 'Forrest' was destroyed by hurricane Katrina August 29, 2005 and was replaced by GS 'Katrina'.

The GS supports survey planning, data processing, quality control and data export. The GS component also includes a KGPS base station, which provides independent post-processed position and height data. A comprehensive description of the GS is provided in the Data Acquisition and Processing Report.

B.2 QUALITY

B.2.1 Data Density

The survey area was sounded at 4x4 meter laser spot spacing with main lines of sounding spaced at 80 meters, which provided the required 200% coverage.

At the sea surface the footprint of the laser beam is approximately 2.5 meters in diameter. As the beam passes through the water column it slowly diverges due to scattering. It should be noted that at 4x4 meter laser spot spacing there is a gap of between 1 to 1.5 meters between the illuminated area of adjacent soundings at the sea surface. There is a possibility that small objects in shallow water along the coast line may fall between consecutive 4x4 meter soundings and not be detected.

B.2.2 Water Clarity

The water clarity in the survey area was generally good for laser survey; however, it did vary from poor to excellent and this required close management and extra lines to be planned. The water clarity was better at the two headlands with water depths to 30 meters. In the upper reaches of Eagle Harbor water depths to 10-15 meters were collected.

B.2.3 Data Management

The database is identified as follows:

Database Name	General Locality	Sheets
Nagai Shum	agin Islands	AA

A detailed table of databases and line numbers is presented in the Data Acquisition and Processing Report.

B.2.4 Data Acquisition

Survey operations were planned when suitable weather conditions prevailed. The first survey sortie was flown on April 29, 2005. Survey sorties were conducted when there was minimal

low cloud in the survey area and this generally occurred if the wind was below 20 knots from the west to the north. In general the aircraft departed at 1400 hours local time. The final survey sortie was conducted on August 2, 2005.

B.2.5 Sea Conditions - Sea State, Waves, Swell, White Water

The sea state ranged from 1 to 3 throughout the survey and was generally state 2. This did not affect data quality except where significant white water occurred around rocks in exposed areas of the headlands. White water creates saturated surface pulses; where this occurred the soundings have been edited and the area reflight on a calm day.

Calm seas were experienced on occasions and were common in Eagle Harbor. Under such calm conditions the sea may become glassy which degrades the sea surface model. Long period swell was not significant during the survey and an allowance has been made in the assessment of accuracy.

B.2.6 Kelp

Kelp is one of the factors that increases the complexity of a particular survey area. It is one of the reasons why 200% coverage is recommended in these areas. Kelp reduces the survey coverage achieved by lidar resulting in an increased amount of boatwork. Additional boatwork recommendations are outlined in section D.1.3 additional boatwork inside lidar area and D.1.4. (chart comparison spreadsheet). Large areas of kelp exist in the survey area. Kelp also increases the amount of data processing required as more points need to be assessed and reviewed by the surveyors validating, checking, conducting quality control and approving the data.

Kelp areas can be recognized in the data by the following indications:

- Mid water column pulses, frequently with low amplitude and poorly defined leading edges.
- Returns from the seabed are highly attenuated.
- Soundings in shallow water are very sparse.
- Soundings do not correlate with overlapping data from adjacent lines.

Kelp areas appear as gaps in the data on the coverage plot. In such areas of partial coverage kelp symbols have been inserted on the smooth sheet.

Rocks detected by the system in kelp areas may be difficult to discriminate as rock or kelp returns. Where it is undetermined whether the return is from rock or kelp, a recommendation for additional boatwork is given in section D.1.4 chart comparison spreadsheet.

B.2.7 Nature of the Seabed

The coastline in general rises steeply out of the sea. At Woolly Head and the headland to the north a large number of islets, rocks and kelp patches exist close to the coast. At both headlands an undulating and rugged coastline exists.

Halfway along Eagle Harbor to the head of Eagle Harbor the seabed rises steeply and uniformly out of the sea resulting in consistent data coverage.

B.2.8 Topography

The LADS Mk II system can measure topographic heights up to 50 meters elevation, subject to the depth / topographic logging window selected. For this survey, a 20-meter topographic height logging window was selected. As a result, the coastline was surveyed and elevations up to 20 meters were measured. Above 20 meters elevation, no coverage has been achieved. On the smooth sheet the height of islets is shown in () and provided in feet above MHW. Maximum heights up to approximately 70 feet are shown as a result of the 20-meter topographic logging window.

B.2.9 Datums

Upon the completion of each flight the GPS data logged on the aircraft and at the base station was processed to determine the post-processed KGPS position and height of the aircraft. This data is used in the calculation of the sea surface datum.

B.2.10 Wind

Survey operations were conducted in wind strengths of up to 20 knots during the survey. In general the wind strength during the time of survey was around 10 knots from the west to northeast. The high ridges to the north and south of Eagle Harbor caused uplift and high levels of turbulence. The wind direction also influenced the formation of low cloud and sea fog. Turbulence, low cloud and sea fog influenced the choice of survey area during sortie operations.

B.2.11 Cloud

Low cloud was a significant factor. The wind direction affected the cloud base in the survey area. For example, in southerly or easterly conditions a low cloud base was experienced. The effects of low cloud were managed as follows:

- a. Being located in Sand Point allowed close monitoring of the current weather conditions as the survey area was only 45 km north east of Sand Point. Two internet sites proved to be invaluable for forecasting the weather. An aviation site, <http://adds.aviationweather.gov/>, provided METAR data, actual wind speed and direction, cloud base and satellite cloud data. The observations were updated every 20 minutes. A NOAA weather site, <http://pafc.arh.noaa.gov/>, provided aviation and general weather.
- b. Diversion to the alternate survey area in southeast Alaska under project OPR-O112-KRL-05 occurred during prolonged poor conditions on the Alaska Peninsula.

B.2.12 Effects of High Ground

All survey operations were conducted at 2,200 feet, as high ground was a significant issue. The proximity of high ground on the ridges caused severe turbulence under certain conditions.

B.2.13 Receiver Gain

Changes in gain levels in the Airborne System automatically accommodate for changes in the sea surface, water column and seabed conditions. In some areas, after long over land passages, low gain levels were initially set on passing back over the water. Where this has been identified in the data these lines were re-flown from the opposite direction to improve the coverage.

B.2.14 Raw Laser Waveforms

The raw laser waveform returns from the areas, which were covered with kelp, are considerably attenuated. In order to detect the seabed in such areas, the threshold in the GS was lowered to detect pulses with low signal-to-noise ratios. This enabled the seabed to be detected but also resulted in increased data validation times. In some areas of kelp the seabed was completely obscured and either no signal was detected (NBD - No Bottom Determined) or noise was detected by the system, in which case an appropriate NBA (No Bottom At) depth was assigned by the hydrographic survey operators during data validation.

B.2.15 Data Processing

The data was processed at the operating site in Sand Point on the return from each sortie. Final validation and checking were conducted at this site and Biloxi, MS. The quality control of the data was done independently in Adelaide, South Australia and the final approval was conducted in Biloxi, MS.

B.2.16 Progress Sketches

Progress sketches were provided to NOAA on a bi-weekly basis, copies of which can be found in Appendix III.

B.3 DATA FORMATS

Data is provided in the following formats:

- Hard copy preliminary smooth sheet. Depths in decimal fathoms and heights in feet.
- Digital preliminary smooth sheet. Produced in MicroStation version 8 and saved as MicroStation version 7 .dgn file. Note contour B-splines have been re-parameterized for compatibility with MicroStation 95 used by NOAA.
- Edited data set. An ASCII file of 3 meter clashed data, which is a subset of all accepted data. Depths are in meters.

- Preliminary smooth sheet data. An ASCII file of all soundings on the smooth sheet. Depths are in meters.
- Caris compatible data. LADS soundings and waveforms, which can be imported into Caris HIPS.
- Accepted mission runs plot.
- Coverage plots and sun illuminated images. Provided in GEOTIFF format.
- Tidal Data provided in ASCII, xls and CSV formats.
- Digital georeferenced image in JPEG, TIFF and ECW formats.

Refer to the Data Acquisition and Processing Report for specific details.

B.4 BENCHMARKS

Depth benchmark areas from the 2003 lidar survey in the Shumagin Islands and Vicinity (H11147 A – I & L – N) were used to check the performance of the LADS Mk II system for the H11430 survey. Five benchmarks were used; two are in Popof Strait and three lie on a line south of Korovin Island. These benchmarks were surveyed to check the LADS Mk II system accuracy.

Center coordinates for the benchmark areas are as follows:

Sand Point Benchmark Line

Benchmark Name	Nominal Depth	Easting (NAD 83)	Northing (NAD 83)
BM_1	14.5 m	404 100	6 135 080
BM_2	5 m	403 087	6 133 148

Korovin Benchmark Line

Benchmark Name	Nominal Depth	Easting (NAD 83)	Northing (NAD 83)
BM_3	4 m	420 620	6 141 390
BM_4	12 m	420 330	6 140 920
BM_5	18 m	420 090	6 140 363

Table 1 – Benchmarks

Either one or both benchmark lines were flown during each sortie. The total number of benchmarks compared during the survey was 58. The tidal model in use for the comparison of benchmarks was the same as the tidal model used to reduce the benchmarks during the 2003 survey. Benchmark comparisons were conducted after the application of tides.

Comparison summaries are provided in the Separates.

The LADS data is compared against the gridded benchmark surface in the GS and statistics are generated which include the number of points compared, the mean depth difference (MDD) and the standard deviation (SD) between the data sets. The benchmark comparison

function compares the data against the benchmark surface, and as this data is unedited it may contain noise normally removed during the validation process which is flagged as the shoalest and deepest differences.

B.4.1 Mean Depth Differences (MDD) and Standard Deviation (SD)

The benchmarks were flown independently of the database being surveyed at the time. The averages of the mean depth differences and standard deviation for each benchmark run are as follows:

N. Popov Straight Benchmarks

GS ID	BM Name	Nominal Depth	MDD	SD
1	BM_1 14.5	m	0.05 +/- 0.06	0.14 +/- 0.02
2	BM_2	5 m	0.07 +/- 0.04	0.11 +/- 0.01

Korovin Benchmarks

GS ID	BM Name	Nominal Depth	Average MDD	SD
3	BM_3	4 m	-0.05 +/- 0.02	0.25 +/- 0.03
5	BM_4	12 m	0.17 +/- 0.10	0.16 +/- 0.02
5	BM_5 18	m	0.20 +/- 0.07	0.18 +/- 0.04

Table 2 – Benchmark Results

These results are within expected tolerances and show that the LADS Mk II depth performance was within specifications. These results compare well with the 2003 and 2004 surveys and indicate that the LADS Mk II system operated correctly during the survey.

B.5 CROSSLINES

Two crosslines were planned to cover where the seabed was reasonably flat. The crossline areas identified to conduct crossline comparisons were selected based on data coverage, nature of the seabed and angle of intersection. This minimizes the apparent differences in depths due to minor positional differences in steeper areas of seabed.

The two crosslines were sounded at 4x4 meter laser spot spacing throughout the survey area as follows:

Line 1500.1.1 17 crossline intersections. Along the north coast of Eagle Harbor.

Line 1410.0.1 17 crossline intersections. Into Eagle Harbor.

B.5.1 Mean Depth Differences (MDD) and Standard Deviation (SD)

The averages of the mean depth differences and standard deviation for each cross line are as follows:

Run No.	Comparisons	Mean Confidence	Average MDD	Average SD
1500.1.1	29665	2.06	-0.07 +/- 0.11	0.19 +/- 0.10
1410.0.1	41670	1.61	0.08 +/- 0.13	0.24 +/- 0.16

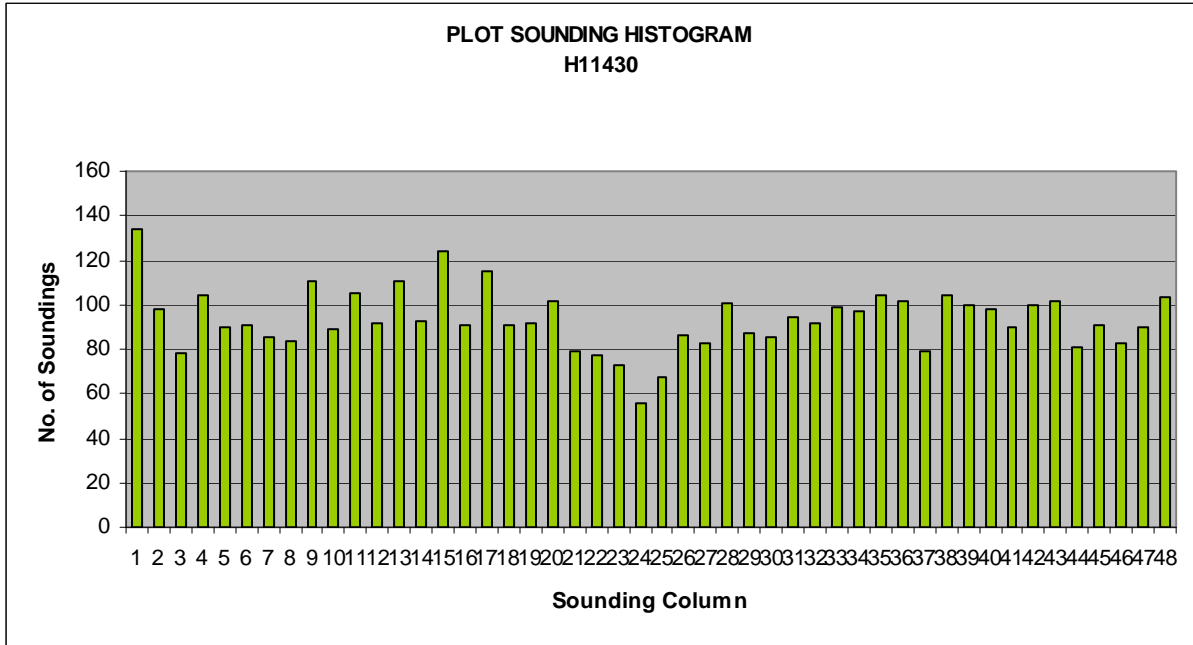
Table 3 – Crossline Comparison Results

Crossline comparison details are provided in Appendix V of the Separates.

All depth comparison results are consistent with IHO Order-1 depth accuracy.

B.6 ANALYSIS OF RESULTS

A sounding histogram has been produced of the column and occurrence of each sounding shown on the smooth sheet. The graph shows that there is no evident scan angle bias in the data.



Graph 1 – Sounding Histogram of Smooth Sheet H11430

B.7 POSITION CHECKS

Two independent positioning systems were used during the survey. Real-time positions were determined by autonomous GPS. A post-processed KGPS position was also determined relative to a local GPS base station that was established on the roof top of the Popof Pizza Building at the processing facility in Sand Point. The post-processed KGPS positions were applied to each sounding during post-processing.

Position checks were conducted prior to, during and following data collection as follows:

- a. DGPS Site Confirmation. A 24-hour certification was conducted of the local GPS base station established at the processing facility on the roof at the Popof Pizza building at Sand Point.
- b. Static Position Check. Prior to commencing data collection the coordinates of the aircraft GPS antenna were determined relative to three marks, which were surveyed on the tarmac at Sand Point Airport. Data was then logged by each LADS Mk II positioning system enabling the positions to be checked against the known surveyed points. The accuracy of the KGPS solution during the static position check was 0.179 meters (95% confidence). The results and details of the static position check are enclosed in the Vertical and Horizontal Control Report.
- c. Dynamic Position Check. During each sortie GPS data was logged on the aircraft and at the local GPS base station. This provided a check between the real-time GPS and post-processed positions. The mean difference between the real-time and post-processed position was 2.333 meters, with an average standard deviation of 0.272 meters. Details are provided in the Vertical and Horizontal Control Report.
- d. Navigation Position Check. Navigation checks were also conducted over the local GPS base station on the roof of the processing facility. This enabled the known position of the structure to be checked against the image on the downward looking video. This provided a gross error check of position. The mean error was 1.79 meters with a standard deviation of 7.23 meters. Details are provided in the Separates.
- e. Position Confidence. The position quality was also monitored by checking a post-processed position confidence (C3), which is determined from the AS platform error, GPS error and residual errors between the actual GPS positions and aircraft position as determined from the line of best fit. No position anomalies were detected.

The position checks were within the expected tolerances and showed that the positioning systems were functioning correctly.

B.8 CORRECTIONS TO SOUNDINGS

Refer to the Data Acquisition and Processing Report for a description of corrections to soundings, which demonstrates that corrections to the soundings were being applied correctly.

There were no deviations from the corrections described therein.

C. VERTICAL AND HORIZONTAL CONTROL

Refer to the Vertical and Horizontal Control Report for a detailed description of the vertical and horizontal control used during this survey. A summary of vertical and horizontal control for the survey follows.

C.1 VERTICAL CONTROL

Vertical control for the survey was based on the Mean Lower Low Water tidal datum (MLLW). The operating National Water Level Observation Network (NW LON) station at Sand Point, AK (9459450) established vertical control for the LADS depth benchmark areas.

Station details are as follows:

Gauge	Location	WGS84	
		Latitude	Longitude
9459450	Sand Point City Dock	55° 20.2' N	160° 30.1' W

Table 4 – Sand Point Tide Gauge

C.2 ZONING

NOAA initially supplied tide zones that cover the extent of the survey, with time and range correctors relative to the Sand Point tide station. These are as follows:

Tide Zone	GS Identifier	Time Corrector	Range Corrector	Reference Station
SWA193A 1		+0 minutes	x1.02	9459450
SWA204A	2	+0 minutes	x1.00	9459450
SWA193 3		-6 minutes	x1.02	9459450
SWA204 4		+0 minutes	x0.98	9459450

Table 5 – Tide Zones

An analysis of crosslines and overlaps of the mainlines of soundings concluded that the preliminary tide zoning was adequate and therefore the preliminary tide zoning correctors have been considered to be the final tide zoning correctors for the survey.

The verified tides were supplied by John Oswald and Associates. The verified tide data was checked against predicted tides to ensure there were no meteorological effects at the tide gauge. The corrected gauge data was smoothed using a fifth order polynomial of five hours length and then supplied to Tenix LADS, Inc. for the application of tides.

For final processing, the time and amplitude correctors were applied to the tidal data delivered by JOA. Soundings were then reduced to MLLW using these corrected tides.

C.3 HORIZONTAL CONTROL

Data collection and processing were conducted on the Airborne and Ground Systems in World Geodetic System (WGS 84) on Universal Transverse Mercator (Northern Hemisphere) projection UTM (N) in Zone 4, Central Meridian 159 ° West. All units are in meters. This data was post-processed and all soundings are relative to the North American Datum 1983 (NAD 83).

C.3.1 LADS Local GPS Base Station – Sand Point

Real-time positions were determined using an Ashtech G G24 GPS receiver. A local GPS base station was coordinated by John Oswald and Associates on the roof of the Popof Pizza Building at the processing facility, Sand Point, AK on March 28 - 29, 2004.

The derived NAD83 coordinates for the local GPS base station, are:

NAD 83		UTM (N) Zone 4		
Latitude (N)	Longitude (W)	Easting (m)	Northing (m)	Ellipsoidal Height (m)
55° 20' 42.544"	160° 28' 53.447"	406 048.735	6 134 199.851	72.980

Table 6 – GPS Base Station

Post-processed KGPS positions were determined off-line using data logged at the local GPS base station and on the aircraft. This data was processed through Ashtech PNAV software to calculate both a DGPS and KGPS position solution. The post processed KGPS positions were then imported into the GS and applied to all soundings. This provided increased sounding position accuracy and horizontal redundancy.

The local GPS base station site was checked for obstructions and multipath over a 24-hour period on April 30 and May 1, 2005. The results outlined in the Vertical and Horizontal Control Report reveal that the local GPS base station site is free from site specific problems such as multipath and obstructions.

On April 28, 2005 static position checks of the LADS MkII positioning systems were undertaken using a three-point control network established at the Sand Point Airport. The results outlined in the Vertical and Horizontal Control Report revealed no gross errors and that all positioning systems functioned correctly.

During each sortie, GPS data was logged both on the aircraft and at the local GPS base station, which enabled a post-processed KGPS position solution to be determined. These positions were then compared to the position determined by the real-time positioning system. This dynamic positioning check provided quality control of the positioning systems and the positional differences were within tolerance for the survey. These differences are tabulated in the Vertical and Horizontal Control Report.

Navigation position checks were conducted over the local GPS base station during each sortie when suitable weather conditions prevailed. Following each sortie the logged aircraft position was processed against the downward looking video record to determine the difference in position at the time of overflight. This provided a gross error check on the aircraft positioning.

The tabulated results are presented in the Vertical and Horizontal Control Report and revealed that the positioning systems functioned to within expectations.

D. RESULTS AND RECOMMENDATIONS

Recommendations for charting action for smooth sheet H11430 is provided in sections D.1.1 to D.1.7 below.

In the vicinity of steep coastline some contours on the smooth sheet appear unsupported by the smooth sheet soundings. Particularly around the MLLW depth curve, additional soundings were added from a 15m -clashed dataset. The 15m -clashed dataset was imported into Microstation Layers "15m _DPT" and "15m _DRY". Where an additional sounding was deemed necessary for the smooth sheet, one would be selected from either the 15m _DPT or 15m _DRY Microstation Layer and placed on the "ADD_DPT" or "ADD_DRY" Microstation Layer respectively. The "ADD_DPT" and "ADD_DRY" Microstation Layers were created in order to track soundings that were added to the smooth sheet from the 15m -clash dataset. These are provided in an additional file found with the smooth sheet plot scale clashed data.

D.1 CHART COMPARISON - SMOOTH SHEET H11430 AA

H11430 was compared to:

Preliminary Chart 16553 5th Edition September 2005, at scale 1:80,000. Corrected through NM Sept. 24, 2005. Corrected through LNM Sept. 13, 2005.

This chart was downloaded from the NOAA Office of Coast Survey – NOAA Raster Navigational Charts download website (<http://chartmaker.ncd.noaa.gov/mcd/Raster/Index.htm>) on April 10, 2006.

Recommendations for charting action are described in section D.1.1 charted depths and features and in the chart comparison spreadsheet under section D.1.4.

D.1.1 Charted Depths and Features

The chart in this area is generally unsurveyed with only the coastline and a number of rocks and islets along the coast portrayed. The area surveyed is represented on the smooth sheet in considerably more detail than is currently shown on the chart. In particular, the position of the coastline, islets and rocks are more accurately portrayed on the smooth sheet.

The following general recommendations are relevant:

- a. Coastline. The charted coastline is highly generalized. The surveyed coastline differs from the charted position by up to 40 meters throughout the smooth sheet. The main differences occur along the rugged coastlines at Wolfy Head and the headland at the north of Eagle Harbor. It is recommended that the coastline on the chart be amended to match the smooth sheet.
- b. Inshore Islets. A large number of islets have been surveyed close to the coastline at the headlands. Many of these are not shown on the chart, as the charted coastline is highly

generalized. It is recommended that the chart be amended to match the smooth sheet. Where significant these islets are detailed in the chart comparison spreadsheet (D.1.4).

- c. Rocks. A number of rocks and drying rocks have been surveyed along the coastline that are not shown on the chart due to the unsurveyed nature of the area. It is recommended that the chart be amended to match the smooth sheet. Where significant, these rocks are detailed in the chart comparison spreadsheet D.1.4.

In addition to the general recommendations above, some 110 significant differences between the chart and the smooth sheet have also been identified. Specific recommendations for these differences are described in the chart comparison spreadsheet. An expanded version of the spreadsheet is included digitally on the survey report CD. The digital .xls version contains information that may be useful for planning of boat sounding and easy to download into other survey packages and has the file name H11430_V1_ChartComp.xls.

The chart comparison was conducted by reviewing the chart, the lidar coverage plot, the digital orthophoto mosaic and the lidar smooth sheet. For each item identified, screen dumps of the Local Area Display and Raw Waveform Display were extracted from the LADS Mk II Ground System. These have been reviewed in order to make the following assessments:

- a. Type of Feature
- b. Kelp Area
- c. Further Examination Recommended
- d. Charting Recommendation
- e. Remarks

Each chart comparison was categorized as follows:

1. New shoal found
2. Charted shoal disproved / not found

The fields in the chart comparison spreadsheet have been developed from experience learned and feedback received from previous lidar surveys in Alaska, witnessing survey operations in NOAA ship Rainier and from meetings at PHB and UNH. They have been designed for ease of use and to minimize double handling of data and transcription. Continued feedback is welcomed in order to develop these formats in order to achieve further efficiencies in data handling.

D.1.2 AWOIS

No AWOIS were assigned to this Task Order.

D.1.3 Additional Boatwork Inside Lidar Area

A number of significant soundings have been reviewed that we're uncertain. For example, some isolated rocks in kelp were detected that were difficult to correctly classify as either rock or kelp. In circumstances where it was difficult to correctly classify a particular sounding, a recommendation for investigation by boat for 45 uncertain soundings has been made in the chart comparison spreadsheet. An expanded version of the spreadsheet is included digitally on the USB hard drive. The digital .xls version contains information that may be useful for planning of boat sounding and is readily downloaded into other survey packages.

D.1.4 Chart Comparison Spreadsheet

Sequence No	Shoal No	Category	CHARTED			SURVEYED			Type of Feature	Kelp Area	Further Examination Recommended	Charting Recommendation	Remarks	
			Charted Depth (fms)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)	Surveyed Depth (meters)	Surveyed Depth (decimal fms / whole feet / (feet) above MHW)	NAD 83 Latitude N (DMS)						NAD 83 Longitude W (DMS)
1	AA1	1				-0.61	-2	55° 5' 30.836"	160° 9' 1.8684"	Drying Rk	Y	N	Inse rt	Note: 3 drying rocks within 165m WNW.
2	AA2	1				-1.11	-4	55° 5' 32.9493"	160° 9' 17.9094"	Drying Rk	Y	N	Inse rt	Note: Charted islet 45m NE confirmed, cov 2 ft drying rock 50m NW, -0 drying rock 85m NW.
3	AA3	1				-0.88	-3	55° 5' 32.2501"	160° 9' 30.0376"	Drying Rk	Y	N	Inse rt	Note: Many drying rocks inshore. See Danger to Navigation Report. Item no. 3
4	AA4	1				5.97	3.2	55° 5' 27.3493"	160° 9' 43.2414"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 5.3 Rk 50m NE, 6.3 Rk 120m NNW. See Danger to Navigation Report. Item no. 4
5	AA5	1				7.50	4.1	55° 5' 33.0287"	160° 9' 42.0499"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: Charted -5 drying rock 120m NNE confirmed.
6	AA6	1				9.95	5.4	55° 5' 28.616"	160° 9' 55.904"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 5.8 Rk 65m E, 7.1 Rk 105m NE, 7.2 Rk 100m N. See Danger to Navigation Report. Item no. 5

Shoal Categories

1-New Shoal Found

2-Charted Shoal Disproved / Not Found

Sequence No	Shoal No	Category	CHARTED			SURVEYED				Type of Feature	Kelp Area	Further Examination Recommended	Charting Recommendation	Remarks
			Charted Depth (fms)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)	Surveyed Depth (meters)	Surveyed Depth (decimal fms / whole feet / (feet) above MHW)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)					
7 A	A7	2	Drying Rk	55° 5' 39"	160° 9' 40"	-3.42	(5)	55° 5' 39.6644"	160° 9' 39.7254"	Islet	Y	N	Replace	Note: Islet 50m W, 2 drying rocks 60m SW.
8 A	A8	2	Drying Rk	55° 5' 40"	160° 9' 48"	-4.86	(10)	55° 5' 39.4796"	160° 9' 48.5173"	Islet	Y	N	Replace	Note: Charted islet 80m W confirmed, islet 50m W, many drying rocks in vicinity.
9	AA9	1				-0.26	-1	55° 5' 36.4688"	160° 9' 52.1168"	Drying Rk	Y	N	Insert	Note: 7.2 Rk 110m SW.
10	AA10	1				5.40	2.9	55° 5' 35.6745"	160° 9' 47.9181"	Rk	Y	Y	N/A	Possible Rk in kelp.
11	AA11	1				7.07	3.8	55° 5' 35.6573"	160° 10' 3.764"	Rk	Y	Y	N/A	Possible Rk in kelp. See Danger to Navigation Report. Item no. 6
12	AA12	1				9.70	5.3	55° 5' 35.808"	160° 10' 15.0751"	Rk	Y	Y	N/A	Possible Rk in kelp.
13	AA15	1				0.17	-0	55° 5' 47.2151"	160° 10' 12.7042"	Drying Rk	Y	Y	N /A	Possible drying rock in kelp. Note: Many drying rocks to E.
14	AA16	1				-2.02	-7	55° 5' 38.9701"	160° 10' 24.7825"	Drying Rk	N	N	Inse rt	Note: 4.6 Rk 45m NE, 4.0 Rk 130m N. See Danger to Navigation Report. Item no. 7
15 A	A17	1				11.77	6.4	55° 5' 37.0247"	160° 10' 25.905"	Rk	N	N	Insert	
16	AA18	1				3.60	1.9	55° 5' 47.0231"	160° 10' 20.4452"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 2 drying rocks 80m NE.
17	AA19	1				-3.70	(6)	55° 5' 56.758"	160° 10' 21.5752"	Islet	N	N	Insert	Note: -7 drying rock 70m W.
18	AA20	1				10.69	5.8	55° 5' 49.8537"	160° 10' 36.6669"	Rk	N	N	Insert	Possible Rk in kelp.

Shoal Categories

1-New Shoal Found

2-Charted Shoal Disproved / Not Found

Sequence No	Shoal No	Category	CHARTED			SURVEYED				Type of Feature	Kelp Area	Further Examination Recommended	Charting Recommendation	Remarks
			Charted Depth (fms)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)	Surveyed Depth (meters)	Surveyed Depth (decimal fms / whole feet / (feet) above MHW)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)					
19	AA21	1				-0.27	-1	55° 5' 57.2436"	160° 10' 35.8794"	Drying Rk	Y	N	Insert	Note: Many islets and drying rocks NW.
20	A A22	2	Drying Rk	55° 5' 58"	160° 10' 38"	-7.61	(19)	55° 5' 59.1693"	160° 10' 37.051"	Islet	Y	N	Replace	
21	AA23	1				-1.41	-5	55° 5' 57.8727"	160° 10' 47.9971"	Drying Rk	Y	N	Insert	Note: Charted -7 drying rock 60m SE confirmed, many islets and drying rocks in vicinity.
22	AA24	1				-1.16	-4	55° 5' 57.101"	160° 10' 55.1393"	Drying Rk	Y	N	Insert	Note: Many drying rocks to N.
23	AA25	2	Islet	55° 6' 1"	160° 10' 56"	-2.56	-9	55° 6' 0.2025"	160° 10' 56.0442"	Drying Rk	Y	N	Replace	
24	AA26	1				8.72	4.7	55° 5' 51.8568"	160° 10' 48.2511"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 5.8 Rk 90m WNW.
25	AA27	1				10.57	5.8	55° 5' 51.3133"	160° 10' 58.0402"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 6.2 Rk 60m NW, 7.6 Rk 50m S.
26	AA29	1				10.38	5.7	55° 5' 53.4976"	160° 11' 10.4505"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 5.5 Rk 60m NW. See Danger to Navigation Report. Item no. 8
27	A A30	2	Drying Rk	55° 6' 1"	160° 11' 4"	-3.76	(6)	55° 6' 1.4038"	160° 11' 3.6224"	Islet	Y	N	Replace	
28	AA31	1				-5.36	(11)	55° 6' 3.6126"	160° 11' 8.0647"	Islet	Y	N	Insert	Note: Charted -7 drying rock 40m SSE confirmed, islet 30m N.

Shoal Categories

1-New Shoal Found

2-Charted Shoal Disproved / Not Found

Sequence No	Shoal No	Category	CHARTED			SURVEYED			Type of Feature	Kelp Area	Further Examination Recommended	Charting Recommendation	Remarks	
			Charted Depth (fms)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)	Surveyed Depth (meters)	Surveyed Depth (decimal fms / whole feet / (feet) above MHW)	NAD 83 Latitude N (DMS)						NAD 83 Longitude W (DMS)
29	AA32	1				-5.87	(13)	55° 6' 6.6071"	160° 11' 10.4045"	Islet	Y	N	Insert	Note: -3 drying rock 25m SW.
30	AA33	1				-6.74	(16)	55° 6' 8.0884"	160° 11' 17.5463"	Islet	Y	N	Insert	Note: Charted -7 drying rock 50m S confirmed, -7 drying rock 25m NNE.
31	AA34	2	6	55° 6' 2"	160° 11' 26"	8.90	4.8	55° 6' 3.2543"	160° 11' 24.5066"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 5.5 Rk 60m SW, 9.0 Rk 195m SW, 5.8 Rk 100m W.
32	AA35	1				0.01	-0	55° 6' 7.9739"	160° 11' 23.5603"	Drying Rk	Y	Y	N / A	Possible drying rock in kelp. Note: Charted -5 drying rock 45m W confirmed, -6 drying rock 40m N.
33	A A36	2	Drying Rk	55° 6' 7"	160° 11' 29"	-4.15	(7)	55° 6' 7.3721"	160° 11' 30.5923"	Islet	Y	N	Replace	Note: Charted -9 drying rock 90m NNW confirmed, 2 islets N, many drying rocks in area.
34	AA37	1				11.87	6.5	55° 6' 3.3547"	160° 11' 36.3352"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 2.8 Rk 110m NE, 4.1 Rk 105m N.
35	AA38	1				15.64	8.5	55° 6' 7.559"	160° 11' 44.8689"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 4.7 Rk 100m E, 9.6 Rk 110m NW, 5.4 Rk 155m ENE.
36	A A39	2	Drying Rk	55° 6' 15"	160° 11' 33"	-3.14	(4)	55° 6' 14.8045"	160° 11' 32.0064"	Islet	Y	N	Replace	Note: -8 drying rock 70m SSW, -4 drying rock 40m E, 6.0 Rk 145m SW.
37	AA40	1				9.44	5.1	55° 6' 16.7608"	160° 11' 39.3691"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 7.8 Rk 130m S, 8.1 Rk 70m SSW. See Danger to Navigation Report. Item no. 9

Shoal Categories

1-New Shoal Found

2-Charted Shoal Disproved / Not Found

Sequence No	Shoal No	Category	CHARTED			SURVEYED			Type of Feature	Kelp Area	Further Examination Recommended	Charting Recommendation	Remarks	
			Charted Depth (fms)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)	Surveyed Depth (meters)	Surveyed Depth (decimal fms / whole feet / (feet) above MHW)	NAD 83 Latitude N (DMS)						NAD 83 Longitude W (DMS)
38	AA41	2	7	55° 6' 20"	160° 11' 36"	10.29	5.6	55° 6' 20.5938"	160° 11' 34.3502"	Slope	Y	N	Remove	
39	A A42	2	Drying Rk	55° 6' 22"	160° 11' 28"	-5.61	(12)	55° 6' 21.765"	160° 11' 27.9212"	Islet	Y	N	Replace	Note: -6 drying rock 50m SE.
40	A A43	2	Drying Rk	55° 6' 26"	160° 11' 34"	-6.24	(14)	55° 6' 23.4871"	160° 11' 29.7631"	Islet	Y	N	Replace	Note: Charted -1 drying rock 90m NNE confirmed, islet 20m N.
41	A A44	2	Drying Rk	55° 6' 33"	160° 11' 37"	-4.09	(7)	55° 6' 32.9311"	160° 11' 35.4765"	Islet	Y	N	Replace	Note: -5 drying rock 80m NW, -5 drying rock 30m SE, 0.8 Rk 130m SE.
42	AA45	1				11.13	6.1	55° 6' 25.295"	160° 11' 52.4413"	Rk	Y	Y	N/A	Possible Rk in kelp.
43	AA46	1				-5.71	(12)	55° 6' 31.0732"	160° 11' 55.2624"	Islet	Y	N	Insert	Note: Many charted islets and drying rocks in vicinity confirmed, many islets and drying rocks in vicinity.
44	A A47	2	Drying Rk	55° 6' 36"	160° 11' 49"	-4.24	(22)	55° 6' 37.5074"	160° 11' 48.9047"	Islet	Y	N	Replace	Note: 2 charted drying rocks to N and NE confirmed, -0 drying rock 90m W, many islets and drying rocks in vicinity.
45	A A48	2	Drying Rk	55° 6' 34"	160° 12' 2"	-3.94	(7)	55° 6' 33.1691"	160° 11' 59.7059"	Islet	Y	N	Replace	Note: 3.9 Rk 60m WSW, 5.5 Rk 130m N.
46	AA49	1				0.09	-0	55° 6' 31.6664"	160° 12' 5.1325"	Drying Rk	Y	Y	N /A	Possible drying rock in kelp. Note: -0 drying rock 50m N, 7.4 Rk 70m NW, 7.8 Rk 140m N.
47	AA50	1				-5.98	(13)	55° 6' 44.5037"	160° 11' 38.9655"	Islet	Y	N	Insert	Note: Many islets and drying rocks in vicinity, 5.6 Rk 90m NNW, 6.0 Rk 100m N, 0.8 Rk 155m ENE.

Shoal Categories

1-New Shoal Found

2-Charted Shoal Disproved / Not Found

Sequence No	Shoal No	Category	CHARTED			SURVEYED				Type of Feature	Kelp Area	Further Examination Recommended	Charting Recommendation	Remarks
			Charted Depth (fms)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)	Surveyed Depth (meters)	Surveyed Depth (decimal fms / whole feet / (feet) above MHW)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)					
48	AA51	1				14.56	7.9	55° 6' 52.1647"	160° 11' 36.3866"	Rk	Y	Y	N/A	Possible Rk in kelp.
49	AA52	1				-0.77	-3	55° 6' 50.3333"	160° 11' 20.4698"	Drying Rk	Y	N	Insert	Note: -6 drying rock 150m SSW.
50	AA53	1				-0.90	-3	55° 6' 56.1673"	160° 11' 22.0786"	Drying Rk	Y	N	Insert	Note: Many drying rocks in vicinity.
51	A A54	2	Drying Rk	55° 7' 1"	160° 11' 28"						Y	Y	N/A	Not detected by lidar, not observed in downward looking video.
52	AA55	1				-1.41	-4	55° 7' 4.289"	160° 11' 26.9023"	Drying Rk	Y	N	Inse rt	Note: Charted islet and 2 drying rocks in area confirmed, many islets and drying rocks in vicinity.
53	AA56	1				13.66	7.6	55° 7' 1.8031"	160° 11' 32.6988"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 7.5 Rk 85m N.
54	AA57	1				12.71	6.9	55° 7' 6.8966"	160° 11' 28.4157"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 7.7 Rk 105m NNE, 2.1 Rk 105m ENE.
55	AA58	1				-2.48	-8	55° 7' 10.7121"	160° 11' 17.0899"	Drying Rk	Y	N	Inse rt	Note: Many drying rocks in vicinity, 6.8 Rk 90m NW, 6.4 Rk 155m N. See Danger to Navigation Report. Item no. 10
56	AA59	1				-0.79	-3	55° 7' 12.6175"	160° 11' 7.0302"	Drying Rk	Y	N	Insert	Note: 3 drying rocks within 80m ENE.
57	AA60	1				-0.36	-1	55° 7' 17.9539"	160° 11' 0.5006"	Drying Rk	Y	N	Inse rt	Note: Charted -2 drying rock 70m N confirmed, many islets and drying

Shoal Categories

1-New Shoal Found

2-Charted Shoal Disproved / Not Found

Sequence No	Shoal No	Category	CHARTED		SURVEYED				Type of Feature	Kelp Area	Further Examination Recommended	Charting Recommendation	Remarks	
			Charted Depth (fms)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)	Surveyed Depth (meters)	Surveyed Depth (decimal fms / whole feet / (feet) above MHW)	NAD 83 Latitude N (DMS)						NAD 83 Longitude W (DMS)
													All items covered by 4x4m laser spot spacing at 200% lidar coverage.	
													rocks to SE and E.	
58	AA61	1				13.22	7.2	55° 7' 21.8767"	160° 11' 6.1684"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 6.5 Rk 75m S, 7.7 Rk 50m
59	AA62	1				11.97	6.5	55° 7' 23.7919"	160° 10' 56.3767"	Rk	Y	Y	N/A	Possible Rk in kelp.
60	AA63	1				10.17	5.5	55° 7' 23.561"	160° 10' 51.372"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 8.2 Rk 165m ENE.
61	AA64	1				-1.71	-6	55° 7' 17.972"	160° 10' 41.0693"	Drying Rk	Y	N	Insert	Note: -9 drying rock 35m SW.
62	AA65	2	5	55° 7' 23"	160° 9' 53"	4.61	2.5	55° 7' 21.82"	160° 9' 54.1459"	Slope	Y	N	Remove	
63	AA66	1				4.93	2.7	55° 7' 24.0402"	160° 9' 40.2325"	Rk	Y	Y	N/A	Possible Rk in kelp. See Danger to Navigation Report. Item no. 11
64	A A68	2	Drying Rk	55° 6' 30"	160° 7' 23"						N	N	Remove	Not detected by lidar, not observed in downward looking video.
65	A A69	2	Drying Rk	55° 6' 26"	160° 7' 17"						N	N	Remove	Not detected by lidar, not observed in downward looking video.
66	A A70	2	Drying Rk	55° 6' 22"	160° 7' 8"						N	N	Remove	Not detected by lidar, not observed in downward looking video.
67	AA71	1				16.29	8.9	55° 6' 31.025"	160° 6' 59.8332"	Rk	N	N	Insert	
68	AA72	1				5.55	3.0	55° 5' 37.0727"	160° 4' 51.5965"	Rk	N	N	Insert	Note: 2 charted drying rocks to W confirmed.

Shoal Categories

1-New Shoal Found

2-Charted Shoal Disproved / Not Found

Sequence No	Shoal No	Category	CHARTED			SURVEYED				Type of Feature	Kelp Area	Further Examination Recommended	Charting Recommendation	Remarks
			Charted Depth (fms)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)	Surveyed Depth (meters)	Surveyed Depth (decimal fms / whole feet / (feet) above MHW)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)					
69	A A73	2	Drying Rk	55° 5' 12"	160° 3' 47"						N	N	Remove	Not detected by lidar, not observed in downward looking video.
70	A A74	2	Drying Rk	55° 5' 13"	160° 3' 37"	4.15	2.2	55° 5' 12.9981"	160° 3' 36.9361"	Rk	N	N	Replace	
71	AA75	1				0.87	0.5	55° 5' 23.6019"	160° 3' 24.26"	Rk	N	N	Insert	
72	A A76	2	Drying Rk	55° 5' 37"	160° 3' 34"						N	N	Remove	Not detected by lidar, not observed in downward looking video.
73	AA77	1				4.42	2.4	55° 5' 55.3861"	160° 4' 21.663"	Rk	N	N	Insert	
74	AA78	1				8.99	4.9	55° 6' 20.921"	160° 5' 30.8938"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: -4 drying rock 130m ENE.
75	AA79	1				14.47	7.9	55° 6' 26.1675"	160° 5' 37.9913"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 7.5 Rk 40m ENE.
76	AA80	2	3	55° 6' 49"	160° 5' 57"	-1.89	-6	55° 6' 49.6869"	160° 5' 54.3267"	Drying Rk	Y	N	Replace	
77	AA81	1				-5.26	(11)	55° 7' 36.2891"	160° 6' 50.6598"	Islet	Y	N	Insert	Note: Charted -2 drying rock 55m SW confirmed, -6 drying rock 180m SSE.
78	AA82	1				-2.04	-7	55° 7' 42.1735"	160° 6' 53.5056"	Drying Rk	Y	N	Insert	Note: Charted -7 drying rock 190m NW confirmed.
79	AA83	2	9	55° 7' 42"	160° 7' 10"	13.10	7.1	55° 7' 41.8778"	160° 7' 9.8249"	Slope	N	N	Remove	
80	AA84	1				-0.85	-3	55° 7' 52.1767"	160° 7' 18.6948"	Drying Rk	Y	N	Insert	Note: -3 drying rock 45m NE.

Shoal Categories

1-New Shoal Found

2-Charted Shoal Disproved / Not Found

Sequence No	Shoal No	Category	CHARTED			SURVEYED			Type of Feature	Kelp Area	Further Examination Recommended	Charting Recommendation	Remarks	
			Charted Depth (fms)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)	Surveyed Depth (meters)	Surveyed Depth (decimal fms / whole feet / (feet) above MHW)	NAD 83 Latitude N (DMS)						NAD 83 Longitude W (DMS)
81	A A85	2	Drying Rk	55° 7' 53"	160° 7' 17"	-6.62	(15)	55° 7' 54.397"	160° 7' 17.7683"	Islet	Y	N	Replace	Note: -2 drying rock 75m N, -1 drying rock 40m NE.
82	AA86	1				-0.60	-2	55° 7' 54.0034"	160° 7' 22.151"	Drying Rk	Y	N	Insert	
83	AA88	1				2.87	1.5	55° 8' 1.2211"	160° 7' 31.1559"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: Charted -6 drying rock 45m SE confirmed, many drying rocks to E.
84	AA89	1				-1.79	-6	55° 8' 7.7085"	160° 7' 26.4281"	Drying Rk	Y	N	Insert	Note: Charted -7 drying rock 55m W confirmed, many drying rocks in vicinity.
85	AA90	1				-3.33	(5)	55° 8' 14.7776"	160° 7' 24.1702"	Islet	Y	N	Insert	Note: Cov 2 ft drying rock 95m NW.
86	AA91	1				6.18	3.4	55° 8' 17.3169"	160° 7' 40.1703"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: Charted drying rock 75m NE surveyed as drying shelf, many drying rocks to N, 5.7 Rk 80m SE.
87	AA92	1				4.20	2.3	55° 8' 25.7"	160° 7' 42.7926"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: Charted -6 drying rock 130m SSE confirmed, 3.3 Rk 80m NNE. See Danger to Navigation Report. Item no. 12
88	AA93	1				6.59	3.6	55° 8' 27.4682"	160° 7' 44.7935"	Rk	Y	Y	N/A	Possible Rk in kelp.
89	AA94	1				2.24	1.2	55° 8' 30.6737"	160° 7' 45.8369"	Rk	Y	Y	N/A	Possible Rk in kelp.

Shoal Categories

1-New Shoal Found

2-Charted Shoal Disproved / Not Found

Sequence No	Shoal No	Category	CHARTED			SURVEYED			Type of Feature	Kelp Area	Further Examination Recommended	Charting Recommendation	Remarks	
			Charted Depth (fms)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)	Surveyed Depth (meters)	Surveyed Depth (decimal fms / whole feet / (feet) above MHW)	NAD 83 Latitude N (DMS)						NAD 83 Longitude W (DMS)
90	A A95	2	Drying Rk	55° 8' 34"	160° 7' 43"	-3.34	(5)	55° 8' 36.3093"	160° 7' 43.7583"	Islet	Y	N	Replace	Note: 2 drying rocks 45m E.
91	AA96	1				-3.07	(4)	55° 8' 38.7566"	160° 7' 43.9379"	Islet	Y	N	Insert	Note: Charted -4 drying rock 35m WSW confirmed, many drying rocks in vicinity.
92	AA97	1				-0.14	-1	55° 8' 38.9255"	160° 7' 54.7078"	Drying Rk	Y	Y	N /A	Possible drying rock in kelp. Note: Charted -6 drying rock 45m ENE confirmed, 0.9 Rk 100m NE, 4.5 Rk 85m NNW.
93	AA98	1				12.69	6.9	55° 8' 40.5858"	160° 8' 0.1045"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 9.4 Rk 60m SW.
94	AA99	1				-2.90	(3)	55° 8' 42.5761"	160° 7' 46.0098"	Islet	Y	N	Insert	Note: Charted -1 drying rock 50m W confirmed, many islets and drying rocks along coastline.
95	A A100	2	Drying Rk	55° 8' 48"	160° 7' 44"	-2.70	(3)	55° 8' 47.2124"	160° 7' 43.5266"	Islet	Y	N	Replace	Note: Many islets and drying rocks in vicinity.
96	AA101	2	6.2	55° 8' 53"	160° 7' 50"	5.66	3.1	55° 8' 49.6974"	160° 7' 51.8509"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 3.1 Rk 75m ENE.
97	AA102	1				12.18	6.6	55° 8' 45.1105"	160° 8' 5.3713"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 6.1 Rk 60m NE. See Danger to Navigation Report. Item no. 13

Shoal Categories

1-New Shoal Found

2-Charted Shoal Disproved / Not Found

Sequence No	Shoal No	Category	CHARTED		SURVEYED				Type of Feature	Kelp Area	Further Examination Recommended	Charting Recommendation	Remarks	
			Charted Depth (fms)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)	Surveyed Depth (meters)	Surveyed Depth (decimal fms / whole feet / (feet) above MHW)	NAD 83 Latitude N (DMS)						NAD 83 Longitude W (DMS)
98	AA103	1				13.60	7.4	55° 8' 41.3176"	160° 8' 23.3325"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 7.4 Rk 150m E, 8.1 Rk 65m E, 8.2 Rk 80m SSW. See Danger to Navigation Report Item no.2
99	AA104	1				0.43	cov 1 ft	55° 8' 53.8112"	160° 7' 40.2176"	Drying Rk	Y	Y	N /A	Possible drying rock in kelp. Note: -0 drying rock 90m SE. See Danger to Navigation Report. Item no. 14
100	AA105	1				2.83	1.5	55° 9' 4.4845"	160° 7' 31.5011"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: Charted -0 drying rock 170m S confirmed.
101	AA106	1				16.41	9.0	55° 9' 11.5647"	160° 7' 40.6324"	Rk	Y	Y	N/A	Possible Rk in kelp.
102	AA107	1				25.30	13.8	55° 8' 52.5021"	160° 8' 32.505"	Rk	N	Y	N/A	Sparse lidar coverage in deep water.
103	AA108	1				12.05	6.6	55° 5' 33.5074"	160° 10' 12.1404"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 6.0 Rk 50m NNE.
104	AA109	1				0.01	-0	55° 6' 38.0785"	160° 11' 53.8045"	Drying Rk	Y	Y	N /A	Possible drying rock in kelp. Note: 5.5 Rk 95m W.
105	AA110	2	1	55° 5' 60"	160° 5' 3"	0.66	0.3	55° 5' 58.9202"	160° 5' 2.6465"	Rk	N	N	Replace	
106	AA111	2	18	55° 6' 2"	160° 5' 33"	12.55	6.8	55° 6' 2.1398"	160° 5' 27.2651"	Slope	N	N	Remove	See Danger to Navigation Report. Item no. 15
107	AA112	1				-13.09	(37)	55° 8' 19.6076"	160° 7' 33.4064"	Islet	Y	N	Insert	Note:-5 drying rock 30m NNW.
108	AA113	2	Islet	55° 8' 32"	160° 7' 36"					Coast	Y	N	Remove	Note: Surveyed as coastline.

Shoal Categories

1-New Shoal Found

2-Charted Shoal Disproved / Not Found

Sequence No	Shoal No	Category	CHARTED		SURVEYED				Type of Feature	Kelp Area	Further Examination Recommended	Charting Recommendation	Remarks	
			Charted Depth (fms)	NAD 83 Latitude N (DMS)	NAD 83 Longitude W (DMS)	Surveyed Depth (meters)	Surveyed Depth (decimal fms / whole feet / (feet) above MHW)	NAD 83 Latitude N (DMS)						NAD 83 Longitude W (DMS)
109	AA114	1				15.98	8.7	55° 6' 58.3541"	160° 11' 40.7063"	Rk	Y	Y	N/A	Possible rock in kelp. See Danger to Navigation Report. Item no. 16
110	AA115	1	Drying Rk	55° 7' 58"	160° 7' 21"	-3.97	(7)	55° 7' 55.7513"	160° 7' 21.2429"	Islet	Y	N	Replace	

Shoal Categories
 1-New Shoal Found
 2-Charted Shoal Disproved / Not Found

D.1.5 Features Requiring Investigation

During the validation, checking and approving stages of the data processing a spreadsheet of the features was compiled. The list from this spreadsheet was then compared to the chart comparisons and DtoNs reported and their significance evaluated. Some 94 additional soundings were identified for further investigation and are presented in the following table. The full spreadsheet is also provided in Excel format with the digital data (H11430_V1_Features_Inv.xls). Where these areas correlate with a feature listed in the chart comparison spreadsheet, a reference has been made to the shoal number. The kelp areas are described under five general sections:

1. Kelp area observed in video, no detection by system – deep water.
2. Kelp area observed in video, no detection by system within data coverage.
3. Kelp area, some detections, least depth found.
4. Kelp area, some detections, least depth NOT found.
5. No evidence of kelp but poor coverage – least depth NOT found.

All reported features are considered significant for further investigation during boat work and are reported as possible hazards when conducting survey work by boat. The majority of the features exist around the rugged coastlines around the headlands and in particular Woolly Head.

During the approval of the smooth sheet a number of possible small objects were identified on the seabed and these possible features have been assigned the text “Rk” in the category column. These possible features may or may not be kelp related but analysis of the waveform indicates the possibility of a small object. During the production of the smooth sheet the digital mosaic was reviewed against the surveyed charted drying features.

Sequence No.	Feature No.	Kelp Description Category	NAD 83 Latitude (N) (deg min sec.dd)	NAD 83 Longitude (W) (deg min sec.dd)	Dimension (m)	Description	Significance and Chart Comparison Relationship
1	FAA1	5	55° 05' 35.99"	160° 10' 33.57"	N/A	poorly defined 20m shoal	630m SW of N coast of Falmouth Harbor.
2	FAA2	4	55° 06' 16.90"	160° 11' 38.00"	10x10	poorly defined shoal, LD possibly not found	200m W offshore Woolly Head. In vicinity of AA40
3	FAA3	4	55° 06' 25.76"	160° 11' 52.40"	45x45	Kelpy feature	400m W offshore Woolly Head. In vicinity of AA45
4	FAA4	4	55° 05' 28.62"	160° 09' 55.90"	25 x 25	LD definitely not found	400m S of N coast of Falmouth Harbor. See AA6, Note: many kelp patches in vicinity

Sequence No.	Feature No.	Kelp Description Category	NAD 83 Latitude (N) (deg min sec.dd)	NAD 83 Longitude (W) (deg min sec.dd)	Dimension (m)	Description	Significance and Chart Comparison Relationship
5	FAA5	4	55° 05' 31.37"	160° 09' 52.82"	10 x 10	No detections on this line	350m S of N coast of Falmouth Harbor. Note: many kelp patches in vicinity
6	FAA6	4	55° 05' 34.37"	160° 09' 57.31"	10 x 10	LD definitely not found - manual insert on ropey sounding	170m S of N coast of Falmouth Harbor. See AA10, Note: many kelp patches in vicinity
7	FAA7	4	55° 05' 36.86"	160° 10' 10.24"	60x70	poorly defined shoal in area of prominent Kelp, LD possibly not found	400m SW of N coast of Falmouth Harbor. Note: many kelp patches in vicinity
8	FAA8	4	55° 05' 41.70"	160° 10' 19.24"	25x30	LD definitely not found - kelp area, no surrounding support	330m SW of N coast of Falmouth Harbor. Note: many kelp patches on vicinity and inshore
9	FAA9	4	55° 05' 54.62"	160° 10' 34.01"	30x30	Shoals, LD possibly not found in kelp no support on this line	140m SW of N coast of Falmouth Harbor. Note: many kelp patches inshore
10	FAA10	4	55° 05' 51.32"	160° 10' 50.06"	30x25	Shoal, LD possibly not found in kelp area, shoal 30m W	330m SW of N coast of Falmouth Harbor., 100m SW of kelp area See AA27
11	FAA11	4	55° 05' 52.24"	160° 11' 02.94"	50x50	Kelp Patch, many kelp areas in vicinity especially inshore	320m SW offshore Wooly Head. 100m SW of large kelp area.
12	FAA12	4	55° 06' 10.10"	160° 11' 49.23"	50x50	Possible Rk	300m W offshore Wooly Head.
13	FAA13	4	55° 06' 07.65"	160° 11' 45.04"	50x50	Possible Rk	250m W offshore Wooly Head. See AA38
14	FAA14	4	55° 05' 28.92"	160° 09' 51.85"	20x20	Kelp Patches	400m S of N coast of Falmouth Harbor. Note: many kelp patches in vicinity
15	FAA15	4	55° 05' 30.52"	160° 09' 46.65"	20x20	Kelp Patch	350m S of N coast of Falmouth Harbor. Note: AA5 100m NE
16	FAA16	4	55° 05' 27.45"	160° 09' 43.51"	30x20	Kelp Patch	400m S of N coast of Falmouth Harbor. See AA4, Note: kelp 30m N
17	FAA17	3	55° 06' 37.50"	160° 11' 59.02"	20x20	poorly defined shoal	300m W of Wooly Head , 80m N of islets and drying rocks
18	FAA18	5	55° 06' 35.69"	160° 12' 06.19"	40x40	Feature for investigation	400m W of Wooly Head , 80m N of drying rocks

Sequence No.	Feature No.	Kelp Description Category	NAD 83 Latitude (N) (deg min sec.dd)	NAD 83 Longitude (W) (deg min sec.dd)	Dimension (m)	Description	Significance and Chart Comparison Relationship
19	FAA19	4	55° 06' 05.29"	160° 11' 25.44"	70x50	Large kelp area	150m SW offshore Wooly Head.
20	FAA20	4	55° 06' 02.75"	160° 11' 29.65"	45x45	shoal area approaching coast	180m SW offshore Wooly Head.
21	FAA21	4	55° 08' 09.13"	160° 07' 38.04"	35x65	Kelp patch, kelp patches inshore	230m SW of N coast of Eagle Harbor
22	FAA22	4	55° 06' 22.19"	160° 11' 49.81"	45x40	Feature for investigation	450m W offshore Wooly Head.
23	FAA23	4	55° 05' 57.68"	160° 11' 18.78"	75x55	poor coverage	320m SW offshore Wooly Head. 100m SW of large kelp area.
24	FAA24	4	55° 08' 05.35"	160° 07' 37.76"	80x100	poor coverage approaching coast. Many kelp areas in vicinity and inshore	250m SW of N coast of Eagle Harbor
25	FAA25	4	55° 06' 01.94"	160° 11' 27.09"	70x60	Area of shoals LD?? as no support from other lines	250m SW offshore Wooly Head. In vicinity of AA34
26	FAA26	4	55° 05' 55.22"	160° 11' 12.22"	30x30	Shoal in kelp LD possible not found, sparse data and kelp in vicinity	320m SW offshore Wooly Head. 100m SW of large kelp area.
27	FAA27	4	55° 05' 46.21"	160° 10' 17.63"	15x15	Kelp patch, kelp patches inshore	200m SW of N coast of Falmouth Harbor
28	FAA28	Rk	55° 07' 15.50"	160° 08' 52.80"	N/A	Possible Rk	300m NNE offshore Wooly Head.
29	FAA29	4	55° 05' 37.14"	160° 09' 31.84"	50x50	Possible drying rocks in large kelp area. Many possible drying rocks in vicinity	50m S of N coast of Falmouth Harbor
30	FAA30	4	55° 07' 23.44"	160° 10' 56.32"	10x10	Possible Rk in kelp, many kelp areas in vicinity	200m NNW offshore Wooly Head. See AA62
31	FAA31	Rk	55° 08' 48.64"	160° 08' 11.97"	10x10	Possible Rk in kelp, many kelp areas in vicinity	500m W of N headland of Eagle Harbor
32	FAA32	Rk	55° 08' 41.84"	160° 08' 30.03"	N/A	Possible Rk	800m W of N headland of Eagle Harbor
33	FAA33	Rk	55° 06' 42.91"	160° 11' 48.63"	10x10	Possible Rk in kelp, many kelp areas in vicinity	200m W offshore Wooly Head.
34	FAA34	Rk	55° 08' 41.32"	160° 08' 23.35"	N/A	Possible Rk, many kelp areas in vicinity	700m W of N headland of Eagle Harbor See AA103

Sequence No.	Feature No.	Kelp Description Category	NAD 83 Latitude (N) (deg min sec.dd)	NAD 83 Longitude (W) (deg min sec.dd)	Dimension (m)	Description	Significance and Chart Comparison Relationship
35	FAA35	Rk	55° 06' 52.16"	160° 11' 36.37"	10x10	Possible Rk in kelp, many kelp areas in vicinity	300m NW offshore Wooly Head. See AA51
36	FAA36	Rk	55° 06' 41.13"	160° 11' 52.41"	10x10	Possible Rk in kelp, many kelp areas in vicinity	200m W offshore Wooly Head.
37	FAA37	Rk	55° 06' 46.92"	160° 11' 42.20"	10x10	Possible Rk in kelp, many kelp areas in vicinity	200m NW offshore Wooly Head., 100mNW of islet
38	FAA38	Rk	55° 08' 44.49"	160° 08' 02.48"	10x10	Possible Rk in kelp, many kelp areas in vicinity	330m W of N headland of Eagle Harbor
39	FAA39	Rk	55° 08' 40.60"	160° 08' 00.11"	10x10	Possible Rk in kelp	270m W of N headland of Eagle Harbor See AA98
40	FAA40	Rk	55° 06' 24.97"	160° 11' 43.86"	10x10	Possible Rk in kelp	300m W offshore Wooly Head.
41	FAA41	4	55° 07' 24.05"	160° 09' 40.24"	50x50	Large kelp area, many kelp areas in vicinity	280m W offshore Wooly Head. See AA66
42	FAA42	4	55° 08' 17.35"	160° 07' 40.53"	50x50	Large kelp area, many kelp areas in vicinity	130m WSW of N coast of Eagle Harbor See AA91
43	FAA43	4	55° 06' 07.58"	160° 11' 39.39"	50x50	Large kelp area, many kelp areas in vicinity	150m SW offshore Wooly Head.
44	FAA44	4	55° 06' 03.37"	160° 11' 36.33"	50x50	Large kelp area, many kelp areas in vicinity	400m SW offshore Wooly Head. See AA37
45	FAA45	4	55° 06' 04.89"	160° 11' 39.76"	50x50	Large kelp area, many kelp areas in vicinity	400m SW offshore Wooly Head.
46	FAA46	Rk	55° 05' 59.74"	160° 11' 33.57"	N/A	Rk	400m SW offshore Wooly Head.
47	FAA47	Rk	55° 05' 53.56"	160° 11' 10.59"	30x30	Possible Rk in kelp, kelp areas inshore	320m SW offshore Wooly Head. 100m SW of large kelp area. See AA29
48	FAA48	Rk	55° 05' 50.72"	160° 10' 52.57"	10x10	Possible Rk in kelp	250m SW of N coast of Falmouth Harbor.
49	FAA49	Rk	55° 05' 51.87"	160° 10' 48.26"	15x15	Possible Rk in kelp	250m SW of N coast of Falmouth Harbor. See AA26
50	FAA50	Rk	55° 05' 53.14"	160° 10' 50.61"	15x15	Possible Rk in kelp, many kelp patches in vicinity	250m SW of N coast of Falmouth Harbor.

Sequence No.	Feature No.	Kelp Description Category	NAD 83 Latitude (N) (deg min sec.dd)	NAD 83 Longitude (W) (deg min sec.dd)	Dimension (m)	Description	Significance and Chart Comparison Relationship
51	FAA51	Rk	55° 05' 48.73"	160° 10' 25.03"	N/A	Possible Rk in kelp, kelp areas inshore	260m SW of N coast of Falmouth Harbor. Note: many kelp patches on vicinity and inshore
52	FAA52	Rk	55° 05' 42.55"	160° 10' 27.67"	10x10	Possible Rk in kelp	400m SW of N coast of Falmouth Harbor.
53	FAA53	4	55° 05' 35.82"	160° 10' 15.07"	15x15	Kelp area	400m SW of N coast of Falmouth Harbor. See AA12 Note: many kelp patches in vicinity
54	FAA54	4	55° 05' 39.47"	160° 10' 11.73"	30x30	Large kelp area	330m SW of N coast of Falmouth Harbor. Note: many kelp patches on vicinity and inshore
55	FAA55	4	55° 05' 35.67"	160° 10' 03.78"	15x15	Kelp area	370m SW of N coast of Falmouth Harbor, 200m W of islet See AA11. Note: many kelp patches on vicinity
56	FAA56	4	55° 05' 38.32"	160° 10' 03.57"	15x15	Kelp area	300m SW of N coast of Falmouth Harbor., 150m W of islet Note: many kelp patches on vicinity and inshore
57	FAA57	Rk	55° 06' 26.18"	160° 05' 37.99"	N/A	Possible Rk in kelp	150m SW of N coast of Eagle Harbor See AA79
58	FAA58	Rk	55° 06' 20.93"	160° 05' 30.90"	N/A	Possible Rk in kelp	150m SW of N coast of Eagle Harbor See AA78
59	FAA59	Rk	55° 06' 58.36"	160° 11' 40.68"	N/A	Possible Rk in kelp	400m W offshore Wooly Head. See AA114
60	FAA60	Rk	55° 07' 01.66"	160° 11' 36.83"	N/A	Possible Rk, sparse data and possible rocks in vicinity	350m W offshore Wooly Head., 150m W of islets
61	FAA61	Rk	55° 07' 04.46"	160° 11' 32.00"	N/A	Possible Rk, sparse data and possible rocks in vicinity	350m W offshore Wooly Head., 150m W of islets
62	FAA62	Rk	55° 07' 10.02"	160° 11' 26.07"	N/A	Possible Rk, sparse data and possible rocks in vicinity	150m NW offshore Wooly Head.
63	FAA63	4	55° 07' 19.49"	160° 11' 06.54"	10x10	Possible Rk, sparse data and possible rocks in vicinity	200m NW offshore Wooly Head.

Sequence No.	Feature No.	Kelp Description Category	NAD 83 Latitude (N) (deg min sec.dd)	NAD 83 Longitude (W) (deg min sec.dd)	Dimension (m)	Description	Significance and Chart Comparison Relationship
64	FAA64	Rk	55° 08' 48.46"	160° 08' 16.88"	N/A	Possible Rk	600m W of N headland of Eagle Harbor
65	FAA65	Rk	55° 08' 53.59"	160° 08' 08.39"	N/A	Possible Rk	500m WNW of N headland of Eagle Harbor
66	FAA66	4	55° 08' 55.19"	160° 08' 03.01"	10x10	Possible Rk in kelp	500m WNW of N headland of Eagle Harbor
67	FAA67	Rk	55° 09' 11.58"	160° 07' 40.65"	10x10	Possible Rk in kelp, at extent of smooth sheet	450m NW of N headland of Eagle Harbor See AA106
68	FAA68	Rk	55° 09' 10.40"	160° 07' 38.13"	10x10	Possible Rk in kelp, at extent of smooth sheet	400m NW of N headland of Eagle Harbor
69	FAA69	Rk	55° 08' 47.39"	160° 08' 07.53"	N/A	Possible Rk in kelp	440m W of N headland of Eagle Harbor
70	FAA70	4	55° 07' 23.56"	160° 10' 51.36"	10x10	Possible Rk in kelp	130m N offshore Wooly Head. See AA63
71	FAA71	Rk	55° 07' 01.80"	160° 11' 32.71"	N/A	Possible Rk, sparse data and possible rocks in vicinity	270m W offshore Wooly Head., 100m W of islets See AA57
72	FAA72	Rk	55° 06' 58.42"	160° 11' 37.69"	N/A	Possible Rk, sparse data and possible rocks in vicinity	350m W offshore Wooly Head.
73	FAA73	Rk	55° 06' 49.16"	160° 11' 45.20"	N/A	Possible Rk	300m NW offshore Wooly Head.
74	FAA74	4	55° 08' 27.47"	160° 07' 44.77"	30x30	Possible Rk, sparse data and kelp areas inshore	180m W of N coast of Eagle Harbor See AA92
75	FAA75	Rk	55° 07' 15.72"	160° 11' 19.13"	N/A	Possible Rk, sparse data and possible rocks inshore	250m NW offshore Wooly Head.
76	FAA76	Rk	55° 08' 27.47"	160° 07' 44.77"	30x30	Possible Rk, sparse data and kelp areas inshore	220m W of N coast of Eagle Harbor See AA93
77	FAA77	Rk	55° 07' 21.89"	160° 11' 06.15"	N/A	Possible Rk, sparse data and possible rocks in vicinity	280m NW offshore Wooly Head. See AA61
78	FAA78	Rk	55° 05' 52.29"	160° 11' 00.74"	10x10	Possible Rk in kelp, sparse data and kelp areas inshore	320m SW offshore Wooly Head. 100m SW of large kelp area.
79	FAA79	Rk	55° 05' 52.66"	160° 10' 53.13"	10x10	Possible Rk in kelp	250m SW of N coast of Falmouth Harbor.
80	FAA80	4	55° 05' 33.03"	160° 09' 42.04"	20x20	S edge of kelp are, kelp inshore	250m S of N coast of Falmouth Harbor. See AA5, Note many kelp patches on vicinity

Sequence No.	Feature No.	Kelp Description Category	NAD 83 Latitude (N) (deg min sec.dd)	NAD 83 Longitude (W) (deg min sec.dd)	Dimension (m)	Description	Significance and Chart Comparison Relationship
81	FAA81	Rk	55° 06' 12.50"	160° 11' 38.92"	20x20	Possible Rk in kelp	150m W offshore Wooly Head.
82	FAA82	4	55° 05' 50.35"	160° 10' 30.95"	20x20	kelp area	270m SW of N coast of Falmouth Harbor.
83	FAA83	4	55° 05' 38.25"	160° 09' 57.65"	20x20	S edge of kelp are, kelp inshore	220m SW of N coast of Falmouth Harbor, 50m W of islet Note: many kelp patches on vicinity
84	FAA84	Rk	55° 06' 24.67"	160° 11' 57.90"	N/A	Rk	500m W offshore Wooly Head., 200m S of islets
85	FAA85	Rk	55° 06' 14.71"	160° 11' 41.01"	20x20	Possible Rk in kelp	200m W offshore Wooly Head.
86	FAA86	4	55° 05' 54.40"	160° 10' 30.95"	10x10	SW edge of kelp are, kelp inshore	140m SW of N coast of Falmouth Harbor. Note: many kelp patches inshore
87	FAA87	Rk	55° 06' 41.75"	160° 11' 58.30"	N/A	Rk	300m W of Wooly Head , 150m N of islets and drying rocks
88	FAA88	Rk	55° 07' 26.45"	160° 10' 43.59"	N/A	Possible Rk	250m N offshore Wooly Head.
89	FAA89	4	55° 06' 20.59"	160° 11' 38.20"	10x10	Kelp area off the coast	280m W offshore Wooly Head. Note: AA41 30m E
90	FAA90	4	55° 05' 30.59"	160° 09' 22.39"	15x15	Kelp area off the coast	150m S of N coast of Falmouth Harbor
91	FAA91	4	55° 07' 23.74"	160° 09' 48.64"	30x30	Offshore extent of large kelp area	260m N of Wooly Head
92	FAA92	4	55° 07' 21.81"	160° 09' 54.17"	30x30	NW extent of large kelp area	280m N of Wooly Head See AA65
93	FAA93	4	55° 07' 23.57"	160° 09' 59.59"	15x15	Kelp area off the coast	280m N of Wooly Head
94	FAA94	4	55° 05' 30.10"	160° 09' 26.67"	20x20	Kelp area off the coast	180m S of N coast of Falmouth Harbor

D.1.6 Aids To Navigation

No Aids to Navigation were seen or detected in the survey area for H11430.

D.1.7 Recommended Overlap With Lidar Data

The smooth sheet H11430 consists of Woolly Head and Eagle Harbor. Around Woolly Head and the headland to the north many islets, rocks and kelp patches leading to sparse data because of the exposed rugged coastline. Within Eagle Harbor a more uniform sloping seabed has led to a more consistent data set. At the exposed headlands depths to 12 – 15 fathoms were collected and depths to 8 – 10 fathoms experienced in Eagle Harbor. The recommended overlap by surface vessel is described below. A polygon is also included in the MicroStation file to illustrate the following recommendation and should be consulted when reading the following notes. This polygon is provided as a .dgn file (H11430_v1_Overlap.pzip) and is provided with the digital data in MicroStation version 7 format.

Note: all positions quoted are in NAD 83.

The recommended overlap by surface vessels for smooth sheet H11430 is to seaward of the poly-lines /polygons described as follows:

a) Poly-line H11430_1

This poly-line covers from Woolly Head at 55° 05.15' N, 160° 09.7' W through Eagle Harbor and finishing at the headland to the north at 55° 09.2' N, 160° 07.7' W. Good coverage exists around the headlands to 12 fathoms and sparse data to 15 fathoms. In Eagle Harbor more consistent coverage was achieved along the coast with data to 5 – 8 fathoms with sparse data to 10 fathoms. The recommended overlap is depicted by the poly-line. In addition, local areas of sparse coverage exists as follows:

- Within the 3fm contour along the coast from 55° 05.5' N, 160° 09.0' W to 55° 05.9' N, 160° 10.3' W
- Around 3.2Rk and kelp at 55° 02.55' N, 160° 09.7' W
- Around 3.8Rk and kelp at 55° 05.6' N, 160° 10.1' W
- Kelp area at 55° 05.7' N, 160° 10.2' W, kelp exists inshore of this area.
- Between 5fm and 1fm contour along the coast from 55° 05.95' N, 160° 10.6' W to 55° 06.5' N, 160° 11.3' W
- Kelp area at 55° 06.1' N, 160° 11.6' W
- Around 5.1Rk and kelp at 55° 06.3' N, 160° 11.7' W
- Kelp area at 55° 06.4' N, 160° 11.9' W
- Between 5fm and 1fm contour along the coast from 55° 06.2' N, 160° 11.5' W to 55° 06.8' N, 160° 11.4' W
- Around drying rocks and kelp at 55° 06.55' N, 160° 12.1' W, many islets, drying rocks and kelp inshore
- Kelp area at 55° 06.85' N, 160° 11.6' W
- Kelp area seaward of islets and drying rocks at 55° 07.05' N, 160° 11.5' W
- Kelp area at 55° 07.2' N, 160° 11.3' W
- Large kelp area close to coast at 55° 07.3' N, 160° 10.7' W

- Kelp area at 55° 07.3' N, 160° 07.15' W
- Kelp area at 55° 07.4' N, 160° 09.8' W
- Kelp area at 55° 07.4' N, 160° 09.6' W
- Large kelp area close to coast at 55° 07.25' N, 160° 09.2' W
- Shallowest limit of hydrography from 55° 05.9' N, 160° 05.7' W to 55° 05.7' N, 160° 05.4' W
- Tidal inlet at 55° 05.7' N, 160° 05.7' W
- Shallowest limit of hydrography at 55° 05.55' N, 160° 04.7' W
- Shallowest limit of hydrography at 55° 05.4' N, 160° 04.4' W
- Kelp area at 55° 06.2' N, 160° 05.4' W
- Shallowest limit of hydrography at 55° 07.2' N, 160° 06.4' W
- Between 5fm and 1fm contour along the coast from 55° 07.8' N, 160° 07.0' W to 55° 08.2' N, 160° 07.5' W, heavy kelp area.
- Around drying rocks and kelp at 55° 08.4' N, 160° 07.7' W, kelp inshore.
- Around 1.2 Rk and kelp area at 55° 08.5' N, 160° 07.8' W
- Kelp area at 55° 08.75' N, 160° 08.1' W
- Kelp area at 55° 08.7' N, 160° 08.4' W
- Around 3.1Rk and kelp at 55° 08.8' N, 160° 07.9' W
- Around 1.9Rk and kelp at 55° 09.1' N, 160° 07.5' W

E. APPROVAL SHEETS**LETTER OF APPROVAL – OPR-P183-KRL-05**

This report and the accompanying smooth sheets are respectfully submitted.

Field operations contributing to the accomplishment of this survey were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report and the accompanying smooth sheets have been closely reviewed and are considered complete and adequate as per the Statement of Work.

<u>Report</u>	<u>Submission Date</u>
Descriptive Report – H11430	June 27, 2006



FOR

Mark Sinclair
Hydrographer
Tenix LADS Incorporated

Date June 27, 2006

¹ The LIDAR survey referenced in this Descriptive Report has been applied to the multibeam surveys at junctions with. No stand-alone LIDAR information was compiled to either an HCell or an Hdrawing. For information concerning the compilation of LIDAR features and soundings see the Descriptive Report for multibeam survey H11593. LIDAR does not meet IHO object detection requirements. LIDAR was not used to supersede shoaler charted soundings or to disprove charted features.

The Data Acquisition and Processing Report and Horizontal and Vertical Control Report have been filed with the project records.

APPENDIX I – DANGERS TO NAVIGATION – DTONS Submitted to PHB during data acquisition

1.1.1. Danger to Navigation Report

Hydrographic Survey Registry Number: H11430

State: Alaska

Locality: Shumagin Islands

Sub-locality: Eagle Harbor

Project Number: OPR-P183-KRL-05

Survey Dates: May - August 2005

Depths are in meters and reduced to Mean Lower Low Water using preliminary tides. Positions are based on the NAD83 horizontal datum.

Charts Affected

Number	Version	Date	Scale
16553	5 th Ed.	09/01/05	1:80,000

The following items were found during hydrographic survey operations:

No.	Feature	Depth	Latitude (N)	Longitude (W)
1	Rk in kelp	7.6	55°03'59.13"	160°10'56.33"
2	Rk in kelp	13.9	55°08'42.51"	160°08'16.49"

COMMENTS: Preliminary tides have been applied to date from the Sand Point tide gauge. Final tides will be applied at a later date. The shoals was found using LIDAR.

Questions concerning this report should be directed to the Darren Stephenson in the Tenix LADS Inc. office in Biloxi MS. At (228) 594-6800.

DTONS Submitted to PHB during final data processing

1.1.2. Danger to Navigation Report

Hydrographic Survey Registry Number: H11430

State: Alaska

Locality: Shumagin Islands

Sublocality: Eagle Harbor

Project Number: OPR-P183-KRL-05

Survey Dates: April - August 2005

Depths are in decimal fathoms and reduced to Mean Lower Low Water using final verified tides. Drying heights are in whole feet above MHW. Positions are based on the NAD83 horizontal datum.

Charts Affected

Number	Version	Date	Scale
16553	4 th Ed.	03/05/04	1:80,000
16540	12 th Ed.	01/01/05	1:300,000

DANGERS:

No.	Feature	Depth	Latitude (N)	Longitude (W)	Remarks
3	Drying Rk	-3	55° 05' 32.23"	160° 09' 30.06	
4	Rk in kelp	3.2	55° 05' 27.35"	160° 09' 43.23"	Recommend further investigation by boat
5	Rk in kelp	5.4	55° 05' 28.62"	160° 09' 55.90"	Recommend further investigation by boat
6	Rk in kelp	3.8	55° 05' 35.67"	160° 10' 03.78"	Recommend further investigation by boat
7	Drying Rk	-7	55° 05' 38.96"	160° 10' 24.80"	
8	Rk in kelp	5.7	55° 05' 53.49"	160° 11' 10.42"	Recommend further investigation by boat
9	Rk in kelp	5.1	55° 06' 16.76"	160° 11' 39.38"	Recommend further investigation by boat
10	Drying Rk	-8	55° 07' 10.72"	160° 11' 17.11"	

No.	Feature	Depth	Latitude (N)	Longitude (W)	Remarks
11	Rk in kelp	2.7	55° 07' 24.05"	160° 09' 40.24"	Recommend further investigation by boat
12	Rk in kelp	2.3	55° 08' 25.71"	160° 07' 42.80"	Recommend further investigation by boat
13	Rk in kelp	6.6	55° 08' 45.11"	160° 08' 05.38"	Recommend further investigation by boat
14	Drying Rk in kelp	cov 1ft	55° 08' 53.82"	160° 07' 40.20"	Recommend further investigation by boat
15	Rk	6.8	55° 06' 02.14"	160° 05' 27.29"	
16	Rk	8.7	55° 06' 58.36"	160° 11' 40.68"	Recommend further investigation by boat

COMMENTS: Final verified tides have been applied from the Sand Point tide gauge. The shoals were found using LIDAR.

Questions concerning this report should be directed to the Survey Manager, Darren Stephenson, in the Tenix LADS, Inc., Biloxi, MS office at (228) 594-6800.

DTONS Submitted to MCD during data acquisition

1.1.3. Danger to Navigation Report

Hydrographic Survey Registry Number: H11430

State: Alaska
 Locality: Shumagin Islands
 Sub-locality: Eagle Harbor

Project Number: OPR-P183-KRL-05

Survey Dates: May - August 2005

Depths are in fathoms and feet, reduced to Mean Lower Low Water using preliminary tides. Positions are based on the NAD83 horizontal datum.

Charts Affected:

<u>Number</u>	<u>Version</u>	<u>Date</u>	<u>Scale</u>
16553	4 th Ed.	03/05/04	1:80,000

DANGERS TO NAVIGATION:

<u>Feature</u>	<u>Depth</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>
Rk in kelp	4.1	55° 03' 59.13"	160° 10' 56.33"
Rk in kelp	7.3	55° 08' 42.51"	160° 08' 16.49"

COMMENTS: Preliminary tides have been applied to date from the Sitka tide gauge. Final tides will be applied at a later date. The shoals was found using LIDAR.

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch at (206) 526-6835.

DTONS Submitted to MCD during data processing

1.1.4. Danger to Navigation Report

Hydrographic Survey Registry Number: H11430

Survey Title: State: Alaska

Locality: Shumagin Islands

Sub-locality: Eagle Harbor

Project Number: OPR-P183-KRL-05

Survey Dates: APR-AUG 2005

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
16553	1:80,000	5th	09/01/05
16540	1:300,000	12th	01/01/05

DANGERS:

Feature	Depth(ft or fms)	Latitude (N)	Longitude (W)
Rock	uncovers 3 ft	55/05/32	160/09/29
Rock	3 fms 1 ft	55/05/27	160/09/43
Rock	5 fms 2 ft	55/05/29	160/09/58
Rock	3 fms 5 ft	55/05/36	160/10/05
Rock	awash	55/05/47	160/10/12
Rock	uncovers 7 ft	55/05/39	160/10/26
Rock	4 fms 4 ft	55/05/52	160/10/48
Rock	5 fms 4 ft	55/05/54	160/11/10
Rock	5 fms	55/06/17	160/11/38
Rock	uncovers 8 ft	55/07/11	160/11/17
Rock	2 fms 4 ft	55/07/24	160/09/40
Rock	2 fms 2 ft	55/08/26	160/07/44
Rock	6 fms 3 ft	55/08/45	160/08/06
Rock	7 fms 2 ft	55/08/41	160/08/24
Rock	covers 1 ft	55/08/54	160/07/41
Rock	6 fms 5 ft	55/06/02	160/05/28
Rock	8 fms 4 ft	55/06/58	160/11/42

COMMENTS: All features were found using LIDAR.

Submitted by TENIX/LADS (LIDAR) reviewed by PHB

Submit Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch at (206) 526-6835

APPENDIX II – LIST OF GEOGRAPHIC NAMES

Geographical names were not checked during the survey, and no amendments are proposed.

APPENDIX III – PROGRESS SKETCH FINAL PROGRESS SKETCH

13 August 2005

1.1. OPR-P183-KRL-05 & OPR-P184-KRL-05

Shumagin and Pavlof Islands, AK
Tenix LADS Inc.

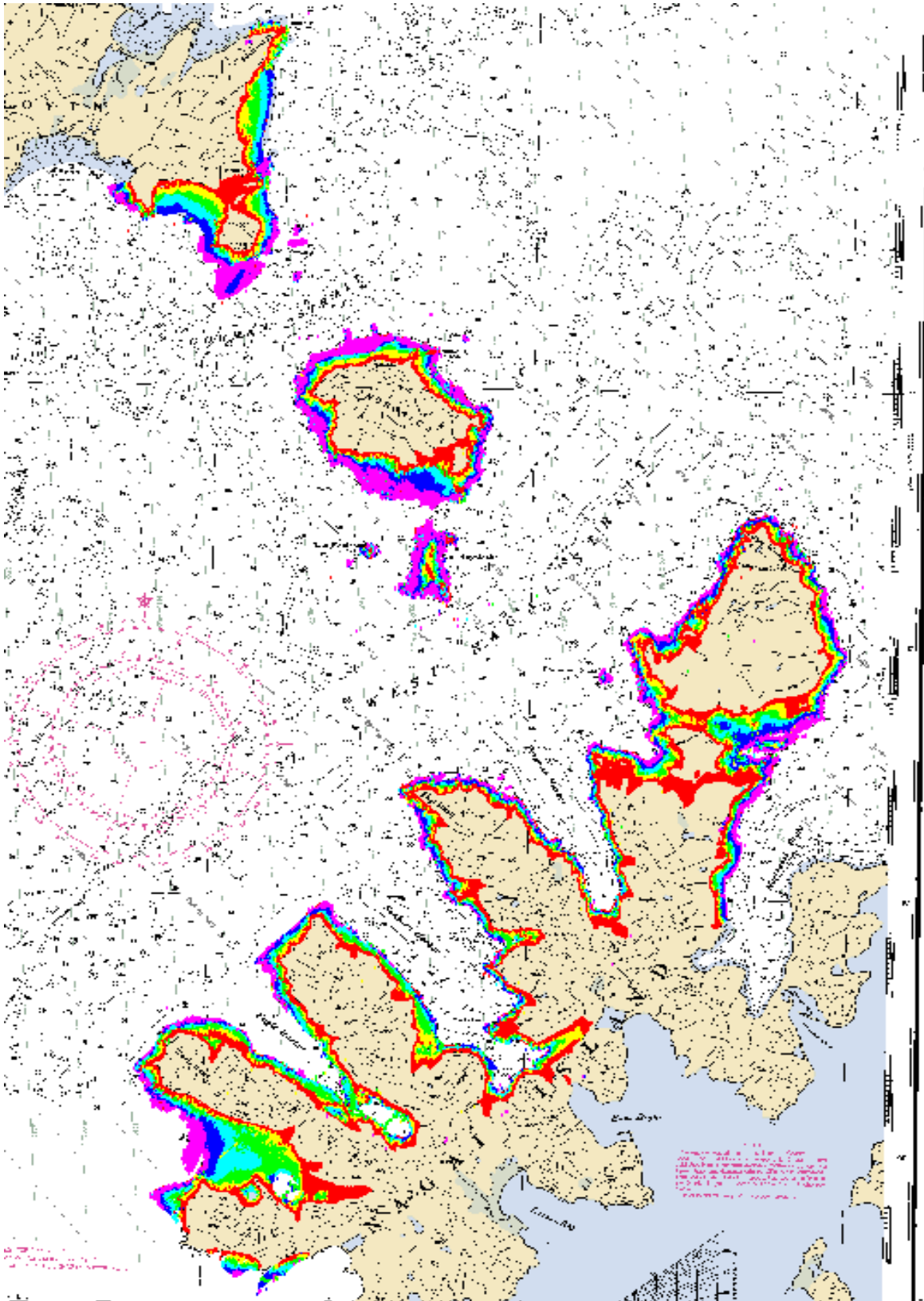
Darren Stephenson, Lead Hydrographer

Deployed to the field on April 28, 2005 for survey commencement on April 29, 2005.

This is the status numerically at August 13, 2005 and the chartlet is of July 15, 2005.

Both projects OPR-P183-KRL-05 and OPR-P184-K RL-05 have been combined for ease of reporting.

	April	May	June	July	August	Total	Total Planned	% Complete
Days on project	2	23	26	23	10	84		
Line – nm - flown	250	2907.3	2326.96	2482.0	1370.8	9337.1	6025.5	154.9
Aircraft flown hours	3.2	56.23	51.52	67.65	29.6	208.2		
Aircraft on task hours	2.2	40.61	35.05	43.14	22.9	143.9		
Days with flight	1	9	10	12	5	37	32	115.6
Transit to Sand Point		1	0	0	0	1		
No flight due to weather	1	11	16	11	5	44		
No flight due to water quality		0	0	0	0	0		
No flight due to system		2	0	0	0	2		
Hours lost to weather		3	4	4	0	11		
Hours lost to system		7	4	8	0	19		



APPENDIX IV – TIDES AND WATER LEVELS

Abstract of Times of Hydrography

Start and End times refer to tidal applications requirement.

Time on Task indicates actual time of task in the survey area. All times and dates are in UTC.

05_5Nagai

Date Flown	JD	Sortie No	Start time	End Time	Time On Task
April-29-05	119	5	19:00	00:54	05:54
May-13-05	133	7	01:00	06:54	05:54
May-14-05	134	8	00:00	06:54	06:54
May-16-05	136	9	00:00	00:00	Sortie Not Processed
May-19-05	139	11	20:00	03:54	07:54
May-21-05	141	12	22:00	23:48	01:48
May-22-05	142	13	03:00	05:24	02:24
May-23-05	143	14	21:00	00:48	03:48
May-24-05	144	15	18:30	22:24	03:54
June-03-05	154	16	21:00	23:48	02:48
June-12-05	163	18	21:00	04:54	07:54
June-13-05	164	19	19:30	23:48	04:18
June-16-05	167	20	21:30	04:48	07:18
June-19-05	170	21	18:42	03:00	08:18
June-27-05	178	23	22:30	04:24	05:54
June-28-05	179	24	19:00	02:24	07:24
June-29-05	180	25	21:00	05:24	08:24
July-02-05	183	27	14:00	16:24	02:24
July-07-05	188	30	19:30	04:30	09:00
July-12-05	193	31	22:00	04:54	06:54
July-13-05	194	32	19:00	02:24	07:24
July-14-05	195	33	00:00	00:00	Sortie Not Processed
July-27-05	208	37	22:00	04:54	06:54
July-30-05	211	38	19:00	01:00	06:00
Aug-02-05	214	40	14:00	21:24	07:24
Aug-04-05	216	42	14:00	21:54	07:54
Aug-05-05	217	43	16:00	20:00	04:00

T I D A L D A T U M S

Tidal datums at SAND POINT, POPOF ISLAND based on:

LENGTH OF SERIES: 19 Years
 TIME PERIOD: January 1983 - December 2001
 TIDAL EPOCH: 1983-2001
 CONTROL TIDE STATION:

Elevations of tidal datums referred to Mean Lower Low Water (MLLW), in METERS:

HIGHEST OBSERVED WATER LEVEL (12/31/1986) = 3.531
 MEAN HIGHER HIGH WATER (MHHW) = 2.204
 MEAN HIGH WATER (MHW) = 1.988
 MEAN TIDE LEVEL (MTL) = 1.197
 MEAN SEA LEVEL (MSL) = 1.181
 MEAN LOW WATER (MLW) = 0.406
 MEAN LOWER LOW WATER (MLLW) = 0.000
 LOWEST OBSERVED WATER LEVEL (11/15/1993) = -1.120

Bench Mark Elevation Information In METERS above:

Stamping or Designation	MLLW	MHW
9450 R 1991	4.593	2.605
9450 S 1991	4.582	2.594
9450 T 1991	3.836	1.848
9450 U 1991	4.397	2.409
945 9450 SHEET PILE BOLT	4.006	2.018
9450 V 1992	4.180	2.192
9450 W 1992	3.553	1.565
9450 X 1992	3.731	1.743
9450 Y 1997	4.559	2.571
1293-1 1984	3.585	1.598

APPENDIX V – SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

-----Original Message-----

From: Edward J Van Den Ameele [mailto:Edward.J.Vandenameele@noaa.gov]
Sent: Tuesday, May 20, 2003 1:10 AM
To: 'John K Longenecker'; 'Gary Nelson'
Cc: 'John Lowell'
Subject: RE: PHB_visit_7_May_03

See my two comments below; I'm sure John and Gary will have additional comments
-EJ

-----Original Message-----

From: John K Longenecker [mailto:John.K.Longenecker@noaa.gov]
Sent: Monday, May 19, 2003 7:55 AM
To: Gary Nelson
Cc: John Lowell; Edward J Van Den Ameele
Subject: PHB_visit_7_May_03

Could you please review and comment or give concurrence to the following statements or assumptions from the recent meeting at PHB? I will compile the response to Mark. Thanks.

John

Lidar Anywhere Task Order 1 OPR-P183-KR-03

Attendees:

Gary Nelson
Bob Mihailov
Bruce Olmstead
John Lowell
John Longenecker
Edward J Van den Ameele
Mark Sinclair

A meeting was held at Pacific Hydro Branch on 7 May, 2003 at the request of Tenix LADS Inc. The purpose of the meeting was to outline the TLI LADS Mk II survey plan and clarify items in the Statement of Work for Lidar Survey Services.

Summary of items raised:

- The SOW states certain versions of software are to be used. It is acceptable for delivered data to be compatible with the latest versions of Caris and Microstation.

- The requirements for reporting were discussed. 1 HVCR and 1 DAPR are to be provided per Task Order, however each smoothsheet is to have a separate DR which will facilitate standard archiving practices.
- Soundings in kelp were discussed. Sparse soundings in kelp are to be retained in the data set as they provide useful data, even if the coverage in these areas is incomplete. EJ: I believe it was also decided to delineate and denote the extents of kelp areas on the smooth sheet (i.e. with dashed line and "kelp" annotation)
- Automatically generated contours on smooth sheets which are close to gaps in the data, due to kelp or white water, may be placed in the wrong position if they are interpolated for the nearest soundings. In such cases, contours are to be manually edited to reflect the best estimate of the true position of the feature. EJ: This discussion mainly was in reference to the MLLW and MHW lines; and incorrect interpolation of the shoreline from irregularly spaced soundings.
- The requirement to bin the final data set was discussed. A 3 meter bin may be used for the sounding data set in lieu of the 5 meter bin.
- The depiction of drying soundings on the smoothsheet was discussed. Drying soundings shall be at the same density as depths. The datum and units stated in the SOW are to be used.
- 2D Microstation seed files shall be provided to PHB. It was noted that AHB specifies 3D seed files.
- The importance of the correct production of smoothsheets was discussed. Gary Nelson offered to review early drafts and provide feedback. He will also provide an example of a smoothsheet and microstation files.
- EJ advised that for the 2001 survey work, the list of doubtful soundings provided in the DR was very helpful. Such a list shall be provided in the event that doubtful depths are retained in the dataset.
- More information on the interpretation of raw laser waveforms was requested. MJS will plan to visit PHB on his next trip to Alaska and provide a presentation on waveform interpretation.

Prepared by Mark Sinclair
Project Director
Tenix LADS Inc
14 May 03

APPENDIX VI – AWOIS

No AWOIS were assigned to this task order.

APPROVAL SHEET
H11430

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

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

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