H11438

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic/Lidar Survey

Field No. N/A

Registry No. H11438

LOCALITY

State Alaska

General Locality Southwest Alaska Peninsula
Pavlof Islands and Vicintiy

Sublocality Belkofski Point

2005

CHIEF OF PARTY

Darren Stephenson, Tenix LADS

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DATE

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

HYDROGRAPHIC TITLE SHEET

REGISTRY No

H11438

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

FIELD No: N/A

State **Alaska**

General Locality **Southwest Alaska Peninsula, Pavlof Islands**

Sub-Locality **Belkofski Point**

Scale **1:10,000** Date of Survey **April 29 to August 12, 2005**

Instructions dated **April 18, 2005 and June 17, 2005** Project No. **OPR-P184-KRL-05**

Vessel **Tenix LADS Aircraft, VH - LCL**

Chief of party **D.J. Stephenson**

Surveyed by **M. J. Sinclair, S.R. Ramsey, M.S. Hawkins, T.M. Farrow, J.K. Young, B.C. McWilliam, et al**

Soundings by **Laser Airborne Depth Sounder**

SAR by **Toshi Wozumi** Compilation by **Katie Reser**

Soundings compiled in **Fathoms and Tenths**

REMARKS: **All times are UTC. UTM Projection 4**

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were generated during office processing. Page numbering may be interrupted or non sequential.

DESCRIPTIVE REPORT TO ACCOMPANY

HYDROGRAPHIC SURVEY H11438

SCALE 1:10,000, SURVEYED IN 2005

TENIX LADS AIRCRAFT, VH-LCL

TENIX LADS, INC. (TLI)

MARK SINCLAIR, HYDROGRAPHER

PROJECT[1]
Project Number: OPR-P184-KRL-05 **Original:** DG 133C-03-CQ-0011
Date of Instructions: April 18, 2005 and June 17, 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.
- Modification to Task Order 7 dated June 17, 2005.
- Email dated September 21, 2006 regarding locality name.
- Email dated August 2, 2006 regarding sheet limits.
- Email dated October 5, 2006 regarding the name of Iliasik.

Sheet Number: C
Registry Number: H11438

PURPOSE

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-P184-KRL-05, Southwest Alaska Peninsula, Pavlof Islands, AK. Survey operations covered six smooth sheets. This Descriptive Report describes Sheet C, which covers Belkofski Point (see Figure 1 and Figure 2).

During this period survey operations were also conducted in the Shumagin Islands under OPR-P183-KRL-05, and five forward deployments were made to Sitka for operations in the Approaches to Sitka Sound under OPR-O112-KRL-05. These other surveys are reported separately.

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 C:

	Latitude (NAD 83)	Longitude (NAD 83)
NW corner	55°.12880642	162°.09131478
NE corner	55°.12897378	161°.97264381
SW corner	55°.01466639	162°.09066303
SE corner	55°.01482919	161°.97232964

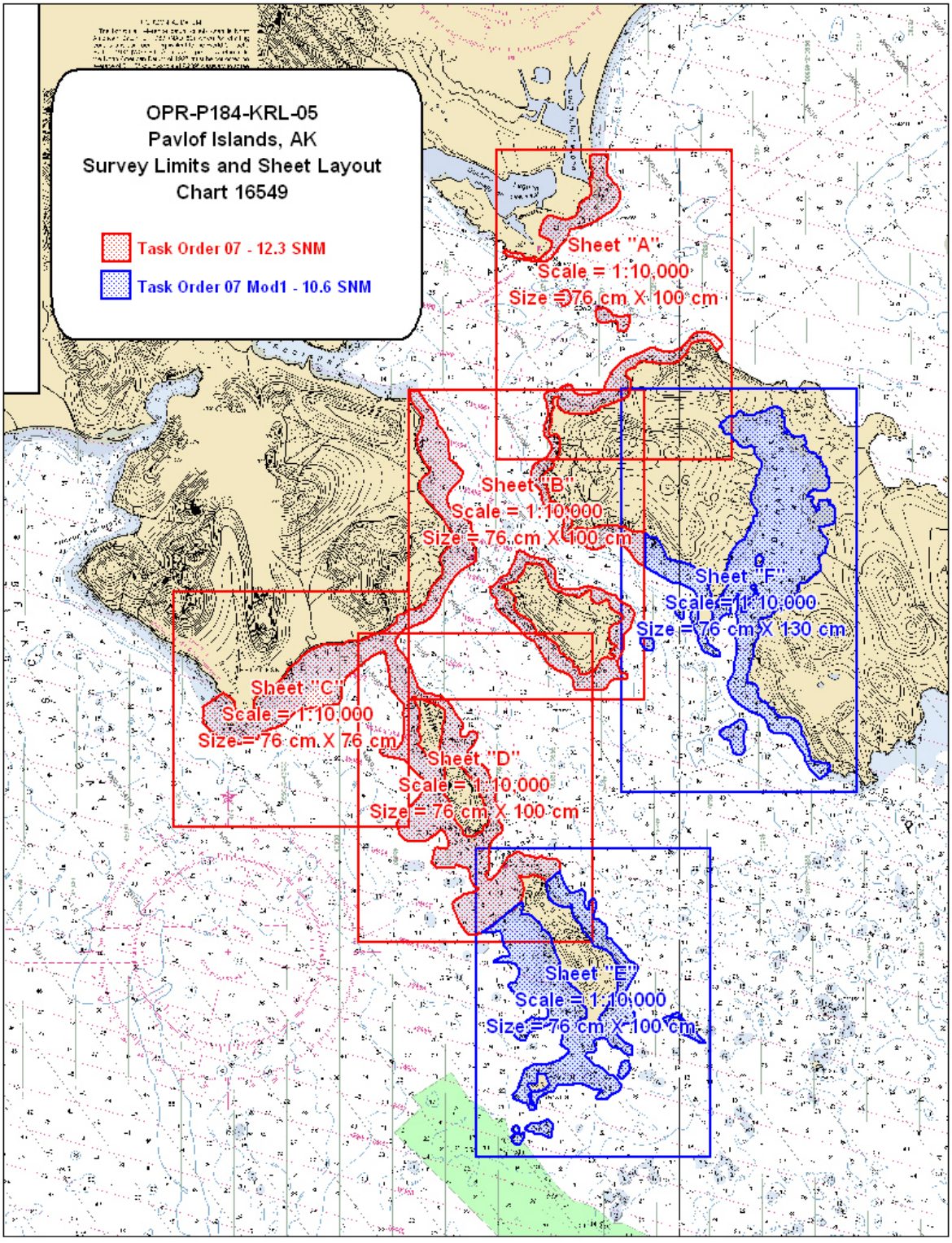


Figure 1 - Survey Area for Task Order 7 OPR-P184-KRL-05 including the modification

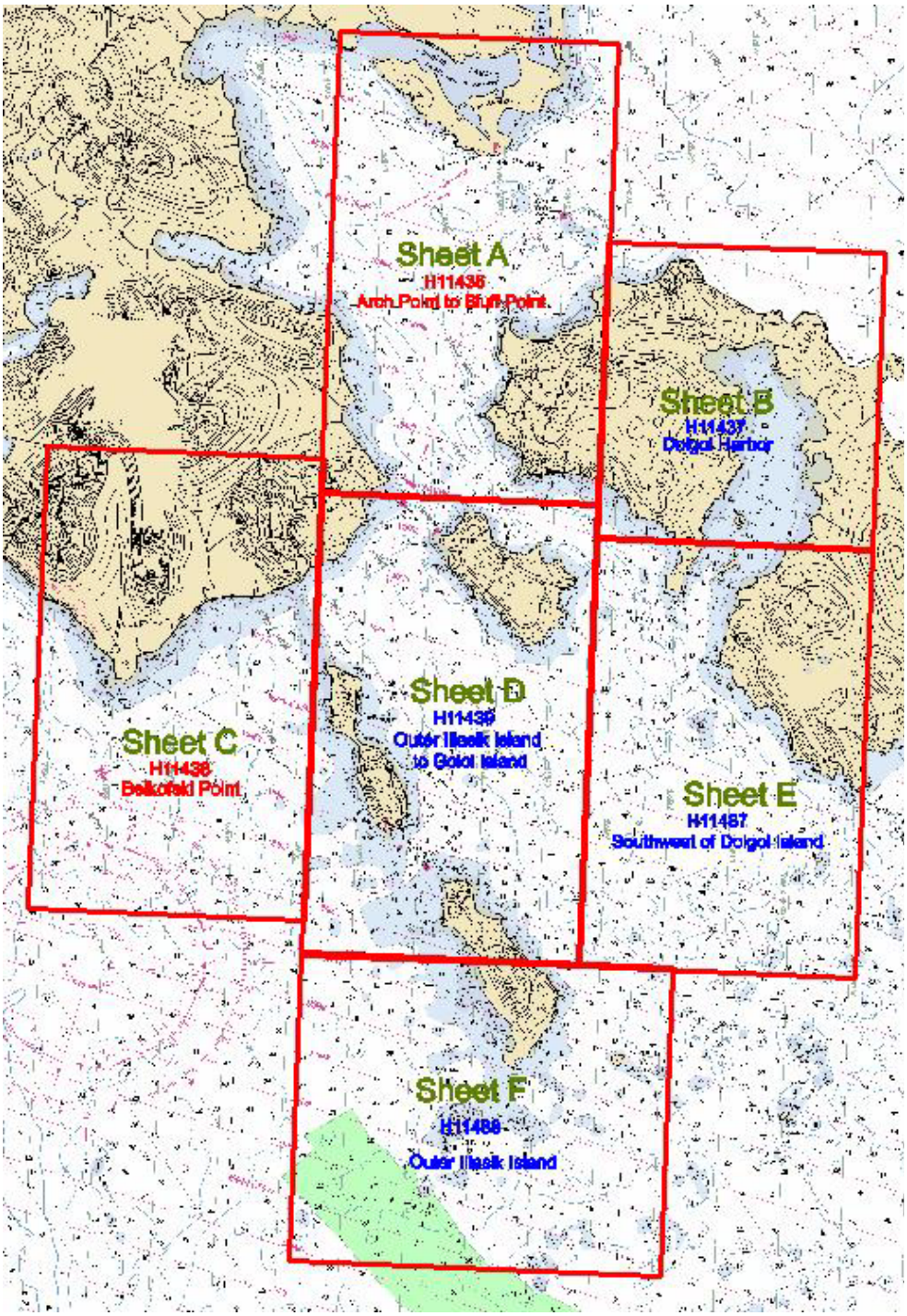


Figure 2 – Amended Sheet limits for Task Order 7 OPR-P184-KRL-05

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 protype 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 rectilinear 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 or Fugro OmniStar WADGPS where coverage is available. 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 at the Biloxi office on 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 coastline 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. Water depths up to 30 meters were achieved in the survey area, however in general good coverage was achieved to maximum depths of 15 to 20 meters.

B.2.3 Data Management

The database is identified as follows:

Database Name	General Locality	Sheet(s)
Pavlof	Pavlof Islands	C

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 12, 2005.

Several survey sorties were conducted in the early morning during low water spring tides to enable data acquisition over exposed rocks in kelp.

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 reflown on a calm day.

Calm seas were experienced on occasions. 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.1.4 Additional Boatwork Inside Lidar Area and D.1.5. 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.1.5 Chart Comparison Spreadsheet.

B.2.7 Nature of the Seabed

The seabed throughout the smooth sheet is quite regular. To the west and south of Belkofski Point a rock ledge exists for approximately ⅓ of a mile offshore. This drying shelf is surrounded by kelp to the 5 fm isobath.

In the bay heading east past the abandoned township of Belkofski the rock ledge and kelp lessens, however, many features exist within the 5 fm isobath.

At the north eastern extent of the smooth sheet the north western part of a shallow sand bar connecting to the Peninsula to Inner Iliasik Island has been surveyed.

At the eastern extent many shallow features exist to the west of Inner Iliasik Island.

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 on the Peninsula to the north of the survey area 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 100 km west 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

The majority of the survey lines were flown at 2200ft especially when in close proximity to the high ground on the Peninsula. Once away from the high ground the majority of the survey operations were conducted at either 1600ft or 1800ft. 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 reflown 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 H11438 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 22. 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 +/- 0.13	0.15+/-0.05
2	BM_2	5 m	0.07 +/- 0.03	0.11 +/- 0.02

Korovin Benchmarks

GS ID	BM Name	Nominal Depth	Average MDD	SD
3	BM_3	4 m	-0.02 +/- 0.01	0.26 +/- 0.06
5	BM_4	12 m	0.24 +/- 0.06	0.17 +/- 0.01
5	BM_5	18 m	0.31 +/- 0.11	0.15 +/- 0.01

Table 2 – Benchmark Results

These results are within expected tolerances and show that the LADS Mk II depth performance was within specifications. There are higher than expected MDD for BM_4 and BM_5. However, 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

Six crosslines were flown in the OPR-P184-KRL-05 survey area, one of which is on Sheet C (H11438). The 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 crossline was sounded at 4x4 meter laser spot spacing throughout the survey area as follows:

Line 1205.0.1	44 crossline intersections.	Across the sandbar connecting Inner Iliasik Island and the Alaska Peninsula.

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

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

Run No.	Comparisons	Mean Confidence	Average MDD	Average SD
1205.0.1	49077	6.6	-0.07 +/- 0.08	0.20 +/- 0.12

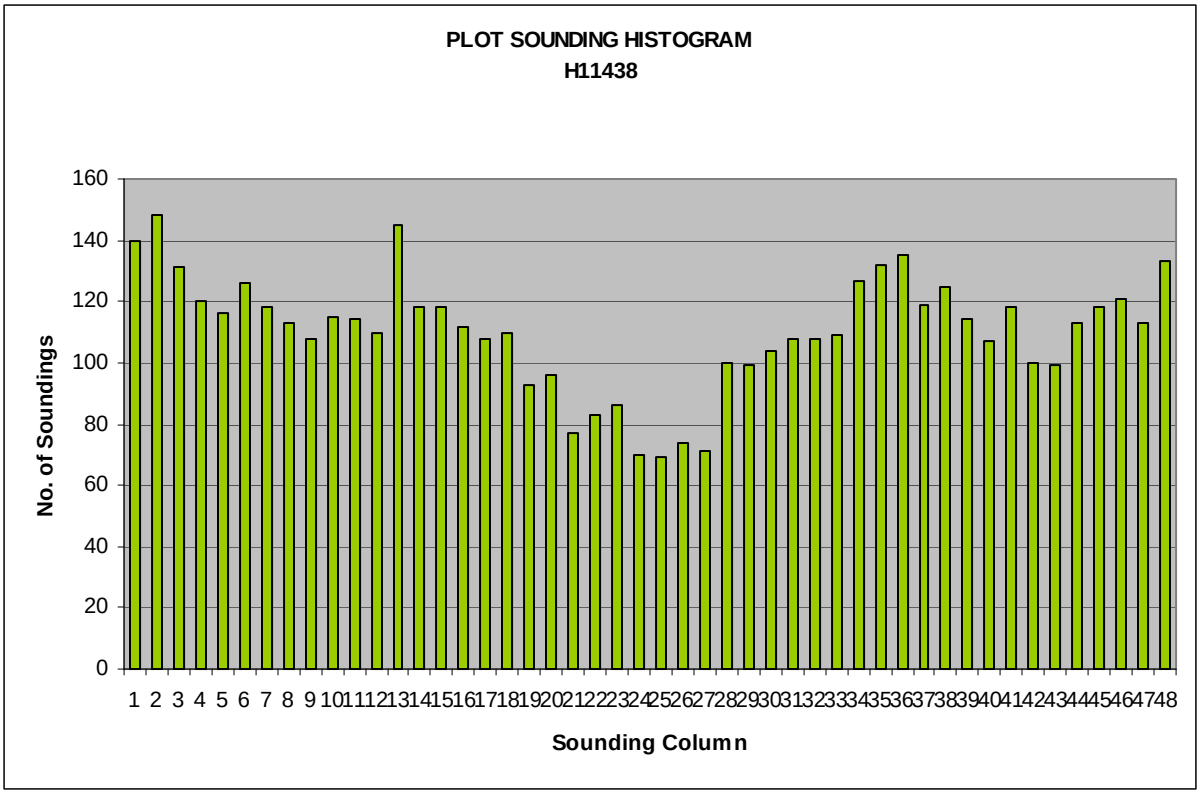
Table 3 – Crossline Comparison Results

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. It is noted that there is a slightly lower yield from columns close to nadir which is usual. Due to the 80 meter line spacing and 200 meter swath width, this area is covered by overlapping lines on either side, and so is effectively covered at 300% compared with 200% for the remaining area. This generally results in a slightly lower yield from columns close to nadir and near the edges of the scan. There is a slightly higher yield in columns 1, 2 and 48 than expected, however this is not considered to be material. The graph shows that there are no significant scan angle biases on the data.



Graph 1 – Sounding Histogram of Smooth Sheet H11438

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 rooftop 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 2.381 meters, with an average standard deviation of 0.323 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 2.82 meters with a standard deviation of 2.43 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 (NWLON) station at Sand Point, AK (945-9450) established vertical control for the LADS depth benchmark areas and for datum determination at the subordinate tide station installed at Dolgoi Harbor, Dolgoi Island. The Dolgoi Harbor tide station served as vertical control for the survey areas around the Pavlof Islands.

Station details are as follows:

		WGS84	
Gauge	**Location**	**Latitude**	**Longitude**
945-9758	Dolgoi Harbor, Dolgoi Island	55° 07.2' N	161° 47.5' W

Table 4 – Dolgoi Harbor 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 were superseded by the final tide zoning computed by JOA once the tide gauges at Dolgoi Island were recovered. The initial and final tide zones are as follows:

Tide Zone	GS Identifier	Time Corrector	Range Corrector	Reference Station
SWA193A	1	+0 minutes	x1.02	945-9450
SWA204A	2	+0 minutes	x1.00	945-9450
SWA205	3	+6 minutes	x0.94	945-9450
SWA218	4	+6 minutes	x0.91	945-9450
D1	5	+0 minutes	x1.00	945-9758

Table 5 – Tide Zones

An analysis of simultaneous tides at Sand Point and Dolgoi Harbor for the period May 1, 2005 to July 31, 2005 enabled JOA to compute final datum for the Dolgoi Harbor tide station. Full

details of this analysis can be found in the Dolgoi Harbor Tide Station Report prepared by JOA dated December 16, 2005.

This report has been supplied digitally on the USB hard drive in the tides directory in PDF format and sent to CO-OPS.

The final tide zone for H11438 is tide zone D1, details are provided in A.3.3 of the Vertical and Horizontal Control Report.

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

The derived value at Dolgoi Harbor tide station for the difference between MLLW and MHW is 1.865m. From the final tide zoning a range factor 1.00 was used for H11438, Sheet C to determine a MHW of 1.865m or 1.020 fathoms.

The final tides were supplied by John Oswald and Associates. The final 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 (WGS84) 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 GG24 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 Mk II 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 H11438 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 H11438 C

H11438 was compared to:

Preliminary Chart 16549 15th Edition July 2003, at scale 1:80,000. Corrected through NM July 26, 2003 and through LNM July 8, 2003.

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.1.2 Charted Depths and Features and in the Chart Comparison Spreadsheet under section D.1.5.

D.1.1 Dangers to Navigation

For the H11438 survey four dangers to navigation have been reported and are presented in Appendix 1.

- Item number 1 is in a kelp area lying 500 meters offshore to the west of Belkofski Point and requires further investigation by boat to determine the least depth if possible.
- Item number 2 is a shoal lying seaward of the 10 fathom contour, 900 meters southeast of Belkofski Point.
- Item number 3 is a shoal located 1100 meters west of the east coast of inner Iliasik Island. It should be noted that a number of shoals exist immediately inshore of this item.
- Item number 4 is a shoal located 2500 meters west of the east coast of Inner Iliasik Island.

D.1.2 Charted Depths and Features

Source data for the chart in this area was acquired between 1900-1939. Only partial bottom coverage was obtained. 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 drying rocks and rocks are more accurately portrayed on the smooth sheet.

The following general recommendations are relevant:

a. Coastline. The charted coastline around Belkofski Point towards Moss Cape is highly generalized. The surveyed coastline differs from the charted position by up to 100 meters throughout the smooth sheet. The main difference occurs at random intervals along the coastline. It is recommended that the coastline on the chart be amended to match the smooth sheet.

b. Inshore Islets. A number of islets have been surveyed close to the coastline. 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.1.5.

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.1.5.

In addition to the general recommendations above, some 44 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 H11438_V2_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 on 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.1.3 AWOIS

No AWOIS were assigned to this Task Order.

D.1.4 Additional Boatwork Inside Lidar Area

A number of significant soundings have been reviewed that were 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 19 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.1.5 Chart Comparison Spreadsheet

			CHARTED			SURVEYED								
Sequence No	**Shoal No**	**Category**	**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)	**Type of Feature**	**Kelp Area**	**Further Examination Recommended**	**Charting Recommendation**	**Remarks** **All items covered by 4x4m laser spot spacing at 200% lidar coverage.**
1	C1	2	Islet	55° 5' 15"	162° 4' 42"	-1.31	-4	55° 5' 13.5003"	162° 4' 42.4384"	Drying Rk	N	N	Replace	
2	C2	1				-1.26	-4	55° 5' 1.1947"	162° 4' 30.1565"	Drying Rk	Y	N	Insert	Note: -5 drying rock 190m NW, cov 2 ft drying rock 60m W.
3	C3	1				-0.60	-2	55° 4' 57.8241"	162° 4' 24.1893"	Drying Rk	Y	Y	N/A	Possible drying rock in kelp. Note: -1 drying rock 40m NNW.
4	C4	1				-0.45	-2	55° 4' 44.0271"	162° 4' 7.3107"	Drying Rk	Y	N	Insert	Note: Charted -5 drying rock 145m S confirmed, -3 drying rock 105m NNW.
5	C5	2	Drying Rk	55° 4' 38"	162° 4' 5"	-4.86	(10)	55° 4' 36.3037"	162° 4' 3.6072"	Islet	Y	N	Replace	Note: 2 charted drying rocks in vicinity confirmed, -5 drying rock 45m W.
6	C6	1				3.28	1.8	55° 4' 26.6926"	162° 4' 2.9068"	Rk	Y	Y	N/A	Possible Rk in kelp. See Danger to Navigation Report. Item 1
7	C7	1				-2.31	-8	55° 4' 27.0972"	162° 3' 54.9055"	Drying Rk	Y	Y	N/A	Possible drying rock in kelp - likely bird strike. Note: Charted -5 drying rock 135m ESE confirmed, many drying rocks in vicinity.
8	C8	1				-2.08	-7	55° 4' 21.1446"	162° 3' 49.0135"	Drying Rk	Y	Y	N/A	Possible drying rock in kelp - likely bird strike.
9	C9	2	Islet	55° 4' 17"	162° 3' 42"	-2.22	-7	55° 4' 15.0598"	162° 3' 42.9291"	Drying Rk	N	N	Replace	Note: Extensive drying shelf to N and E.

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

			CHARTED			SURVEYED								
Sequence No	**Shoal No**	**Category**	**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)	**Type of Feature**	**Kelp Area**	**Further Examination Recommended**	**Charting Recommendation**	**Remarks** **All items covered by 4x4m laser spot spacing at 200% lidar coverage.**
10	C10	1				-2.11	-7	55° 4' 11.035"	162° 3' 28.0326"	Drying Rk	N	N	Insert	Note: Charted -6 drying rock 170m WSW confirmed, -2 drying rock 160m ESE confirmed, many drying rocks in vicinity.
11	C11	1				0.64	cov 2 ft	55° 4' 5.2427"	162° 3' 24.335"	Drying Rk	Y	Y	N/A	Possible drying rock in kelp. Note: 1.6 Rk 70m SW.
12	C12	2	Drying Rk	55° 4' 3"	162° 3' 14"						N	N	Remove	Not detected by lidar, not observed in downward looking video.
13	C13	1				12.06	6.6	55° 3' 52.8742"	162° 3' 13.8694"	Rk	Y	N	Insert	
14	C14	2	$6^1/_2$	55° 4' 8"	162° 2' 46"	9.10	5.0	55° 4' 8.2392"	162° 2' 47.3"	Slope	Y	Y	N/A	
15	C15	2	9	55° 4' 11"	162° 2' 24"	9.57	5.2	55° 4' 12.6247"	162° 2' 29.4766"	Rk	N	N	Replace	
16	C16	1				14.29	7.8	55° 4' 8.579"	162° 2' 13.415"	Rk	N	N	Insert	Note: 9.2 Rk 190m SW. See Danger to Navigation Report. Item 2
17	C17	1				-0.85	-3	55° 4' 29.3857"	162° 2' 48.2897"	Drying Rk	N	N	Insert	Note: 2 islets 100m W, -6 drying rock 70m SW.
18	C18	1				0.71	cov 2 ft	55° 4' 33.6652"	162° 2' 36.7534"	Rk	Y	Y	N/A	Possible drying rock in kelp.
19	C19	2	Rk	55° 4' 39"	162° 2' 25"						N	N	Remove	Many charted rocks in vicinity surveyed as drying shelf.
20	C20	1				-1.76	-6	55° 4' 42.3911"	162° 2' 16.1083"	Drying Rk	N	N	Insert	

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

			CHARTED			SURVEYED								
Sequence No	**Shoal No**	**Category**	**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)	**Type of Feature**	**Kelp Area**	**Further Examination Recommended**	**Charting Recommendation**	**Remarks** **All items covered by 4x4m laser spot spacing at 200% lidar coverage.**
21	C21	1				6.08	3.3	55° 4' 40.6426"	162° 1' 57.6982"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 6.6 Rk 145m E.
22	C22	1				4.34	2.3	55° 4' 51.3664"	162° 1' 46.065"	Rk	Y	Y	N/A	Possible Rk in kelp.
23	C23	2	Rk	55° 4' 52"	162° 2' 7"			0° 0' 0"	0° 0' 0"		N	N	Remove	Many charted rocks in vicinity surveyed as drying shelf.
24	C24	1				7.57	4.1	55° 5' 21.7476"	162° 0' 46.0495"	Rk	Y	Y	N/A	Possible Rk in kelp. Note: 4.0 Rk 160m ENE.
25	C25	2	9	55° 5' 10"	162° 0' 36"	13.91	7.6	55° 5' 10.1787"	162° 0' 34.0495"	Slope	N	N	Replace	
26	C26	2	$1^3/_4$	55° 5' 31"	162° 0' 23"	1.12	0.6	55° 5' 29.8964"	162° 0' 19.0068"	Slope	Y	Y	N/A	
27	C27	1				-0.98	-3	55° 5' 48.5836"	161° 58' 58.2395"	Drying Rk	Y	Y	N/A	Possible drying rock in kelp. Note: Charted islet 140m ENE confirmed, many drying rocks in vicinity.
28	C28	1				-0.97	-3	55° 6' 5.0427"	161° 58' 26.4274"	Drying Rk	Y	Y	N/A	Possible drying rock in kelp. Note: Many drying rocks in vicinity.
29	C29	1				11.64	6.3	55° 3' 42.0429"	161° 58' 51.0773"	Rk	Y	Y	N/A	Possible Rk in kelp.
30	C30	1				12.17	6.6	55° 3' 37.9816"	161° 58' 54.134"	Rk	N	N	Insert	See Danger to Navigation Report. Item 3
31	C31	1				23.16	12.6	55° 2' 58.3726"	161° 58' 59.0885"	Shoal	N	N	Insert	Note: 12.6 130m NE.
32	C32	2	10	55° 2' 35"	161° 59' 6"	15.08	8.2	55° 2' 27.0434"	161° 59' 18.6117"	Rk	N	N	Replace	See Danger to Navigation Report. Item 4
33	C33	1				15.28	8.3	55° 2' 20.655"	161° 58' 33.8316"	Rk	N	N	Insert	
34	C34	1				16.96	9.2	55° 2' 17.2045"	161° 58' 40.3571"	Shoal	N	N	Insert	

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

			CHARTED			SURVEYED								
Sequence No	**Shoal No**	**Category**	**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)	**Type of Feature**	**Kelp Area**	**Further Examination Recommended**	**Charting Recommendation**	**Remarks** **All items covered by 4x4m laser spot spacing at 200% lidar coverage.**
35	C35	2	Rk	55° 5' 6"	162° 1' 47"	-1.11	-4	55° 5' 6.1336"	162° 1' 46.6629"	Drying Rk	N	N	Replace	Note: Many drying rocks in vicinity.
36	C36	2	2	55° 5' 43"	161° 59' 2"	-0.29	-1	55° 5' 45.2758"	161° 59' 3.3357"	Drying Rk	Y	Y	N/A	Possible drying rock in kelp.
37	C37	1				11.12	6.1	55° 3' 42.7914"	161° 58' 42.3004"	Rk	N	N	Insert	
38	C38	2	Drying Rk	55° 4' 32"	162° 3' 53"						Y	N	Remove	Not detected by lidar, not observed in downward looking video.
39	C39	1				1.58	0.8	55° 4' 21.0919"	162° 3' 57.8721"	Rk	Y	Y	N/A	Possible Rk in kelp.
40	C40	2	$6^3/_4$	55° 3' 59"	162° 3' 40"	7.35	4.0	55° 4' 1.1866"	162° 3' 38.634"	Rk	Y	Y	N/A	Possible Rk in kelp.
41	C41	1				0.17	-0	55° 4' 35.6686"	162° 2' 26.4409"	Drying Rk	Y	Y	N/A	Possible drying rock in kelp.
42	C42	1				7.26	3.9	55° 5' 0.779"	162° 1' 23.7528"	Rk	N	N	Insert	
43	C43	1				6.92	3.8	55° 5' 22.3564"	162° 0' 30.6305"	Rk	N	N	Insert	Note: 3.1 Rk 105m NE.
44	C44	1				6.63	3.6	55° 5' 31.7304"	161° 59' 33.0188"	Rk	Y	Y	N/A	Possible Rk in kelp.

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

D.1.6 Features Requiring Investigation

During the validation, checking and approving stages of the data processing a spreadsheet of the features requiring investigation was compiled. The list from this spreadsheet was then compared to the chart comparisons and DtoNs reported and their significance evaluated. Six 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 (H11438_V2_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.

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 and charted drying features. Any drying features have been assigned the text “DR” in the category column for investigation.

Sequence No.	Feature No.	Kelp Description Category	NAD83 Latitude N (deg min sec.dd)	NAD83 Londitude W (deg min sec.dd)	Dimension (m)	Description	Significance and Chart Comparison Relationship
1	FC01	4	55° 04' 53.17"	162° 04' 32.42"	40x10	Possible Rk in kelp	360m SW of E coast of Belhofski Point, many kelp features in vicinity.
2	FC02	4	55° 05' 40.75"	161° 59' 06.14"	5x5	Possible Rk in kelp	200m SE of S coast. Seaward extent of kelp area
3	FC03	Rk	55° 04' 55.24"	162° 01' 29.32"	10x10	Possible Rk	570m SE of S coast
4	FC04	Rk	55° 05' 21.75"	162° 00' 46.07"	10x10	Possible Rk	460m SSE of S coast. See C24
5	FC05	4	55° 05' 31.74"	161° 59' 33.00"	10x10	Possible Rk in kelp	300m SE of S coast, many kelp features in vicinity.

Sequence No.	Feature No.	Kelp Description Category	NAD83 Latitude N (deg min sec.dd)	NAD83 Londitude W (deg min sec.dd)	Dimension (m)	Description	Significance and Chart Comparison Relationship
6	FC06	DR	55° 04' 53.12"	162° 04' 15.37"	10x30	Possible drying Rk in kelp	170m SW of E coast of Belkofski Point.

D.1.7 Aids To Navigation

No Aids to Navigation were seen or detected in the survey area for H11438.

D.1.8 Recommended Overlap With Lidar Data

The smooth sheet H11438 consists of Belkofski Point in the west through a bay passing the abandoned township of Belkofski toward Moss Cape. In the east of the smooth sheet a shallow sand bar with kelp patches connects the north coast of Inner Iliasik Island to the mainland. South of this sand bar, shallow data coverage exists which is offshore to the west coast of Inner Iliasik Island. At the northern extent of the sand bar data coverage exists to 5 fms.

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. The polygon is provided as a .dgn file (H11438_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 sheet H11438 is seaward of the poly-lines described as follows:

a) Poly-line H11438_1

This poly-line covers from northwest of Belkofski Point, around Belkofski Point towards Moss Cape including the shallow sand bar connecting to the north coast of Inner Iliasik Island. Good coverage exists between the 3fm and 10fm contour around Belkofski Point with a number of rocks and features in this area. Good coverage exists on the northern part of the sand bar to 5fms and large kelp areas exist on the southern part of the sand bar causing sparse data. The recommended overlap is depicted by the poly-line. In addition, local areas of sparse coverage exists as follows:

- Kelp area between the 2fm and 0fm contour from 55° 05.15’ N, 162° 04.75’ W to 55° 04.7’ N, 162° 04.1’ W
- Kelp area at 55° 04.9’ N, 162° 04.6’

- Around Rk and kelp area at 55° 04.45', 162° 04.1'
- Kelp area at 55° 04.2', 162° 04.0'
- Kelp area at 55° 04.15', 162° 04.2'
- Deep area at 55° 04.25', 162° 04.5'
- Large kelp area at 55° 04.1' N, 162° 03.8 W
- Kelp area at 55° 04.1' N, 162° 03.4' W
- Kelp area at 55° 04.15' N, 162° 02.8' W
- Between 0fm and 2fm contour from 55° 04.1' N, 162° 03.4' W to 55° 04.55'N, 162° 02.4' W
- Deep area at 55° 04.3' N, 162° 02.2' W
- Kelp area at 55° 05.1' N, 162° 01.4'
- Kelp area at 55° 04.6' N, 162° 02.1'W
- Kelp area at 55° 05.5' N, 162° 00.3' W, other small kelp patches exist seaward of this kelp area.
- Between 0fm and 2fm contour from 55° 05.6' N, 161°59.9' W to 55° 06.05' N, 161° 58.6' W
- Kelp area at 55° 05.1' N, 161° 58.6' W

b) Poly-line H11438_2

This poly-line covers a shoal area at 55°03.7' N, 161° 58.7' W located approximately 1,000 meters west of the east coast of Inner Iliasik Island. Good coverage exists to 11 fathoms with sparse data to 12 fathoms. Good coverage exists to the north and east of this shoal and is covered in more detail on H11439. The recommended overlap is depicted by the poly-line. In addition, local areas of sparse coverage exists as follows:

- Kelp area at 55° 03.8' N, 161° 58.9' W
- Kelp area at 55° 03.7' N, 161° 58.9' W

A Shoal exists at 55° 03.0' N, 161° 58.9' W

c) Poly-line H11438_3

This poly-line covers a shoal at 55° 02.5' N, 161° 59.2' W located 2,300 meters west of the east coast of Inner Iliasik Island. Good coverage exists to 12 fathoms with sparse data to 13 fathoms. The recommended overlap is depicted by the poly-line.

d) Poly-line H11438_4

This poly-line covers a shoal at 55° 02.4', 161° 58.5' W located 1,800 meters west of the east coast of Inner Iliasik Island. Good coverage exists to 11 fathoms with sparse data to 12-13 fathoms. The recommended overlap is depicted by the poly-line.

E. APPROVAL SHEETS

LETTER OF APPROVAL – OPR-P184-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.

Report	Submission Date
Descriptive Report – H11438	October 4, 2006

Mark Sinclair
Hydrographer
Tenix LADS Incorporated

Date 10/04/2006

Revisions and Corrections Compiled During Office Processing and Certification

[1] The LIDAR survey referenced in this Descriptive Report has been applied to the multibeam surveys it junctions with. No stand-alone LIDAR information was compiled to the HCell. For information concerning the compilation of LIDAR features and soundings see the Descriptive Reports for multibeam surveys H11902, H11904 and H11905. 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

1.1.1. Danger to Navigation Report

Hydrographic Survey Registry Number: H11438

State: Alaska

Locality: Pavlof Islands and Vicinity, AK

Sub-locality: Belkofski Point

Project Number: OPR-P184-KRL-05

Survey Dates: April - August 2005

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

Charts Affected

Number	Version	Date	Scale
16549	15th Ed.	July 2003	1:80,000

The following items were found during hydrographic survey operations:

No.	Feature	Depth	Latitude (N)	Longitude (W)	Comments
1	Rk in kelp	1.8	55° 04' 26.70"	162° 04' 02.91"	Recommended further investigation by boat
2	Rk	7.8	55° 04' 08.57"	162° 02' 13.40"	
3	Rk	6.6	55° 03' 37.99"	161° 58' 54.12"	
4	Rk	8.2	55° 02' 27.03"	161° 59' 18.60"	

COMMENTS: Final verified tides have been applied from the Dolgoi Harbor tide gauge (945-9758). The DTONS were found using LIDAR.

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

DTONS Submitted to MCD

1.1.2. Danger to Navigation Report

Hydrographic Survey Registry Number: **H11438**

Survey Title:	**State:**	**Alaska**
	Locality:	**Pavlof Islands and Vicinity, AK**
	Sub-Locality:	**Belkofski Point**

Project Number: OPR-P184-KRL-05

Survey Dates: April - August 2005

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

CHARTS AFFECTED:

Chart	Scale	Edition	Date
16549	1:80,000	15th	07/26/03
16540	1:300,000	12th	Jan. / 05

DANGERS TO NAVIGATION:

Feature	Depth (fm_{ft})	Latitude (N)	Longitude (W)
Rk	1_5	55° 04' 26.70"	162° 04' 02.91"
Rk	7_5	55° 04' 08.57"	162° 02' 13.40"
Rk	6_3	55° 03' 37.99"	161° 58' 54.12"
Rk	8_1	55° 02' 27.03"	161° 59' 18.60"

COMMENTS: All features were found by Tenix LADS (LIDAR) and reviewed by PHB. Final verified tides have been applied from the Dolgoi Harbor tide gauge (945-9758).

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.

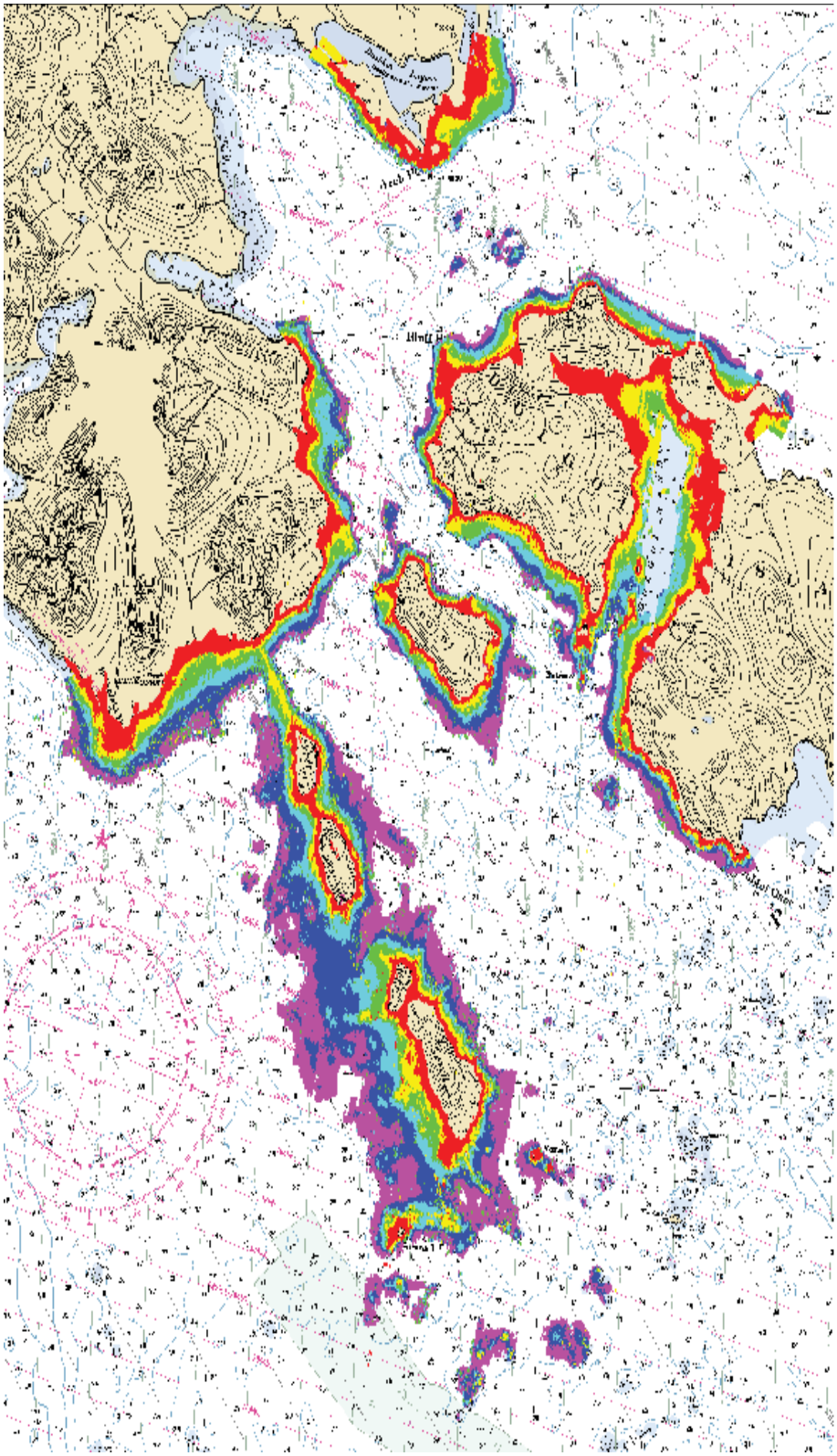
APPENDIX III – PROGRESS SKETCH

FINAL PROGRESS SKETCH

13 August 2005
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-KRL-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_7Pavlof

Date Flown	JD	Sortie No	Start Time	End Time	Time on Task
May-15-05	135	2	0:06	7:00	6:54
May-16-05	136	3	20:06	2:00	5:54
May-19-05	139	5	20:06	4:00	7:54
May-20-05	140	6	23:06	5:00	5:54
May-21-05	141	7	22:06	4:30	6:24
May-22-05	142	8	21:06	6:00	8:54
May-24-05	144	9	14:36	20:00	5:24
June-3-05	154	13	21:06	23:54	2:48
June-4-05	155	14	14:06	16:54	2:48
June-28-05	179	18	19:06	2:30	7:24
July-1-05	182	19	21:36	4:00	6:24
July-6-05	187	21	15:36	22:54	7:18
July-10-05	191	23	17:36	23:30	5:54
July-12-05	193	24	22:06	5:00	6:54
July-15-05	196	26	2:06	7:00	4:54
July-28-05	209	29	0:06	5:06	5:00
July-30-05	211	30	19:00	1:00	5:00
Aug-3-05	215	31	14:00	22:00	8:00
Aug-8-05	220	33	17:00	21:12	4:12

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

Dolgoi Harbor, Dolgoi Island, AK

Station ID: 9459758

Dolgoi Harbor, Dolgoi Island, AK: Data Inventory

Page Help

Datums

Click HERE for printable version

Data Units:

Feet Meters Apply Change

Oct 2 2006 13:45 **ELEVATIONS ON STATION DATUM**
National Ocean Service (NOAA)

Station: 9459758 **T.M.:** 0
W
Name: DOLGOI HARBOR, DOLGOI ISLAND, AK **Units:**
Meters
Status: Accepted **Epoch:** 1983-
2001

Datum	Value	Description
MHHW	8.271	Mean Higher-High Water
MHW	8.068	Mean High Water
DTL	7.237	Mean Diurnal Tide Level
MTL	7.335	Mean Tide Level
MSL	7.317	Mean Sea Level
MLW	6.603	Mean Low Water
MLLW	6.203	Mean Lower-Low Water
GT	2.067	Great Diurnal Range
MN	1.464	Mean Range of Tide
DHQ	0.203	Mean Diurnal High Water Inequality
DLQ	0.400	Mean Diurnal Low Water Inequality
HWI	11.39	Greenwich High Water Interval (in Hours)
LWI	4.96	Greenwich Low Water Interval (in Hours)
NAVD		North American Vertical Datum
Maximum		Highest Water Level on Station Datum
Max Date		Date Of Highest Water Level
Max Time		Time Of Highest Water Level
Minimum		Lowest Water Level on Station Datum
Min Date		Date Of Lowest Water Level
Min Time		Time Of Lowest Water Level

To refer Water Level Heights to a Tidal Datum, apply the desired Datum Value.

Click HERE for further station information including New Epoch products.

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 form 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 clash 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

-----Original Message-----
From: David.Scharff [mailto:David.Scharff@noaa.gov]
Sent: Thursday, 21 September 2006 4:32 AM
To: STEPHENSON Darren
Cc: Toshi (E-mail); Gary.Nelson@noaa.gov
Subject: Re: FW: Locality Name

Darren,

Please use "Pavlof Islands and Vicinity, AK" for locality on all TO7 sheets. We've
been using "Southwest Alaska Peninsula" more as a project title it really shouldn't
have followed locality in the SOW for this task order. Sorry for the confusion.

Regards,
Dave

STEPHENSON Darren wrote:

> Dave
>
> We are about to send the first P184 sheet to PHB for a preliminary review and are having trouble fitting the Locality name in the title block. Or is there a way to fit the locality name into the title block?
>
> Please see below.
>
> regards
> Darren
>
> > -----Original Message-----
> > From: GUILFORD James
> > Sent: Thursday, 21 September 2006 3:50 AM
> > To: STEPHENSON Darren
> > Subject: Locality Name
> >
> > Was wondering if we could shorten the Locality name for the Pavlof Sheets. We would like to change it from Pavlof Islands and Vicinity, Southwestern Alaska Peninsula (how it is written in the SOW) to Pavlof Islands and Vicinity, AK.
> >
> >
> > ---
> > James Guilford
> > Senior Hydrographer
> > Tenix LADS Inc.
> > 925 Tommy Munro Dr. Ste J
> > Biloxi, MS 39532
> >
> > Ph (O): 228-594-6800
> > Ph (M): 228-342-3028
> > Fax: 228-594-6887
> >

> >
>
> Disclaimer :
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> Tenix does not warrant nor guarantee that this email communication is free
> from errors, virus, interception or interference.

-----Original Message-----
From: David.Scharff [mailto:David.Scharff@noaa.gov]
Sent: Wednesday, 2 August 2006 12:49 AM
To: STEPHENSON Darren
Cc: Toshi (E-mail); kim Sampadian (E-mail); Gary.Nelson@noaa.gov
Subject: Re: Pavlof sheet limits

Darren,

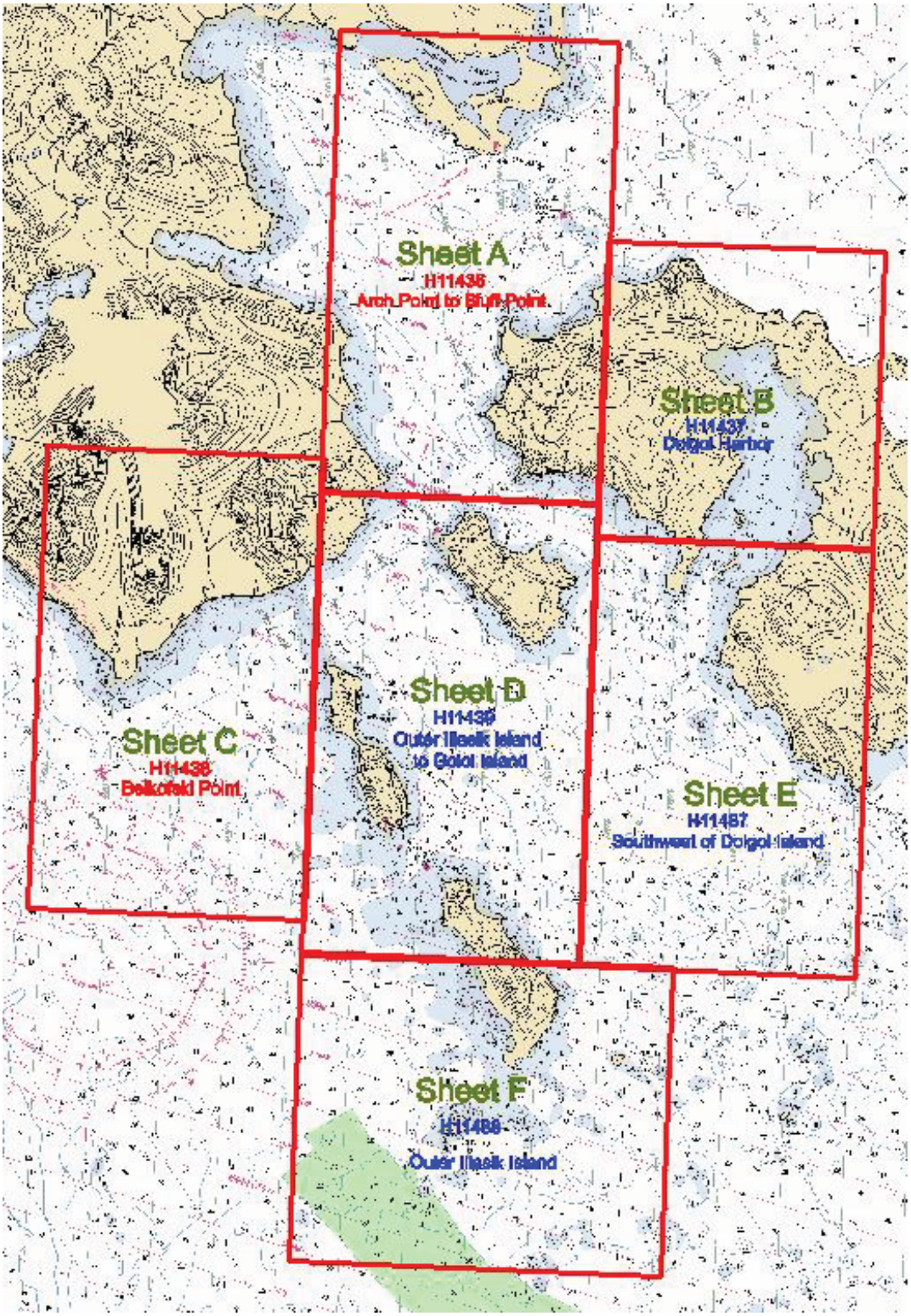
The layout and registry numbers matches the survey outlines you sent us and the
sublocalities look good. Just let me know if this is the way you plan on submitting
these sheets to PHB so I can make the appropriate changes on our end.

Regards,
Dave

STEPHENSON Darren wrote:

> Dave
>
> Late last year we orientated the sheet limits for the Pavlof Island survey area and the we mistakenly labeled the sheets wrong in some places. I have tried to get this sorted out at our end and went back through emails between us late last year.
>
> Please see attached the sheets with the sub localities. I hope that these are ok as they are what I believe we agreed too.
>
> <<Pavlof_Sheet_Limits_LADS.pdf>>
> regards
>
> Darren Stephenson
> Survey Manager
> Tenix LADS Incorporated
>
> Disclaimer :
> The contents of this e-mail including any attachments are intended only
> for the person or entity to which this e-mail is addressed. If you are not,
> or believe you may not be, the intended recipient, please advise the sender
> immediately by return e-mail, delete this e-mail and destroy any copies.
> Tenix does not warrant nor guarantee that this email communication is free
> from errors, virus, interception or interference.
>
> ----------
> Name: Pavlof_Sheet_Limits_LADS.pdf
> Type: Portable Document Format (application/pdf)
> Pavlof_Sheet_Limits_LADS.pdf Encoding: base64

> Description:
Pavlof_Sheet_Limits_LADS.pdf
> Download Status: Not downloaded with
message



-----Original Message-----
From: Toshi Uozumi [mailto:Toshi.Uozumi@noaa.gov]
Sent: Thursday, 5 October 2006 2:06 AM
To: STEPHENSON Darren
Subject: Re: Lliasik or Iliasik Island

Darren,

You are correct. It is on the current chart and prior survey as I L I A S I K.

Toshi

STEPHENSON Darren wrote:
> Dave
>
> We are just about to send the reports for H11438 and have picked an inconsistency in the wording of Inner Iliaslik and Outer Iliasik Islands on the chart compared to the SOW. We believe that it is Iliasik as apposed to Lliasik as written in the SOW.
> Can you please clarify this so that we can amend the reports prior to dispatch.
>
> regards
>
> Darren Stephenson
> Survey Manager
> Tenix LADS Incorporated
>
>
> Disclaimer :
> The contents of this e-mail including any attachments are intended only
> for the person or entity to which this e-mail is addressed. If you are not,
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>

APPENDIX VI – AWOIS

No AWOIS were assigned to this task order.

APPROVAL SHEET
H11438

Initial Approvals:

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

Katie Reser
2010.08.25
06:04:12 -07'00'

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

Digitally signed
by Russ Davies
Date: 2010.08.24
15:48:04 -07'00'

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

Gary C. Nelson
2010.08.24
15:25:45 -07'00'

Digitally signed by David Scharff
DN: cn=David Scharff, o=OCS, ou=NOAA, email=david.scharff@noaa.gov, c=US
Reason: AWOIS and Surf Check complete
Date: 2010.09.03 06:09:39 -04'00'