H11437

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.* H11437

## LOCALITY

*State* Alaska

*General Locality* Southwest Alaska Peninsula
Pavlof Islands and Vicintiy

*Sublocality* Dolgoi Harbor

**2005**

## CHIEF OF PARTY

**Darren Stephenson, Tenix LADS**

## LIBRARY & ARCHIVES

**DATE**

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

# HYDROGRAPHIC TITLE SHEET

REGISTRY No

**H11437**

**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 **Dolgoi Harbor**

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 H11437**

**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:** B
**Registry Number:** H11437

## 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. Initially, the survey operations were to cover four smooth sheets and this smooth sheet was one of the two that were added during the survey data acquisition. This Descriptive Report describes Sheet B, which covers Dolgoi Harbor (see Figure 1 and Figure 2).

During the processing of the data, all sheet limits were re-aligned and adjusted slightly. When this occurred, the sheet identifiers were changed. This is explained in part in Figures 1 and 2 and in supplemental correspondence at Appendix V.

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 for Sheet B are as follows:

| **NAD 83** | **Latitude (N)** | **Longitude (W)** |
|---|---|---|
| NW corner | 55°.18521797 | 161°.85505849 |
| NE corner | 55°.18515675 | 161°.73612124 |
| SW corner | 55°.11159326 | 161°.85506683 |
| SE corner | 55°.11152977 | 161°.73634839 |

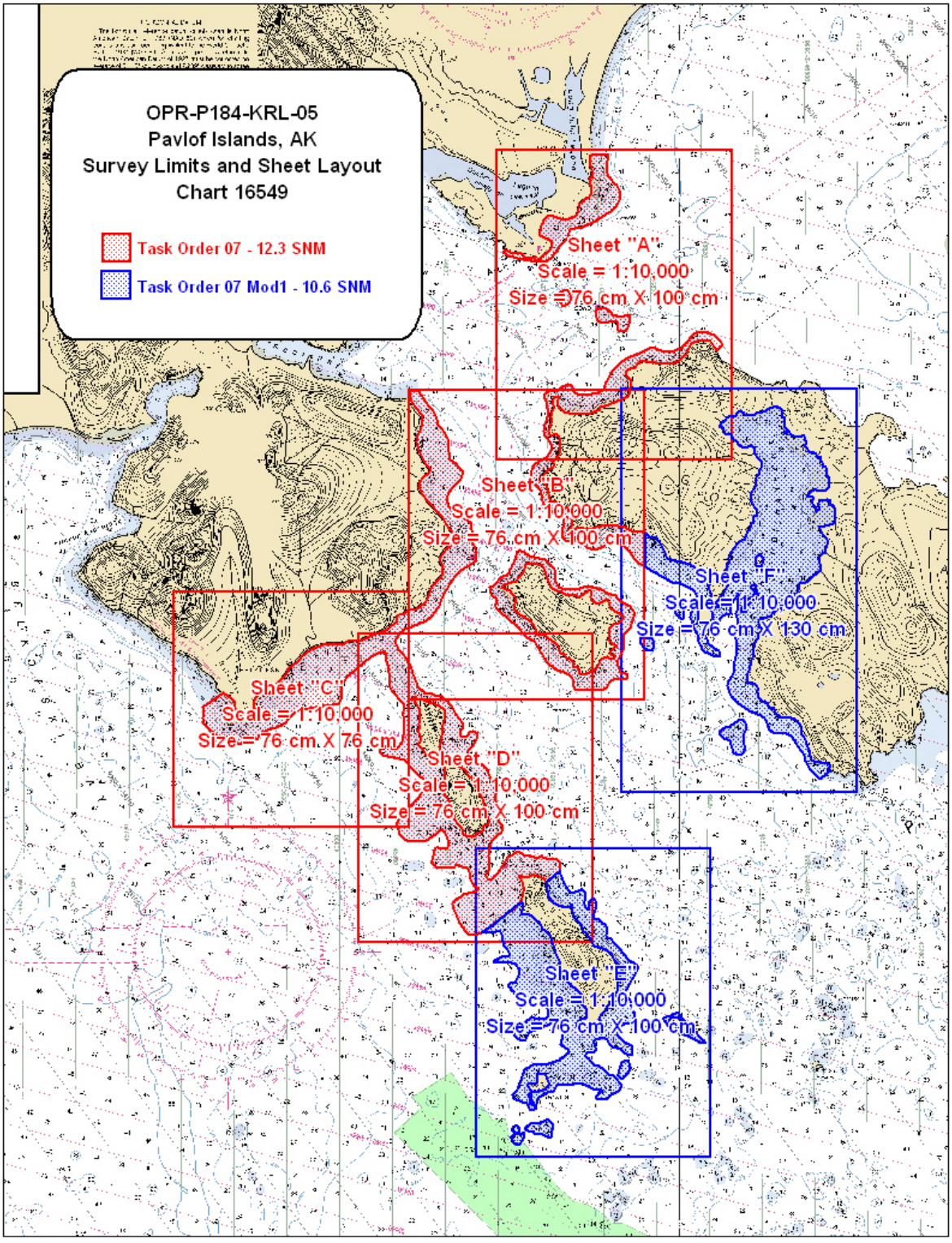



**Figure 1 - Survey Area for Task Order 7 OPR-P184-KRL-05 including the modification**

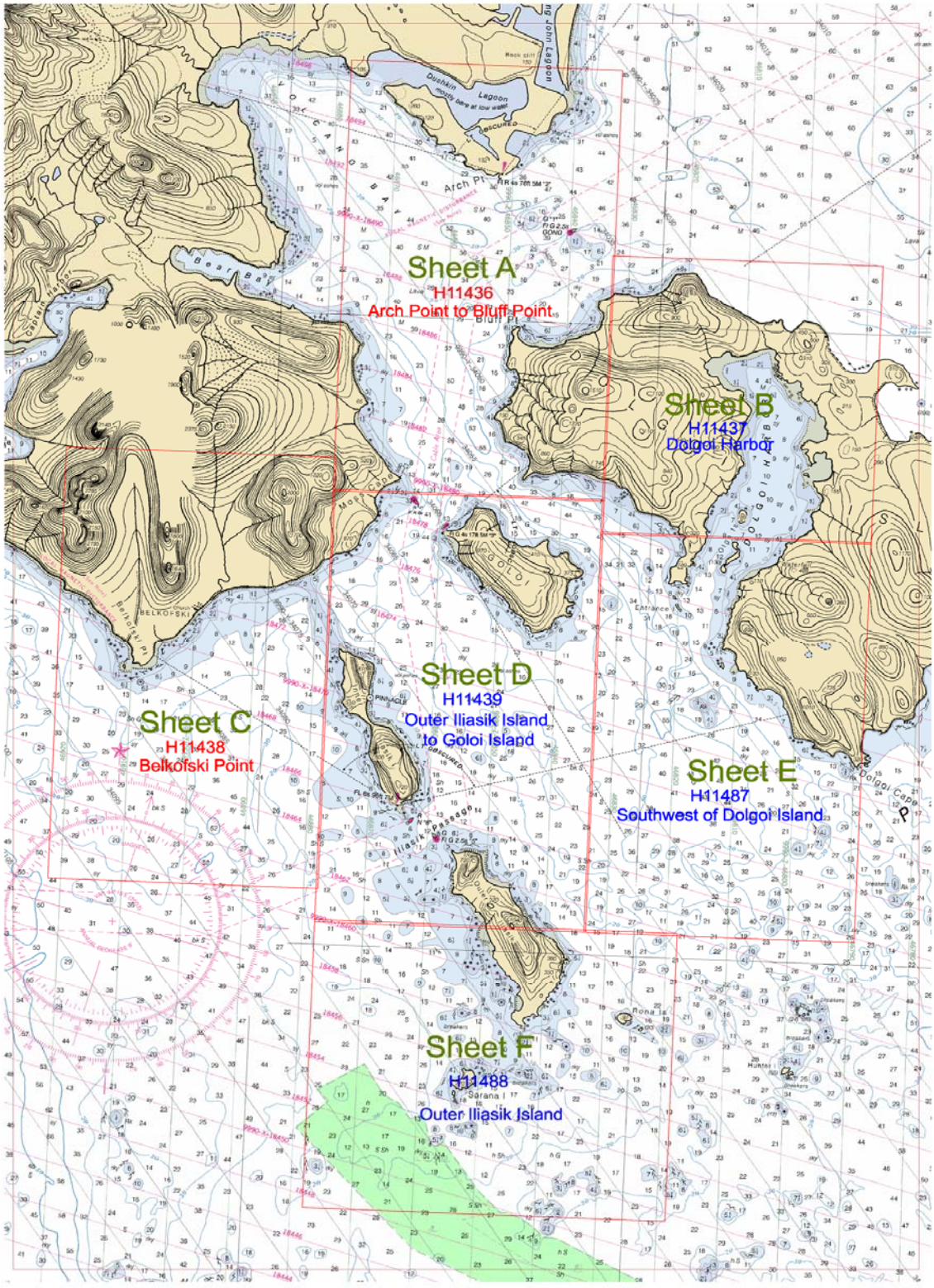



**Figure 2 – Amended Sheet limits and naming conventions for Task Order 7 OPR-P184-KRL-05**

# 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 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 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 infrared beam is also directed vertically beneath the aircraft. The height of the aircraft is determined by the infrared 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 to 30 meters were achieved in the survey area; however, in general, good coverage was achieved to maximum depths of 15 to 20 meters.

The upper reaches of Dolgoi Harbor had poor water quality resulting in data coverage to 10 meters in places. Some gaps exist in the data due to turbidity, even though additional lines were planned. These areas are tabulated in section D.1.6. On the coverage plot it can be seen where turbid data has been cut out of the data leaving a linear effect of data coverage. This striping is a result of the water clarity during one sortie being better than other sorties. These areas exist in the upper reaches of Dolgoi Harbor.

The water quality along the north and south coasts of Dolgoi Island was very good and resulted in quality lidar coverage to 25-30 meters.

### *B.2.3 Data Management*

The database is identified as follows:

| Database Name | General Locality | Sheet(s) |
|---|---|---|
| 05_7Pavlof | Pavlof Islands | B |

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 coverage 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. The exposed areas are along the south coast of Dolgoi Island and for the most part, this coastline is protected by Goloi Island, except when a southerly wind is present. White water creates saturated surface pulses; where this occurred the soundings have been edited and the area reflown on a calm day.

The majority of areas covered by this smooth sheet were protected and calm seas were experienced on occasions. Under such calm conditions the sea may become glassy which degrades the sea surface model. Within Dolgoi Harbor, calm conditions were experienced the majority of the time, due to the protected nature of the Harbor. However, glassy seas were not experienced and had no adverse effect on seabed coverage.

Long period swell was not significant during the survey and only a small allowance has been made in the assessment of vertical 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 Gaps in the Data*

The ground system supports interactive tagging of soundings by the operators using S-57 compliant and user-defined tags. These tags have been used to identify gaps in the data due to environmental conditions. For this smooth sheet the following tags were used:

- GT – gap in the data due to turbidity.

  This has been identified and collated in section D.1.6.

- GS – gap in the data due to the secondary exclusion zone.

  This gap occurs at the land / sea interface where the waveform return from the seabed is mixed with the waveform return from the sea surface. Neither the seabed nor a drying sounding can be determined, so a gap exists in the shallow area; these areas have been tabulated in section D.1.6.

- KELPA – gap due to kelp.

  This tag has been used to identify kelp areas for the production of the smooth sheet.

### *B.2.8 Nature of the Seabed*

The seabed throughout the smooth sheet is generally quite regular.

The north coast of Dolgoi Island is protected and the coastline is quite regular. The slightly more exposed headlands are more irregular with exposed rocks and kelp areas. The protected bays exhibit a regular sloping seabed.

The south coast is quite rugged and a rock ledge exists between the MHW and MLLW line, extending approximately 0.2 of a mile offshore. To seaward of the rock ledge, many kelp areas exist to the 3fm contour and then the seabed drops off in a regular fashion.
Dolgoi Harbor is very protected and the shallow seabed gently slopes from the regular coastline. Many tidal flats extend for half a mile from the coastline in the upper reaches of Dolgoi Harbor.

### *B.2.9 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.2.10 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.2.11 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 coverage and sea fog. Turbulence, low cloud coverage and sea fog influenced the choice of survey area during sortie operations.

### *B.2.12 Cloud*

Low cloud coverage 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 coverage 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.2.13 Effects of High Ground*

Survey lines were either flown at 1600ft, 1800ft or 2200ft depending on the proximity of high ground. The proximity of high ground on Dolgoi Island caused severe turbulence under certain conditions. The majority of the survey lines were flown at 1800ft.

### *B.2.14 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.2.15 Raw Laser Waveforms*

The raw laser waveform returns from seabed areas that 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.

### *B.2.16 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.2.17 Progress Sketches*

Progress sketches were provided to NOAA on a bi-weekly basis. A copy of the final progress sketch can be found in Appendix III.

### *B.2.18 Georeferenced Orthophoto*

A prototype digital image capture system was used to capture images from the downward looking video. These images were then combined to produce a georeferenced orthophoto of the coastline for the smooth sheet. During the production of the georeferenced orthophoto, some artifacts were produced in the mosaic and have not been resolved.

These artifacts are at the following locations:

a. On the north coast of Dolgoi Island in the vicinity of 55°10’18”N, 161°48’28”W, where 250m of coastline is shifted to the south.

b. On the north coast of Dolgoi Island in the vicinity of 55°10’01”N, 161°45’39”W, where a strip of data is missing from one of the lines flown. Approximately 100m of coastline imagery is missing.

c. On the south coast of Dolgoi Island in the vicinity of 55°06’38”N, 161°49’29”W. There is a misalignment of images in the mosaic resulting in a southerly shift in the coastline of approximately 300m.

## 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 .tif / .tfw 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 H11437 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 | Northing |
|---|---|---|---|
| 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 | Northing |
|---|---|---|---|
| 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 seabed 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 |
| 4 | 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 B (H11437). The crosslines were planned to cover areas of seabed that were reasonably flat. The crossline areas identified to conduct comparisons against mainlines 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 1404.0.1 | 24 crossline intersections | Along the north coast of Dolgoi Island |

### *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 |
|---|---|---|---|---|
| 1404.0.1 | 18984 | 6.1 | -0.02 +/- 0.12 | 0.22 +/- 0.24 |

**Table 3 – Crossline Comparison Results**

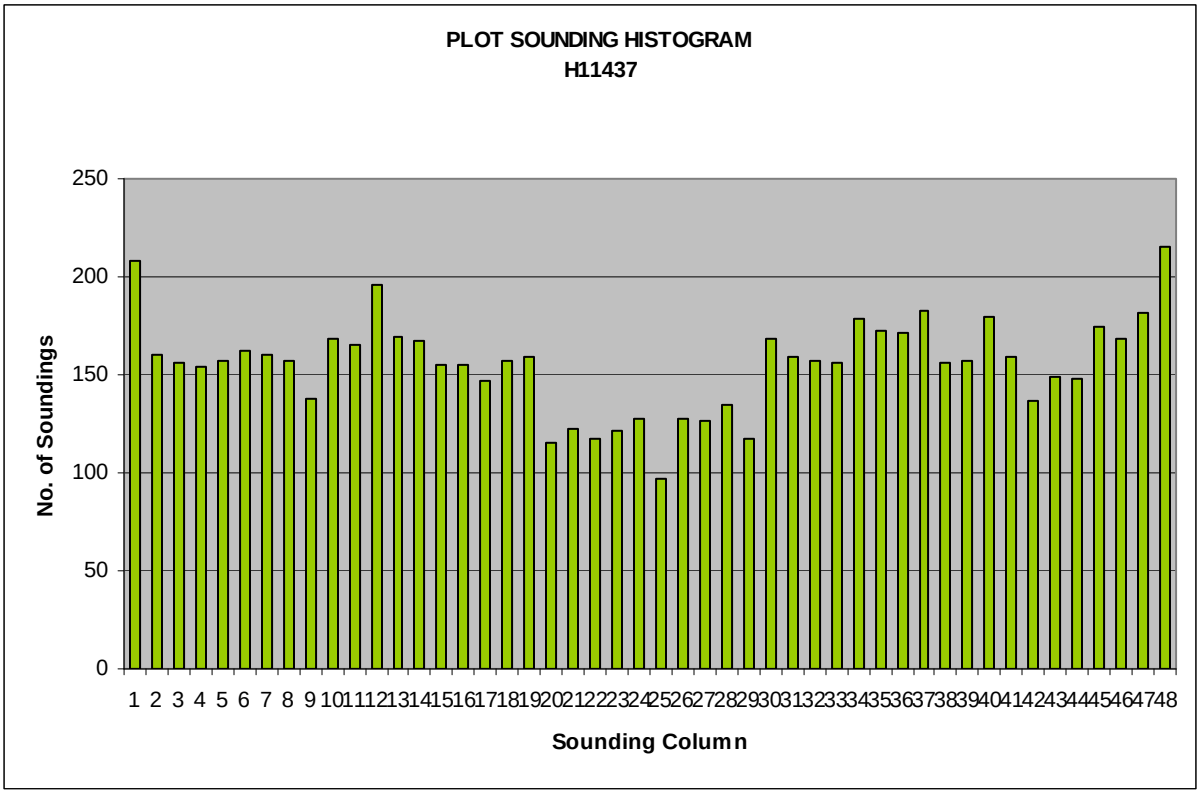
Crossline comparison details are provided in Appendix V of the Separates.

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

## B.6 ANALYSIS OF RESULTS

A sounding histogram has been produced to demonstrate the occurrence of each sounding shown on the smooth sheet with respect to the sounding column it was derived from. 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 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 H11437**

## 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 of 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 (9459450) 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** |
| 9459758 | 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 | 9459450 |
| SWA204A | 2 | +0 minutes | x1.00 | 9459450 |
| SWA205 | 3 | +6 minutes | x0.94 | 9459450 |
| SWA218 | 4 | +6 minutes | x0.91 | 9459450 |
| D1 | 5 | +0 minutes | x1.00 | 9459758 |

**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 H11437 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. 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 H11437, Sheet B 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 H11437 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 H11437 B

H11437 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 H11437 survey six dangers to navigation have been reported and are presented in Appendix I.

- Item number 1 is a possible rock in kelp, in a bay lying 180 meters offshore to the north of the north coast of Dolgoi Island and requires further investigation by boat to determine the least depth if possible.
- Item number 2 is a possible rock in a large kelp area, approximately 500 meters offshore of the south coast of Dolgoi Island and approximately 1500 meters west of Dolgoi Harbor. This feature requires further investigation by boat to determine the least depth if possible.
- Item number 3 is a rock located 300 meters southeast of the northern island of the Olga Islands and is at the entrance to Dolgoi Harbor.
- Item number 4 is a rock located in the upper reaches of Dolgoi Harbor, approximately 250 meters off the west coast of Dolgoi Harbor at the seaward extent of a tidal flat.

- Item number 5 is a rock located in the upper reaches of Dolgoi Harbor, approximately 400 meters off the east coast of Dolgoi Harbor. A tidal flat exists immediately inshore of this feature, consisting of many drying rocks and islets.
- Item number 6 is a drying rock located approximately 500 meters off the east coast of Dolgoi Harbor and approximately 250 meters south west of 2 islets.

### *D.1.2 Charted Depths and Features*

Source data for the chart in this area was acquired between 1900 and 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 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, but mainly at the head of bays. 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 inadequately surveyed 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 53 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 H11437_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 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 8 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 | B1 | 1 | | | | -1.82 | -6 | 55° 10' 32.0403" | 161° 51' 12.8451" | Drying Rk | Y | N | Insert | Note: -6 drying rock 80m SW, -3 drying rock 60m E. |
| 2 | B2 | 2 | Rk | 55° 10' 34" | 161° 51' 00" | | | | | | N | N | Remove | Not detected by lidar. |
| 3 | B3 | 2 | Rk | 55° 10' 34" | 161° 50' 49" | 0.54 | cov 2 ft | 55° 10' 34.4601" | 161° 50' 50.7816" | Drying Rk | Y | N | Replace | |
| 4 | B4 | 2 | Rk | 55° 10' 33" | 161° 50' 42" | | | | | | Y | N | Remove | Not detected by lidar. |
| 5 | B5 | 2 | Rk | 55° 10' 32" | 161° 50' 36" | | | | | | Y | N | Remove | Not detected by lidar. |
| 6 | B6 | 2 | 8 | 55° 10' 38" | 161° 50' 17" | 2.21 | 1.2 | 55° 10' 35.3303" | 161° 50' 17.9229" | Rk | Y | Y | N/A | Possible Rk in kelp. Note: 2.5 Rk 50m N. See Danger to Navigation Report. Item 1. |
| 7 | B9 | 2 | Rk | 55° 10' 56" | 161° 49' 35" | | | | | | N | N | Remove | Not detected by lidar. |
| 8 | B10 | 2 | Rk | 55° 10' 56" | 161° 49' 23" | | | | | | N | N | Remove | Not detected by lidar. |
| 9 | B11 | 1 | | | | -3.69 | (6) | 55° 10' 49.1291" | 161° 49' 01.0742" | Islet | Y | N | Insert | Note: Islet 200m NW, -8 drying rock 70m NW. |
| 10 | B12 | 1 | | | | -2.13 | -7 | 55° 10' 42.218" | 161° 48' 52.5342" | Drying Rk | Y | N | Insert | Note: Many islets in vicinity. |

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.** |
| 11 | B13 | 1 | | | | -1.56 | -5 | 55° 10' 32.8432" | 161° 48' 46.3857" | Drying Rk | Y | N | Insert | |
| 12 | B14 | 1 | | | | -0.43 | -2 | 55° 10' 10.9626" | 161° 47' 30.8701" | Drying Rk | Y | Y | N/A | Possible drying rock in kelp. Note: 1.3 Rk 120m NW. |
| 13 | B15 | 1 | | | | 11.66 | 6.4 | 55° 10' 17.8788" | 161° 46' 59.5605" | Rk | N | Y | N/A | Possible seabed feature. |
| 14 | B16 | 1 | | | | -1.77 | -6 | 55° 10' 8.777" | 161° 46' 55.8688" | Drying Rk | Y | N | Insert | Note: Islet 40m SW. |
| 15 | B17 | 1 | | | | -2.60 | (3) | 55° 9' 56.2919" | 161° 45' 31.9503" | Islet | Y | N | Insert | Note: 6.8 Rk 160m E. |
| 16 | B18 | 1 | | | | 1.44 | 0.8 | 55° 9' 41.4282" | 161° 45' 16.3808" | Rk | Y | Y | N/A | Possible Rk in kelp. |
| 17 | B19 | 1 | | | | -1.00 | -3 | 55° 9' 34.0115" | 161° 45' 08.7242" | Drying Rk | Y | N | Insert | Note: 1.0 Rk 105m N |
| 18 | B20 | 1 | | | | 0.62 | cov 2 ft | 55° 9' 34.7523" | 161° 44' 59.2405" | Drying Rk | Y | N | Insert | |
| 19 | B21 | 2 | Drying Rk | 55° 9' 32" | 161° 44' 57" | | | | | Drying Shelf | Y | N | Remove | Charted drying rock surveyed as drying shelf. |
| 20 | B22 | 2 | Drying Rk | 55° 9' 27" | 161° 44' 48" | | | | | Drying Shelf | Y | N | Remove | Charted drying rock surveyed as drying shelf. Note: Charted drying rock 135m ENE surveyed as drying shelf. |

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 | B23 | 1 | | | | -0.81 | -3 | 55° 7' 12.0721" | 161° 50' 48.9193" | Drying Rk | Y | N | Insert | Note: -2 drying rock 35m N. |
| 22 | B24 | 2 | Drying Rk | 55° 7' 16" | 161° 50' 48" | | | | | Drying Shelf | Y | N | Remove | Charted drying rock surveyed as drying shelf. Note: Many charted drying rocks to N surveyed as drying shelf. |
| 23 | B25 | 1 | | | | 12.90 | 7.0 | 55° 7' 2.1875" | 161° 50' 58.8520" | Rk | Y | Y | N/A | Possible Rk in kelp. |
| 24 | B26 | 1 | | | | 4.10 | 2.2 | 55° 7' 7.1634" | 161° 50' 40.1616" | Rk | Y | Y | N/A | Possible Rk in kelp. |
| 25 | B27 | 2 | $6^1/_2$ | 55° 6' 50" | 161° 50' 23" | 8.96 | 4.9 | 55° 6' 51.827" | 161° 50' 22.0556" | Slope | N | N | Remove | |
| 26 | B28 | 1 | | | | -0.28 | -1 | 55° 6' 59.9656" | 161° 50' 8.3986" | Drying Rk | Y | N | Insert | |
| 27 | B29 | 1 | | | | -0.84 | -3 | 55° 6' 57.9365" | 161° 49' 55.4937" | Drying Rk | Y | N | Insert | Note: -8 drying rock 110m ESE. |
| 28 | B30 | 1 | | | | -1.68 | -6 | 55° 6' 52.3117" | 161° 49' 48.7071" | Drying Rk | Y | N | Insert | |
| 29 | B31 | 1 | | | | 6.63 | 3.6 | 55° 6' 44.7706" | 161° 50' 04.9069" | Rk | Y | Y | N/A | Possible Rk in kelp. See Danger to Navigation Report. Item 2. |
| 30 | B32 | 1 | | | | 7.44 | 4.0 | 55° 6' 42.2873" | 161° 50' 06.6085" | Rk | Y | Y | N/A | Possible Rk in kelp. |

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.** |
| 31 | B33 | 1 | | | | -1.92 | -6 | 55° 6' 49.7762" | 161° 49' 27.1958" | Drying Rk | N | N | Insert | |
| 32 | B34 | 1 | | | | -0.78 | -3 | 55° 6' 42.1966" | 161° 49' 14.1999" | Drying Rk | Y | N | Insert | Note: Charted -9 drying rock 85m W confirmed, many drying rocks in vicinity. |
| 33 | B35 | 1 | | | | 1.00 | 0.5 | 55° 6' 55.3659" | 161° 48' 24.0949" | Rk | N | N | Insert | Note: Charted -6 drying rock 210m S confirmed. |
| 34 | B36 | 1 | | | | -0.84 | -3 | 55° 7' 0.4516" | 161° 48' 26.622" | Drying Rk | N | N | Insert | Note: Many charted drying rocks to N confirmed. |
| 35 | B37 | 1 | | | | 4.02 | 2.2 | 55° 7' 9.1018" | 161° 48' 02.7253" | Rk | N | N | Insert | Note: 2.2 Rk 220m NE. |
| 36 | B39 | 1 | | | | 8.46 | 4.6 | 55° 6' 53.1108" | 161° 47' 15.3075" | Rk | N | N | Insert | See Danger to Navigation Report. Item 3. |
| 37 | B40 | 1 | | | | 1.59 | 0.8 | 55° 8' 37.2684" | 161° 47' 16.2335" | Rk | N | N | Insert | Note: -0 drying rock 170m NNW. Seaward edge of ledge. See Danger to Navigation Report. Item 4. |
| 38 | B41 | 2 | $2^1/_4$ | 55° 9' 29" | 161° 47' 43" | 2.59 | 1.4 | 55° 9' 29.4691" | 161° 47' 40.6134" | Slope | N | N | Remove | |

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.** |
| 39 | B42 | 2 | Islet | 55° 9' 26" | 161° 46' 58" | | | | | Drying Shelf | N | N | Remove | Not detected by lidar, not observed in downward looking video. Note: Many charted islets in vicinity surveyed as drying shelf. |
| 40 | B43 | 1 | | | | -0.91 | -3 | 55° 9' 10.0471" | 161° 46' 41.8659" | Drying Rk | N | N | Insert | Note: 2 charted islets to E confirmed. |
| 41 | B44 | 2 | Islet | 55° 8' 58" | 161° 46' 29" | -1.09 | -4 | 55° 8' 57.4459" | 161° 46' 30.4618" | Drying Rk | N | N | Replace | Note: Many charted islets in vicinity confirmed, many drying rocks in vicinity. |
| 42 | B45 | 1 | | | | 1.02 | 0.5 | 55° 8' 52.9629" | 161° 46' 26.5209" | Rk | N | N | Insert | Note: 0.9 Rk 90m ESE, 1.4 Rk 130m SE. |
| 43 | B46 | 1 | | | | 3.18 | 1.7 | 55° 8' 46.5395" | 161° 46' 18.4628" | Rk | N | N | Insert | See Danger to Navigation Report. Item 5. |
| 44 | B47 | 1 | | | | -0.01 | -0 | 55° 8' 50.3556" | 161° 46' 06.6968" | Drying Rk | N | N | Insert | Note: Charted islet 120m NW confirmed. |
| 45 | B48 | 1 | | | | -0.13 | -1 | 55° 8' 2.8596" | 161° 46' 01.7778" | Drying Rk | N | N | Insert | |
| 46 | B49 | 1 | | | | -0.09 | -0 | 55° 7' 50.1786" | 161° 45' 58.9062" | 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.** |
| 47 | B50 | 1 | | | | 2.01 | 1.1 | 55° 7' 38.2512" | 161° 46' 06.7539" | Rk | N | N | Insert | Note: 2 charted islets to E confirmed. |
| 48 | B51 | 1 | | | | 0.76 | cov 2 ft | 55° 7' 29.6588" | 161° 46' 12.4634" | Drying Rk | N | N | Insert | Note: 0.9 Rk 65m N, 0.6 Rk 75m E, 3.2 Rk 135m NW. See Danger to Navigation Report. Item 6. |
| 49 | B52 | 1 | | | | -2.03 | -7 | 55° 7' 12.0143" | 161° 45' 50.1571" | Drying Rk | N | N | Insert | Note: Charted islet 60m S confirmed. |
| 50 | B53 | 1 | | | | 0.99 | 0.5 | 55° 7' 4.1659" | 161° 45' 56.4213" | Rk | N | N | Insert | |
| 51 | B54 | 1 | | | | -4.51 | (9) | 55° 7' 8.7297" | 161° 47' 31.3830" | Islet | N | N | Insert | Note: Charted -3 drying rock 65m N confirmed. |
| 52 | B55 | 2 | Islet | 55° 8' 58" | 161° 46' 15" | -1.21 | -4 | 55° 8' 57.4231" | 161° 46' 19.3058" | Drying Rk | N | N | Replace | Note: Charted islet 150m NNE confirmed, many drying rocks in vicinity. |
| 53 | B56 | 1 | | | | -3.33 | (5) | 55° 9' 5.8109" | 161° 46' 30.8658" | Islet | N | N | Insert | |

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

### *D.1.6 Features Requiring Investigation and Gaps in the Data*

#### *D.1.6.1 Gaps in the Data*

The ground system supports interactive tagging of soundings by the operators using S-57 compliant and user-defined tags. These tags have been used to identify gaps in the data due to environmental conditions. For this smooth sheet the following tags were used:

- GT – gap in the data due to turbidity.

Gaps due to turbidity exist at the following locations:

| Latitude (N) | Longitude (W) | Easting (m) | Northing (m) | Dimension (m) | Significance |
|---|---|---|---|---|---|
| 55° 09' 14.9" | 161° 47' 57.2" | 321 650 | 6 115 520 | 20x20 | 300m offshore |
| 55° 09' 25.8" | 161° 47' 10.3" | 322 492 | 6 115 825 | Many small gaps | 350m offshore |
| 55° 06' 41.8" | 161° 48' 24.3" | 320 980 | 6 110 808 | Many small gaps | 350m offshore |

A large area of sparse data due to turbidity exists in the vicinity of the following location:
55° 08’ 48”’ N, 161° 46’ 48” W

- GS – gap in the data due to the secondary exclusion zone.

This gap occurs at the land / sea interface where the waveform return from the seabed is mixed with the waveform return from the sea surface. Neither the seabed nor a drying sounding can be determined, so a gap exists in a shallow area. In most cases these areas occur at the MLLW line adjacent to the coast. However, due to the tidal flats, some of these gaps may be significant and have been tabulated at the following locations:

| Latitude (N) | Longitude (W) | Easting (m) | Northing (m) | Dimension (m) | Significance |
|---|---|---|---|---|---|
| 55° 07' 46.8" | 161° 45' 24.7" | 324 240 | 6 112 690 | 50x450 | 50m offshore |
| 55° 07' 50.8" | 161° 45' 42.7" | 323 926 | 6 112 828 | 10x10 | 100m offshore |
| 55° 07' 37.5" | 161° 45' 48.9" | 323 800 | 6 112 420 | 10x10 | 50m offshore |

- KELPA – gap due to kelp.

This tag has been used to identify kelp areas for the production of the smooth sheet.

#### *D.1.6.2 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

(H11437_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.

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 ship junctioning 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 that 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 and features verification process, a group of soundings suspected to be fish or whale strikes were identified. This area has been identified as features FB05 and FB06, which have been assigned a category of “DS” relating to a doubtful sounding. This area should be examined by vessel to verify that no shoal exists.

| Sequence No. | Feature No. | Kelp Description Category | NAD 83 Latitude (N) (deg min sec.dd) | NAD 83 Longitude (W) (deg min sec.dd) | Eastings (m) | Northings (m) | Line No. | F/R/C | Dimension (m) | Description | Significance and Chart Comparison Relationship |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | FB01 | 4 | 55° 06' 44.01" | 161° 50' 05.17" | 319196 | 6110950 | 620.0.1.2 | 129/14/25 | 50x30 | Offshore kelp area with possible rocks | 500m S of south coast of Dolgoi Island<br>See B31 and B32 |
| 2 | FB02 | 4 | 55° 07' 02.18" | 161° 50' 58.85" | 318268 | 6111550 | 1352.0.1.1 | 78/16/29 | 15x20 | Offshore kelp area, possible rocks | 500m SW of south coast of Dolgoi Island<br>See B25 |
| 3 | FB03 | Rk | 55° 10' 35.13" | 161° 50' 46.51" | 318753 | 6118121 | 1373.0.1.1 | 61/16/7 | N/A | Possible Rk in kelp, offshore | 150m N of north coast of Dolgoi Island |
| 4 | FB04 | 4 | 55° 10' 35.35" | 161° 50' 17.91" | 319261 | 6118107 | 1554.0.1.5 | 124/1/40 | 20x20 | Possible Rk in kelp area | 180m N of north coast of Dolgoi Island<br>See B6 and Danger to Navigation Report Item 1 |
| 5 | FB05 | DS | 55° 11' 03.73" | 161° 49' 44.30" | 319891 | 6118960 | 1406.0.1.2 | 127/12/11 | N/A | Doubtful sounding, possible whale | 400m N of north coast of Dolgoi Island |
| 6 | FB06 | DS | 55° 11' 05.43" | 161° 49' 40.86” | 319954 | 6119010 | 1407.0.1.1 | 26/3/18 | N/A | Doubtful sounding, possible whale | 400m N of north coast of Dolgoi Island |

### *D.1.7 Aids to Navigation*

No Aids to Navigation were seen or detected in the survey area for H11437.

### *D.1.8 Recommended Overlap With Lidar Data*

The smooth sheet H11437 consists of a portion of the north coast of Dolgoi Island, Dolgoi Harbor and a small portion of the south coast of Dolgoi Island. In general, good coverage to 10–12 fathoms exists along the rugged exposed coastlines located on the north and south sides of Dolgoi Island. In Dolgoi Harbor the coastline is more regular; however, the water clarity deteriorates towards the upper reaches of the harbor. In general, good coverage exists to 5 fathoms in the south of the harbor and there is good coverage to 3 fathoms in places in the upper reaches of the harbor. Gaps due to turbidity and secondary exclusion zone do exist and have been tabulated in section D.1.6.

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 (H11437_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 H11437 is seaward of the poly-lines described as follows:

a) Poly-line H11437_1

This poly-line covers a portion of the north coast of Dolgoi Island from 55° 10.6’ N, 161° 51.3’ W to 55° 09.8’ N, 161° 44.5’ W. Good coverage exists to 10-12 fathoms, with sparse data to 14 fathoms. Very good consistent coverage exists on the bays. Coastal kelp areas exist, for the most part of the coastline, in general between the 1fm and 2fm contours. The recommended overlap is depicted by the poly-line. In addition, local areas of sparse coverage exist as follows:

- Kelp area at 55° 10.55’ N, 161° 51.1’ W
- Kelp area at 55° 10.55’ N, 161° 50.9’ W
- Kelp area at 55° 10.5’ N, 161° 50.6’ W
- Seaward of 2.5Rk at 55° 10.6’ N, 161° 50.3’ W
- Coastal kelp between 1fm and 2fm contour from 55° 10.65’ N, 161° 49.9’ W to 55° 10.45’N, 161° 48.4’ W
- Coastal kelp area at 55° 10.25’ N, 161° 47.8’ W

- Coastal kelp between 1fm and 3fm contour from 55° 10.15’ N, 161° 46.3’ W to 55° 09.5’N, 161° 44.6’ W

A shoal area with good coverage exists to seaward of the poly-line at 55° 10.7’ N, 161° 46.4’ W.

b) Poly-line H11437_2

This poly-line covers Dolgoi Harbor. Good coverage exists to 5 fathoms at the entrance to the harbor. Towards the north of the harbor the water clarity deteriorates and good coverage was achieved to 3 fathoms. In all cases good coverage exists from the extent of lidar coverage, through the land / sea interface and through to the topographic data set. Many shallow tidal flats have been sounded by lidar throughout Dolgoi Harbor. The recommended overlap is depicted by the poly-line. In addition, local areas of sparse coverage exist as follows:

- Turbid area at 55° 07.9’ N, 161° 48.2’ W
- Shallowest limit of hydrography from 55° 07.5’ N, 161° 47.7’ W to 55° 07.9’ N, 161° 47.6’ W
- Shallowest limit of hydrography at 55° 08.6’ N, 161° 47.2’ W
- Turbid area at 55° 09.25’ N, 161° 47.9’ W
- Turbid areas in the vicinity of 55° 09.4’ N, 161° 47.2’ W
- Turbid area at 55° 08.85’ N, 161° 46.6’ W
- Turbid area at 55° 08.7’ N, 161° 46.3’ W

A sparse turbid area exists in the vicinity of 55° 08.8’ N, 161° 46.8’ W. No shoals are expected in this area but due care should be taken when surveying the region.

c) Poly-line H11437_3

This poly-line covers a portion of the south coast of Dolgoi Island from 55° 07.15’ N, 161° 51.3’ W to 55° 06.7’ N, 161° 50.3’ W. A rock ledge extends approximately 0.1 - 0.2 of a mile offshore. Seaward of the rock ledge, large coastal kelp areas are present, resulting in sparse data. Good coverage exists from 3 fathoms to 9 fathoms with sparse data to 12 fathoms. The recommended overlap is depicted by the poly-line. In addition, local areas of sparse coverage exist as follows:

- Kelp area at 55° 07.2’ N, 161° 51.2’ W
- Around 7.0Rk at 55° 07.05 N, 161° 51.0’ W
- Around 3.5Rk and kelp area at 55° 06.7 N, 161° 50.1’ W

# E. APPROVAL SHEET

## 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 – H11437 | March 13, 2007 |

Mark Sinclair
Hydrographer
Tenix LADS Incorporated

Date 7/13/2007

**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 H11901, H11902 and H11903. 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

### I.1.1. Danger to Navigation Report

Hydrographic Survey Registry Number: H11437

State: Alaska

Locality: Pavlof Islands and Vicinity, AK

Sub-locality: Dolgoi Harbor

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 | 1.2 | 55° 10' 35.33” | 161° 50' 17.92" | Recommend further investigation by boat |
| 2 | Rk in Kelp | 3.6 | 55° 06' 44.77" | 161° 50' 04.91" | Recommend further investigation by boat |
| 3 | Rk | 4.6 | 55° 06' 53.11" | 161° 47' 15.31" | |
| 4 | Rk | 0.8 | 55° 08' 37.27" | 161° 47' 16.23" | |
| 5 | Rk | 1.7 | 55° 08' 46.54" | 161° 46' 18.46" | |
| 6 | Drying Rk | Cov 2ft | 55° 07' 29.66" | 161° 46' 12.46" | |

**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

## I.1.2. Danger to Navigation Report

**Hydrographic Survey Registry Number**: **H11437**

**Survey Title:** **State:** **Alaska**
**Locality:** **Pavlof Islands and Vicinity, AK**
**Sub-Locality:** **Dolgoi Harbor**

**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 | Latitude (N) | Longitude (W) |
|---|---|---|---|
| Rk | 1 fm 1 ft | 55° 10' 35.33" | 161° 50' 17.92" |
| Rk | 3 fm 3 ft | 55° 06' 44.77" | 161° 50' 04.91" |
| Rk | 4 fm 3 ft | 55° 06' 53.11" | 161° 47' 15.31" |
| Rk | 0 fm 3 ft | 55° 08' 37.27" | 161° 47' 16.23" |
| Rk | 1 fm 4 ft | 55° 08' 46.54" | 161° 46' 18.46" |
| Rk | cov 2ft | 55° 07' 29.66" | 161° 46' 12.46" |
| Sounding | 3 fm | 55° 06' 42.03" | 161° 47' 40.12" |

**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.

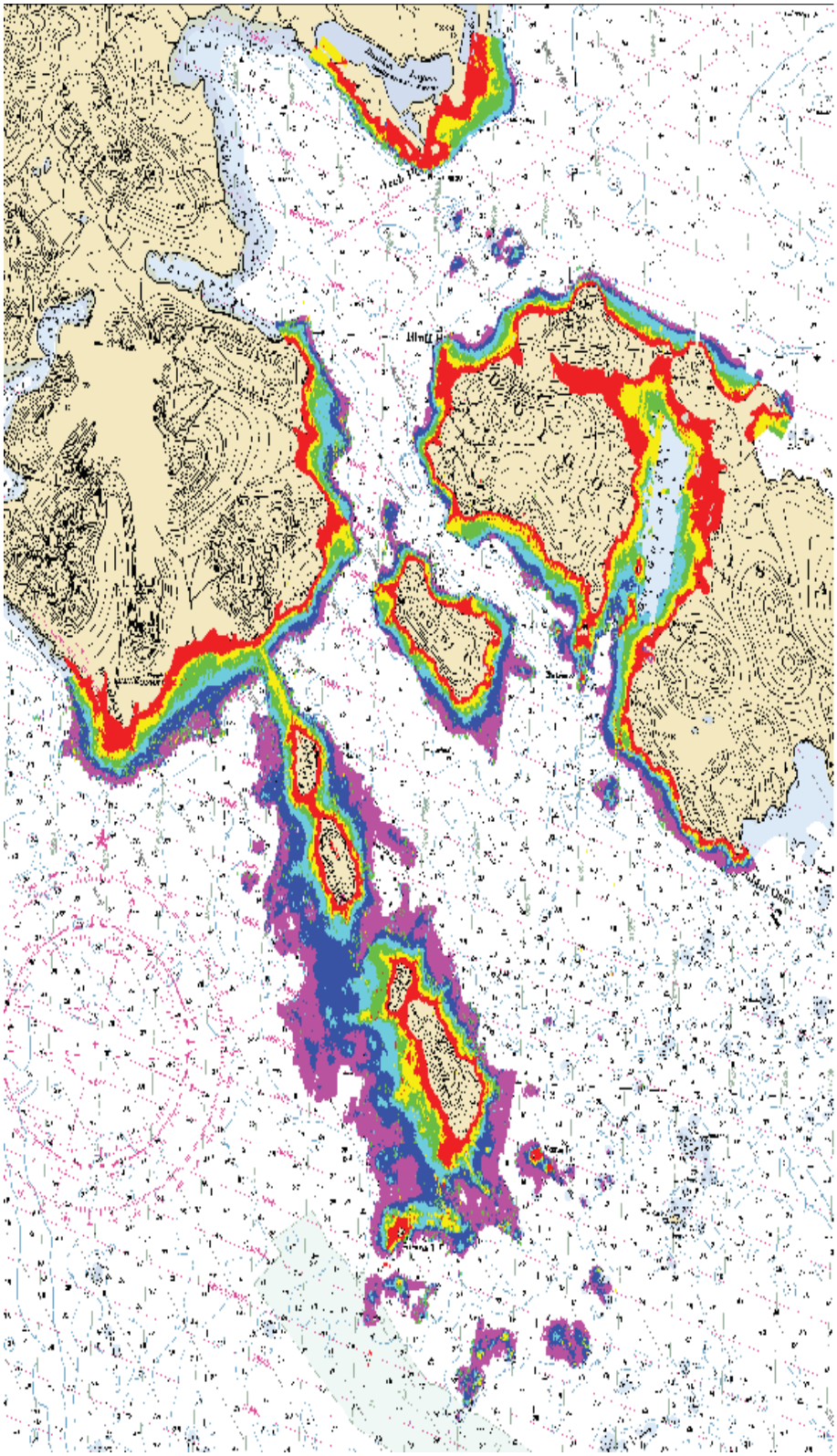
## APPENDIX III – PROGRESS SKETCH

# 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 :
> 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.

-----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

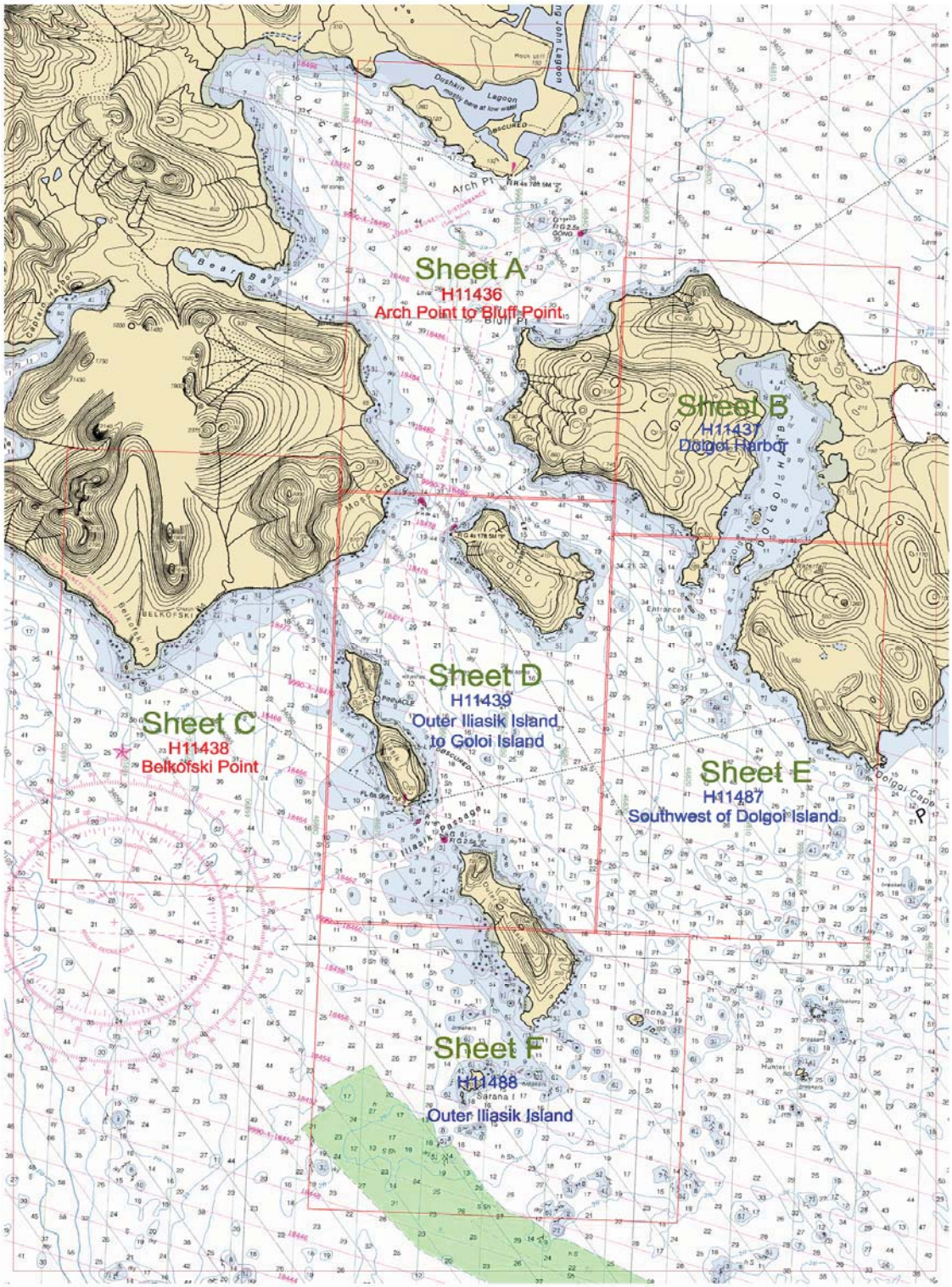
Darren,

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,
> 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.
>
>

# APPENDIX VI – AWOIS

No AWOIS were assigned to this task order.

APPROVAL SHEET
H11437

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
2010.08.24
14:07:31 -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
14:46:57 -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
14:45:15 -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 06:08:25 -04'00'