W00035

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey HYDROGRAPHIC

Field No.

Registry No. W00035

LOCALITY

State Alaska

General Locality SW Baranof Island

Sublocality Cape Ommaney

2001

CHIEF OF PARTY

William Gilmour

LIBRARY & ARCHIVES

DATE

NOAA FORM 77-28
(11-72)

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

REGISTER NO.

HYDROGRAPHIC TITLE SHEET

W00035

INSTRUCTIONS The hydrographic sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the office.

FIELD NO.

State **Alaska**

General Locality **SW Baranof Island**

Sublocality **Cape Ommaney**

Scale **1:10,000** Date of Survey **05/24/01-05/28/01**

Instructions Dated _____ Project No. _____

Vessel **R/V DAVIDSON**

Chief of Party **William Gilmour**

Surveyed by **Thales GeoSolutions**

Soundings taken by echo sounder, hand lead, pole **Reson 8111**

Graphic record scaled by **Thales GeoSolutions**

Graphic record checked by **Thales GeoSolutions**

Evaluation by **S. Allen** Automated plot by **HP Design Jet 1050C**

Verification by **R. Shipley**

Soundings in **Meters** at **MLLW**

REMARKS: **All times are UTC.**

Revisions and annotations appearing as endnotes were generated during office processing.

All seperates are filed with the hydrographic data.

As a result, page numbering may be interrupted or non-sequential.

All depths listed in this report are referenced to MLLW unless otherwise noted. UTM Projection (zone 8).

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF COAST SURVEY
Pacific Hydrographic Branch
Seattle, Washington 98115-6349

February 11, 2009

MEMORANDUM TO: Captain John E. Lowell, NOAA
Chief, Marine Chart Division

THROUGH: Jeffrey Ferguson
Chief, Hydrographic Surveys Division

FROM: Gary C. Nelson
Cartographic Team Leader
Pacific Hydrographic Branch

Gary C. Nelson
2009.02.11
14:32:57 -08'00'

SUBJECT: Approval Memorandum for W00035
Alaska, SW Baranof Island
Cape Ommaney

The Pacific Hydrographic Branch has completed evaluation and chart application of Outside Source Data survey W00035. This survey was conducted for the Alaska Department of Fish and Game by Thales Geosolutions (Pacific) Inc. in 2001. I have reviewed the data, reports and compilation to the chart. Data are suitable for nautical charting except where specifically recommended in the Evaluation and Quality Assurance Memorandum and Chart Application Memorandum.

Within the 2008 NOAA Hydrographic Survey Priorities (NHSP), the area in the vicinity of the Cape Ommaney is listed as "Priority 5". Some small portions of an adjoin "Priority 1" area may have been covered by W00035 but due to the incomplete coverage in the Priority "1" area and quality issues it is recommended the area remain as "Priority 1".

Further, it is recommended the survey area should be classified as Category of Zone of Confidence (CATZOC) "B" if used to update ENC survey area classification.

cc: Chief, HSD Operations Branch N/CS31

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF COAST SURVEY
Pacific Hydrographic Branch
Seattle, Washington 98115-6349

September 30, 2007

MEMORANDUM TO: Commander David O. Neander, NOAA
Chief, Pacific Hydrographic Branch

FROM: LT John J. Lomnicky, NOAA
Benthic Mapping Specialist

Gary C. Nelson
For Lt. Lomnicky
2009.02.11 14:34:14
-08'00'

SUBJECT: Review of Outside Source Data Survey W00035
Thales GeoSolutions (Pacific), Inc./Alaska Dept. of Fish and Game/National Marine Fisheries Service
Fishery Habitat Mapping

I have reviewed outside source hydrographic survey W00035 with regard to data integrity and completeness of the data submission package, survey field procedures, data processing and quality assurance methods, and overall data accuracy and data quality. Survey W00035 exhibits the following deficiencies with regards to the specifications and requirements set forth in the NOS Hydrographic Surveys Specifications and Deliverables Manual (HSSDM):

- The hydrographer did not install a tide gauge within the survey area. Tides were based on a NOAA primary tide gauge outside of the survey area. Errors associated with incomplete tidal information have not been noted in the data.
- Due to the age of the survey, error models have not been supplied.

Special attention should be given to the following:

- For recommendations in specific areas, refer to the Hydrographic Survey Outside Source Data Quality Assurance Checklist for this survey.

Final Recommendations:

- The data should be used to chart soundings and depth curves representing general bathymetric trends, and update shoals that are not adequately depicted on NOAA charts. Data should be charted in areas where W00035 found shoaler soundings than the chart. For safety, charted shoal sounding in near shore areas should not be removed from the charts.
- Although MBES data in this survey may meet higher requirements, the survey area should be classified as Category of Zone of Confidence (CATZOC) “B” if used to update ENC survey area classification.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE OFFICE OF COAST SURVEY
Pacific Hydrographic Branch Seattle, Washington
98115-6349
February 4, 2009

MEMORANDUM TO: Commander Dave O. Neander
Chief, Pacific Hydrographic Branch

FROM: Rick Shipley
Cartographer, Pacific Hydrographic Branch

Digitally signed by Rick Shipley
Date: 2009.02.11 13:50:50 -08'00'

SUBJECT: Application of Outside Source Data Survey W00035
Thales / National Marine Fisheries Service
Multibeam Echosounder Survey in the Vicinity of
SW Baranof Island, Alaska

I concur with all recommendations by the reviewer Shyla Allen except where noted in their reports.

Summary of compilation:

- -soundings, curves and features applied
- -no rocks, shoals were superseded
- -shoreline was retained as charted
- -bottom characteristics were retained
- -no aids to navigation survey area
- -no additional Dangers to Navigation were found during compilation

It is recommended that OSD survey W00035 supersede charted information within the common area and applied to charts 17320 and 17330.

Record of Application to Charts is attached.

Review and Approved Gary C. Nelson
Gary C. Nelson
2009.02.11 14:35:27 -08'00'

Gary Nelson, Cartographer Team Leader
Pacific Hydrographic Branch

ALASKA DEPARTMENT OF FISH AND GAME AND NATIONAL MARINE FISHERIES SERVICE

FISHERY HABITAT MAPPING

DESCRIPTIVE REPORT

Thales Document No: TGP-2251-RPT-01-00

Applicable to:	**Thales GeoSolutions (Pacific), Inc.**
Controlled by:	**Survey Manager** **Thales GeoSolutions (Pacific), Inc.** **3738 Ruffin Road** **San Diego, CA 92123**
Telephone:	**(858) 292-8922**
Facsimile:	**(858) 292-5308**

REPORT CERTIFICATION
FOR

ALASKA DEPARTMENT
OF FISH AND GAME
AND
NATIONAL MARINE
FISHERIES SERVICE

FISHERY HABITAT MAPPING
2251

This issue of the report has been approved by:

1.	Project Manager	Robert Pawlowski	_____
2.	Survey Manager	William Gilmour	_____

This report has been distributed to:

1.	Alaska Department of Fish & Game	1 Copy
2.	Moss Landing Marine Laboratories	1 Copy
3.	National Marine Fisheries Service	1 Copy
4.	Thales GeoSolutions (Pacific), Inc.	1 Copy

The following versions of this report have been issued:

0	04/10/01	Fishery Habitat Mapping	TG / DA	WG	RP
REV	DATE	DESCRIPTION	APPROVED		

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1. Acquisition and Processing Logs
2. Sound Velocity Profile Data
3. Crossline Comparisons
4. Miscellaneous Logs
5. Charts, Plots, and Graphics

1. AREA SURVEYED

Thales GeoSolutions (Pacific), Inc. was contracted by the Alaska Department of Fish and Game and National Marine Fisheries Service to perform a detailed multibeam echosounder survey at Cape Ommaney under contract number IHP-01-091. The survey required digital, high-resolution multibeam bathymetry along with calibrated backscatter in the area.

The Cape Ommaney site was located off the coast of Baranof Island, in Southeast Alaska. The site comprised of 275 square kilometers, in water depths of approximately 30 to 300 meters. Hydrographic data collection began on May 24, 2001 and ended on May 28, 2001.

The Cape Ommaney site is bounded by the coordinate listing below:

Table 1-1 Cape Ommaney Survey Limits

Point	Latitude	Longitude
1	56.270766 N	135.100503 W
2	56.196155 N	134.714504 W
3	56.181269 N	134.718126 W
4	56.170700 N	134.709844 W
5	56.163829 N	134.692089 W
6	56.158201 N	134.689894 W
7	56.150324 N	134.653869 W
8	56.126619 N	134.662745 W
9	56.126841 N	134.756939 W
10	56.152280 N	134.889477 W
11	56.120900 N	134.907499 W
12	56.167216 N	135.143565 W
13	56.225264 N	135.098585 W
14	56.230623 N	135.126066 W

The following diagram illustrates the extents of the Cape Ommaney survey:

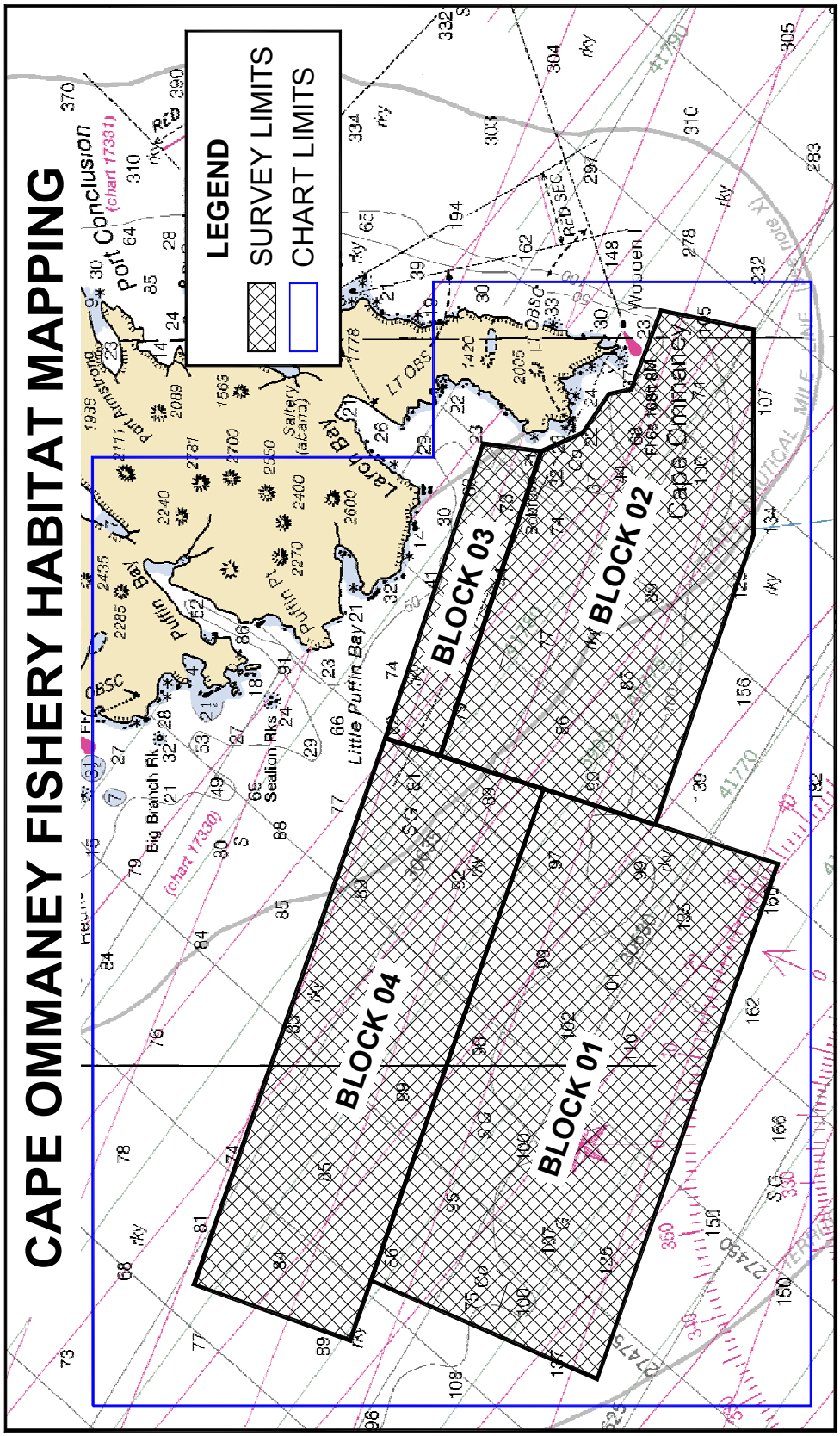


Figure 1-1 Cape Ommaney Survey Extents

2. DATA ACQUISITION & PROCESSING

Refer to the TGP-2251-RPT-01-00 Data Acquisition and Processing Report for a detailed description of all equipment, survey vessels, processing procedures and quality control features. Items specific to this survey and any deviations from the Data Acquisition and Processing Report are discussed in the following sections.

2.1. EQUIPMENT & VESSELS

The R/V Davidson acquired all sounding data at Cape Ommaney. The Davidson, which is 153 feet in length with a draft of 17.75 feet, was equipped with a Reson 8150 and 8111 for medium to deep-water multibeam data acquisition. For the Cape Ommaney survey, multibeam data was acquired exclusively with the Reson SeaBat 8111 (Processor SN 23279 and Transducer Array SN Transmit 0100050/Receive 0700016) with option 033 (pseudo side scan). Vessel heading and attitude were measured using a TSS Heading and Dynamic Motion Sensor (HDMS, IMU SN 049, Processor SN 013) for the survey of Block 1. Vessel heading and attitude were measured using a SG Brown Meridian Surveyor Gyrocompass (SN 2165) and TSS Dynamic Motion Sensor DMS2-05 (SN 004104), respectively, for Block 2, Block 3, and Block 4. XTF files were logged in Winfrog Multibeam V 3.23 05/18/01. The multibeam computer was equipped with a twelve channel NovAtel GPS receiver card; that output a WGS84 geographical position and a One Pulse Per Second (1 PPS) timing stamp. The Davidson was also equipped with a Sea-Bird CTD (SBE 19 Plus SN 290) for sound velocity profiles.

Refer to TGP-2251-RPT-01-00 Data Acquisition & Processing Report for a complete listing of equipment and vessel descriptions.

2.2. QUALITY CONTROL

2.2.1. Crosslines

The Cape Ommaney survey area was subdivided into four blocks to ease survey operations. Quality control tie lines were planned to measure 5 percent of the main scheme line length. A total of 4 tie lines were surveyed across the blocks, with a total cross line length of 42.7 km (23.1 nautical miles) or 6.3 percent of the total main scheme miles. A total of 20 tie line crossings were examined using the CARIS HIPS Q/C report. The majority of QC tie lines passed the specified vertical accuracy of IHO Order 1 hydrographic surveys, at the 95 percent confidence level. A listing of those cross lines that did not pass at the 95 percent confidence level is given in the following table:

Table 2-1 CARIS QC Failed Beams

CARIS QC FILE	TIE LINE	SURVEY LINE	# OF FAILED BEAMS
co_qc001	CO-01_04-TIE01A	CO-01-00800	1
co_qc006	CO-01_04-TIE02	CO-01-01400	2
co_qc007	CO-02_03-TIE01	CO-02-06040	3
co_qc008	CO-02_03-TIE01	CO-02-05030	11
co_qc009	CO-02_03-TIE01	CO-02-03270	1
co_qc011	CO-02_03-TIE02	CO-02-00050	1
co_qc013	CO-02_03-TIE02	CO-02-04400	4
co_qc018	CO-01_04-TIE01	CO-04-04370	3

The individual QC Reports can be viewed in Separate 3.

Note: The QC reports were generated based on the given accuracy specification of:

$$\pm\sqrt{[a^2 + (b * d)^2}$$

Where:

a = 0.5,

b = 0.013 and,

d = depth.

However, since a variance of a difference, rather than a variance from a mean is being used, the a and b values defined in the makehist.cla file within CARIS will use:

$$a = 0.5 * \sqrt{2} = 0.707$$
$$b = 0.013 * \sqrt{2} = 0.018$$

2.2.2. Data Quality

Throughout the survey at Cape Ommaney, the quality of acquired backscatter data was generally good. However, there were noticeable errors in the acquired multibeam data, where all vessel attitude data obtained with the TSS DMS2-05 during the Cape Ommaney survey contained minor inconsistencies.

The behavioral characteristics of the TSS DMS2-05 were then compared to those of the TSS HDMS, once the HDMS unit was refitted. During comparisons, it was noticed that there were distinct differences between the two motion reference units' mannerisms. From the comparisons, conversion variables were calculated, allowing the DMS2-05 data to emulate those obtained with the HDMS. Subsequently, the

DMS2-05 attitude data collected at Cape Ommaney was then reprocessed using the calculated conversion factors. The precision of the conversions and consequently the reprocessed multibeam data is evident when viewing the previously mentioned QC control reports.

2.2.3. Quality Control Checks

Refer to the TGP-2251-RPT-01-00 Data Acquisition and Processing Report for the results of the multibeam patch tests conducted prior to the survey at Cape Ommaney.

Positioning system confidence checks were conducted on a daily basis using the graphics interface of the acquisition computer. Winfrog Multibeam (WFMB) had built in QC windows, were the positioning data were displayed and monitored in real-time. The graphics window was configured to show the navigation information in plan view. This includes vessel position, survey lines, background plots and charts. The vehicle window can be configured to show any tabular navigation information required. Typically, this window displays: position, time, line name, heading, HDOP, speed over ground, distance to start of line, distance to end of line and distance off line. The Calculation window is used to look at specific data items in tabular or graphical format. On-line operators look here to view 1 PPS performance, GPS satellite constellation, and positional solutions.

2.3. CORRECTIONS TO ECHO SOUNDINGS

Refer to the TGP-2251-RPT-01-00 Data Acquisition and Processing Report for a detailed description of all corrections to echo soundings.

2.4. BACKSCATTER

Processing of the backscatter data revealed an intensity problem starting at nadir and faded across the swath to the outer edges. This resulted in a dark streaked mosaic that limited interpretation of geologic features within the vicinity of nadir. While gains, filters and manipulation during processing reduced some of the problems, a clean mosaic could not be compiled at sea, requiring the mosaicked data to be manipulated further at Thales GeoSolutions (Pacific), Inc. office in San Diego.

3. HORIZONTAL & VERTICAL CONTROL

3.1. HORIZONTAL CONTROL

The horizontal control datum for this survey was the World Geodetic System of 1984 (WGS84). All positions were collected in WGS84.

Two MBX-3 differential receivers, that used U.S. Coast Guard (USCG) network of differential beacons, supplied RTCM corrections to the acquired GPS pseudorange measurements; which subsequently produced WGS84 DGPS positions.

3.2. VERTICAL CONTROL

All sounding data were reduced to MLLW using verified tidal data from one tide gauge located at Sitka, Alaska. The tide gauge at Sitka is operated and maintained by NOAA. The tidal data was downloaded at the Thales GeoSolutions (Pacific), Inc. office in San Diego and e-mailed to the R/V Davidson at the end of every Julian day.

Table 3-1 Vertical Control Station Specifications

NAME	SIN	LATITUDE	LONGITUDE	ESTABLISHED
Sitka, AK	9451600	57.051667 N	135.341667 W	19/05/38

LCMF Inc. was contracted to provide final tidal zoning for the Cape Ommaney survey area. The verified tidal data were then used to correct acquired bathymetric data.

Appendix A – Progress Sheet

A chronological list of activities occurring at Cape Ommaney for R/V Davidson is given below:

Table A-1 Cape Ommaney Progress

YEAR	JULIAN DAY	DATE	START TIME (UTC)	COMMENTS
2001	144	24/05/01	22:23	Commenced survey at Cape Ommaney
2001	145	25/05/01	17:22	Completed Block 1 survey at Cape Ommaney
2001	145	25/05/01	18:00	Operations suspended to disembark Gary Greene
2001	146	26/05/01	01:00	Resumed operations. Perform patch test
2001	146	26/05/01	02:15	Commenced survey at Cape Ommaney Block 2
2001	146	26/05/01	22:37	Completed Block 2 survey at Cape Ommaney
2001	147	27/05/01	06:32	Completed Block 3 survey at Cape Ommaney
2001	147	27/05/01	20:37	Completed Block 4 survey at Cape Ommaney
2001	148	28/05/01	01:37	Completed re-runs and tie lines. Cape Ommaney survey completed. Transit to Glacier Bay
2001	148	28/05/01	19:30	Arrived at Glacier Bay. Disembarked USGS/NPS Team

Registry No: W00035

State: Alaska

General Locality: SW Baranof Island

Sub Locality: Cape Ommaney

Dates of Survey: 05/24/2001 - 05/28/2001

OSD Supplier: Thales GeoSolutions (Pacific), Inc.

OSD Project No: TGP-2251-RPT-01-00

Reviewer: LT Jay Lomnicky **Review Date:** 09/30/2007

I. DATA INVENTORY

A. Reports

Report Type	Format	Document Title	Date
Descriptive Report or equivalent	.pdf	Fisheries Habitat Mapping	04/10/2001
Data Acquisition and Processing Report or equivalent	.pdf	Fishery Habitat mapping Data Acquisition and Processing Report	04/10/2001
Horizontal and Vertical Control Report or equivalent		none submitted	
System Certification Report or Equivalent		none submitted	
Other	.doc	W00035 (1)	8/12/2003

B. Data

Data Type	Format	Description (Raw, Processed)
Smooth Sheet Sounding Plots	none	
XYZ ASCII Files	.xyz	5m resolution .txt file
Multibeam	HDCS	Processed Caris HDCS data
Side Scan Sonar	none	
LIDAR	none	
Single Beam	none	

Data Type	Format	Description (Raw, Processed)
Detached Position Point Feature	none	
Kinematic / Static GPS	none	Differentially corrected GPS positioning applied to data, but raw data not submitted
Sound Velocity	Caris .svp file	CapeOmmaney.svp
Water Levels	Caris .tid file	Verified tides file CapeOmmaney.tid
AWOIS	none	
DtoN	none	
Shoreline	none	
Bottom Sample	none	

yes All data open correctly and without error (MBES lines, SSS lines, VBES, Crosslines, Fieldsheets, Smooth Sheets, Sessions, DTM's, BASE grids, Mosaics, and DP's).

C. Sensors

List all sensor(s) that were used to acquire data.

Sensor	Manufacturer	System	Model	Vessel / Platform
MBES	Reson	SeaBat	8111	R/V DAVIDSON
Position	NovAtel GPS			R/V DAVIDSON
Attitude	TSS (2)	HDMS		R/V DAVIDSON
Sound speed	SBE		SBE 19+	R/V DAVIDSON
Heading	SB Brown	Gyro	MeridanSurveyor	R/V DAVIDSON
Attitude	TSS (2)	DMS2-05		R/V DAVIDSON
		8111		

yes Are all sensors listed above capable of meeting NOAA HSSDM accuracy and object detection requirements? Provide information in the comments section.

II. DATA ACQUISITION AND PROCESSING

A. System Calibrations and/or Certifications

yes A sensor offset and alignment survey was conducted to NOAA HSSDM requirements

yes Offset values provided

yes Patch tests were conducted for shallow-water multibeam systems

yes Alignment bias and latency values provided

yes Draft measurements were conducted

✔ Static Draft ✔ Dynamic Draft ___ Loading

yes Draft values were provided

unknown Sensors were calibrated in accordance with manufacturer requirements and NOAA specifications

no Calibration reports were provided.

B. Sound Velocity Corrections

no (3) Sound velocity sampling regimen is in accordance with NOAA HSSDM requirements

yes Sound velocity profiles were supplied

yes All profiles appear valid

C. Water Levels

yes Water level measuring equipment and methods are consistent with NOAA equipment and methods and are capable of meeting specifications

Equipment / method used: NOAA Tide Gauge, Sitka AK

yes Tide corrector files were supplied

yes All tide correctors appear valid

yes Water level correctors applied to sounding data

___ Verified ✔ Observed ___ Predicted ___ NOAA Zoning ✔ Other zoning

no Water level error estimate provided by CO-OPS

Water level / zoning error estimate: _____

E. Survey Methodology

__yes__ The surveyor has conducted adequate quality control of horizontal positioning data

__yes__ DTM, BASE surface, and/or mosaics indicate that seafloor coverage requirements (per NOAA HSSDM) were met and no significant coverage holidays exist.

__yes__ All least depths over shoals, wrecks, rocks, obstructions, and other features have been determined

__yes__ The Hydrographer has conducted the required quantity of cross lines, or acquired sufficient redundant data, in accordance with the HSSDM, to assess internal data consistency.

F. Data Processing and Quality Control

__yes__ An adequate description of data processing and quality control methods is provided in documentation.

Processing software used: Caris HIPS and Caris HDCS (4)

yes Data processing methodology is robust enough and adequate to provide a dataset suitable for charting.

__yes__ Data have been reviewed and are cleaned appropriately with no noise, fliers, or systematic errors noted.

__yes__ Crossline agreement or redundant data overlap has been visually inspected by the hydrographer

yes Disagreements have been noted

_no (5)_ A Chart comparison was conducted by the hydrographer

_no_ Disagreements have been noted.

III. DATA QUALITY AND RESULTS

A. Internal Data Consistency

yes Full resolution data was provided in order to gauge the adequacy of cleaning and/or processing of the data.

_____ A review of the data reveals no positioning errors exceeding NOAA specifications

yes (6) Crossline agreement or redundant data overlap shows no disagreements exceeding NOAA HSSDM tolerances.

no **A**nomalous data (fliers, noise, etc) were apparent in the BASE surface, DTM, and/or selected sounding set.

no Are there any tide errors exceeding NOAA HSSDM requirements observable in the data

no Are there any observable SV errors exceeding NOAA HSSDM accuracy standards.

yes All shoals are valid (no fliers) and the proper least depth has been retained.

n/a Where multiple systems, platforms, and/or sensors were used, junctioning or overlapping data agree within NOAA HSSDM tolerance between platforms.

yes (6) Any statistical assessment of the data (e.g. BASE standard deviation, QC reports, etc) indicate that data agree within NOAA HSSDM tolerances.

B. Error Budget Analysis

no An error budget analysis was provided by the surveyor

n/a The error budget analysis indicates that data are capable of meeting NOAA HSSDM standards

n/a The evaluator concurs with the provided error budget analysis

no The evaluator has conducted an error budget analysis

n/a The error budget analysis indicates that data are capable of meeting NOAA HSSDM standards

D. Automated Wreck and Obstruction Information System (AWOIS) Items

no AWOIS Items are located within the limits of the survey.

n/a AWOIS Items can be sufficiently confirmed or disproved using data from this survey (Attach AWOIS pages to the certification memorandum.).

E. Dangers to Navigation

____no____ Dangers to Navigation (DTONs) were selected and submitted by the surveyor / data provider

____n/a____ DTONs have been verified by the office evaluator.

____no____ Additional DTONs were noted during office evaluation and submitted

F. Aids to Navigation

____no____ Aids to Navigation (ATONs) were positioned during this survey

____n/a____ New ATONS were positioned during this survey

____n/a____ Survey positions match charted positions

____n/a____ The surveyor / data provider issued DTONs or notified the USCG for any ATON discrepancies

____n/a____ ATON discrepancies were noted during office evaluation and submitted as DTONs.

G. Shoreline and Bottom Samples

____no____ The shoreline (MHW and/or MLLW lines) were included as part of this survey

____n/a____ Surveyed shoreline matches charted shoreline

____n/a____ Surveyed shoreline compares with NGS/RSD source data

____n/a____ Surveyed shoreline should be used to revise nautical charts

____no____ Shoreline features were positioned during this survey

____n/a____ Surveyed features match charted shoreline

____n/a____ Surveyed features compares with NGS/RSD source data

____n/a____ Surveyed features should be used to revise nautical charts

____no____ Bottom samples were acquired during this survey

____n/a____ Bottom sample spacing was in accordance with NOAA HSSDM requirements

____n/a____ Bottom samples should be used to update NOAA charts

IV. COMMENTS

1. Shyla Allen (former PHB PS) began a review of W00035 in 2003. Two similar versions of a preliminary report of her review of the data were completed, but not submitted. These reports contain detailed analysis of the survey methods and quality. An unedited copy of "W00035.doc" has been attached to this report for information and archival purposes.

2. The HDMS system failed and was replace by the DMS2-05. The surveyor noticed roll and pitch error due to the DMS2-05. The data was reprocessed by the surveyor using a conversion factor to account for these errors.

3. Initially, sound speed measurements were conducted every 5-6 hours. The surveyors determined that water conditions were isothermal and isohaline. The frequency of sound velocity casts was reduced to 6-10 hour intervals, dependent on water depth and survey area.

4. Software versions and applied hotfixes available in DAPR. Several HIPS Fieldsheets exist within the project folder. For QC, only the Filedsheet entitled "Cape Ommaney" was used.

5. Chart comparison completed at PHB

6. Caris QC reports have been provided. Failed beams have been noted. Overall, the quality of the data is high.

V. CHART COMPARISON

Affected charts

Chart	Scale	Edition	Date

see attached pages

Smooth Sheet Soundings

Reported Obstructions

Charted Features

New Features

Outside Source Data Evaluation
Survey W00035

Data Acquired by:
Alaska Department of Fish and Game
and
National Marine Fisheries Service
Surveyed by: Thales GeoSolutions (Pacific), Inc.
Cape Ommaney, AK
May 2001

A. GENERAL INFORMATION

A.1 Background

This survey was conducted by Thales GeoSolutions (Pacific), Inc. for the Alaska Department of Fish and Game and the National Marine Fisheries Service. The purpose of the survey was to collect high resolution multibeam bathymetry of Cape Ommaney along with calibrated backscatter data.

A.2 Area Surveyed

Cape Ommaney is located off the Southwest coast of Baranof Island, in Southeast Alaska. See *Figure 1* for graphic of survey limits.

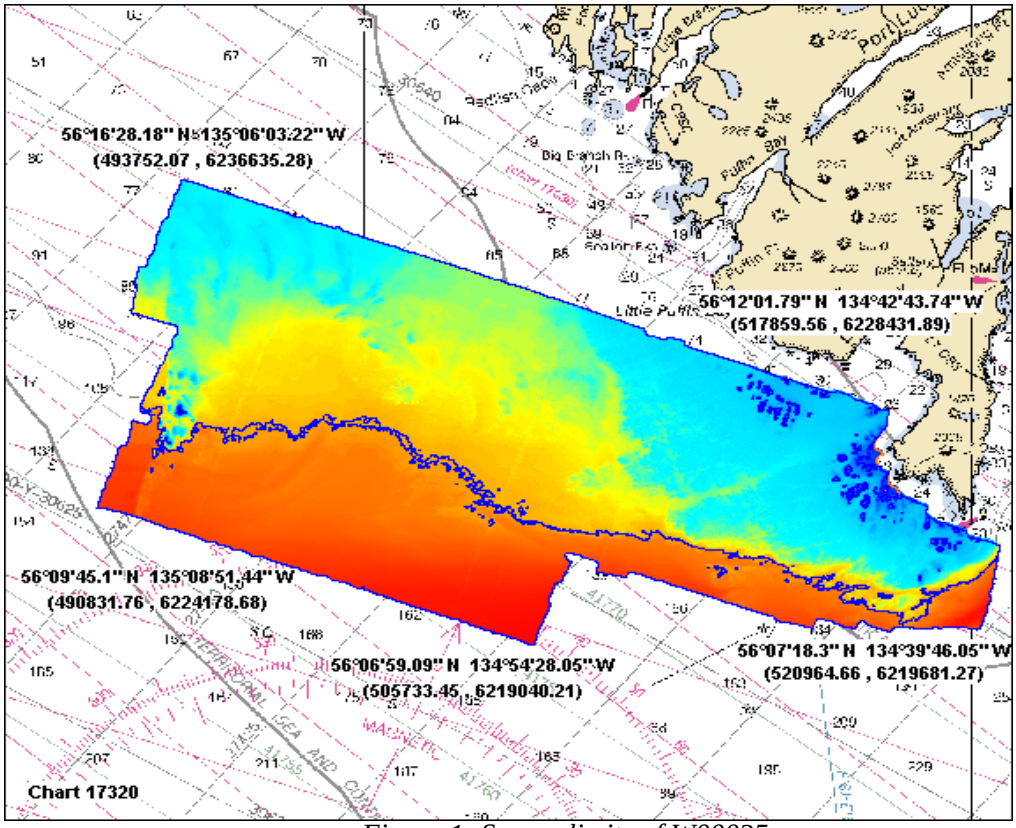


Figure 1: Survey limits of W00035

A.3 Data and Reports

The following data and documentation were received from the Alaska Department of Fish and Game:

- Raw .XTF multibeam data
- Processed five-meter gridded XYZ data in ASCII format
- CARIS Patch test lines
- CARIS Quality Control Reports
- CARIS Field Sheets: CO-CON, CO-DTM, and CO-Mosaic
- A verified CARIS tide file: CapeOmmaney.tid
- A CARIS sound velocity file: CapeOmmaney.svp
- A Descriptive Report, Thales Document Number: TGP-2251-RPT-01-00
- A Data Acquisition and Processing Report, Thales Document Number: TGP-2251-RPT-01-00

B. DATA ACQUISTION AND PROCESSING

B1. Data Acquisition

As described in the *Data Acquisition and Processing Report* [1]prepared by the hydrographer, the R/V DAVIDSON was the only vessel utilized for the collection of sound velocity profiles and multibeam data in shallow to medium water depths. The R/V DAVIDSON was equipped with a hull-mounted Reson SeaBat 8111 and a Sea-Bird CTD for sound velocity profiling. Vessel heading and attitude were measured using a TSS Heading and Dynamic Motion Sensor, which was replaced with a SG Brown Meridian Surveyor Gyrocompass and TSS Dynamic Motion Sensor DMS2-05. Position data were acquired with NovAtel GPS antennas in conjunction with two MBX-3 differential receivers that utilized USCG beacons. Data were logged using Winfrog Multibeam software from Thales GeoSolutions (Pacific), Inc.

B2. Corrections to Echo Soundings

As described in the Hydrographer's *Data Acquisition and Processing Report* sounding data were corrected for sound velocity, dynamic draft, static draft, verified zoned tides, heading, heave, pitch, and roll. A patch test was conducted before acquiring data and is also described in the hydrographer's *Data Acquisition and Processing Report*. The following sections summarize how the hydrographer measured corrections to echo soundings:

<u>Sound Velocity Correction</u>
A Sea-Bird Model 19-03 Conductivity, Temperature, and Depth profiler was used to determine sound velocities. This is the identical model used by NOAA hydrographic field units. Casts were taken every five to six hours until it was determined that water conditions were isothermal and isohaline. Sound velocity casts were then reduced to intervals of six to ten hours depending on water depth and the beginning of a new survey area.

<u>Dynamic Draft (Settlement Curve)</u>
The settlement curve was established by using Trimble RTK GPS derived altitude data.

<u>Static Draft</u>
The average measurement taken from tabs on both sides of the vessel established the static draft correction.

Tides
All soundings for W00035 were reduced to Mean Lower-Low Water (MLLW) using verified tide data from one NOAA tide station located at Sitka, AK (945-1600). These data were used in creating tide tables that were applied to the data in CARIS. LCMF Inc. was contracted by Thales Geosolutions (Pacific) to provide final verified tidal zoning for the Cape Ommaney survey area. Tide reports were not included with deliverables to the Pacific Hydrographic Branch.

Vessel Attitude
Vessel heading and dynamic motion was measure with a TSS Heading and Dynamic Motion Sensor (HDMS SN 049). The HDMS failed and was replaced with a TSS Dynamic Motion Sensor (SN 004104) and a SG Brown Gyrocompass. Vessel attitude was measured with an accelerator block mounted over the multibeam transducer.

B3. Data Processing and Quality Control

Hydrographer

The hydrographer processed and analyzed survey data CARIS Hydrographic Information and Processing System (HIPS) and Hydrographic Data Cleaning System (HDCS) on Unix and NT workstations.

As described in detail in the hydrographer's *Data Acquisition and Processing Report*, following acquisition, shallow-water multibeam data were converted from Winfrog Multibeam to XTF, then to HDCS using the CARIS xtfToHDCS program. Sound velocity profiles and static draft were loaded into each line and then corrected in the HDCS program SwathEdit. All soundings beyond a maximum angle of 65° off-nadir were flagged as rejected. Attitude, navigation, and bathymetry data for individual lines were examined for noise, as well as to ensure the completeness and correctness of the data set. After individual lines were examined and cleaned, the tide file was loaded and the lines were merged.

All soundings were reviewed, spatially referenced, in CARIS HDCS Subset Edit Mode. Data were compared with adjacent lines and cross lines for systematic errors such as tide or sound velocity and to clean any remaining noise.

Sun-illuminated Digital Terrain Model images (DTMs) were created in CARIS HIPS to demonstrate coverage and to further check for systematic errors such as tide, sound velocity, or attitude and/or timing errors. The DTM's were created at a specified 5 meter and 10 meter grid intervals.

Evaluator

The processed dataset was compared to the largest scale chart in MapInfo which provided rudimentary 'ground truthing' as well as a check for anomalous depths. Questionable soundings were reviewed in "subset mode" using CARIS NT for confirmation or further rejection.

The processed soundings were in general consistent with the charted soundings and contours (see *D.4 Chart Comparisons)* [2]however several large discrepancies were noted Greater differences between adjacent charted and survey soundings can be attributed to the steep and rugged character of the bathymetry, and to increased bottom coverage using SWMB methods.[3]

Internal Data Consistency

During the evaluation of the survey data at the Pacific Hydrographic Branch (PHB) main scheme and cross lines were compared in CARIS NT subset mode. No inconsistencies were observed between main scheme and crosslines. The general comparison was good however, the cross lines were not cleaned and should not be used in the final dataset.

The evaluator believes that cross line comparison is acceptable and that the data is internally consistent within specifications required by the Specifications and Deliverables Manual.

Data Quality Factors

Data quality was affected by the failure of the TSS HDMS attitude sensor. The replacement of the TSS HDMS with a TSS DMS2-05 and gyrocompass was complicated by errors noticed by the hydrographer in the pitch and roll correctors of the DMS2-05. The hydrographer created a conversion factor which allowed the TSS DMS2-05 data to emulate that of the HDMS. Subsequently, all of the attitude data collected with the DMS2-05 was reprocessed with new conversion factor.

The evaluator noted no discrepancies with the attitude data or other factors which would affect the quality of the data.

B4. Data Decimation

To produce the final reduced data set represented by the final field sheet, all non-rejected soundings having passed all other quality-assurance checks were imported by the evaluator, into a Pydro Preliminary Smooth Sheet (PSS) file using shoal-biased “line-by-line” binning using a cell size of 1.5 millimeters x 1.5 millimeters at survey scale. The resultant thinned data were then excessed in Pydro using a 3-millimeter character size, ensuring that the largest spacing between selected soundings would not exceed 5 millimeters at survey scale. Final selected soundings were exported to MapInfo from Pydro, and plotted in MapInfo at a 2-millimeter character size.[4]

C. VERTICAL AND HORIZONTAL CONTROL

Vertical and horizontal control is adequately addressed in the hydrographer’s *Descriptive Report*. A summary of horizontal and vertical control for this survey follows.

C.1 Horizontal Control

The horizontal control datum for survey W00035 was World Geodetic System of 1984 (WGS84). Differential GPS was the sole method of positioning. Differential correction from US Coast Guard beacons at Biorka Island (305 kHz) and Annette Island (323 kHz) were utilized independently by two MBX-3 differential receivers.

As a quality control measure of positioning the hydrographer logged three separate position files. The first file contained only the raw antenna position. The second file contained the pseudorange-corrected position calculated from a single differential beacon, antenna offsets and Kalman filtering. The final file contained a position generated from a weighted mean of pseudorange correctors logged simultaneously from both differential beacons. This file was also corrected for antenna offsets and Kalman filtering.

At the end of every line the hydrographer reviewed the weighted mean position with the single source position. This provided near real time verification of the RTCM sources.

Based on the information provided and a review of the data, horizontal accuracy standards of the HSSDM appear to have been met.

C.2 Vertical Control

The vertical datum for survey W00035 was Mean Lower Low Water (MLLW). The operating National Water Level Observation Network primary tide station at Sitka, AK (945-1600) served as control for datum determination and as the primary source for water level reducers. The hydrographer installed no additional tide stations.

The "ZoneHIPS" function in HPTools V 8.9.5, supplied to Thales GeoSolutions (Pacific), Inc by NOAA, was used to calculate zoned tidal correctors using CARIS navigation files that were exported from CARIS NT. LCMF Inc. was contracted to provide final tidal zoning for the Cape Ommaney. Tide reports were not included with deliverables to PHB; however the tide zones and co-tidal correctors used are summarized in section 3.4 of the hydrographer's *Data Acquisition and Processing Report*. An evaluation of selected areas did not reveal tidal offsets in the data. The evaluator believes that tides used by the hydrographer meet standards set forth in the NOS Hydrographic Surveys Specifications and Deliverables Manual (HSSDM).

D. ANALYSIS AND RECOMMENDATIONS

D.1 Error Analysis

The data were assessed for consistency, system capabilities, object detection capabilities, and survey procedures.

A manual comparison of cross lines to mainscheme lines demonstrated good internal data consistency (*See B.3 Internal Data Consistency).*

The survey equipment, as described in the hydrographer's *Data Acquisition and Processing Report*, are capable of meeting accuracy standards for an IHO order 1 survey.

Although not apparent from manual examination of selected bathymetry, the evaluator noted two possible sources of error that may affect data accuracy. Sound velocity profiling may not have been frequent enough to accurately correct for fluctuations in conductivity and temperature. Another source of possible error stems from the tidal zoning. The primary tide gauge is not in the survey area and no tertiary gauges were established. However, from the areas inspected by the evaluator in CARIS subset mode, no SV or tide errors were noticed and the data were internally consistent. The evaluator believes that, while methods for acquiring sound velocity profiles and water level data were not consistent with standard NOAA field procedures, the data still meet accuracy requirements set forth by the HSSDM.

The object detection criteria for IHO Order 1 were met while in the field by limiting survey speeds to an average of 7.5 knots, ensuring that the maximum line spacing did not to exceed three times the water depth and reviewing backscatter data in conjunction with bathymetry line data.

The following table is the evaluator's assessment of whether or not the systems and procedures utilized are capable of meeting IHO accuracy and object detection requirements:

Measurement Source	IHO Special Order	IHO Order 1	IHO Order 2
Echosounder	Unknown	Yes	Yes
Vertical GPS	No	Not used	Not used
Horizontal GPS	No	Yes	Yes
Vessel heading	Yes	Yes	Yes
Sound Velocity / Refraction	Yes	Yes	Yes
Heave	Yes	Yes	Yes
Vessel Attitude source	Yes	Yes	Yes
Water Level	No	Yes	Yes
Object detection	No	Yes	Yes
Standard Met?	No	Yes	Yes

D.2 Discussion of Data Quality and Suitability for Charting

An evaluation of the data has determined that this survey meets accuracy requirements as set forth in the HSSDM. This determination is based on the following factors:

- The systems used by the hydrographer are capable of meeting NOS accuracy and object detection requirements.
- The field procedures used by the hydrographer in acquiring the data meet bottom coverage, data accuracy, and object detection criteria required by NOS.
- The data are internally consistent; no tide errors, sound velocity, or positioning errors are evident in the data.
- All necessary corrections to echo soundings were measured within NOS accuracy requirements and have been applied to the data.
- The data processing and quality assurance methods used by the hydrographer appear sound.
- Apart from areas of obvious bottom change, the data compare well with the largest scale chart of the area.
- No systematic errors are apparent in the data.
- No gross blunders are evident in the data.

The data have also been evaluated to determine suitability for use in revising the specified nautical chart.

D.3 Automated Wreck and Obstruction Information System (AWOIS) Items

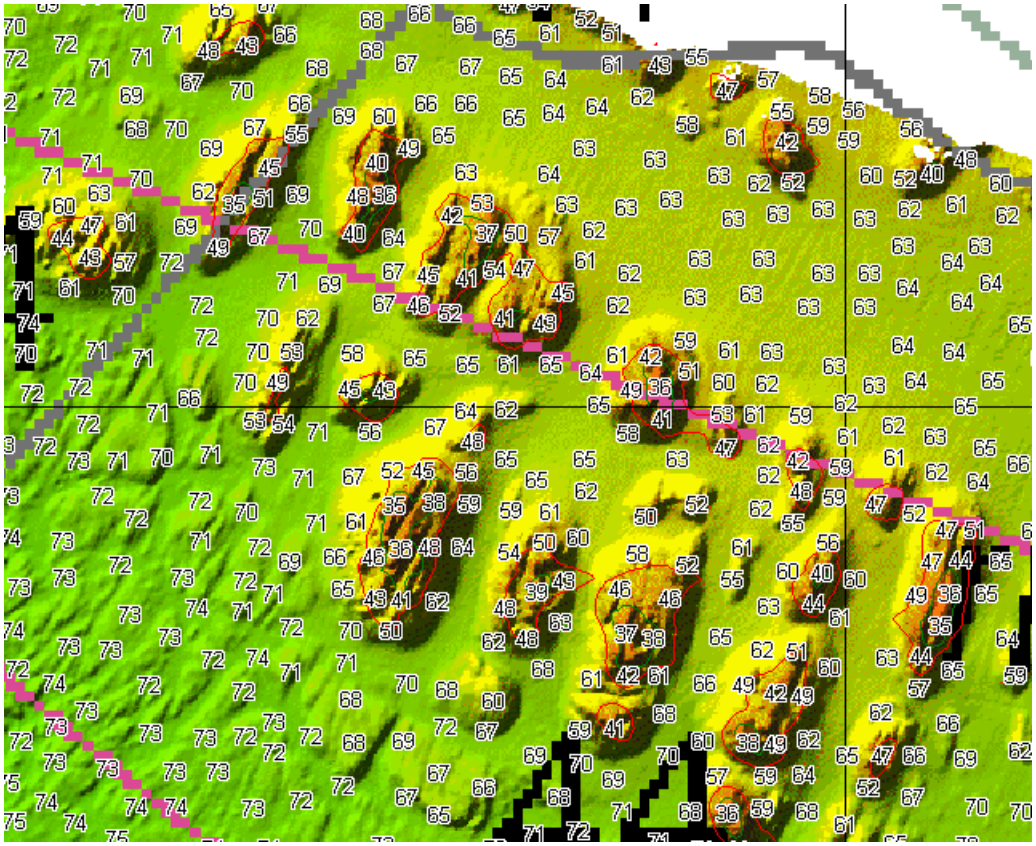
No AWOIS were located within the area surveyed. No new AWOIS items should be created as a result of this survey.[5]

D.4 Chart Comparison [6]

Survey W00035 was compared with charts 17320 (15t^{h} Ed.; March 6, 1999, 1:217,828).

Depths from survey W00035 general compare well with chart 17320, however several discrepancies were noted; the largest is listed below. Greater differences between adjacent charted and survey

soundings can be attributed to the steep and rugged character of the bathymetry, and to increased bottom coverage using SWMB methods.[7]



In the vicinity of a charted 100 fathom sounding the current survey found a 44 fathom sounding at 56°11'11.89" N 135°06'32.19" W (493238.37 E, 6226857.2 N).

D.5 Shoreline

No outside source shoreline was provided with this survey. No shoreline was investigated during this survey. The evaluator recommends retaining the shoreline as charted.[8]

D.6 Dangers to Navigation

No dangers to navigations were identified by the hydrographer or evaluator. [9]

D.7 Aids to Navigation

No aids to navigation were ivestigated by this survey and none exist within the survey area.[10]

E. APPROVAL

All records, reports, and data obtained by the Pacific Hydrographic Branch from this outside data source have been evaluated with regard to survey coverage, data accuracy, and suitability for use in nautical charting. Charting recommendations contained in this report are based on an assessment of the systems, field procedures, and quality assurance methods used by the hydrographer in comparison with the NOS Hydrographic Surveys Specifications and Deliverables Manual, and Special Publication 44 of the International Hydrographic Organization.

Evaluated by:

Gary C. Nelson
For Shyla Allen
2009.02.11 14:37:13 -08'00'

Shyla Allen
Physical Scientist - Hydrographer
Pacific Hydrographic Branch

Reviewed by:

Digitally signed by
Kurt Brown
Date: 2009.02.12
09:21:30 -08'00'

Kurt Brown
Acting Hydrographic Team Leader
Pacific Hydrographic Branch

Digitally signed by Charles R. Davies
DN: cn=Charles R. Davies, c=US,
o=Pacific Hydrographic Branch,
ou=NOAA,NOS,OCS, email=Russ.
Davies@NOAA.GOV
Date: 2009.02.12 09:17:35 -08'00'

Russ Davies
Cartographer
Pacific Hydrographic Branch

Approval

I have reviewed the accompanying outside source data and accompanying reports. Data are suitable for use in nautical charting as noted in this report.

Approved by:

Gary C. Nelson
2009.02.11 14:39:37
-08'00'

Gary Nelson
Cartographic Team Leader
Pacific Hydrographic Branch

Revisions compiled during office processing by the cartographer

[1] Attached to this report.
[2] Attached to this report.
[3] Concur.
[4] During office processing, W00035 was applied to charts 17330 and 17320.
[5] Concur.
[6] Refer to attached chart comparison for discussion.
[7] Concur.
[8] Concur.
[9] Concur.
[10] Concur.

W00035 Chart Comparison

Affected Charts:
17320 17th Ed. Nov '05 (1:217,828)[1]
17330 8th Ed. Nov '03 (1:20,000)[2]

Upon visual inspection using Caris BASE Editor and Caris HIPS, W00035 generally agrees with the above charts within 1-2 fathoms in areas of featureless seafloor. This survey is neither consistently deeper nor shoaler than the affected charts.[3] Acquisition of 100% SWMB has revealed several shoals and reefs which are not depicted on the charts which are, in some cases, drastically different from the charted depths.[4] The following table and figures describe the shoal areas which differ significantly from the charts. For visualization purposes, the following convention is used in the figures:
Blue mark = sounding position
First, larger number = sounding depth (fathoms)
Smaller number in parenthesis = corresponding sounding in Table 1

Shoal number	Charts affected	Depth (ftm)	Latitude	Longitude
1 (Figs. 1 & 2)	17320,17330	45.28	56° 12.2064N	134° 47.7332W
2 (Figs. 1 & 2)	17320,17330	35.92	56° 12.2543N	134° 47.3509W
3 (Figs. 1 & 2)	17320,17330	36.95	56° 12.2807N	134° 47.0413W
4 (Figs. 1 & 2)	17320,17330	48.25	56° 12.0112N	134° 47.0525W
5 (Fig. 1)	17320	37.16	56° 11.8682N	134° 46.9808W
6 (Figs. 1 & 2)	17320,17330	39.07	56° 12.2102N	134° 46.7903W
7 (Fig. 1 & 2)	17320,17330	36.97	56° 12.0262N	134° 46.4093W
8 (Fig. 1)	17320	37.95	56° 11.7218N	134° 46.4885W
9 (Fig. 1)	17320	37.41	56° 11.5003N	134° 46.2626W
10 (Fig. 1)	17320	35.21	56° 11.7312N	134° 45.7922W
11 (Fig. 2)	17320,17330	43.28	56° 12.3249N	134° 46.1368W
12 (Fig. 2)	17320,17330	41.13	56° 12.2892N	134° 45.8081W
13 (Fig. 2)	17320,17330	39.23	56° 12.1156N	134° 45.2241W
14 (Fig. 2)	17320,17330	40.80	56° 12.0421N	134° 44.8764W
15 (Fig. 3)	17320	14.24	56° 10.9169N	134° 43.0666W
16 (Fig. 3)	17320	17.19	56° 10.2344N	134° 42.8059W
17 (Fig. 4)	17320	35.46	56° 11.73.16N	135° 06.0251W
18 (Fig. 4)	17320	45.63	56° 11.1975N	135° 06.5409W

Table 1. List of W00035 shoal areas

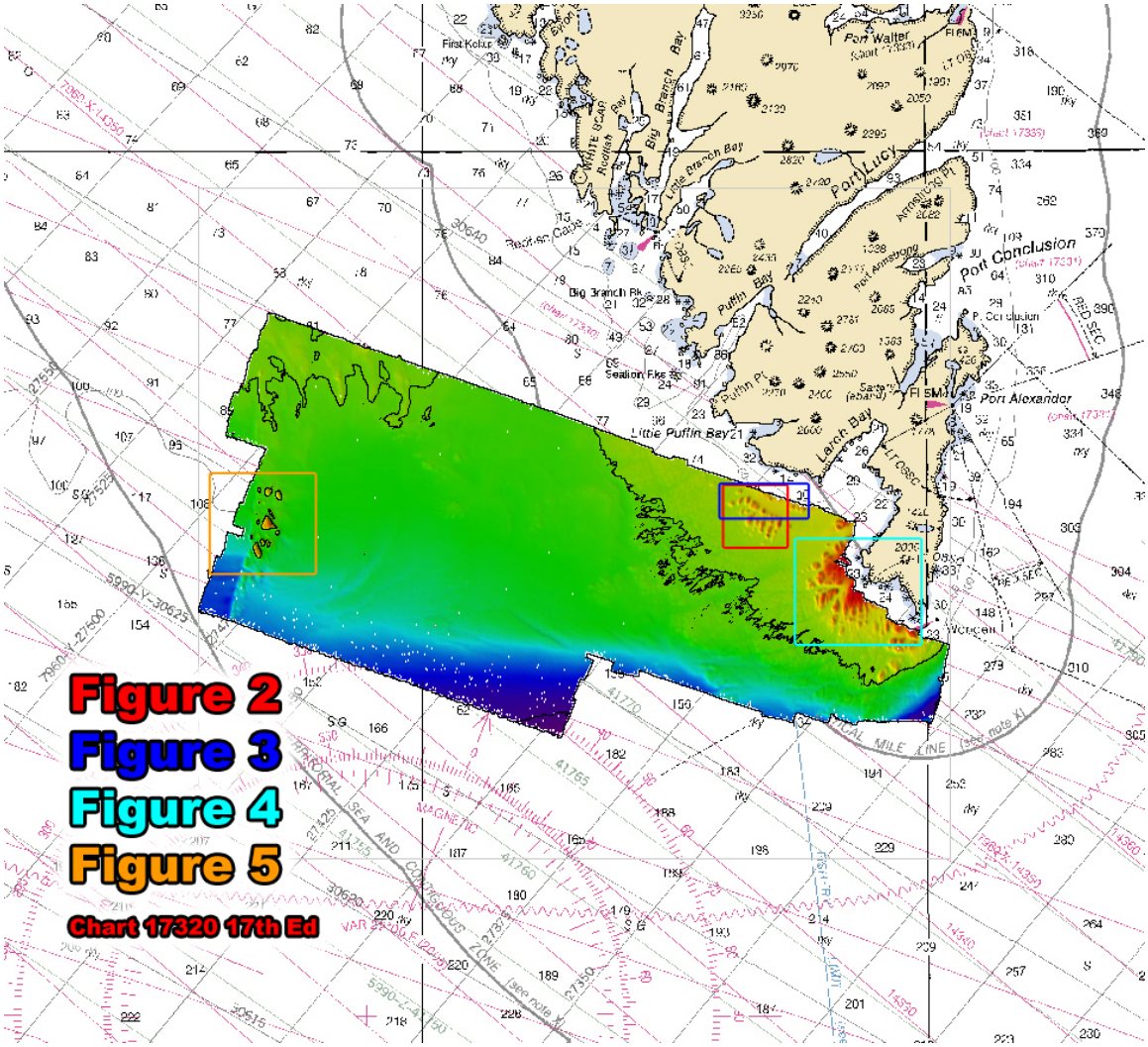


Figure 1. Overview of survey area and outlines of subsequent figures

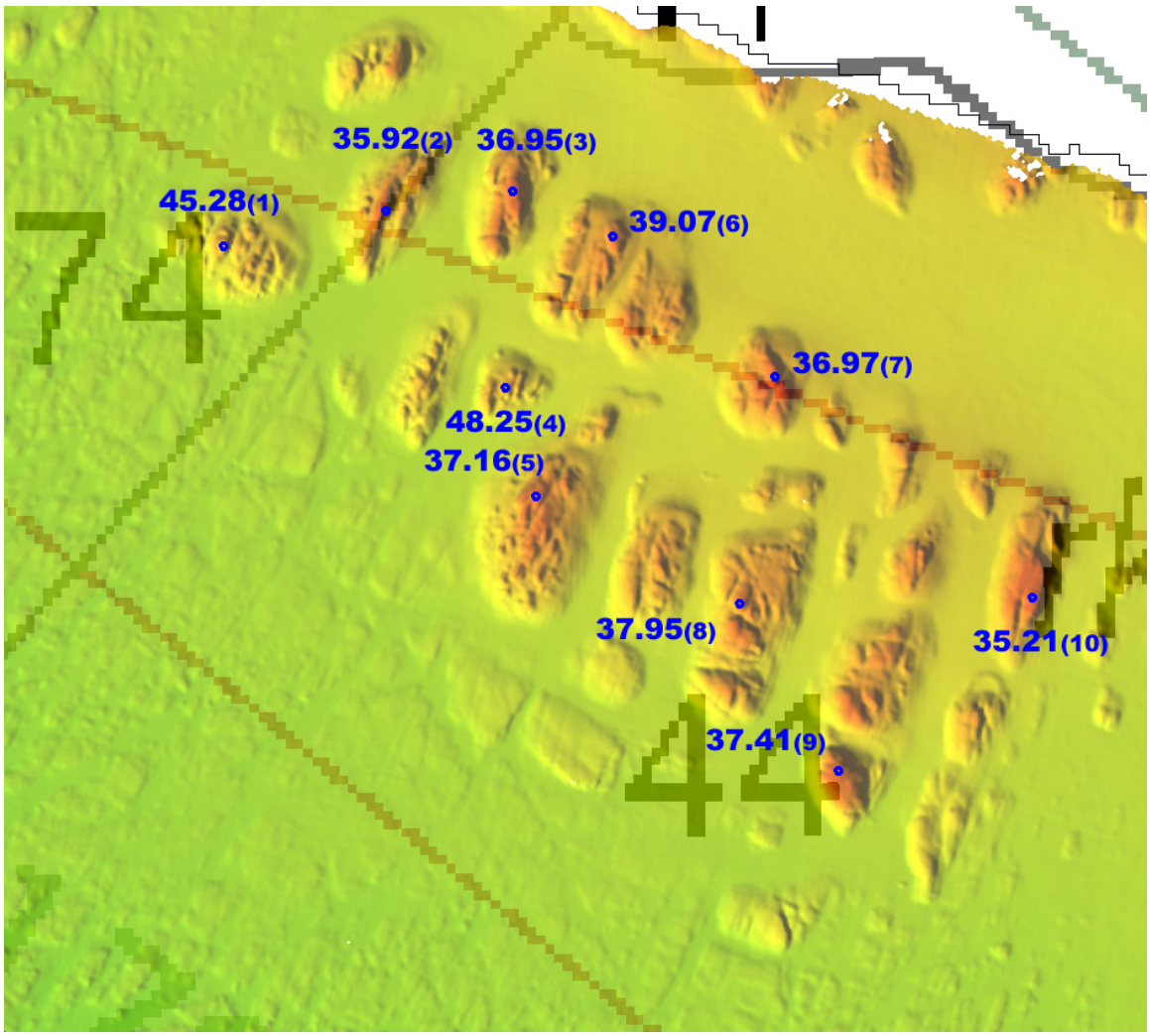


Figure 2. Chart 17320

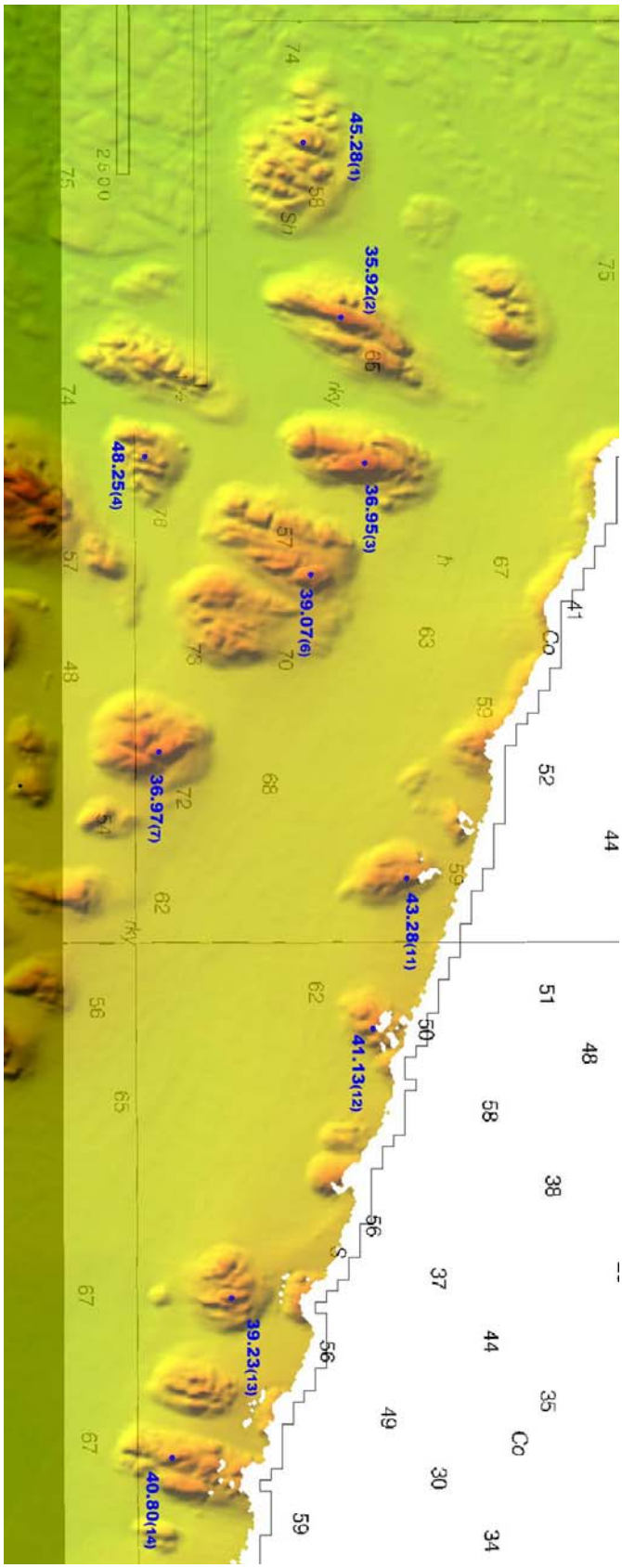


Figure 3. Chart 17330

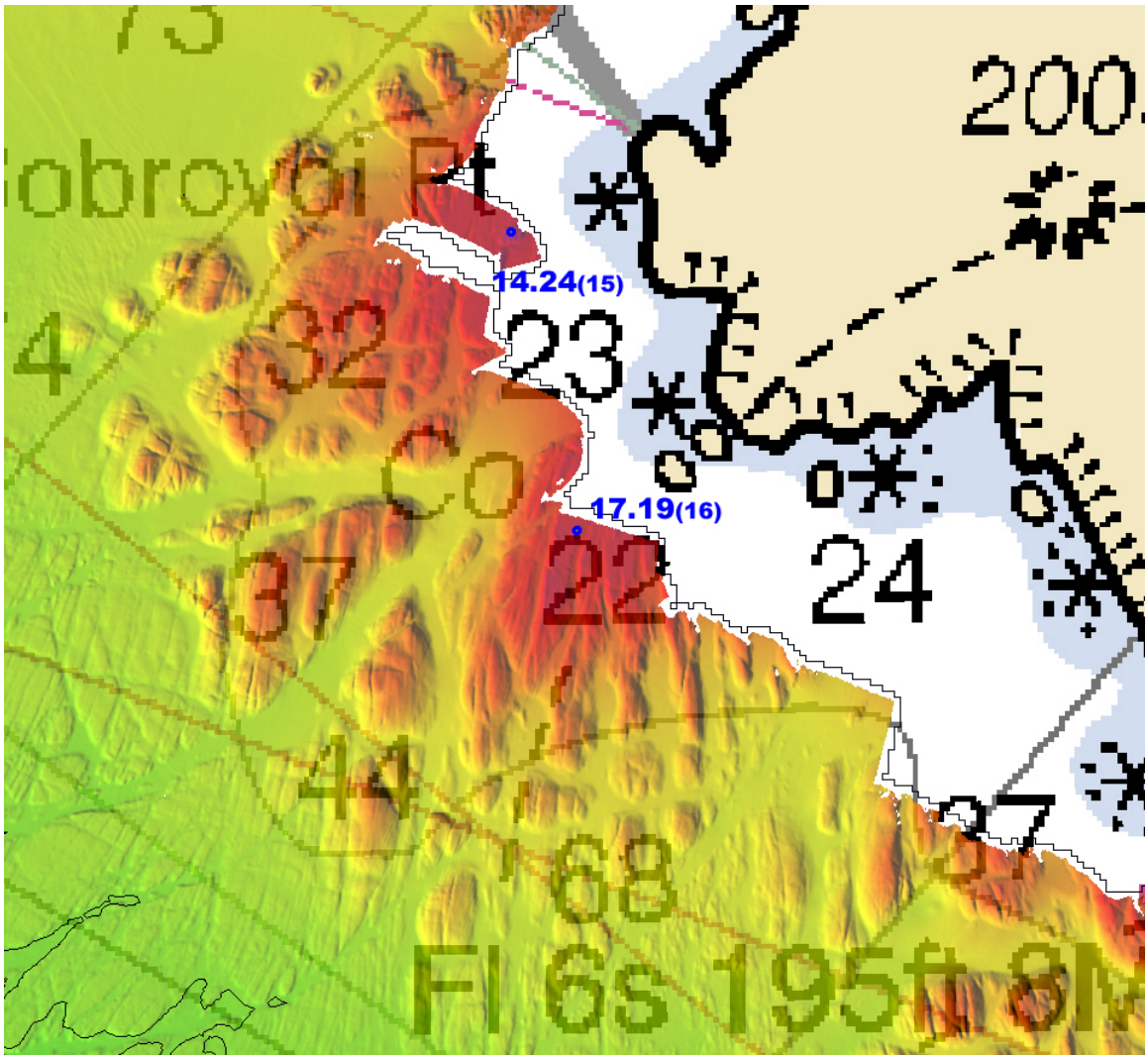


Figure 4. Chart 17320

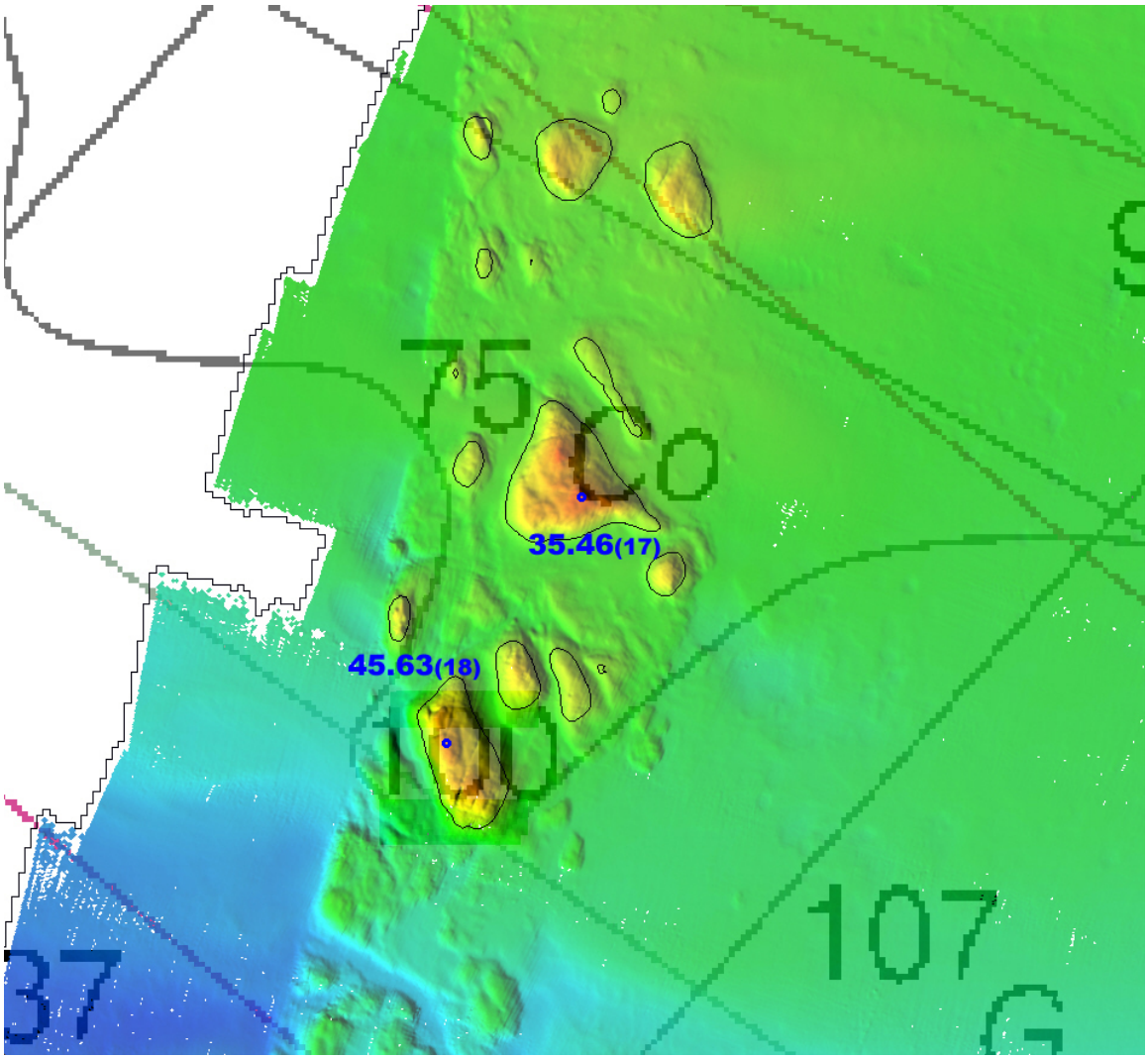


Figure 5. Chart 17320

Revisions compiled during office processing by the cartographer

[1] In PHB processing, W00036 was compared to 17320 18th Edition, continuous maintenance raster dated 01/07/09.
[2] In PHB processing, W00036 was compared to 17330 9th Edition, continuous maintenance raster dated 01/07/09.
[3] Concur. Do not supercede charted shoal soundings. Chart survey area as shown on the Hdrawing.
[4] Concur. Chart survey area as shown on the Hdrawing.

APPROVAL SHEET
W00035

Evaluated by:

Gary C. Nelson
For Shyla Allen
2009.02.11 15:19:39 -08'00'

Shyla Allen
Physical Scientist (Hydrographer)
Pacific Hydrographic Branch

Review by:

Digitally signed by Kurt Brown
Date: 2009.02.11 15:11:21
-08'00'

Kurt Brown
Hydrographic Team Leader

Cartography

The evaluated survey has been inspected with regard to delineation of the depth curves, development of critical depths, cartographic symbolization, and verification or disproval of charted data

Compiled by:

Digitally signed by
Rick Shipley
Date: 2009.02.11
13:37:34 -08'00'

Rick Shipley
Cartographer
Pacific Hydrographic Branch

Reviewed by:

Digitally signed by Charles R. Davies
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o=Pacific Hydrographic Branch,
ou=NOAA,NOS,OCS, email=Russ.
Davies@NOAA.GOV
Date: 2009.02.11 14:25:13 -08'00'

Russ Davies
Cartographer
Pacific Hydrographic Branch

Approval

I have reviewed the data, and reports. Data are suitable for nautical charting except where specifically recommended in this report.

Gary C. Nelson
2009.02.11 15:15:58
-08'00'

Gary Nelson
Cartographic Team Leader
Pacific Hydrographic Branch

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Reason: AWOIS and Surf Check complete
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NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. W00035

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.

1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
17330	1/7/09		~~Full~~ Part Before After Marine Center Approval Signed Via
(INSET)			Drawing No. PARTIAL Application of soundings, features
			AND CURVES from smooth sheet.
17330	1/21/09		~~Full~~ Part Before After Marine Center Approval Signed Via
			Drawing No. PARTIAL Application of soundings, features
			AND CURVES from smooth sheet.
17320	1/22/09		~~Full~~ Part Before After Marine Center Approval Signed Via
			Drawing No. PARTIAL Application of soundings, features
			AND CURVES from smooth sheet.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
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			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED