**NOAA** FORM 76-35A

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

# DATA ACQUISITION AND PROCESSSING REPORT

## NOAA Ship FAIRWEATHER

*For Survey* **OPR-O167-FA-05**

## LOCALITY

*State* **Alaska**

*General Locality* **Cape Decision**

CHIEF OF PARTY

CAPT John E. Lowell, Jr.

## LIBRARY & ARCHIVES

DATE

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## INTRODUCTION

This hydrographic project was completed as specified by Hydrographic Survey Letter Instructions OPR-O167-FA, signed March 21st, 2005. This Data Acquisition and Processing Report applies to sheet B – H11363, sheet C – H11364, sheet F – H11469, sheet G – H11470 and the shoreline component of sheet E – H11409. All sheets have the general locality of Cape Decision in the state of Alaska.

In accordance with the System Certification memorandum dated February 14, 2005, FAIRWEATHER personnel conducted system certification procedures and produced the *NOAA Ship FAIRWEATHER Hydrographic Systems Certification Report 2005* (*SCR*) submitted April 18, 2005. The System Certification Recommendation memorandum, *FA_SCR_2005_Rev1*, was received on May 23, 2005 and is included in Appendix 1. A System Certification Recommendation Approval memorandum from the Chief of Hydrographic Surveys Division Operations Branch, *FA_SCR_Approval*, was received on August 24, 2005 and is included in Appendix 1.

The information contained within the SCR verifies that the hydrographic systems used for surveying meet or exceed requirements as defined in the *NOS Hydrographic Surveys Specifications and Deliverables (NHSSD)* dated March 2003. The Data Acquisition and Processing Report (DAPR) describes the procedures used to acquire and process data.

Survey specific details will be listed in Descriptive Reports as needed. Unless otherwise noted, the acquisition and processing procedures used and deliverables produced are in accordance with the *Standing Instructions* (February 10, 2005), the *NHSSD*, and the *Field Procedures Manual v1.1* (March 2005). Hydrographic Surveys Technical Directives 2004-1 through 4 and 2005-1 were followed during the course of this project.

## A. EQUIPMENT

Detailed descriptions of the equipment and systems used for bathymetric data acquisition, horizontal and vertical control operations, and shoreline acquisition are included in the *NOAA Ship FAIRWEATHER Hydrographic Systems Certification Report 2005* (*SCR*) submitted under separate cover. The *SCR* also contains the determination of correctors, dates and documentation of calibration and testing information. The hardware and software used for data acquisition and processing are listed in the SCR.

## I. Updates, Additions, and Deviations from the SCR

### a. System Tracking

The updated system tracking documents, *Survey Software 081505* which includes software versions and dates of installation; *Personnel Inventory May05; and FA Hardware May05,* are included in Appendix 1.

### b. Addendums to Vessel Reports

The NOAA Ship FAIRWEATHER (S220) RESON 8111ER Vessel Report 2005 submitted with the SCR did not contain the results of the Dynamic Draft Settlement and Squat (DDSSM) testing that was conducted on April 14, 2005. The report, included in Appendix 1, is being resubmitted with the addition of Addendum 1 which lists and explains the DDSSM results.

On May 12th, after 1600 GMT, an error occurred with the dropdown transducer mount for Launch 1018 while acquiring data on Survey H11469. Debris was trapped between the transducer arm and the stop. This changed the Roll Bias, which remained steady, during the time period that the debris was trapped. With the correct bias, the data meets specifications. Refer to the *NOAA Hydrographic Survey Launch 1018 Vessel Report – 2005 Addendum 2* for further information.

No additional patch testing was done after submission of the SCR through the time of this project.

### c. Noise Analysis

The FAIRWEATHER sonar systems RESON 8111ER underwent noise analysis testing on October 11, 2004. The results are utilized during acquisition to enhance data quality and are included Appendix 1. The Standard Operating Procedure for Survey Speeds to be run while acquiring data with the RESON 8111ER is included in Appendix 3.

### d. Moving Vessel Profiler (MVP)

The MVP system consists of a winch, cable, fish (the towed unit with the sound velocity sensor), support assembly, and controlling hardware and software. During ship acquisition, the fish was deployed using the on-deck controller and towed with enough cable out to keep the fish 3-5 m below the water surface. A “messenger” (a short cable-thickening sleeve) was set on the cable to allow the system to keep the appropriate amount of cable out and reset as needed when the ship acquisition speed was altered.

During SVP acquisition, the controlling computer application, Brooke Ocean Technology MVP version 2.24, was used to control the MVP system and to acquire SVP data. MVP allows for three acquisition modes: 1) automatic continuous multiple cast freefall casting while at speed, 2) single cast freefall casting while at speed, and 3) single cast winch speed casting while stationary. The user limits the depth to which the fish will fall by

setting 1) the depth-off-bottom and 2) the maximum depth. During this project, the depth-off-bottom feature was not available. While this does not affect the capability of the FAIRWEATHER, solutions are being investigated by Hydrographic Systems and Technology Programs (HSTP) and Triton Imaging to support the depth-off bottom functionality. In the interim, single, individually initiated casts were performed, at the discretion of the Hydrographer.

### e. Maintenance and Periodic Testing

The maintenance and periodic testing that was conducted on the CTD equipment by the FAIRWEATHER personnel is documented in *CTD_Maintenance and Periodic Testing May05* and included in Appendix 2.

## II. Data Acquisition

### a. Multibeam Echosounder Acquisition and Monitoring Procedures

Methods of acquisition took into consideration system performance limitations, the bottom topography, water depth, and the ability of the vessel to safely navigate the area.

All multibeam data were acquired in Triton Elic's extended transfer format (XTF) and monitored in real-time using the 2-D and 3-D data display windows and the on-screen displays for the RESON SeaBat 8101ER, and 8111ER sonar processors. Adjustable parameters that were used to control the RESON from the ISIS software include range scale, power, gain, and pulse width. These parameters were adjusted as necessary to ensure best data quality. Additionally, vessel speed was adjusted as necessary to ensure the required along-track coverage for object detection in accordance with the *NOS Specifications and Deliverables and Standing Project Instructions*. The *RESON 81XX SOP* (standard operating procedure) and the *TEI Real Time Bathy SOP* detail the settings and procedures utilized during acquisition of data on the Reson systems and in Isis aboard the FAIRWEATHER. Both are included in Appendix 3.

Mainscheme multibeam sounding lines using the RESON Seabat 8101ER and 8111ER were generally run parallel to the contours at a line spacing approximately three to four times the water depth. For discrete item developments, line spacing was reduced to 2 times water depth to ensure least-depth determination by multibeam near-nadir beams.

Triton Elic's DelphMap Real Time Bathy was utilized in lieu of planned line files. The Real Time Bathy displayed the acquired multibeam swath during acquisition and was monitored to ensure overlap and full bottom coverage. If coverage was not adequate, additional lines were run while still in the area.

### b. Shoreline Verification

FAIRWEATHER personnel conducted limited shoreline verification at times near predicted low water, in accordance with the Standing Project Instructions and the Field Procedures Manual v1.1 (March 2005), section 2.4. Pertinent standard operating

procedures such as *Importing Shapefiles in Notebook, Trimble_Pathfinder_Setup, Shoreline_Presurvey*, and *Shoreline_Acquisition_SOP* are included in Appendix 3. The source shoreline shape files were imported into CARIS Notebook 2.2 Beta into the .hob file format with correct S57 attribution and called H#####_Edited_CFF_Shoreline.hob. The exception was the CFF Kelp Line, the Remote Sensing Division sent the kelp information as a line, and it must be an area or point to be imported into Notebook as a S57 object type WEDKLP. It was imported into Notebook as VEGATN instead of WEDKLP to circumvent this problem. Charted shoreline, when used for reference purposes or when source data were not available or adequate, was digitized with S57 attribution into Notebook as H#####_Charted_Shoreline.hob file. These files were used as background during shoreline acquisition, are annotated with Hydrographer remarks and submitted with the field products as deliverables. Unedited CFF Shoreline is provided in the two files with the Separates to be included with this report for reference purposes, Sht D_E_F CFF_Shoreline.hob and Sht B_ G _F CFF_Shoreline.hob.

Detached positions (DPs) and generic positions (GPs) acquired during shoreline verification indicate revisions to features, or features not found in the field. They were recorded in the shoreline acquisition software TerraSync using a Trimble Backpack and on DP forms, and then processed through GPS Pathfinder. Scanned copies of the DP forms are included in the digital Separates folder and hard copies are submitted with the Separates to be included with Survey Data. In addition, annotations describing shoreline were recorded on hard copy plots of the digital shoreline, referred to as boat sheets which are also submitted with the individual survey as Separates.

Terminology used during shoreline verification is as follows. The term “Noted” indicates that the feature is correctly located within the scale of the chart or source, as confirmed from a distance. The term “Verified” is used when the existence of the feature is confirmed in close proximity and the feature is correctly located within the scale of the survey.

**c. Bottom Sample Acquisition**

Bottom samples were conducted according to section 7.1 of the *NOS Hydrographic Surveys Specifications and Deliverables* (March, 2003).

**d. Horizontal Control**

A complete description of horizontal control for the project can be found in the *OPR-O167-FA-05 Horizontal and Vertical Control Report (HVCR),* submitted under separate cover.

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning for all soundings and detached positions. The U.S. Coast Guard DGPS beacon at Level Island (295 kHz) was the primary source of differential correctors and Biorka (305 kHz) was the secondary source of differential correctors.

## B. QUALITY CONTROL

### I. Data Processing

The FAIRWEATHER has numerous standard operating procedures (SOPs) that are followed by personnel throughout the survey to ensure consistent high quality data and products. A detailed data processing flowchart and several key SOPs, that differ from the *Field Procedures Manual v1.1* (March 2005) and/or are specific only to the FAIRWEATHER, are included for reference in Appendix 3.

#### a. Multibeam Echosounder Data Processing

Raw XTF multibeam data were converted to HDCS format in Caris HIPS & SIPS 5.4. After conversion, TrueHeave™ was loaded prior to sound velocity correction in HIPS. Tide corrections, dynamic draft correctors, sensor lever arm information, bias information and timing errors, and attitude correctors were applied to the data during "Merge". Once lines are merged, the Total Propagated Error (TPE) was computed in HIPS to determine the quality of the multibeam data.

The TPE takes into account uncertainties in the measurements coming from each sensor (Heave, Pitch, Roll, Position, Heading, Sound Velocity, and Tide) and uncertainties in static measurements (Draft and Latency) to calculate the total uncertainty associated with each sounding. Caris HIPS & SIPS 5.4 uses the vertical uncertainty from TPE to produce a Bathymetry Associated with Statistical Error (BASE) surface. These BASE surfaces and child layers (Depth,Uncertainty, Density, Standard Deviation, Mean, Shoal, Deep) were used for directed data editing, to demonstrate coverage, and to check for systematic errors such as tide, sound velocity, or attitude and timing errors.

Vessel heading, attitude, and navigation data were only reviewed and/or edited in navigation editor and attitude editor as deemed necessary by the Hydrographer. When necessary, fliers or gaps in heading, attitude, or navigation data were manually rejected or interpolated for small periods of time. The data were reviewed and edited in swath editor as needed. All multibeam data were edited and reviewed in HIPS subset mode.

The BASE surfaces, produced as deliverables, have resolutions and depth ranges that are at or below 8 percent of the depth. Overlap is adjusted as necessary for the survey topography. A table listing the resolution and depth ranges used will be provided in the descriptive reports for each survey.

#### i. Data Standards and Processing Guidelines

Bathymetry processing followed section 4.2 of the *Field Procedures Manual v1.1* (March 2005) unless otherwise noted. BASE surface processing was in accordance with *Hydrographic Surveys Technical Directive 2004-3*.

The bathymetric data acquired during this project has been examined and it meets or exceeds the specifications defined in the *NOS Hydrographic Surveys Specifications and Deliverables* (NHSSD), dated March 2003. In accordance with the NHSSD the vertical accuracy standards are S-44 IHO Order 1 for water 100 meters or less in depth and IHO Order 2 for depths greater than 100 meters. Data quality issues, specific to individual surveys, are noted in the descriptive reports.

**ii. System Certification Report Clarifications**

**Hips Vessel File:**

The HVFs for each vessel used for this project and the Devicemodel.xml utilized during data processing in CARIS HIPS are located in the Separates to be included with this report.

Initial entry dates in each vessel HVF do not correspond with the dates noted in each vessel report. The dates entered precede the dates of the patch tests to accommodate other testing and preliminary data collected. As no project data was collected before the initial patch tests by any of the FAIRWEATHER's vessels data quality is not affected.

The sensor latency value noted in the vessel reports can either be entered into each sensor (Navigation, Gyro, Heave, Pitch and Roll) Time Error field or the inverse value can be entered once into the Swath Time Error field. The Swath Time Error value for all vessels is entered as the inverse value of the Navigation Time Error reported in the vessel reports. See correspondence between the Pacific Hydrographic Branch and FAIRWEATHER (*PHB and FA Correspondence*) included in Appendix 1.

Error estimates (TPE values) were entered into the HVF file for each vessel. In the HVFs for 1010_8101, 1018_8101 and S220_8111, the "MRU Align StdDev Gyro" and "MRU Align StdDev Roll/Pitch" values are unknown, and these fields are defined as 0.000. The meaning of the values and how to calculate them were unknown at the time of testing and, moreover, undocumented in Caris' Vessel Editor Help Manual.

The question of the meaning of these values was posed to Dr. Brian Calder from UNH, who was aboard the FAIRWEATHER. Dr. Calder is the creator of the total propagated error concept which was implemented by CARIS. He explained that these error values are defined as the standard deviation of the error estimates for the "gyro" and "roll/ pitch" patch test values, as calculated from the compilation of these values from all of the individuals evaluating the patch test data. These standard deviations were not documented when processing the patch tests used for this project. Future patch test processing will include documentation and reporting of the standard deviation of the error estimates for the "gyro" and "roll/ pitch" patch test values. See correspondence between the Pacific Hydrographic Branch and FAIRWEATHER (*PHB and FA Correspondence*) included in Appendix 1.

**Dropdown Transducer Securing Mechanism:**

In the *SCR*, problems with the transducer securing mechanism were noted. It was stated in the *SCR* that a permanent solution would be installed during the April 29th through May 2nd import in Ketchikan. This was not done since the short term solutions which stabilized the mount proved to be adequate.

**b. Shoreline Data Processing**

During shoreline verification, detached (DP) and generic (GP) positions were acquired with TerraSync 2.4.1. Data were reviewed, edited and exported as ESRI shape files(shp) in GPS Pathfinder 3.00. The exported shape files include the S-57 field attributed positions and are organized by object type.

Pydro and CARIS Notebook are used exclusively in the shoreline processing pipeline from the field to the processing branch. During the processing of this project, the NOAA Ship FAIRWEATHER upgraded from CARIS Notebook 2.2Beta to CARIS Notebook 2.2.

Positions acquired during shoreline verification operations are in shape file format from GPS Pathfinder. The Generic GPs/DPs Import tool in Pydro is utilized to retain the S-57 attribution during import into Pydro. The DPs and GPs indicate revisions to features, or features not found during shoreline verification. Once the features are in Pydro, short descriptive comments along with investigation or survey methods are listed under the Remarks tab in Pydro. Features are flagged as Primary, unless there are multiple detached (DPs) or generic (GPs) positions taken on the same feature. In that case, the most important DP is marked Primary and the associated DPs/GPs were flagged Secondary. A Carto Action of Add, Modify, Delete, or None is assigned to each item in Pydro, and all features are S57 attributed. Items for particular surveys, that were associated with a DP or GP that needed further discussion, are flagged Report in Pydro. Along with the investigation methods provided in the Remarks tab, the hydrographer included recommendations to the cartographer in the Recommendations tab when warranted. All features were flagged according to Pydro Processing Flow Diagram section 4.4.2.4 of the Preliminary Field Procedures Manual dated March 2005.

Photos labeled and associated with a DP/GP number are included in the Pydro PSS session and stored in with the PSS. Photos not associated with a DP/GP are given a descriptive label, are included in the PICREP S-57 attribution column of the associated feature, and stored with the Field Product Notebook files.

The HDCS_DATA lines associated with DPs require further processing in CARIS HIPS & SIPS to correct for tide and sound velocity when necessary. GPs do not have heights associated with them and require no additional processing.

All primary and accepted DPs and GPs are imported from Pydro as an .xml to CARIS Notebook 2.2. Three separate stand alone .hob files were created for the features, based

on the Carto Action assigned in Pydro. The separated files are named H#####_Add_Features.hob, H#####_Modify_Features.hob, H#####_Delete_Features.hob and H#####_None_Features.hob. UserID, remarks and recommendations from Pydro are imported to the userID", "remrks" and "recomd" fields associated with each feature in CARIS Notebook.

New HW/MLLW features and any changes to the source shoreline, such as ledges or reefs, were digitized with S57 attribution to the H#####_Add.hob or H#####_Modify.hob files. Any comments or annotations made on the boat sheets from observations made in the field, including field notes made by the Hydrographer regarding verification of features, were added directly to the "remrks" field of the feature in the .hob file. Marker text is used to add comments to features when necessary for display purposes, such as when the "remrks" field does not display correctly or to highlight an item that was not verified. Source items from the Cartographic Feature File (CFF) or charted items that were disproved have been moved to the H#####_Delete.hob. Due to final tides not being applied, the similar tables (ie H#####_Add.hob and H#####_Add_Features.hob) cannot be combined in the field. The H#####_Edited_CFF_Shoreline.hob and H#####_CHD_Shoreline.hob files only contain features with no modifications and include Hydrographer remarks.

The CARIS Notebook session along with CARIS HIPS BASE surface(s) were viewed to compare soundings and features simultaneously. For detailed descriptions of procedures, see the standard operating procedures included in Appendix 3, *Pydro Shoreline Processing, Notebook Shoreline Processing,* and *CartoAction Flagging.*

**c. Reference Surface**

Due to weather and time constraints a reference surface was not conducted in the OPR-O167-FA-05 project area.

**II. Data Review**

Specific procedures were used on the FAIRWEATHER to ensure quality control of data throughout acquisition, processing, and submission. These procedures are outlined in the *FA QC Checksheets, FA_Data_Query,* and the *Survey Management SOP* located in Appendix 3. As detailed in *FA QC Checksheets*, the QC Check is preformed by the survey manager. The QC Review is conducted by qualified survey personnel other than the survey manager, as an outside review of the survey data and deliverables. The Data Submission and Analog Submission checklists are used to ensure that all data and deliverables are complete and included upon submission. These documents are completed for every survey but are not submitted with the data.

## C. CORRECTIONS TO ECHO SOUNDINGS

### I. POS/MV Correctors

#### a. Position Computation

On all FAIRWEATHER vessels the POS/MV is used for positioning multibeam data. The POS/MV controller software was used to monitor position accuracy and quality during data acquisition. This ensured that positioning accuracy requirements were met, as outlined in the NOS Hydrographic Surveys Specifications and Deliverables. The POS/MV controller software provides clear visual indications whenever accuracy thresholds are exceeded.

The CSI Wireless MBX-3S DGPS Receivers are used in conjunction with Applanix POS/MV to provide vessel positioning during data acquisition. The DGPS receivers are configured in manual mode to allow reception of only one U.S. Coast Guard (USCG) differential GPS beacon station.

#### b. Heading Computation

On all vessels, the heading computed by the POS/MV, was used as a corrector for multibeam data.

#### c. Pitch and Roll Computation

On all vessels, the POS/MV was used for pitch and roll values.

#### d. Heave Computation

The POS/MV's on FAIRWEATHER and her launches are equipped with the TrueHeave™ option. Stored TrueHeave™ data contains time stamps with attitude, position, acceleration, and rotation information. TrueHeave™ data were acquired in accordance with section 6.0 of the *POS/MV Version 3 Installation and Operation Manual*, dated October 2003. These data were loaded, in CARIS HIPS & SIPS 5.4, into the simultaneously collected multibeam data to determine the vessel heave correctors.

In cases where TrueHeave™ could not be applied, real time heave correctors were used. Real time heave data were recorded in Triton Elic's Isis software, stored in the .XTF format and applied as the heave corrector for multibeam data.

Data, that does not have TrueHeave™ applied, will be listed in the individual Descriptive Report for the survey.

### e. Midnight Incorrect Time Stamping

During acquisition, an error can occur for unknown reason when data is logged through and past midnight. The error places the wrong day in the time stamp for the Raw Navigation and Attitude packets. All other packets (Bathymetry, Side Scan, Snippets) have the correct date on the time stamp. Hydrographic Systems and Technology Program was contacted and provided the FAIRWEATHER with a Pydro macro that can make the necessary adjustments. The detailed standard operating procedure (SOP), Fixing Data with Incorrect Date, used to make the adjustments is included in Appendix 3.

Data exhibiting the time stamping issue and processed using the above mentioned SOP will be listed in the descriptive report of the affected survey. The original xtf files and the altered xtf files (which end with _dt) will both be submitted as Preprocess data. Only the HDCS_Data converted from the altered file (_dt) will be submitted as processed data.

## II. Sound Velocity

Within CARIS HIPS there are four different algorithms used to automatically apply sound velocity information to a profile using information stored in the concatenated sound velocity file. They are: Previous in time, Nearest in time, Nearest in distance and Nearest in distance within time. The method used for applying sound velocity information to a line is included in the processing logs that are submitted with the data.

### a. SBE 19*plus* SEACAT Profiler

Sound Velocity Profile (SVP) casts from the SBE 19*plus* were processed with Velocwin and the correctors were applied to echosounder data in CARIS HIPS during post processing.

### b. Moving Vessel Profiler (MVP)

Sound velocity correction data were acquired using the Brooke Ocean Technology Moving Vessel Profiler 200 (MVP) sound velocity profile (SVP) acquisition system and subsequently converted to .svp format using Velocwin for application to multibeam data in CARIS HIPS during post processing.

MVP records cast data into files of type .001, .001c, .001d, and .001e (collectively called BOT files) where the number increments by one with each subsequent cast. The .001c file for each cast was opened with Velocwin and converted into CARIS .svp file format. Each individual .svp file was concatenated to the ship .svp file for the project and applied to multibeam data in CARIS HIPS during data processing.

## III. Water Level

Predicted, unverified observed, and verified water level correctors were downloaded from the CO-OPS website when internet was available. When internet was unavailable, the

ship enabled the automated Tidebot program, which would send daily observed water level correctors for selected tide stations to the ship via email. The daily water level correctors arrived in .dat file format. The files for the relevant days were collated into a tide station master file which was converted to .tid file format in Mapinfo using HydroMI. The .tid files were applied to data along with the zone definition file (.zdf) in CARIS HIPS & SIPS. The Pacific Hydrographic Branch will apply final approved (smooth) tides to the survey data during final processing.

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide station at Sitka, AK (945-1600) served as control for datum determination and as the primary source for water level reducers for this project.

FAIRWEATHER personnel installed one Sutron 8210 "bubbler" tide gauges at the tertiary station listed below. Gauge #09 (S/N 002332) was the gauge used. The gauge was installed in order to provide information to Center for Operational Oceanographic Products and Services (CO-OPS N/OPS1) for the determination of time and height correctors, in accordance with the Project Instructions.

| **Station Name** | **Station Number** | **Type of Gauge** | **Date of Installation** | **Date of Removal** |
|---|---|---|---|---|
| Kuiu Island | 945-0913 | Tertiary 30 Day | April 22, 2005 | May 31, 2005 |

CO-OPS does not provide calibration or quality assurance documentation to the FAIRWEATHER. FAIRWEATHER personnel are responsible for installation and removal of the water level gauges. CO-OPS is responsible for delivering final approved vertical correctors to the processing branch for application to the hydrographic data set.

A complete description of vertical control for the project can be found in the *OPR-O167-FA-05 Horizontal and Vertical Control Report (HVCR),* submitted under separate cover.

# LICENSES

| Caris License # | On | GIS | HIPS | Notebook | Expires | Type |
|---|---|---|---|---|---|---|
| CW9604043 | FADC2 | 5 | 5 | 5 | 10/31/05 | Red USB |
| CW9604041 | roving | 1 | 1 | | 08/31/05 | Purple USB |
| CW9604042 | roving | | | 1 | 12/31/05 | Purple USB |

| ISIS Dongle # | On Processor | Isis | DelphMap | DelphNav | BathyPro | RT Bathy | 81XX Server | Mission Monitor |
|---|---|---|---|---|---|---|---|---|
| TEI 03-1525 | 1010_ACQ | 1 | | | | | 1 | |
| TEI 03-15250 | 1010_ACQ | 1 | 1 | 1 | 1 | 1 | | 1 |
| TEI 03-1526 | 220_ACQ | 1 | | | | | 1 | |
| TEI 03-15260 | 220_ACQ | 1 | 1 | 1 | 1 | 1 | | |
| TEI 03-1527 | | 1 | | | | | 1 | |
| TEI 03-15270 | | 1 | 1 | 1 | 1 | 1 | | |

| Processor | Physical # | Pydro License # | Expires |
|---|---|---|---|
| FA_Process_1 | 00-0B-DB-5A-62-2B | ddbd88e5e2add37c62 | 01/31/06 |
| FA_Process_2 | 00-11-11-0F-84-44 | 17ff4798a45f2e18e0 | 01/31/06 |
| FA_Process_3 | 00-11-11-06-9D-42 | 17ff4798a43184cb81 | 01/31/06 |
| FA_Process_4 | 00-01-02-69-5A-45 | 04730c79144aa2e73d | 01/31/06 |
| FA_Process_6 | 00-0B-DB-56-68-2B | ddbd88e5e2a5818feb | 01/31/06 |
| FA_Process_7 | 00-01-02-69-56-43 | 04730c79142d3c99d4 | 01/31/06 |
| FA_Process_8 | 00-11-11-06-A1-B5 | 17ff4798ab42d6b8e8 | 01/31/06 |
| FA_Process_9 | 00-0B-DB-56-68-30 | ddbd88e5e31a2eb007 | 01/31/06 |
| FA_CST | 00-11-11-06-A4-68 | 17ff4798a69248559b | 01/31/06 |
| FA_FOO | 00-0B-DB-56-68-8C | ddbd88e5e8d45ef885 | 01/31/06 |

| Fledermaus FLEXid | License # | Processor | |
|---|---|---|---|
| ~~9-45953CB6~~ | ~~2518891E2E69~~ | ~~FA_Process_8~~ | (Key was destroyed) |
| 9-65012FEB | B18BA0DE2D3F | FA_Process_3 | |
| 9-6153BBA5 | 21DE819F1F03 | FADC1 | |

| MapInfo v7.5 | Processor | 7.8 Upgrade |
|---|---|---|
| MUIWEU0750026833 | FA_Process_3 | MIUWEU0780026833 |
| MIUWEU0750026834 | FA_Process_7 | MIUWEU0780026834 |
| MIUWEU0750025574 | FA_CST | MIUWEU0750025574 |
| | FA_FOO | MIUWEU0780034111 |

**GPS Pathfinder S/N**

011746-00300-04309-3BAD03D2
024156-00300-05068-0E94DA58

**TerraSync Pro S/N**

498295-00110-04309-7073A4A7
498295-00110-05068-EBD4EA8B

**Computers**

FA_Process_7 added & configured 5/6/05

# ISIS SONAR

| | 1010_ACQ | 1018_ACQ | 220_ACQ | FA_Process_4 | Comments |
|---|---|---|---|---|---|
| **v.6.5.0** | d.u | d.u | d.u | d.u | |
| **v6.5.1** | d.u | d.u | d.u | d.u | |
| **v6.6.0** | d.u | d.u | d.u | d.u | |
| **v6.7.0** | 10/01/04 | 10/01/04 | 09/20/04 | 10/01/04 | ISIS removed 2/14/05 |
| **v6.7.193.0** | | | | | |
| **v6.8** | 02/10/05 | 02/28/05 | 02/14/05 | N/A | FA_Process_4 No longer back-up computer |
| **v6.9** | | | 08/05/05 | | |

d.u.=date unknown; exact intall date not documented

# ISIS DELPHNAV-DELPHMAP

| | 1010_NAV | 1018_NAV | 220_NAV | Comments |
|---|---|---|---|---|
| **v2.10** | d.u | d.u | d.u | |
| **v2.11** | d.u | d.u | 09/20/04 | |
| **v2.00.193.0** | | | | |
| | **1010_ACQ** | **1018_ACQ** | **220_ACQ** | |
| **v2.12** | 02/10/05 | 02/28/05 | 02/14/05 | |

d.u.=date unknown; exact intall date not documented

# TerraSync

| | ToughBook1 | ToughTab1 | TSCe | FA-Mobile1 | ToughBook2 |
|---|---|---|---|---|---|
| v2.40 | | d.u | d.u | d.u | |
| v2.41 | 10/5/2004 | 10/5/2004 | 10/5/2004 | 10/6/2004 | 10/13/2004 |

d.u.=date unknown; exact intall date not documented

# Pathfinder

| | ToughBook1 | ToughTab1 | FA-Mobile1 | ToughBook2 | Olab | Process1 |
|---|---|---|---|---|---|---|
| v3.00 | 9/30/2004 | 10/4/2004 | d.u | 10/13/2004 | d.u. | 3/22/2005 |

d.u.=date unknown; exact intall date not documented

## CARIS HIPS & SIPS

| | FA_Process_1 | FA_Process_2 | FA_Process_3 | FA_Process_4 | FA_Process_6 | FA_Process_7 | FA_Process_8 | FA_Process_9 | FA_CST | FA_FOO | FA_Mobile2 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **v5.4 full** | 05/05/04 | 08/02/04 | 08/02/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/11/04 | 01/23/05 | |
| **HF1** | 06/14/04 | | | | | | | | | | | |
| **HF2** | 06/14/04 | | | | | | | | | | | |
| **HF3** | 06/14/04 | | | | | | | | | | | |
| **HF4** | 06/14/04 | | | | | | | | | | | |
| **HF5** | 06/14/04 | | | | | | | | | | | |
| **HF6** | 06/14/04 | | | | | | | | | | | |
| **HF7** | 06/14/04 | | | | | | | | | | | |
| **HF8** | 06/14/04 | | | | | | | | | | | |
| **HF9** | 06/14/04 | | | | | | | | | | | |
| **HF10** | 06/14/04 | | | | | | | | | | | |
| **HF11** | 06/14/04 | | | | | | | | | | | |
| **HF12** | 06/14/04 | | | | | | | | | | | |
| **HF13** | 06/17/04 | | | | | | | | | | | |
| **HF14** | 06/18/04 | | | | | | | | | | | |
| **HF15** | | | | | | | | | | | | |
| **SP1** | 07/27/04 | 08/02/04 | 08/03/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/26/04 | 01/23/05 | |
| **SP1+HF1** | 07/27/04 | 08/02/04 | 08/03/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/26/04 | 01/23/05 | |
| **SP1+HF2** | 08/03/04 | 08/02/04 | 08/03/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/26/04 | 01/23/05 | |
| **SP1+HF3** | 08/04/04 | 08/04/04 | 08/05/04 | 08/04/04 | 09/11/04 | 05/06/05 | 08/04/04 | 08/06/04 | 08/04/04 | 08/26/04 | 01/23/05 | |
| **SP1+HF4** | 08/26/04 | 08/26/04 | 08/26/04 | 08/26/04 | 09/11/04 | 05/06/05 | 08/26/04 | 08/26/04 | 08/26/04 | 08/26/04 | 01/23/05 | |
| **SP1+HF5** | 08/26/04 | 08/26/04 | 08/26/04 | 08/26/04 | 09/11/04 | 05/06/05 | 08/26/04 | 08/26/04 | 08/26/04 | 08/26/04 | 01/23/05 | |
| **SP1+HF6** | 08/26/04 | 08/26/04 | 08/26/04 | 08/26/04 | 09/11/04 | 05/06/05 | 08/26/04 | 08/26/04 | 08/26/04 | 08/26/04 | 01/23/05 | |
| **SP1+HF7** | 08/26/04 | 08/26/04 | 08/26/04 | 08/26/04 | 09/11/04 | 05/06/05 | 08/26/04 | 08/26/04 | 08/26/04 | 08/26/04 | 01/23/05 | |
| **SP1+HF8** | 10/06/04 | 10/07/04 | 09/26/04 | 10/08/04 | 09/23/04 | 05/06/05 | 09/22/04 | 09/23/04 | 10/07/04 | 10/07/04 | 01/23/05 | |
| **SP1+HF9** | 10/06/04 | 10/07/04 | 09/26/04 | 10/08/04 | 09/23/04 | 05/06/05 | 09/22/04 | 09/23/04 | 10/07/04 | 10/07/04 | 01/23/05 | |
| **SP1+HF10** | 10/06/04 | 10/07/04 | 10/07/04 | 10/08/04 | 10/07/04 | 05/06/05 | 10/05/04 | 10/07/04 | 10/07/04 | 10/07/04 | 01/23/05 | |
| **SP1+HF11** | 10/06/04 | 10/07/04 | 10/07/04 | 10/08/04 | 10/07/04 | 05/06/05 | 10/05/04 | 10/07/04 | 10/07/04 | 10/07/04 | 01/23/05 | |
| **SP1+HF12** | 10/06/04 | 10/07/04 | 10/07/04 | 10/08/04 | 10/07/04 | 05/06/05 | 10/05/04 | 10/07/04 | 10/07/04 | 10/07/04 | 01/23/05 | |
| **SP1+HF14** | 11/05/04 | 11/05/04 | 11/04/04 | 11/06/04 | 11/06/04 | 05/06/05 | 11/06/04 | 11/06/04 | 11/06/04 | 11/06/04 | 01/23/05 | |
| **SP1+HF15** | 01/10/05 | 01/10/05 | 01/13/05 | 01/12/04 | 01/12/04 | 05/06/05 | 01/04/05 | 01/06/05 | 01/14/05 | 01/12/05 | 01/23/05 | |
| **SP1+HF16** | 01/10/05 | 01/10/05 | 01/13/05 | 01/12/04 | 01/12/04 | 05/06/05 | 01/04/05 | 01/06/05 | 01/14/05 | 01/12/05 | 01/23/05 | |
| **SP1+HF17** | 01/10/05 | 01/10/05 | 01/13/05 | 01/12/04 | 01/12/04 | 05/06/05 | 01/04/05 | 01/06/05 | 01/14/05 | 01/12/05 | 01/23/05 | |
| **SP1+HF18** | 01/10/05 | 01/10/05 | 01/13/05 | 01/12/04 | 01/12/04 | 05/06/05 | 01/04/05 | 01/06/05 | 01/14/05 | 01/12/05 | 01/23/05 | |
| **SP1+HF19** | 01/10/05 | 01/10/05 | 01/13/05 | 01/12/04 | 01/12/04 | 05/06/05 | 01/04/05 | 01/06/05 | 01/14/05 | 01/12/05 | 01/23/05 | |
| **SP1+HF20** | 01/10/05 | 01/10/05 | 01/13/05 | 01/12/04 | 01/12/04 | 05/06/05 | 01/04/05 | 01/06/05 | 01/14/05 | 01/12/05 | 01/23/05 | |
| **SP1+HF21** | 01/16/05 | 01/16/05 | 01/16/05 | 01/16/05 | 01/16/05 | 05/06/05 | 01/16/05 | 01/16/05 | 01/16/05 | 01/16/05 | 01/23/05 | |
| **SP1+HF22** | 03/16/05 | 02/14/05 | 02/15/05 | 02/14/05 | 02/15/05 | 05/06/05 | 02/11/05 | 02/14/05 | 02/14/05 | 02/15/05 | 02/11/05 | |
| **SP1+HF23** | 03/16/05 | 03/12/05 | 03/16/05 | 03/16/05 | 03/23/05 | 05/06/05 | 03/12/05 | 03/12/05 | 03/29/05 | 03/29/05 | | |
| **SP1+HF24** | 05/24/05 | 05/18/05 | 04/25/05 | 04/25/05 | 05/24/05 | 05/06/05 | 05/23/05 | 05/23/05 | 05/24/05 | 05/24/05 | | |
| **SP1+HF25** | 05/24/05 | 05/18/05 | 05/06/05 | 05/24/05 | 05/24/05 | 05/06/05 | 05/23/05 | 05/23/05 | 05/24/05 | 05/24/05 | | |
| **SP1+HF26** | 05/24/05 | 05/18/05 | 05/06/05 | 05/24/05 | 05/24/05 | 05/06/05 | 05/23/05 | 05/23/05 | 05/24/05 | 05/24/05 | | |
| **SP1+HF27** | | | | | | | 06/29/05 | | | | | causes problems, don't install |
| **SP1+HF28** | | | | | | | 08/10/05 | 08/02/05 | | | | |

## CARIS Utililties

| | FA_Process_1 | FA_Process_2 | FA_Process_3 | FA_Process_4 | FA_Process_6 | FA_Process_7 | FA_Process_8 | FA_Process_9 | FA_CST | FA_FOO | FA_Mobile2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LUv2.1.0** | 05/05/04 | 08/02/04 | 05/05/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/13/04 | 01/23/05 |
| **CPCR v2.0** | 06/14/04 | 08/02/04 | 08/02/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/11/04 | 01/23/05 |
| **EasyENCv3.0** | 11/05/04 | 10/07/04 | 10/07/04 | 10/08/04 | 09/23/04 | 05/06/05 | 10/08/04 | 09/23/04 | 10/07/04 | 10/07/04 | N/A |
| **ConvUtilityv2.0.0.2** | 2/9/2005 | 2/14/2005 | 2/9/2005 | 2/9/2005 | 2/10/2005 | 05/06/05 | 2/9/2005 | 2/9/2005 | 2/14/2005 | 2/15/2005 | N/A |

## CARIS GIS

| | FA_Process_1 | FA_Process_2 | FA_Process_3 | FA_Process_4 | FA_Process_6 | FA_Process_7 | FA_Process_8 | FA_Process_9 | FA_CST | FA_FOO | FA_Mobile2 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **v4.4a** | 05/05/04 | 08/02/04 | 05/05/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/13/04 | N/A | |
| **LUv2.1.0** | 05/05/04 | 08/02/04 | 05/05/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/13/04 | N/A | |
| **SP4** | 05/05/04 | 08/02/04 | 05/05/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/13/04 | N/A | |
| **SP4+HF1** | 06/14/04 | 08/02/04 | 05/05/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/13/04 | N/A | |
| **SP4+HF2** | 06/14/04 | 08/02/04 | 05/05/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/13/04 | N/A | |
| **SP4+HF3** | 06/14/04 | 08/02/04 | 05/05/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/13/04 | N/A | |
| **SP4+HF4** | 06/17/04 | 08/02/04 | 05/05/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/13/04 | N/A | |
| **SP4+HF5** | 06/17/04 | 08/02/04 | 08/03/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/13/04 | N/A | |
| **SP4+HF6** | 08/03/04 | 08/02/04 | 08/03/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/13/04 | N/A | |
| **SP4+HF7** | 08/03/04 | 08/02/04 | 08/03/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/13/04 | N/A | |
| **SP4+HF8** | 08/03/04 | 08/02/04 | 08/03/04 | 08/02/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/02/04 | 08/04/04 | 08/13/04 | N/A | |
| **SP4+HF9** | 08/26/04 | 08/26/04 | 08/26/04 | 08/26/04 | 09/11/04 | 05/06/05 | 08/26/04 | 08/26/04 | 08/26/04 | 08/26/04 | N/A | |
| **SP4+HF10** | 08/31/04 | 08/31/04 | 08/31/04 | 08/31/04 | 09/11/04 | 05/06/05 | 08/31/04 | 09/01/04 | 08/31/04 | 09/01/04 | N/A | |
| **SP4+HF11** | 11/05/04 | 11/05/04 | 11/04/04 | 11/06/04 | 11/06/04 | 05/06/05 | 11/06/04 | 11/06/04 | 11/06/04 | 11/06/04 | N/A | |
| **SP4+HF12** | 11/05/04 | 11/05/04 | 11/04/04 | 11/06/04 | 11/06/04 | 05/06/05 | 11/06/04 | 11/06/04 | 11/06/04 | 11/06/04 | N/A | |
| **SP4+HF13** | 11/05/04 | 11/05/04 | 11/04/04 | 11/06/04 | 11/06/04 | 05/06/05 | 11/06/04 | 11/06/04 | 11/06/04 | 11/06/04 | N/A | |
| **SP4+HF14** | 11/05/04 | 11/05/04 | 11/04/04 | 11/06/04 | 11/06/04 | 05/06/05 | 11/06/04 | 11/06/04 | 11/06/04 | 11/06/04 | N/A | |
| **SP4+HF15** | 11/05/04 | 11/05/04 | 11/04/04 | 11/06/04 | 11/06/04 | 05/06/05 | 11/06/04 | 11/06/04 | 11/06/04 | 11/06/04 | N/A | |
| **SP4+HF16** | 01/10/05 | 01/10/05 | 01/13/05 | 01/12/05 | 01/12/05 | 05/06/05 | 01/04/05 | 01/06/05 | 01/14/05 | 01/12/05 | N/A | |
| **SP4+HF17** | 01/10/05 | 01/10/05 | 01/13/05 | 01/12/05 | 01/12/05 | 05/06/05 | 01/04/05 | 01/06/05 | 01/14/05 | 01/12/05 | N/A | |
| **SP4+HF18** | 01/10/05 | 01/10/05 | 01/13/05 | 01/12/05 | 01/12/05 | 05/06/05 | 01/04/05 | 01/06/05 | 01/14/05 | 01/12/05 | N/A | |
| **SP4+HF19** | 01/10/05 | 01/10/05 | 01/13/05 | 01/12/05 | 01/12/05 | 05/06/05 | 01/04/05 | 01/06/05 | 01/14/05 | 01/12/05 | N/A | |
| **SP4+HF20** | 01/10/05 | 01/10/05 | 01/13/05 | 01/12/05 | 01/12/05 | 05/06/05 | 01/04/05 | 01/06/05 | 01/14/05 | 01/12/05 | N/A | |
| **SP4+HF21** | 01/10/05 | 01/10/05 | 01/13/05 | 01/12/05 | 01/12/05 | 05/06/05 | 01/04/05 | 01/06/05 | 01/14/05 | 01/12/05 | N/A | |
| **SP4+HF22** | 2/9/2005 | 2/14/2005 | 02/09/05 | 02/09/05 | 2/9/2005 | 05/06/05 | 02/09/05 | 02/09/05 | 02/01/05 | 02/15/05 | N/A | |
| **SP4+HF23** | 2/9/2005 | 2/14/2005 | 02/09/05 | 02/09/05 | 2/9/2005 | 05/06/05 | 02/09/05 | 02/09/05 | 02/01/05 | 02/15/05 | N/A | |
| **SP4+HF24** | 2/9/2005 | 2/14/2005 | 02/09/05 | 02/09/05 | 2/9/2005 | 05/06/05 | 02/09/05 | 02/09/05 | 02/01/05 | 02/15/05 | N/A | |
| **SP4+HF25** | 2/9/2005 | 2/14/2005 | 02/09/05 | 02/09/05 | 2/9/2005 | 05/06/05 | 02/09/05 | 02/09/05 | 2/14/2005 | 02/15/05 | N/A | |
| **SP4+HF26** | 2/9/2005 | 2/14/2005 | 02/09/05 | 02/09/05 | 2/9/2005 | 05/06/05 | 02/09/05 | 02/09/05 | 2/14/2005 | 02/15/05 | N/A | |
| **SP4+HF27** | 2/9/2005 | 2/14/2005 | 02/09/05 | 02/09/05 | 2/9/2005 | 05/06/05 | 02/09/05 | 02/09/05 | 2/14/2005 | 02/15/05 | N/A | |
| **SP4+HF28** | 2/9/2005 | 2/14/2005 | 02/09/05 | 02/09/05 | 2/9/2005 | 05/06/05 | 02/09/05 | 02/09/05 | 2/14/2005 | 02/15/05 | N/A | |
| **SP4+HF29** | 2/9/2005 | 2/14/2005 | 02/09/05 | 02/09/05 | 2/9/2005 | 05/06/05 | 02/10/05 | 02/09/05 | 2/14/2005 | 02/15/05 | N/A | |
| **SP4+HF30** | 03/16/05 | 05/18/05 | 03/16/05 | 03/16/05 | 03/23/05 | 05/06/05 | 03/16/05 | 03/16/05 | 03/29/05 | 03/29/05 | N/A | |
| **SP4+HF31** | 05/24/05 | 05/18/05 | 04/25/05 | 04/25/05 | 05/24/05 | 05/06/05 | 05/23/05 | 05/23/05 | 05/24/05 | 05/24/05 | | |
| **SP4+HF32** | 05/24/05 | 05/18/05 | 04/25/05 | 04/25/05 | 05/24/05 | 05/06/05 | 05/23/05 | 05/23/05 | 05/24/05 | 05/24/05 | | |
| **SP4+HF33** | 05/24/05 | 05/18/05 | 05/06/05 | 05/24/05 | 05/24/05 | 05/06/05 | 05/23/05 | 05/23/05 | 05/24/05 | 05/24/05 | | |
| **SP5** | | | | | | | | 08/02/05 | | | | |
| **SP5+HF1** | | | | | | | | 08/02/05 | | | | |
| **SP5+HF2** | | | | | | | | 08/02/05 | | | | |
| **SP5+HF3** | | | | | | | | 08/02/05 | | | | |

# CARIS NOTEBOOK

| | FA_Process_1 | FA_Process_2 | FA_Process_3 | FA_Process_4 | FA_Process_6 | FA_Process_7 | FA_Process_8 | FA_Process_9 |
|---|---|---|---|---|---|---|---|---|
| **v2.1** | 05/14/04 | 08/06/04 | 08/09/04 | 08/06/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/06/04 |
| **SP1** | 06/23/04 | 08/06/04 | 08/09/04 | 08/06/04 | 09/11/04 | 05/06/05 | 08/02/04 | 08/06/04 |
| **SP1+HF1** | 08/06/04 | 08/06/04 | 08/09/04 | 08/06/04 | 09/11/04 | 05/06/05 | 08/06/04 | 08/06/04 |
| **v2.2BETA** | 2/9/2005 | 02/14/05 | 2/9/2005 | 2/14/2005 | 01/31/05 | 05/06/05 | 2/9/2005 | 2/9/2005 |
| **v2.2BETA2** | 03/25/05 | | | | | | | |
| **v2.2** | 07/11/05 | 07/12/05 | 07/12/05 | 07/12/05 | 07/11/05 | 07/12/05 | 07/12/05 | 07/12/05 |
| **v2.2+HF1** | | | | | | | | |

| FA_CST | FA_FOO | FA_Mobile2 | Comments |
|---|---|---|---|
| 08/06/04 | 08/13/04 | 01/23/05 | |
| 08/06/04 | 08/13/04 | 01/23/05 | |
| 08/06/04 | 08/13/04 | 01/23/05 | |
| 02/01/05 | 02/15/05 | 01/23/05 | |
| 03/25/05 | | | |
| 07/11/05 | 07/12/05 | | |
| 08/01/05 | | | |

# PYDRO

| | FA_Process_1 | FA_Process_2 | FA_Process_3 | FA_Process_4 | FA_Process_6 | FA_Process_7 | FA_Process_8 | FA_Process_9 | FA_CST | FA_FOO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **v4.5.1** | 06/14/04 | | | | | | | | | | |
| **v4.6.1** | 08/03/04 | 08/05/04 | 08/05/04 | 08/05/04 | | | 08/05/04 | 08/05/04 | 08/06/04 | 08/13/04 | |
| **v4.6.1patches** | 08/03/04 | 08/05/04 | 08/05/04 | 08/05/04 | | | 08/05/04 | 08/05/04 | 08/06/04 | 08/13/04 | |
| **v4.7.1** | 08/05/04 | 08/05/04 | 08/05/04 | 08/05/04 | | | 08/05/04 | 08/05/04 | 08/06/04 | 08/13/04 | |
| **v4.8.2** | 08/26/04 | 08/26/04 | 08/25/04 | 08/26/04 | | | 08/26/04 | 08/26/04 | 08/26/04 | 08/26/04 | |
| **v4.8.3** | 08/31/04 | 08/31/04 | 08/31/04 | 08/31/04 | | | 08/31/04 | 09/01/04 | 08/31/04 | 09/01/04 | |
| **v4.9.0** | 09/12/04 | 09/12/04 | 09/12/04 | 09/12/04 | 09/12/04 | | 09/12/04 | n/a | 09/12/04 | | |
| **v4.9.1** | 09/30/04 | 10/04/04 | 10/04/04 | 10/08/04 | 10/07/04 | | 10/5/2004 | 10/07/04 | 10/07/04 | 10/07/04 | |
| **v4.9.1a** | 10/04/04 | 10/04/04 | 10/04/04 | 10/08/04 | 10/07/04 | | 10/05/04 | 10/07/04 | 10/07/04 | 10/07/04 | You can import GP's w/ this version |
| **v4.9.3** | 11/27/04 | 11/27/04 | 11/19/04 | 11/27/04 | 11/27/04 | | 11/27/04 | 11/27/04 | 11/27/04 | 11/27/04 | |
| **v5.2.0** | 02/24/05 | n/a | 02/24/05 | 02/24/05 | 02/24/05 | | n/a | 02/24/05 | 02/24/05 | 02/24/05 | |
| **v5.2.1** | n/a | n/a | n/a | n/a | 02/28/05 | | 02/28/05 | n/a | 02/28/05 | n/a | |
| **v5.3.0** | 03/12/05 | 03/12/05 | 03/12/05 | 03/12/05 | 03/11/05 | | 03/12/05 | 03/12/05 | 03/12/05 | 03/12/05 | |
| **v5.3.1** | 3/16/2005 | 3/16/2005 | 3/16/2005 | 3/16/2005 | 03/29/05 | | 03/16/05 | 03/16/05 | 03/29/05 | 03/29/05 | |
| **v5.3.2** | 05/24/05 | 05/18/05 | 05/06/05 | 05/06/05 | 05/06/05 | 05/18/05 | 05/06/05 | 03/23/05 | 05/24/05 | 05/06/05 | |
| **v5.3.3rc3** | 06/29/05 | 06/29/05 | 07/10/05 | 06/29/05 | 06/15/05 | 06/29/05 | 06/29/05 | 06/29/05 | 06/15/05 | 06/29/05 | |
| **v5.3.3rc3HF1** | 07/21/05 | 07/21/05 | 07/21/05 | 07/21/05 | 07/22/05 | 07/22/05 | 07/21/05 | 07/21/05 | 07/22/05 | 07/28/05 | Fixes Windows permissions issue |

# Fledermaus

| | OLAB | 1010_NAV | 1018_NAV | Fa-Process 1 | Comments |
|---|---|---|---|---|---|
| **v8.5.2** | 07/31/04 | 8/10/2004 | 8/12/2004 | | |
| **v8.6.0** | n/a | n/a | n/a | | doesn't really apply directly to us |
| | | **1010_ACQ** | **1010_ACQ** | | |
| **v8.7.2** | 2/9/2005 | 2/11/2005 | 2/28/2005 | | |
| **v8.7.3** | | | | | |
| **v8.7.5** | | | | 4/5/2005 | |
| **v8.7.6** | | | | 5/6/2005 | |

## Fledermaus

| | FA_Process_1 | FA_Process_2 | FA_Process_3 | FA_Process_4 | FA_Process_5 | FA_Process_6 | FA_Process_7 | FA_Process_8 | FA_Process_9 | FA_FOO | FA_CST | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **v6.1.0** | | | 07/28/04 | | | | | 07/28/04 | | | | |
| **V6.1.1** | | | 08/03/04 | | | | | 08/03/04 | | 08/13/04 | | |
| **v6.1.2c** | | | 10/05/04 | | | | | 10/07/04 | | 10/07/04 | | |
| **v6.1.3** | | | 01/10/05 | | | | | 01/04/05 | | 01/12/05 | | 2 roving keys |
| **v6.1.3i** | | | 03/07/05 | | | | | | | 03/29/05 | | What does this do? We don't know. |
| **v6.1.4a** | | | 04/18/05 | | | | | | | | | |
| **v6.1.4d** | **8/15/2005** | 08/13/05 | 08/13/05 | 08/15/05 | | 08/13/05 | 08/13/05 | 08/13/05 | 08/13/05 | | | 1 local key on Proc 3 and 1 Network key on FADC1 |

# MapInfo

| | FA_Process_1 | FA_CST | FA_Process_3 | FA_FOO | FA_Process_6 | FA_Process_5 | FA_Process_7 | Comments |
|---|---|---|---|---|---|---|---|---|
| **v7.5 (4)** | 06/15/04 | 08/04/04 | 07/30/04 | 09/01/04 | 10/07/04 | | | Removed from FA_Process_1, FA_ |
| **v7.8** | | 05/24/05 | 05/06/05 | 05/24/05 | | | 05/18/05 | Upgrade |

# Hardware Systems Inventory

## Integrated Hardware

| ***Sonar*** |
|---|
| Reson Seabat 8111ER |
| Reson Seabat 8160 |
| Reson Seabat 8101ER |
| Reson 81-P Processor |

| ***Positioning*** |
|---|
| POS/MV 320 v3 with TrueHeave |
| |
| |
| |

## Auxiliary Hardware

| **Sonar** |
|---|
| Ceeducer with integrated DGPS |
| Divers Least Depth Gauge |
| Leadlines |

| **Positioning** |
|---|
| MBX-3S DGPS receiver |
| Trimble Backpack |
| Impulse LR Hand-held Laser |
| |
| Ashtech Z-Extreme GPS receiver |

| **Sound Velocity** |
|---|
| SBE 45 Micro Thermosalinograph (TSG) |
| SBE 19*plus* SEACAT Profiler |
| Moving Vessel Profiler (MVP) |

| **Tide** |
|---|
| Carl Zeiss NI2 333 level |
| Leica NA2 100 level |

| S220 Hardware | | | | | | |
|---|---|---|---|---|---|---|
| **Unit** | **S/N** | **Software/Firmware Version** | **Date of Installation** | **Service** | **Calibration** | **Comment** |
| POS/MV PCS | 846 | 2.16 | Apr-04 | | | |
| POS/MV IMU | 292 | N/A | Apr-04 | | | |
| POS/MV Port Ant. | SGN 98490013 | N/A | Apr-04 | | | |
| POS/MV Stbd Ant. | CGN 96200099 | N/A | Apr-04 | | | |
| DGPS Receiver | 0426-16627-0001 | N/A | 7/2004 | | | |
| DGPS Ant. | | N/A | Apr-04 | | | |
| Reson 81-P Processor (8111) | 35652 | N/A | May-04 | | | |
| Reson 81-P Processor (8160) | 35385 | N/A | May-04 | | | |
| Reson 8111 Transducer | | Dry:8111-E209-6114<br>Wet: 8111-E101-AFAA | Apr-04 | | | |
| Reson 8160 Transducer | | Dry:8160-2.09-7C6D<br>Wet:8160-1.00-E9E1 | Apr-04 | | | |

| 1010 Hardware Serial Numbers | | | | | | |
|---|---|---|---|---|---|---|
| **Unit** | **S/N** | **Software/Firmware Version** | **Date of Installation** | **Service** | **Calibration** | **Comment** |
| POS/MV PCS | 788 | 2.16 | Jul-04 | | | |
| POS/MV IMU | 294 | N/A | Jul-04 | | | |
| POS/MV Port Ant. | SGN 00160051 | N/A | Jul-04 | | | |
| POS/MV Stbd Ant. | SGN 00120116 | N/A | Jul-04 | | | |
| DGPS Receiver | 0331-12579-0008 | N/A | Jul-04 | | | |
| DGPS Ant. | | N/A | Jul-04 | | | |
| Reson 81-P Processor | 34497 | N/A | Jul-04 | | | |
| Reson 8101 Transducer | 2701011 | Dry:<br>Wet: | Jul-04 | | | removed 10/6/04 for repair |

| 1018 Hardware Serial Numbers | | | | | | |
|---|---|---|---|---|---|---|
| **Unit** | **S/N** | **Software/Firmware Version** | **Date of Installation** | **Service** | **Calibration** | **Comment** |
| POS/MV PCS | 786 | 2.16 | Jul-04 | | | |
| POS/MV IMU | 323 | N/A | Jul-04 | | | |
| POS/MV Port Ant. | SGN 99330009 | N/A | Jul-04 | | | |
| POS/MV Stbd Ant. | SGN 98370085 | N/A | Jul-04 | | | |
| DGPS Receiver | 0328-12352-0001 | N/A | Jul-04 | | | |
| DGPS Ant. | | N/A | Jul-04 | | | |
| Reson 81-P Processor | 35737 | N/A | Jul-04 | | | |
| Reson 8101 Transducer | 3102026 | Dry:<br>Wet: | Jul-04 | | | |

| Ceeducer Hardware Serial Numbers | | | | | | |
|---|---|---|---|---|---|---|
| **Unit** | **S/N** | **Software/Firmware Version** | **Date of Installation** | **Service** | **Calibration** | **Comment** |
| Ceeducer Transducer | No S/N visible | | | | | not functional as of Nov '04 |
| Ceeducer GPS Ant. | 0238-10468-0004 | | | | | |
| Ceeducer Processor | 409 | | | | | |

| Trimble Backpack 1 Hardware Serial Numbers | | | | | | |
|---|---|---|---|---|---|---|
| Unit | S/N | Software/Firmware Version | Date of Installation | Service | Calibration | Comment |
| Pro XRS | 0224078543 | | | | | |
| Antenna | 0220341062 | | | | | |

| Trimble Backpack 2 Hardware Serial Numbers | | | | | | |
|---|---|---|---|---|---|---|
| Unit | S/N | Software/Firmware Version | Date of Installation | Service | Calibration | Comment |
| Pro XRS | 0224090101 | | | | | |
| Antenna | 0220321059 | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| TSCe handheld data collector | P/N45268-50 | | | | | Field Laptop/Tougbooks can be used instead of the TSCe handheld data collector |

| Addl Parts | P/N |
|---|---|
| Antenna cable | 22628 |
| Camcorder Batteries | 17466 |
| NMEA/RTCM cable | 30232-00 |
| data/power cable | 30231-00 |
| dual battery cable | 24333 |
| GPS Pathfinder field device cable | 45052 |

| Levels | | | | | | |
|---|---|---|---|---|---|---|
| **Unit** | **S/N** | **Software/Firmware Version** | **Date of Installation** | **Service** | **Calibration** | **Comment** |
| Carl Zeiss NI2 333 | 100056 | | calibrated 03/2004 | | | |
| Carl Zeiss NI2 333 | 103567 | | | | | |
| Leica NA2 100 | 5332739 | | | | | |
| Leica NA2 100 | 5332747 | | | | | |

| HORIZONTAL CONTROL | | | | | | |
|---|---|---|---|---|---|---|
| **Unit** | **S/N** | **Software/Firmware Version** | **Date of Installation** | **Service** | **Calibration** | **Comment** |
| Ashtech Z-Xtreme Receiver | ZE1200339016 | ZE00 | | | 3/7/2005 | |
| Ashtech Geodetic 4 GPS Antenna | 8365 | | | | 3/7/2005 | |
| Pacfic Crest Position Data Link High Powered Base Unit | | | | | 3/7/2005 | |
| Pacfic Crest Position Data Link Rover | | | | | 3/7/2005 | |
| Marine Deep Cycle Battery | | | | | 3/7/2005 | |
| Solar Panel | | | | | 3/7/2005 | |

| SEACATs | | | | | | |
|---|---|---|---|---|---|---|
| **Unit** | **S/N** | **Software/Firmware Version** | **Date of Installation** | **Service** | **Calibration** | **Comment** |
| SBE 19plus SEACAT Profiler | 19P36026-4585 | on S220 | | n/a | | based on use, not returned for cal in '05 |
| SBE 19plus SEACAT Profiler | 19P36026-4617 | | | n/a | | based on use, not returned for cal in '05 |
| SBE 19plus SEACAT Profiler | 19P36026-4616 | | | n/a | | based on use, not returned for cal in '05 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SBE 45 Micro Thermosalinograph (TSG) | | | | | | |

| OFFICERS | | | | | | |
|---|---|---|---|---|---|---|
| **Name** | **CDR John E. Lowell** | **LDCR Doug D. Baird** | **LT Mark Wetzler** | **Abigail Higgins** | **Michael Gonsalves** | **Jon French** |
| **Rate** | CO | XO | FOO | NAV | ENS | ENS |
| **Sevice on Fairweather** | 1 years<br>6 months | 1 years<br>2 months | 1 years<br>2 months | 1 years<br>3 months | 0 years<br>9 months | 0 years<br>9 months |
| **Hydrographic Experience** | 21 years<br>5 months | 9 years<br>10 months | 6 years<br>5 months | 1 years<br>8 months | 0 years<br>9 months | 0 years<br>9 months |
| **Fast Rescue Boat** | July 2004 | July 2004 | July 2004 | July 2004 | Nov 2004 | Nov 2004 |
| **Basic Hydro** | | | | 2004 | 2005 | 2005 |
| **Hydro presenter** | | | 2002-present | | | |
| **SWMB Course** | | | 2002 | 2005 | | |
| **CARIS HIPS** | | | 2001 | | | |
| **RESON Training** | | | Oct 2004 | Oct 2004 | | |
| **COOPS Tide** | | | | | | |
| **Launch PIC Qualified** | | | | | | |
| **Survey PIC Qualified** | | | | | | |
| **Launch Cox'n Qualified** | | | | | | |
| **OOD Qualified** | | | | | | |
| **Other Education, Training, and Qualifications** | | OJT October 1995-June 1999; SWMB January 1999, Qual's: NGS GPS Field party January 1993-March 1994 (GPS Horizontal Control experience) | CARIS HOM Training, Applanix POS/MV training, TEI ISIS training | | | |

| | **Authorized** | **Actual** | **Percentage** |
|---|---|---|---|
| **Mission** | 6 | 4 | 67% |
| **Support** | 2 | 2 | 100% |

| ENGINEERING | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Name** | **William Ness** | **1AE** | **James Hagen** | **Paul Tadesco** | **Greg Bryant** | **Dymitric McDonald** | **Dan Johnson** |
| **Rate** | CME | | 2AE | 3AE | W | GVA | GVA |
| **Service on Fairweather** | 1 years | | 0 years | 0 years | 0 years | 1 years | 0 years |
| | 6 months | | 4 months | 5 months | 4 months | 3 months | 5 months |
| **Engineering Experience** | 11 years | | Not Available | 1 years | 0 years | 1 years | 0 years |
| | 3 months | | Not Available | 5 months | 3 months | 3 months | 5 months |
| **Fast Rescue Boat** | | | | | | July 2004 | |
| **Basic Hydro** | | | | | | | |
| **Launch Cox'n Qual.** | | | | | | | |
| **Other Education, Training, and Qualifications** | | | | | | | |

| | **Authorized** | **Actual** | **Percentage** |
|---|---|---|---|
| **Mission** | | | |
| **Support** | 7 | 6 | 86% |

| SURVEY | | | | | | |
|---|---|---|---|---|---|---|
| **Name** | **Lynnette Morgan** | **Jessica Abrams** | **Grant Froelich** | **Jennifer Keene** | **Verena Kellner** | **Michael Castle** |
| **Rate** | CST | SST | SST | ST | AST | AST |
| **Sevice on Fairweather** | 1 years | 1 years | 1 years | 0 years | 1 years | 0 years |
| | 5 months | 2 months | 2 months | 10 months | 0 months | 11 months |
| **Hydrographic Experience** | 5 years | 3 years | 3 years | 1 years | 1 years | 0 years |
| | 7 months | 6 months | 0 months | 5 months | 0 months | 11 months |
| **Fast Rescue Boat** | July 2004 | July 2004 | July 2004 | Jan 2005 | | Jan 2005 |
| **Basic Hydro** | 2000 & 2001 | 2002 | 2003 | 2004 | 2005 | 2005 |
| **Hydro presenter** | 2003-present | | | | | |
| **SWMB Course** | Dec 2001 | 2004 | Jan 2005 | Jan 2005 | | |
| **CARIS HIPS** | 2001-2005 | Jan 2005 | Jan 2005 | Jan 2005 | March 2005 | Jan 2005 |
| **RESON Training** | Oct 2004 | Oct 2004 | Oct 2004 | Oct 2004 | Oct 2004 | Oct 2004 |
| **COOPS Tide** | 2001 | March 2005 | December 2003 | March 2005 | March 2005 | March 2005 |
| **Launch PIC Qualified** | 2001 | 2004 | 2004 | 2004 | 2005 | |
| **Survey PIC Qualified** | 2001 | | | | | |
| **Launch Cox'n Qualified** | | | | | | |
| **Other Education, Training, and Qualifications** | | | | | | |

| | **Authorized** | **Actual** | **Percentage** |
|---|---|---|---|
| **Mission** | 6 | 6 | 100% |
| **Support** | | | |

| DECK | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Name** | **Garry Guice** | **Eric Heiner** | **Ronald Walker** | **Richard Broome** | **David Grayeagle** | **Clarence Bateman** | **Jim Klapchuck** |
| **Rate** | CB | BGL | DU | GVA | GVA | GVA | GVA |
| **Sevice on Fairweather** | 1 years | 1 years | 1 years | 1 years | 1 years | 0 years | 0 years |
| | 4 months | 5 months | 2 months | 2 months | 6 months | 7 months | 5 months |
| **Deck Experience** | 23 years | 12 years | 21 years | 1 years | 1 years | 0 years | 0 years |
| | 4 months | 4 months | 2 months | 2 months | 6 months | 7 months | 5 months |
| **Fast Rescue Boat** | July 2004 | July 2004 | July 2004 | | Jan 2005 | Feb 2005 | |
| **Basic Hydro** | | 2001 | | | | | |
| **Launch Cox'n Qual.** | | 2000 | | | | | |
| **Other Education, Training, and Qualifications** | | Inland masters license-AB unlimited | STCW 95, Survival Craft, AB Unlimited | | | | |

| | **Authorized** | **Actual** | **Percentage** |
|---|---|---|---|
| **Mission** | 4 | 2 | 50% |
| **Support** | 6 | 5 | 83% |

| STEWARDS | | | |
|---|---|---|---|
| **Name** | **Kathy Brandts** | **Fadhel Saleh** | **Ernest Jones** |
| **Rate** | CS | 2C | 2C |
| **Sevice on Fairweather** | 1 years | 0 years | 0 years |
| | 3 months | 5 months | 8 months |
| **Hydrographic Experience** | 9 years | Not Available | 0 years |
| | 4 months | Not Available | 8 months |
| **Fast Rescue Boat** | | | |
| **Basic Hydro** | | | |
| **Launch Cox'n Qual.** | | | |
| **Other Education, Training, and Qualifications** | | | |

| | **Authorized** | **Actual** | **Percentage** |
|---|---|---|---|
| **Mission** | | | |
| **Support** | 3 | 3 | 100% |

| ETs | | |
|---|---|---|
| **Name** | **Jim Lynn** | **Richard Conway** |
| **Rate** | LET | ET |
| **Sevice on Fairweather** | 1 years | 1 years |
| | 2 months | 2 months |
| **Hydrographic Experience** | 19 years | 1 years |
| | 2 months | 5 months |
| **Fast Rescue Boat** | | |
| **Basic Hydro** | | |
| **Launch Cox'n Qual.** | | |
| **Other Education, Training,** | | |

| | **Authorized** | **Actual** | **Percentage** |
|---|---|---|---|
| **Mission** | | | |
| **Support** | 1 | 1 | 100% |

| NOAA DIVERs | | | | | | |
|---|---|---|---|---|---|---|
| **Name** | **John E. Lowell** | **Doug D. Baird** | **Eric Heiner** | **William Ness** | **Grant Froelich** | **Lynnette Morgan** |
| **Rate** | CO | XO | BGL | CME | SST | CST |
| **Type** | Master Diver | Working Diver | Dive Master, DMT | Working Diver | Working Diver, DMT | Working Diver |
| **Total Diving Experience** | 30 years | 7 years | 6 years | 10 years | 13 years | 3 years |
| | 7 months | 7 months | 7 months | 3 months | 11 months | 11 months |
| **Years as NOAA diver** | 21 years | 7 years | 6 years | 10 years | 2 years | 3 years |
| | 5 months | 7 months | 7 months | 3 months | 7 months | 11 months |

| TOTAL PERCENTAGES | | | |
|---|---|---|---|
| | **Authorized** | **Actual** | **Percentage** |
| **Mission** | 16 | 12 | 75% |
| **Support** | 19 | 17 | 89% |
| **Total** | **35** | **29** | |

**NOAA SHIP FAIRWEATHER (S220)**
**RESON 8111ER VESSEL REPORT 2005**

## Background

NOAA Ship FAIRWEATHER, Hull Registration Number S220, is a 231 foot hydrographic survey vessel built by Aerojet-General Shipyards in Jacksonville Florida. In 2004, the ship underwent a reactivation and modernization program including hull, mechanical, electrical and mission upgrades. The ship underwent conversion to meet American Bureau of Shipping (ABS) Subchapter L classification. Included in this upgrade, an integrated Reson 8111ER multibeam echo sounder (MBES) installed 39.5" starboard of centerline at approximately frame 29. The installation was designed by Seaworthy Systems Inc.

Tests were performed to determine the residual biases of the sensors and sonar system alignment. Data were assessed in CARIS HIPS & SIPS v5.4 (SP 1, Hot Fixes 1-23) calibration mode and applied to the HIPS Vessel File (HVF), S220_8111.HVF.

## Patch Test

Patch tests were performed with NOAA Ship FAIRWEATHER in Eastern Passage, AK on April 7 and 8, 2005 (DN 097 and 103). The patch test data were collected by SST Froelich (DN 097) and AST Kellner and ECO Rheinheimer (DN 103).

Raw ISIS XTF data was converted to CARIS HDCS format. True heave, sound velocity, and predicted tides were applied upon conversion and the lines were "lightly" cleaned in CARIS swath mode to remove major data fliers. The patch test data were then reviewed in CARIS calibration mode independently by SST Froelich, CST Morgan, LT Wetzler and ECO Rheinheimer and other survey personnel to determine the biases.

### *Navigation Time Error*

A Navigation Time Error test has not yet been performed.

A Time Error of -0.01 was inserted into the S220_8111.HVF under Swath 1. This value is justified since the Navigation Time Error is physically the time difference between the time stamps that the POS/MV and the Reson 81-P Sonar Processor place with their data. Given that the configuration of the POS/MV and the Reson 81-P Sonar Processor have not changed since last year, the Navigation Time Error should not have changed. Secondly, the Navigation Time Error for both launches, using an identical configuration, are both 0.01.

As a data quality analysis check a time latency test will be conducted at the earliest possible opportunity.

### *Heading and Pitch*

The heading and pitch bias patch tests were conducted in Eastern Passage over a pinnacle with a radius of 45 m, in an area with an average depth of 90 m and a least depth of 76 m. The rock is located at 56°26'00"N, 132°12'45"W (See *Figure 1*). On DN 097 one set of heading and pitch lines oriented East-West was run. On DN 103 two sets of heading and pitch lines were run, one oriented East-West and the other North-South, as shown in *Figure 1*.

### *Heading*

The heading bias was determined by acquiring data on one or two sets of parallel lines run in opposite directions. On DN 097, the pair of lines were offset from the rock 175 m and 185 m, respectively. Vessel speed was 5 knots. On DN 103 the East-West heading lines were offset 180 m on either side of the rock. The east and west North-South lines on DN 103 were offset 170 m and 150 m, respectively, from the rock.

### *Pitch*

The procedure used to determine the pitch bias was to run one or two pair of coincident lines over the rock at the same speed in different directions. The lines were run at approximately 6 knots. The only difference between DN 097 and 103 was the addition of pitch lines run in the North-South direction.

### *Roll*

The procedures for acquiring roll biases included running one pair of coincident lines over a locally flat area with an approximate depth of 110 m at approximately 6 knots (see *Figure 1*). Data was acquired for four lines on each of DN 097 and 103.

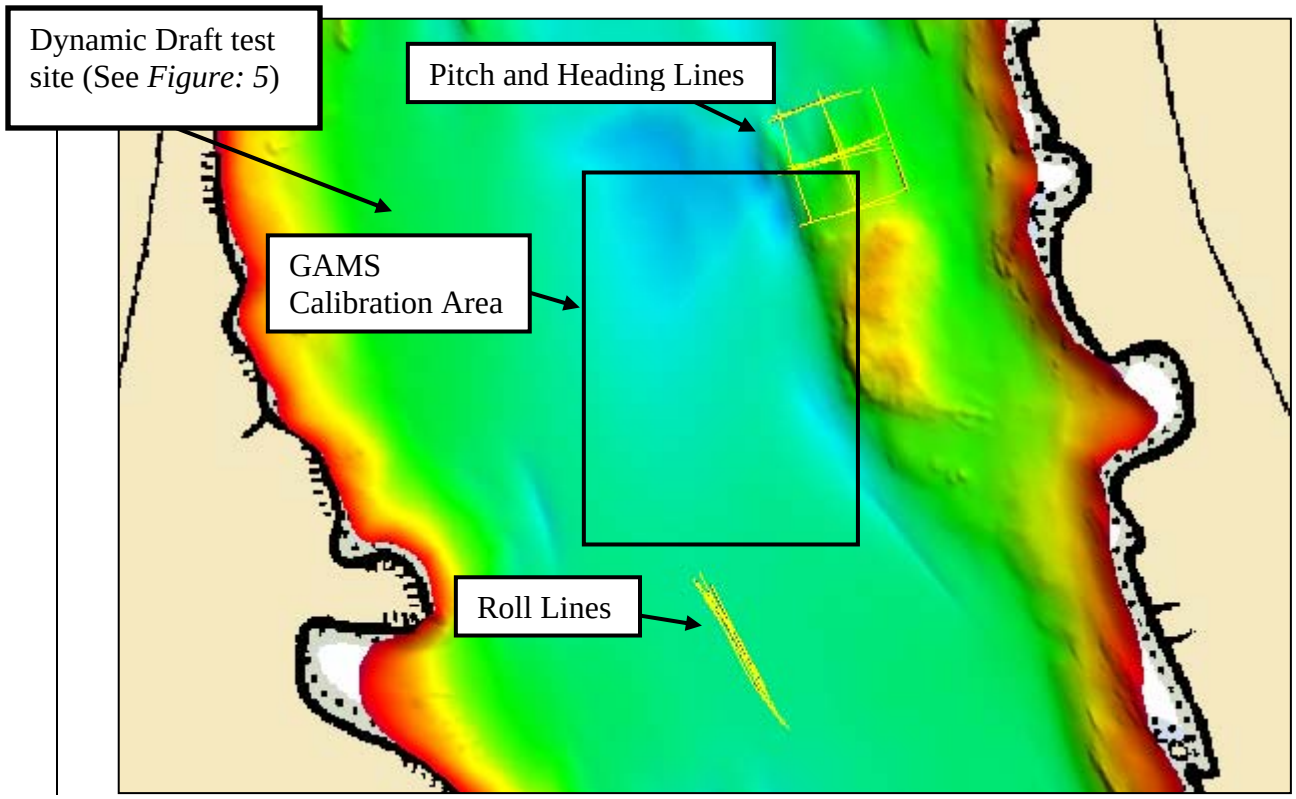



**Figure 1. Location of Pitch, Heading, and Roll Lines and GAMS Calibration.**

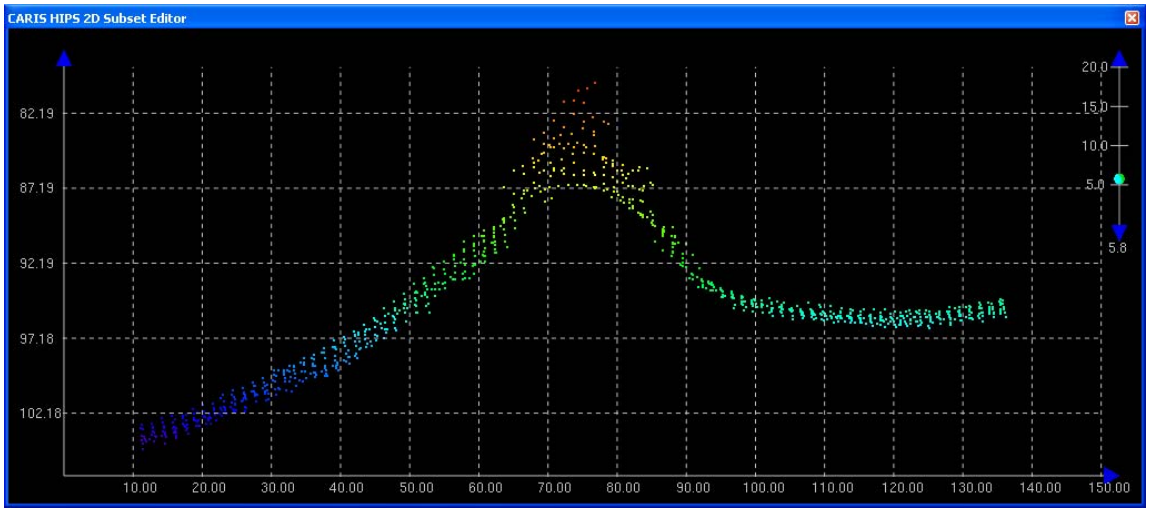



**Figure 2. Pinnacle used for Pitch and Heading Patch Tests.**

### *Patch Test Results*

The results of the patch tests for each of DN 097 and 103 are given in *Table 1*, below.

| Patch Bias | DN 097 Biases | DN 103 Biases | HVF Bias Values |
|---|---|---|---|
| Time Error | N/A | N/A | -0.01 |
| Pitch | -0.35° | -0.1 | -0.1 |
| Roll | 0.0° | 0.01 | 0.01 |
| Heading | -0.25° | -0.37 | -0.35 |

**Table 1: S220 Patch Test Bias Values**

## Dynamic Draft Settlement and Squat Method (DDSSM)

The DDSSM test was conducted April 14, 2005 (DN 104) in Zimovia Strait near Wrangell, AK. Lines were run at location 56°25'54"N, 132°25'40"W in approximately 25 m of water (see *Figure 3*). The dynamic draft data were collected by AST Kellner and ECO Rheinheimer.

One line was run ten (10) times in the same direction at speeds ranging from 3.5 to 13.3 knots. At three points along the line, data were collected with the engine in idle (dead in water or DIW, see *Figure 3*).

SVP and predicted tides (single station) were applied in CARIS HIPS and lines were "lightly" cleaned in CARIS swath mode to remove major data fliers and filtered to 40° from nadir to remove outer beams. The data were then processed by LT Wetzler using DDSSM as documented in the Draft Field Procedures Manual (January 2005). DDSSM results were saved to S220_DDSSM Settlement and Squat.xls located in Appendix III-S220-4.

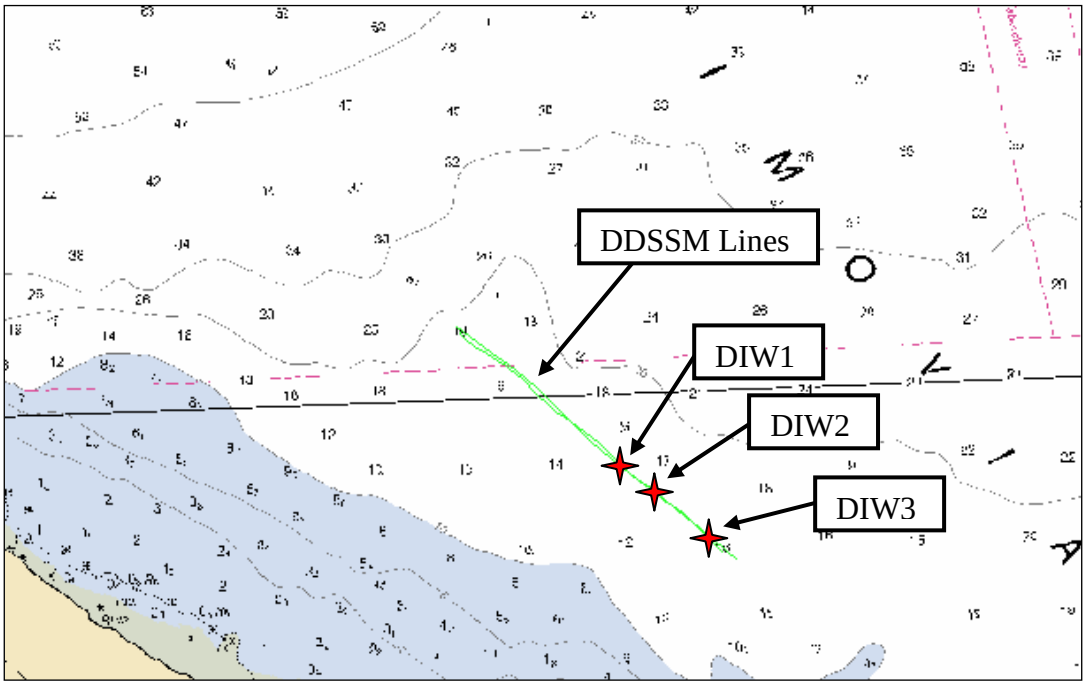



**Figure 3. Dynamic Draft test site for S220.**

Results of the DDSSM test have not been calculated at this time. FAIRWEATHER personnel are waiting to process the test until observed tides and possibly a zone definition file can be downloaded.

## POS/MV GAMS Calibration

POS/MV GPS Azimuth Measurement Subsystem (GAMS) calibration occurred on April 7 (DN 097) near Eastern Passage (see *Figure 1*). GAMS calibration was performed by SST Froelich.

The GAMS heading calibration threshold was initially set to 0.300°. FAIRWEATHER was maneuvered in figure-eights to lower the heading accuracy as much as possible. The best heading accuracy value achieved during this process was 0.721°. The vessel steadied up on a constant heading and GAMS calibration was requested. When the calibration was complete, the POS/MV settings were saved to the file S220_040705_posmv.nvm and are listed below in *Table 2*.

The detailed POS/MV Calibration Report, S220_POS_Calibration_Dn087.xls, is located in Appendix III.

| Component | DN 097 Value |
|---|---|
| Number of Satellites | 9 |
| PDOP | 2.024 |
| Baseline Vector X | -0.031 m |
| Baseline Vector Y | 4.067 m |
| Baseline Vector Z | 0.026 m |
| Two Antenna Separation | 4.067 m |
| Heading Correction | 0.000 ° |

**Table 2: POS/MV GAMS Calibration Results**

## Recommendations

The patch test calibration results are based on averages from DN 097 and DN 103. The HVF values listed in table 1 should be used until such a time or event warrants a new calibration.

The POS/MV GAMS calibration results from April 7 (DN 097) should be used until such a time or event warrants a new calibration.

Dynamic Draft Settlement and Squat results will be calculated and utilized at the earliest opportunity.

**ADDENDUM 1**
**NOAA SHIP FAIRWEATHER (S220)**
**RESON 8111ER VESSEL REPORT 2005**

## Background

The Dynamic Draft and Settlement and Squat Method DDSSM test was conducted April 14, 2005 (DN 104) in Zimovia Strait near Wrangell, AK. However, the test was not processed immediately, pending availability of Verified Tides.

This Addendum 1 of the NOAA Ship FAIRWEATHER Reson 8111ER Vessel Report 2005 documents the results of the DDSSM test and provides a recommendation regarding their use.

## Dynamic Draft Settlement and Squat Method (DDSSM)

One line was run ten (10) times in the same direction at speeds ranging from 3.5 to 13.3 knots. At three points along the line, data were collected with the engine in idle (dead in water or DIW, see *Figure 3* in the initial report).

Sound velocity information and verified tides from the primary National Water Level NLOWN tide gauge 945-0460 were applied in CARIS HIPS and lines were “lightly” cleaned in CARIS swath mode to remove major data fliers and filtered to 40° from nadir to remove outer beams. The data were then processed by LT Wetzler using DDSSM as documented in the Draft Field Procedures Manual (January 2005), with the exception of the idle positions. DDSSM results were saved to the spreadsheet S220_DDSSM_Results.xls and are attached.

Upon processing the data it was determined that the idle positions were unusable. Due to a strong set the nadir beams of the idle positions were 10’s of meters off from the nadir beams of the speed lines. The settlement and squat value of the 0 knot run was extrapolated, and found to be 4.7 cm, by using the slope of the 3.5 knot and 5.5 knot runs. The settlement and squat value for the 0 knot run was then set to 0 cm and the remaining settlement and squat values were reduced by 4.7 cm.

Since the 3 idle positions were not usable six locations in the last 500 m of the line were examined. The use of more locations allowed a better determination of the standard deviation within the results. An average standard deviation of 0.043 m was determined. From the RESON 8111ER documentation the range resolution of the system is 0.037 m. These values show good agreement.

The average change in depth from dead in water for each speed is shown below in *Table 3*.

| Speed (kts) | Average Delta Draft (m) |
|---|---|
| 0 | 0 |
| 3.5 | -0.047 |
| 5.5 | -0.074 |
| 7.5 | -0.074 |
| 8.1 | -0.026 |
| 9.5 | -0.015 |
| 11.3 | 0.021 |
| 13.2 | 0.162 |

**Table 3: DDSSM Test Results**

## Recommendations

The DDSSM results obtained from April 14 (DN 104) and included in Table 3 should be used until such a time or event warrants a new calibration. These values can be used for both the RESON 8111ER and the RESON 8160.

The patch test calibration results are based on averages from DN 097 and DN 103. The HVF values listed in table 1 should be used until such a time or event warrants a new calibration.

The POS/MV GAMS calibration results from April 7 (DN 097) should be used until such a time or event warrants a new calibration.

A Navigation Time Error latency test should be conducted at the earliest opportunity.

## S220 DDSSM Results

| Average | Speed |
|---|---|
| 0 | 0 |
| -0.047 | 3.5 |
| -0.074 | 5.5 |
| -0.074 | 7.5 |
| -0.026 | 8.1 |
| -0.015 | 9.5 |
| 0.021 | 11.3 |
| 0.162 | 13.2 |

**DDSSM Values with Adjustment**

**Location 1**

| Speed | Delta Depth |
|---|---|
| 3.5 | 0 |
| 5.5 | 0.007 |
| 7.5 | 0.027 |
| 8.1 | 0.048 |
| 9.5 | 0.094 |
| 11.3 | 0.119 |
| 13.2 | 0.233 |

**Location 2**

| Speed | DD2 |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.049 |
| 7.5 | -0.087 |
| 8.1 | 0 |
| 9.5 | 0.012 |
| 11.3 | 0.03 |
| 13.2 | 0.206 |

**Location 3**

| Speed | DD3 |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.07 |
| 7.5 | -0.029 |
| 8.1 | 0.011 |
| 9.5 | -0.005 |
| 11.3 | 0.061 |
| 13.2 | 0.248 |

**Location 4**

| | |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.005 |
| 7.5 | 0.027 |
| 8.1 | 0.078 |
| 9.5 | 0.03 |
| 11.3 | 0.087 |
| 13.2 | 0.129 |

**Location 5**

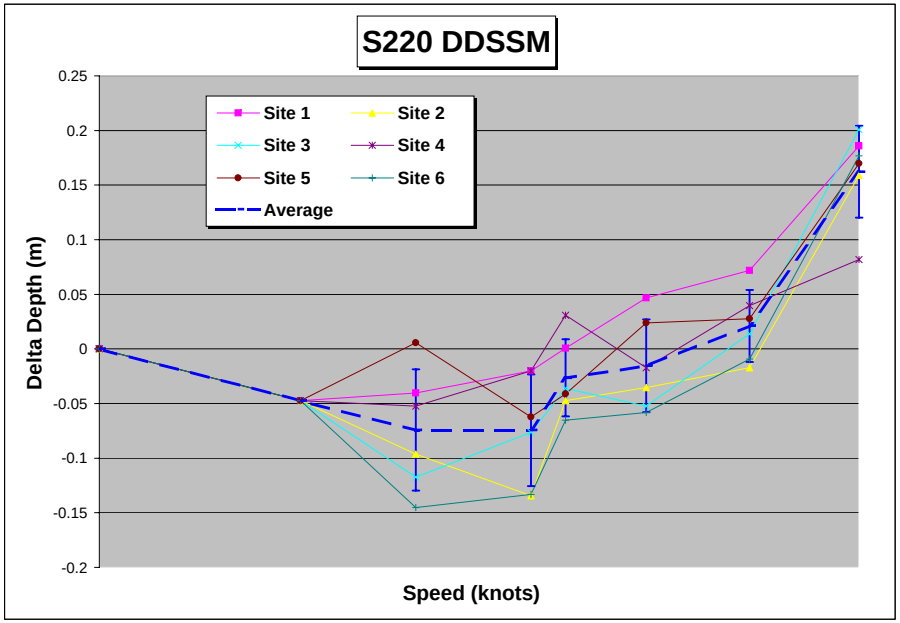
| | |
|---|---|
| 3.5 | 0 |
| 5.5 | 0.053 |
| 7.5 | -0.015 |
| 8.1 | 0.006 |
| 9.5 | 0.071 |
| 11.3 | 0.075 |
| 13.2 | 0.217 |

**Location 6**

| | |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.098 |
| 7.5 | -0.086 |
| 8.1 | -0.018 |
| 9.5 | -0.011 |
| 11.3 | 0.038 |
| 13.2 | 0.224 |

**Average**

| | |
|---|---|
| 0 | 0.04725 |
| 3.5 | 0 |
| 5.5 | -0.027 |
| 7.5 | -0.02717 |
| 8.1 | 0.020833 |
| 9.5 | 0.031833 |
| 11.3 | 0.068333 |
| 13.2 | 0.2095 |




Range Resolution of RESON 8111ER is 3.7 CM

| speed | Std Dev |
|---|---|
| 0 | 0 |
| 3.5 | 0 |
| 5.5 | 0.055523 |
| 7.5 | 0.051109 |
| 8.1 | 0.035397 |
| 9.5 | 0.042395 |
| 11.3 | 0.032873 |
| 13.2 | 0.041937 |
| Ave Std Dev= | 0.043206 |

Delta Depth (m) for various speeds (kts) at independent locations.

| Spd | Site 1 | Site 2 | Site 3 | Site 4 | Site 5 | Site 6 | Average |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | -0.047 | -0.047 | -0.047 | -0.047 | -0.047 | -0.047 | -0.047 |
| 6 | -0.040 | -0.096 | -0.117 | -0.052 | 0.006 | -0.145 | -0.074 |
| 8 | -0.020 | -0.134 | -0.076 | -0.020 | -0.062 | -0.133 | -0.074 |
| 8 | 0.001 | -0.047 | -0.036 | 0.031 | -0.041 | -0.065 | -0.026 |
| 10 | 0.047 | -0.035 | -0.052 | -0.017 | 0.024 | -0.058 | -0.015 |
| 11 | 0.072 | -0.017 | 0.014 | 0.040 | 0.028 | -0.009 | 0.021 |
| 13 | 0.186 | 0.159 | 0.201 | 0.082 | 0.170 | 0.177 | 0.162 |

**DDSSM Values Prior to Adjustment**

**Location 1**

| Speed | Delta Depth |
|---|---|
| 3.5 | 0 |
| 5.5 | 0.007 |
| 7.5 | 0.027 |
| 8.1 | 0.048 |
| 9.5 | 0.094 |
| 11.3 | 0.119 |
| 13.2 | 0.233 |

**Location 2**

| Speed | DD2 |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.049 |
| 7.5 | -0.087 |
| 8.1 | 0 |
| 9.5 | 0.012 |
| 11.3 | 0.03 |
| 13.2 | 0.206 |

**Location 3**

| Speed | DD3 |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.07 |
| 7.5 | -0.029 |
| 8.1 | 0.011 |
| 9.5 | -0.005 |
| 11.3 | 0.061 |
| 13.2 | 0.248 |

**Location 4**

| | |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.005 |
| 7.5 | 0.027 |
| 8.1 | 0.078 |
| 9.5 | 0.03 |
| 11.3 | 0.087 |
| 13.2 | 0.129 |

**Location 5**

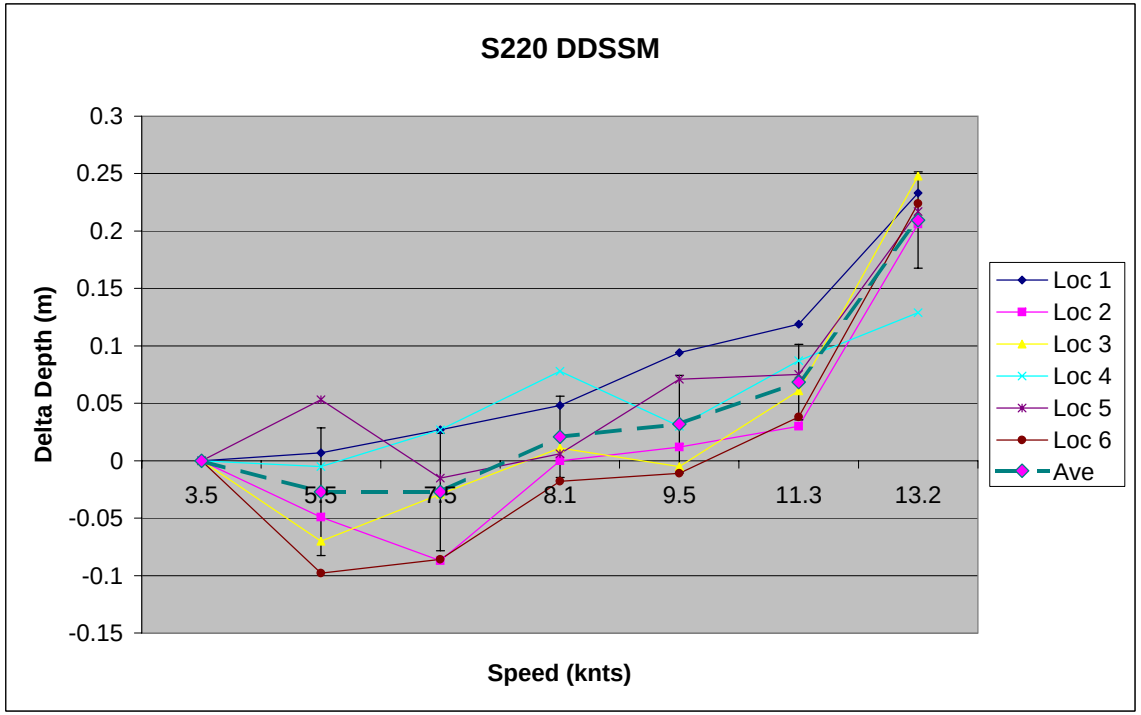
| | |
|---|---|
| 3.5 | 0 |
| 5.5 | 0.053 |
| 7.5 | -0.015 |
| 8.1 | 0.006 |
| 9.5 | 0.071 |
| 11.3 | 0.075 |
| 13.2 | 0.217 |

**Location 6**

| | |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.098 |
| 7.5 | -0.086 |
| 8.1 | -0.018 |
| 9.5 | -0.011 |
| 11.3 | 0.038 |
| 13.2 | 0.224 |

**Average**

| | |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.027 |
| 7.5 | -0.02717 |
| 8.1 | 0.020833 |
| 9.5 | 0.031833 |
| 11.3 | 0.068333 |
| 13.2 | 0.2095 |




Range Resolution of RESON 8111ER is 3.7 CM

| speed | Std Dev |
|---|---|
| 3.5 | 0 |
| 5.5 | 0.055523 |
| 7.5 | 0.051109 |
| 8.1 | 0.035397 |
| 9.5 | 0.042395 |
| 11.3 | 0.032873 |
| 13.2 | 0.041937 |

Ave Std Dev= 0.043206 Does not include 0 Value

## Standard Deviation

**Location 1**

| Speed | Delta Depth |
|---|---|
| 3.5 | 0 |
| 5.5 | 0.007 |
| 7.5 | 0.027 |
| 8.1 | 0.048 |
| 9.5 | 0.094 |
| 11.3 | 0.119 |
| 13.2 | 0.233 |

| speed | Std Dev |
|---|---|
| 3.5 | 0 |
| 5.5 | 0.055523 |
| 7.5 | 0.051109 |
| 8.1 | 0.035397 |
| 9.5 | 0.042395 |
| 11.3 | 0.032873 |
| 13.2 | 0.041937 |
| Ave Std Dev= | 0.043206 |

**Location 2**

| Speed | DD2 |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.049 |
| 7.5 | -0.087 |
| 8.1 | 0 |
| 9.5 | 0.012 |
| 11.3 | 0.03 |
| 13.2 | 0.206 |

**Location 3**

| Speed | DD3 |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.07 |
| 7.5 | -0.029 |
| 8.1 | 0.011 |
| 9.5 | -0.005 |
| 11.3 | 0.061 |
| 13.2 | 0.248 |

**Location 4**

| | |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.005 |
| 7.5 | 0.027 |
| 8.1 | 0.078 |
| 9.5 | 0.03 |
| 11.3 | 0.087 |
| 13.2 | 0.129 |

**Location 5**

| | |
|---|---|
| 3.5 | 0 |
| 5.5 | 0.053 |
| 7.5 | -0.015 |
| 8.1 | 0.006 |
| 9.5 | 0.071 |
| 11.3 | 0.075 |
| 13.2 | 0.217 |

**Location 6**

| | |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.098 |
| 7.5 | -0.086 |
| 8.1 | -0.018 |
| 9.5 | -0.011 |
| 11.3 | 0.038 |
| 13.2 | 0.224 |

**Average**

| | |
|---|---|
| 3.5 | 0 |
| 5.5 | -0.027 |
| 7.5 | -0.027167 |
| 8.1 | 0.020833 |
| 9.5 | 0.031833 |
| 11.3 | 0.068333 |
| 13.2 | 0.2095 |

**NOAA HYDROGRAPHIC SURVEY LAUNCH 1018**
**VESSEL REPORT 2005**

## Background

NOAA Hydrographic Survey Launch 1018 (Hull Registration Number 1018) is a 28 foot 10 inch aluminum survey launch designed by B. F. Jensen & Associates in 1973. Various vendors built a series of "Jensen" launches for NOAA in the mid 1970's to this general design and 1018 was the 18th in the series. It is considered a Qualified Class II Motorboat within the NOAA classification system and is operated within the parameters required for a vessel of this type.

In 2004, the hull, mechanical, electrical and mission systems underwent a modernization program that increased the performance and utility of the vessel. These upgrades include hull strengthening, increased scantlings to accommodate a larger engine and propeller, hard top, new electrical systems including a 6kW hydraulic generator, a flush deck, hydraulic A frame and dive platform. Also added at this time was a new swing arm transducer mount for the Reson 8101ER multibeam echo sounder (MBES), designed by The Glosten Associates, Inc. All modifications were conducted within the constraints as defined by the NAO 217-103, Management of Small Boats, Section 6.03, Significant Alterations.

The opening portion of this report discusses problems identified during initial testing of launch 1018.

## Review of initial Patch Testing

Patch tests were performed with NOAA Launch 1018 in the vicinity of Ketchikan, AK on March 12 & 13 (DN 071 and DN 072). Data from both days were compared for system consistency by acquiring data on the same lines and comparing the results in CARIS HIPS Calibration. The patch test data were collected by SST Froelich, ST Kellner, AST Castle, ENS French, and ECO Rheinheimer.

Raw ISIS XTF data was converted to CARIS HDCS format. Sound velocity and observed tides were applied upon conversion and the lines were "lightly" cleaned in CARIS swath mode to remove major data fliers. The patch test data were then reviewed in CARIS calibration mode independently by CST Morgan, ST Keene, LT Wetzler, and PS Palmer to determine the biases. During this process, problems were identified as described below.

### *Roll*

The procedure for determining roll biases included running one pair of coincident lines over a locally flat area at approximately 8 knots. Patch test bias results were consistent among reviewers. The biases were applied to the HVF and the data was reviewed in CARIS Subset mode. DN 071 results had approximately a 0.4 meter vertical offset between lines that were collected within 10 minutes of each other (see *Figure 1*). When comparing roll lines from DN 071 to DN 072 there was approximately a 4.7 meter vertical offset (see *Figure 2*), which is likely attributable to tidal variations, as preliminary tides were used.

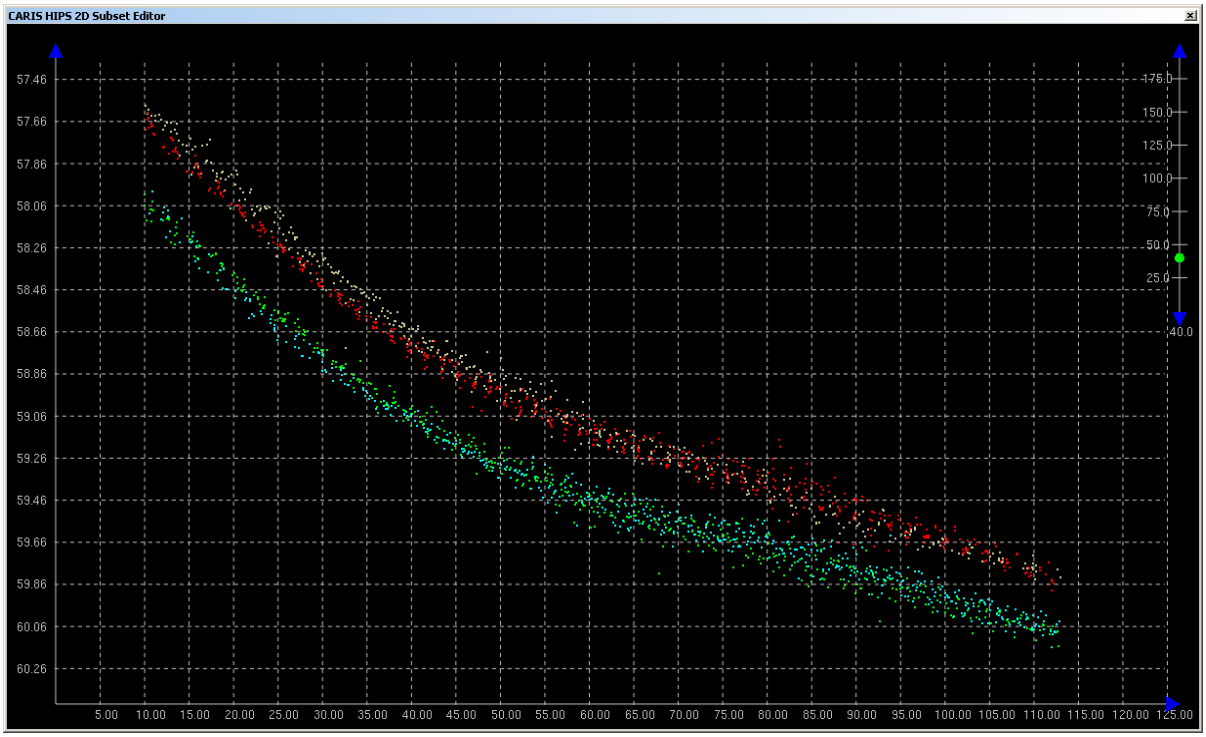



**Figure 1: Across-track view of Roll patch lines from DN 071, with a vertical offset of approximately 0.4 m**

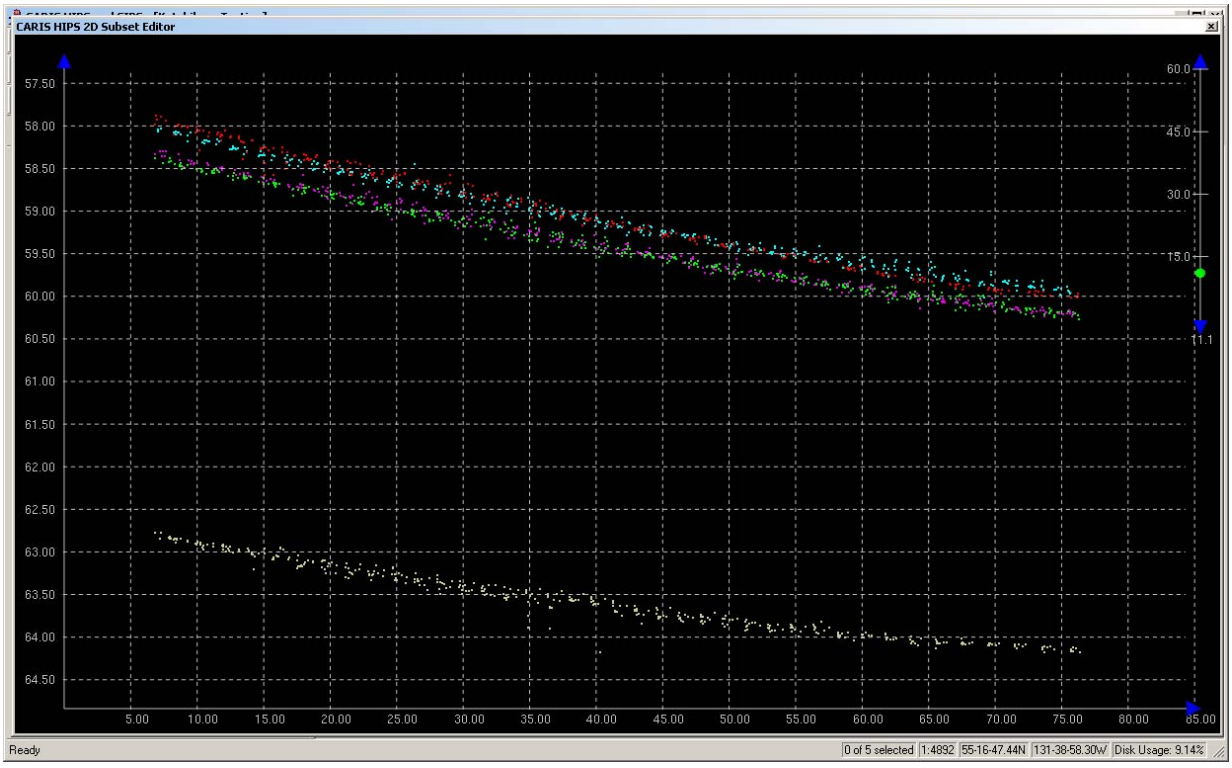



**Figure 2: Across-track view of Roll patch lines from DN 071 and DN 072, with a vertical offset of approximately 4.7 m between days**

## *Patch Test Results*

*Table 1*, below, shows the bias values for the patch tests performed on each of DN 071 and 072. Note the difference between the roll bias on the respective days.

| Patch Bias | DN 071 Bias value | DN 072 Bias value |
|---|---|---|
| Navigation Time Error | 0.01 sec | 0.01 sec |
| Pitch | 0.00° | -0.2° |
| Roll | 2.13° | 2.61° |
| Heading | 0.4° | -0.1° |

**Table 1: Patch Test Bias Results**

## Initial Review of Dynamic Draft Settlement and Squat Method (DDSSM) Test

The DDSSM test consisted of acquiring data for multiple coincident lines in the same direction but at different speeds. The swing arm mount was also tested, by raising and lowering the transducer at the end of each line. In addition, three crosslines were acquired to check for data consistency.

The resulting DDSSM data were reviewed in CARIS Subset mode. There was approximately a 0.4 m maximum vertical offset among lines on DN 071 (see *Figure 3*). There was approximately a 1.5 meter maximum vertical offset among lines on DN 072 (see *Figure 4*). There were very large vertical offsets of approximately 4 m between lines collected on DN 071 and lines collected on DN 072 (see *Figure 5*). DN 072 data appears to be vertically offset 2 meters deeper than that of DN 071. It should be noted that preliminary tide data was used to process the DDSSM test lines, accounting for at least some of the noted day-to-day (and possibly intraday) offset.

The DDSSM data collected on DN 071 and DN 072 is not usable.

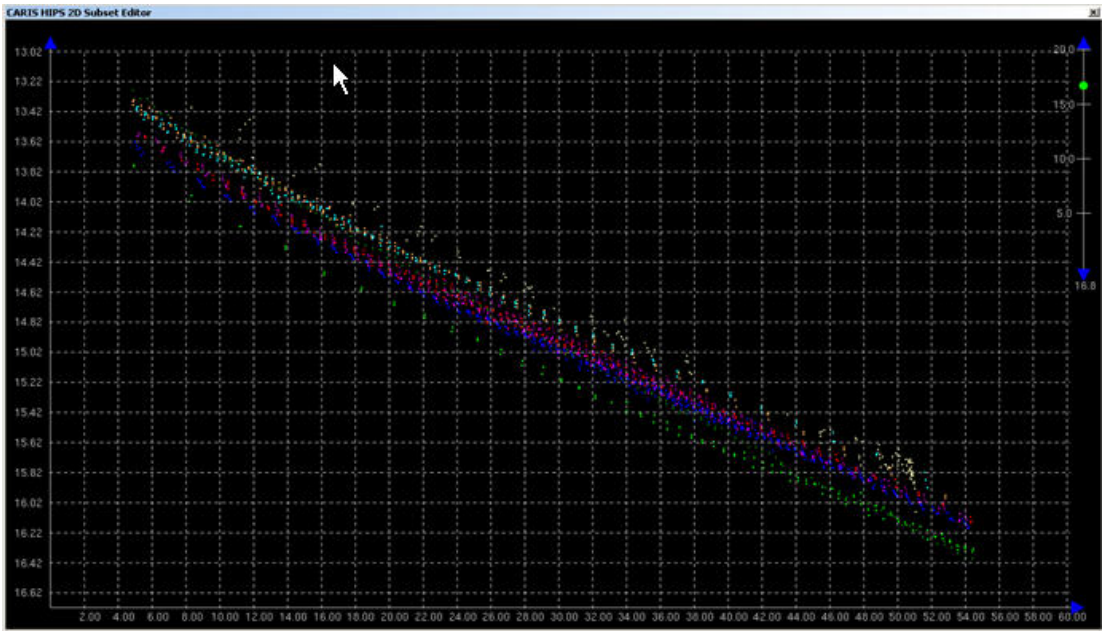



**Figure 3: Across-track view of DDSSM patch test lines from DN 071, with a maximum vertical offset of approximately 0.4 m**

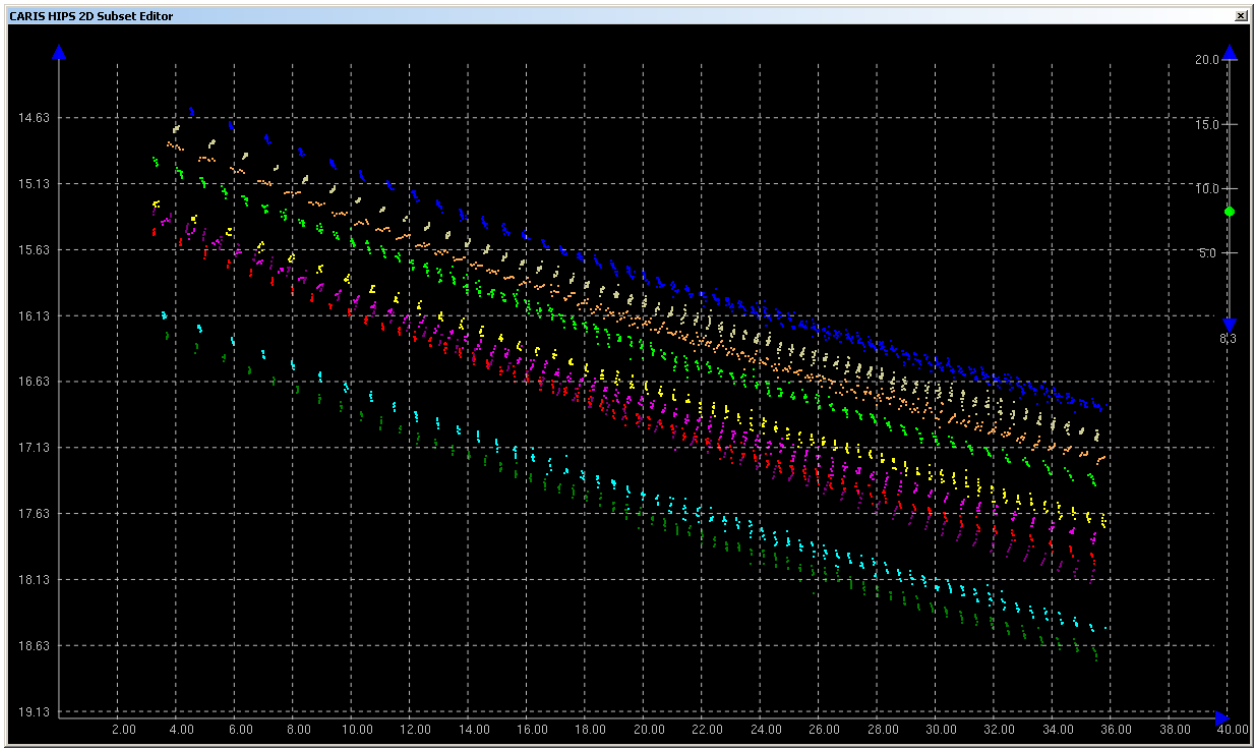



**Figure 4: Across-track view of DDSSM patch test lines from DN 072, with a maximum vertical offset of approximately 1.5 m**

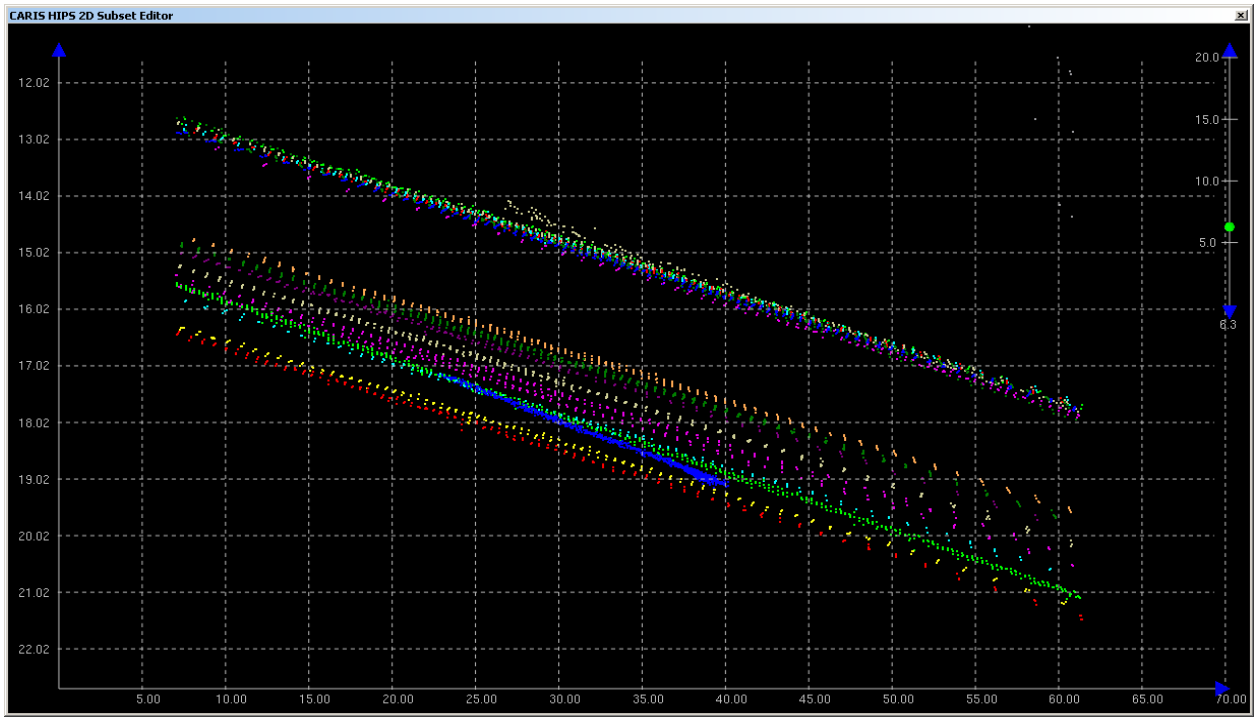



**Figure 5: Across-track view of DDSSM patch test lines from DN 071 and DN 072, with a vertical offset of approximately 4 m**

## Transducer mount issues

We believe the roll inconsistencies are a result of instability in the swing mount arm. The mount was designed to be held in place against the under hull stop, but due to

fabrication and assembly issues, this did not happen. The arm was locked into position inside the cabin by a stainless steel pin sliding through two aluminum brackets (see *Figures 6, 7, and 8*). One of the holes in the brackets has worn away because of the stainless steal pin against a softer aluminum leaving approximately 3 mm of freeplay in the lever arm. Several field modifications were made over a two week period at the start of the 2005 field season that solved this problem (see addendum 1).

**Figure 6: Overview of Launch 1018 swing arm inside of cabin**

**Figure 7: Aluminum bracket for locking position transducer down**

**Figure 8: Stainless steel pin locked in to with transducer up**

**ADDENDUM 1**
**NOAA HYDROGRAPHIC SURVEY LAUNCH 1018**
**VESSEL REPORT 2005**

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## Background:

During testing of Launch 1018 it was noticed that the mount was not stable from day to day. Testing originally occurred on DN 071 and then DN 072 in order to determine if the mechanical corrections to the swing arm mount were functional. The HVF values for DN 071 and DN 072 did not match. Specifically, there were significant differences in the roll bias and the inconsistencies with the DDSSM data. A third patch test was performed on March 28 (DN 087) in Madan Bay to see which of the earlier days were correct. The HVF values for DN 087 closely matched DN 071, but were different from DN 072.

Those three patch tests showed that the multibeam mount was unstable. Because of the drift in the HVF values over such a short period of time, the mechanics of the swing arm mount were inspected. It was found that the aluminum mounting bracket that held the deployment lever arm in place was worn. Further, when pinned in it was noticed that the deployed position the swing arm mount did not rest on its under hull stop. The worn mounting bracket allowed the transducer to move over time.

Another method of locking the deployment lever arm was proposed in order to keep the transducer in place against the under hull stop. On DN 088, a ratcheting tie-down strap was used to hold the deployment lever arm mount in position. *Figure 9* shows the deployment lever arm and the set pin with the temporary fix of the ratcheting tie-down strap.

**Figure 9: The deployment lever arm, set pin and ratcheting tie–down strap. The pin was eventually removed to allow the arm to reach the under hull stop.**

The HVF values for DN 088 were calculated and showed intraday stability. In order to determine if the locking ratchet strap provided the needed consistency two patch tests were run on DN 089. One test was run in the morning prior to acquisition and the other in the evening after acquisition. There was again intraday consistency from the start of DN 089 through to the end of DN 089, but the interday roll and heading values between DN 088 and DN 089 were not close enough for the acquired data to meet IHO S-44 Order 1 specifications. That is to say, if the HVF for DN 088 were used on DN 089 data, the resulting processed data would not meet IHO S-44 Order 1 specifications.

During this process the swing arm transducer mount was repeatedly examined. It was found that with the set pin in place the mount did not touch the transducer mount stop on the bottom of the boat. There was a gap of approximately 2 mm.

On DN 095 another set of patch tests were run, this time without the set pin, and removing any obstructions to the arm. The ratcheting tie down strap was the sole device to hold the mount in place. This allowed the transducer mount to rest on the under hull stop and eliminate any instability issues.

The roll bias values on DN 095, due to the change in the angular positioning of the system from removing the set pin, do not match DN 089. This is to be expected.

The procedure was to conduct a patch test before survey operations, collect data, and then patch test in the evening. After processing the patch tests for the morning and evening, the HVF was then updated if necessary. Sounding data was merged using the updated HVF and then examined for internal consistency. Using this procedure, data meets IHO S-44 Order 1 specifications.

Tests were performed to determine the residual biases of the sensors and sonar system alignment and settlement and squat. Data were assessed in CARIS HIPS & SIPS v5.4 (SP 1, Hot Fixes 1-23) calibration and subset modes and applied to the HIPS Vessel File (HVF), 1018_8101.HVF.

## Patch Test

Patch tests were performed with Launch 1018 in the vicinity of Wrangell Island, AK (see Figure 10) on March 28 (DN 087). The patch test data were collected by ST Keene, AST Castle, and ECO Rheinheimer.

Raw ISIS XTF data were converted to CARIS HDCS format. Sound velocity and predicted tides were applied upon conversion and the lines were “lightly” cleaned in CARIS swath mode to remove major data fliers. The patch test data were then reviewed in CARIS calibration mode independently by CST Morgan, ST Keene, LT Wetzler, and PS Palmer to determine the biases.

Subsequent to using a the ratcheting tie-down strap, as described above, additional patch tests were conducted by FAIRWEATHER personnel on DN 088, DN 089 (AM & PM), and DN 095 (AM & PM) utilizing the method as describe for DN 087.

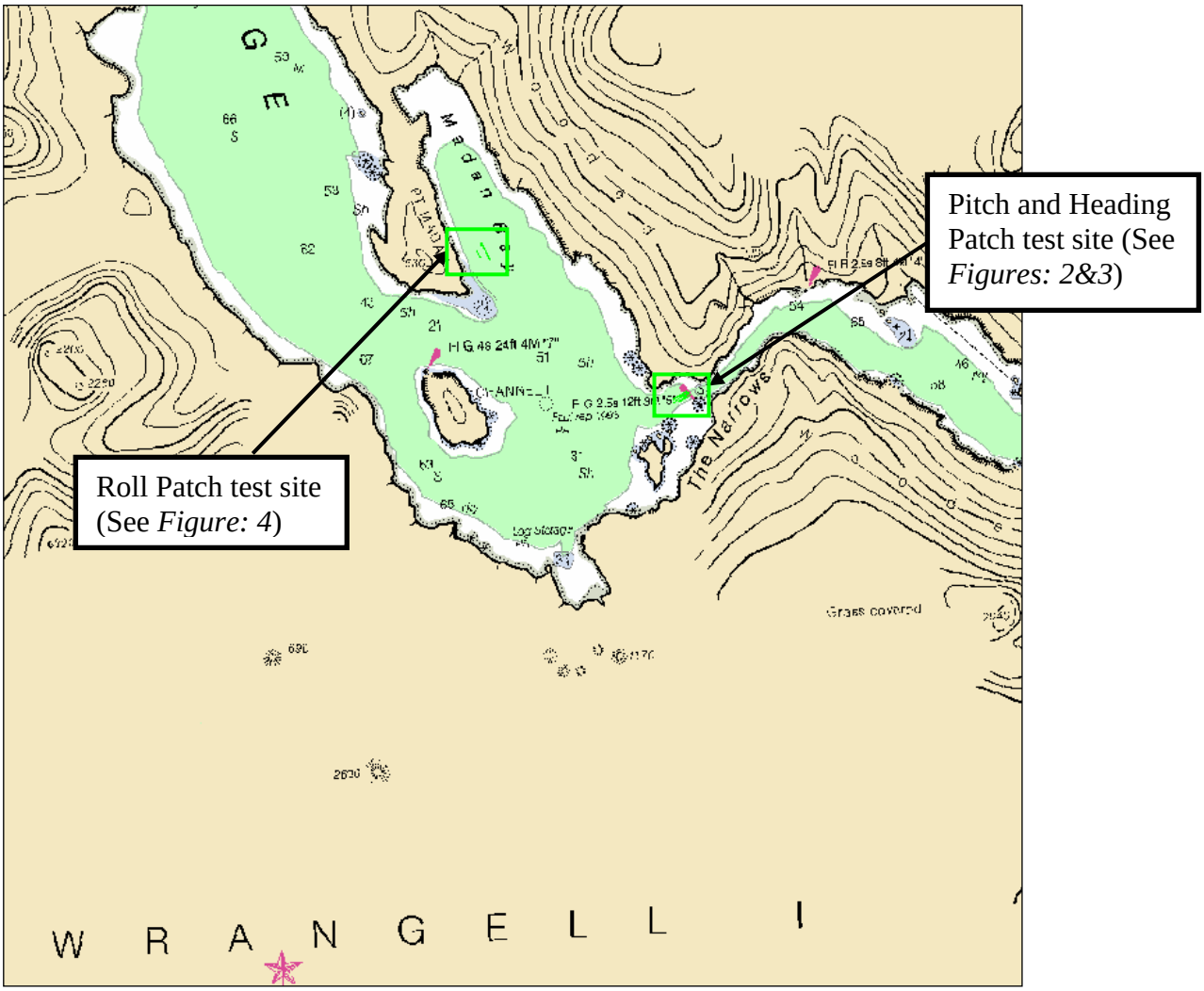


**Figure 10: Test Sites for Launch 1018**

### *Heading and Pitch*

The heading and pitch bias patch tests were conducted in The Narrows over a rock with a radius of 35 m, in an area with an average depth of 40 m and a least depth of 25 m. The rock is located at 56°21'52"N, 132°06'53"W (see *Figures 11 & 12*).

### *Heading*

The heading bias was determined by acquiring data on two sets of parallel lines run in opposite directions. The pairs of lines were offset from the rock 25 m and 35 m, respectively. Vessel speed was 6-7 knots.

### *Pitch*

The procedure used to determine the pitch bias was to run two pair of coincident lines over the rock in approximately 40 m of water at the same speed in different directions. The lines were run between 6-7 knots.

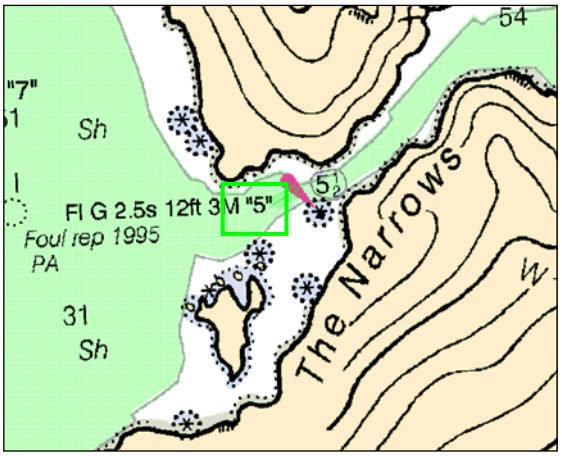


**Figure 11: Heading and Pitch patch test site for launch 1018**

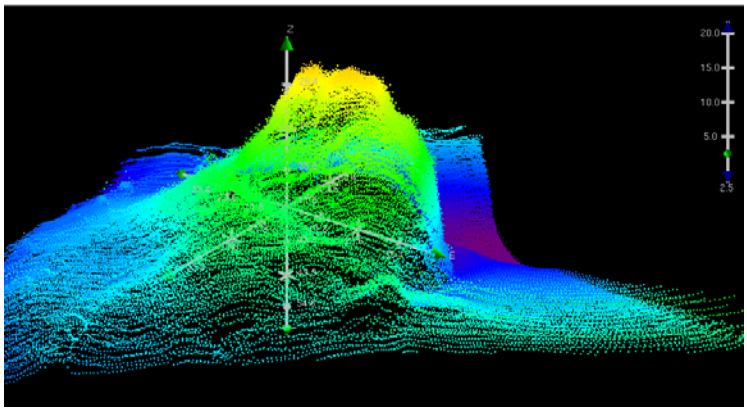

**Figure 12: Rock used for Heading and Pitch patch test for launch 1018**

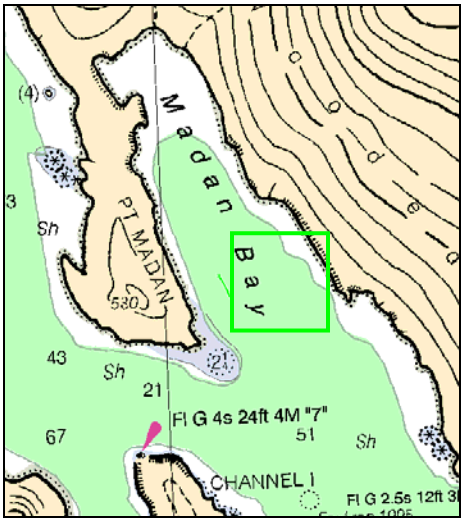


**Figure 13: Roll patch test site for Launch 1018.**

### *Roll*

The roll bias patch was conducted in Madan Bay over a flat area in approximately 90 m of water at location 56°23'00"N, 132°09'21"W (see *Figure 13*). Roll bias was determined by running three pair of coincident lines over the area at 7-8 knots in different directions.

### *Navigation Time Error*

There was no Navigation Time Error test performed on March 28 (DN 087). Final values entered into 1018_8101.HVF were based on previous test results.

Vertical offsets were not noticed in the roll lines from DN 087. However, pitch and heading data shows there is an approximate 0.4° offset from lines collected on the same day. There is approximately a 0.5-1.0m vertical offset from lines run within 15 minutes of each other (see *Figure 6*).

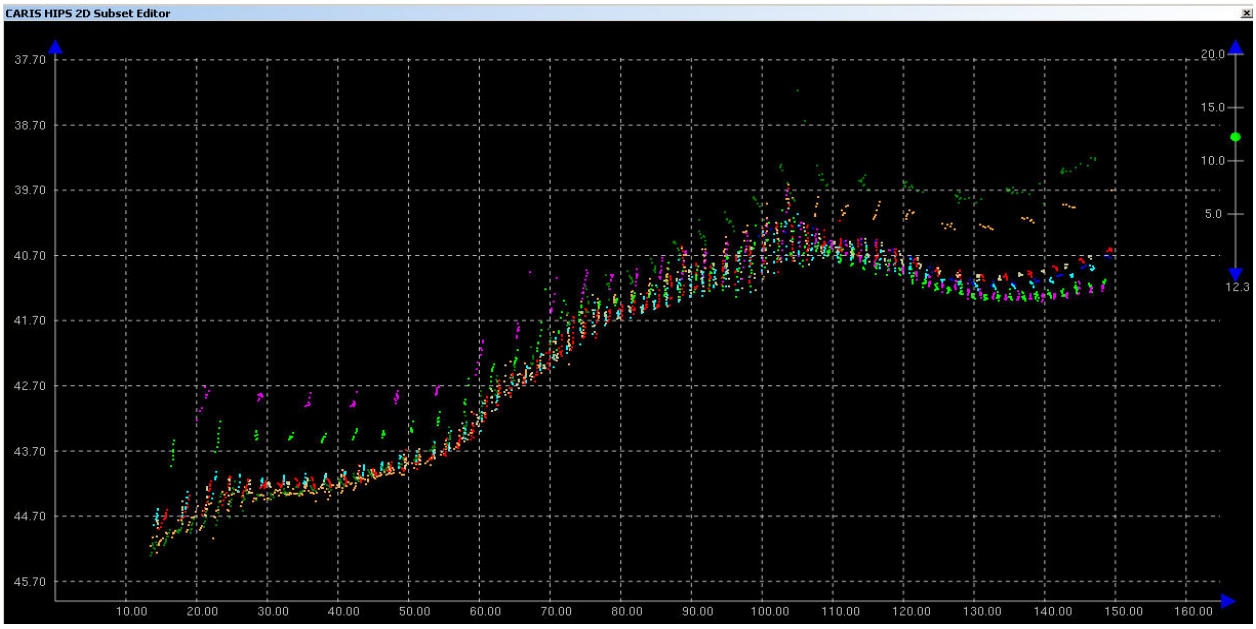


**Figure 14: Pitch & heading patch test lines from DN 087 with approximately a 0.5-1.0 meter vertical offset**

### *Patch Test Results*

The bias results from these second set of patch tests are shown in *Table 2*, below. The bias values applied during processing in the HVF are given for DN 089 and 095 in *Table 3*.

| Patch Bias | DN 087 Bias | DN 088 Bias | DN 089 AM Bias | DN 089 PM Bias | DN 095 AM Bias | DN 095 PM Bias |
|---|---|---|---|---|---|---|
| Nav Time Error | 0.01 sec | 0.20° | 0.0° | 0.10° | 0.0° | 0.0° |
| Pitch | 0.04° | 2.50° | 2.68° | 2.68° | 2.96° | 3.03° |
| Roll | 2.64° | -0.95° | 0.35° | 0.45° | 0.1° | 0.3° |
| Heading | 0.25° | | | | | |

**Table 2: Patch Test Bias Results**

| HVF Patch Bias | DN 089 HVF Bias values | DN 095 HVF Bias values |
|---|---|---|
| Time Error | -0.01 sec | 0.01 sec |
| Pitch | 0.05° | 0.0° |
| Roll | 2.68° | 3.00° |
| Heading | 0.4° | 0.2° |

**Table 3: Patch Test HVF Bias Values**

## Modifications and Additional Patch Testing

Data was continued to be acquired on project OPR-O119-FA and was used because the system was proving to be consistent over the course of a day. Further modifications continued to remedy the day to day fluctuations in biases. Launch 1018 modifications consisted of the pin no longer being used as a stop for the arm, a portion of the wood decking being removed, and the arm being ground down to eliminate any possibility of the arm resting anywhere but the under hull stop (see *Figure 15* for under hull stop).

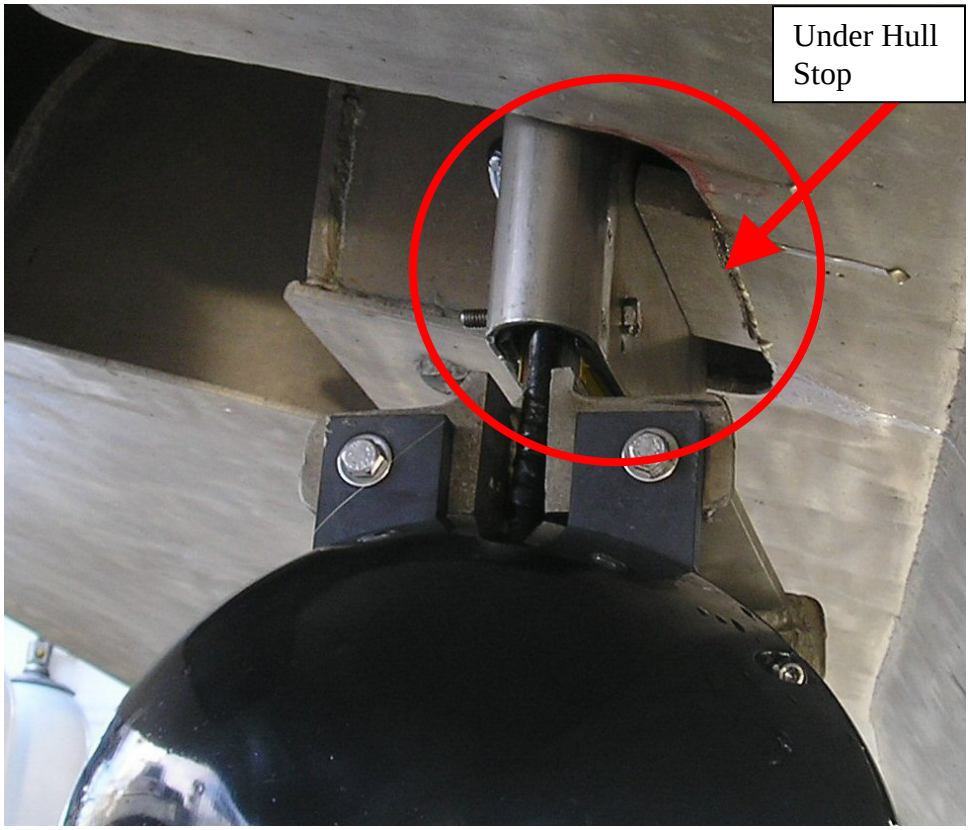


**Figure 6: Launch 1010 swing arm mount against hull stop.**

Patch testing on DN 097 was conducted as described and in the same locations as discussed on DN 087. The patch test data were collected by SST Abrams and AST Castle. Additional roll lines were conducted along with a tension test to examine whether variations in ratcheting of the strap would show up in the data. The patch test data were reviewed in CARIS calibration mode independently by CST Morgan, SST Froelich, ECO Rheinheimer, and ENS Higgins to determine biases. No data was collected on DN 097, due to additional testing being done after modifications.

A new mount with a drilled hole for the tie-down strap to anchor to was bolted to the frame of Launch 1010 on DN 101.

Patch testing on DN 098, DN 099, and DN 101 through DN 102, was conducted in the morning and evening as described and in the same locations as discussed on DN 087. The patch test data were collected and reviewed in CARIS calibration mode to determine biases by FAIRWEATHER personnel.

### *Patch Test Results*

The results of five days of morning and evening patch testing are reported in *Table 5*, below.

| Patch Bias | DN 097 First Bias | DN 097 Roll2 Bias | DN 097 Roll3 Bias | DN 097 Roll4 Bias | DN 097 Final Bias |
|---|---|---|---|---|---|
| Pitch | -0.4° | | | | -0.4° |
| Roll | 3.01° | 3.01° | 3.02° | 3.02° | 3.01° |
| Heading | 0.0° | | | | 0.0° |

| Patch Bias | DN 098 AM Bias | DN 098 PM Bias | DN 099 AM Bias | DN 099 AM2Bias | DN 099 PM Bias |
|---|---|---|---|---|---|
| Pitch | -0.42° | -0.4° | 0.2° | | 0.2° |
| Roll | 3.06° | 3.04° | 3.03° | 3.05° | 3.03° |
| Heading | 0.1° | N/A | 0.1° | | -0.15° |

| Patch Bias | DN 101 AM Bias | DN 101 PM1Bias | DN 101 PM2Bias | DN 102 AM Bias | DN 102 PM Bias |
|---|---|---|---|---|---|
| Pitch | -0.10° | -0.10° | -0.15° | 0.2° | 0.0° |
| Roll | 3.03° | 2.99° | 3.01° | 3.06° | 3.05° |
| Heading | 0.0° | -0.15° | N/A | 0.0° | -0.1° |

**Table 4: Patch Test Bias Results**

### *Patch Test Biases used for data processing*

The bias values in the HVF file, used for daily data processing on lines run on and after Dn 098, are shown in *Table 5*. The DN 098 values are based on averages of values from DN 097 through DN 101.

| HVF Patch Bias | DN 098 - HVF Bias values |
|---|---|
| Time Error | -0.01 sec |
| Pitch | -0.17° |
| Roll | 3.02° |
| Heading | 0.0° |

**Table 5: Patch Test HVF Bias Values**

Patch test acquisition and processing logs are located in Appendix III-1018-3.

## Optical Settlement and Squat

Settlement and Squat were performed on March 13th (DN 072) in Blank Inlet at location 55°14’45.80”N, 131°40’58.58”W in approximately 40m of water (see *Figure: 5*). Data were collected by CST Morgan, SST Froelich, AST Castle, ENS French and PS Palmer.

Optical levels were used to determine settlement and squat biases. The procedure included setting up on shore a Leica NA2 352036 stadia level and placing a graduated metric staff on top of launch 1018's port side gas cap (see *Figures 16 & 17*). The settlement and squat data were acquired at seven different speeds: 5,6,7,8,9,10, and 11 knots. Readings were taken for all seven speeds: four "at rest" before and after each direction, ten readings as the launch is moving away "at speed", and ten as the launch is moving toward the shore team "at speed". This procedure was repeated for all seven speeds.

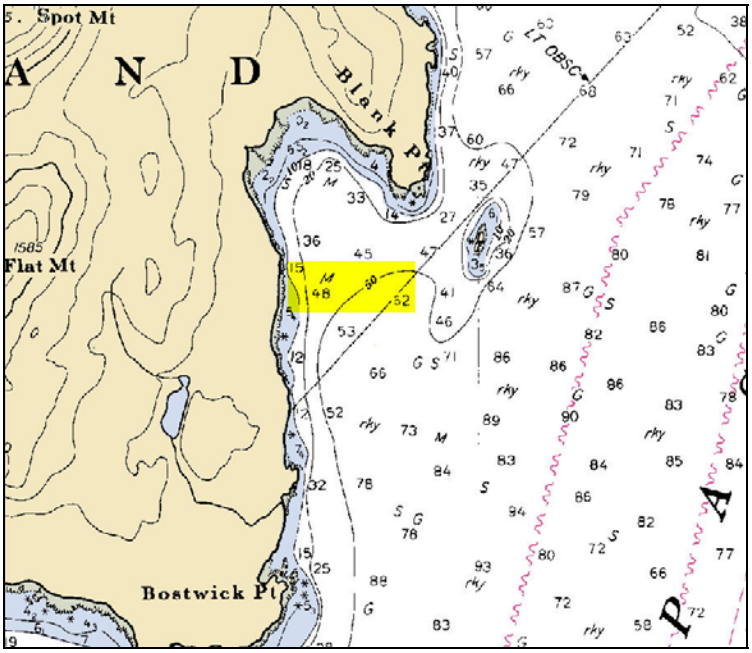


**Figure 15: Settlement and Squat test site for Launch 1018.**

The computations and table of results are included in *1018_DDSSM Settlement and Squat* located in Appendix III-1018-4. The results are summarized in the table below:

| Average Speed (knots) | Delta Draft (m) |
|---|---|
| 0.0 | 0.000 |
| 5.2 | 0.0255 |
| 6.2 | 0.027 |
| 7.15 | 0.03795 |
| 7.95 | 0.0545 |
| 8.95 | 1.0025 |
| 9.9 | 0.052 |
| 11.05 | 0.0425 |

**Table 6: Settlement and Squat Results**

**Figure 16: Settlement and Squat shore team using optical level.**

**Figure17: Graduated metric staff on port side gas cap.**

## Dynamic Draft Settlement & Squat Method (DDSSM)

Due to the swing arm mount problem, the DDSSM lines run on DN 071 & 072 could not be utilized. The DDSSM was not re-run. After analysis of Launch 1010 DDSSM and Optical Settlement and Squat values, FAIRWEATHER personnel decided the Optical values were adequate to be utilized as the Delta Draft correctors.

## POS MV GAMS Calibration

POS MV GPS Azimuth Measurement Subsystem (GAMS) calibration occurred on March 28th (DN 087) near Madan Bay (see *Figure 8*). GAMS calibration was performed by ST Keene, AST Castle and ECO Rheinheimer.

The GAMS heading calibration threshold was initially set to 0.300°. 1018 was maneuvered in "figure 8's" to lower the heading accuracy as much as possible. The best heading accuracy value achieved during this process was 0.05°. The vessel steadied up on a constant heading and GAMS calibration was requested. When the calibration was complete, the POS MV settings were saved to the file 1010_085_posmv.nvm (see *Table 3*). The file name has the wrong vessel number and the wrong day number, due to confusion in the field.

The detailed POS/MV Calibration Report, 1018_POS_Calibration_Dn087.xls, is located in Appendix III-1018-5.

| Component | DN 087 Value |
|---|---|
| Number of Satellites | 8 |
| PDOP | 1.789 |
| Baseline Vector X | 0.009 m |
| Baseline Vector Y | 1.831 m |
| Baseline Vector Z | 0.031 m |
| Two Antenna Separation | 1.831 m |
| Heading Correction | 0.000 ° |

**Table 7: POS MV GAMS Calibration Results**

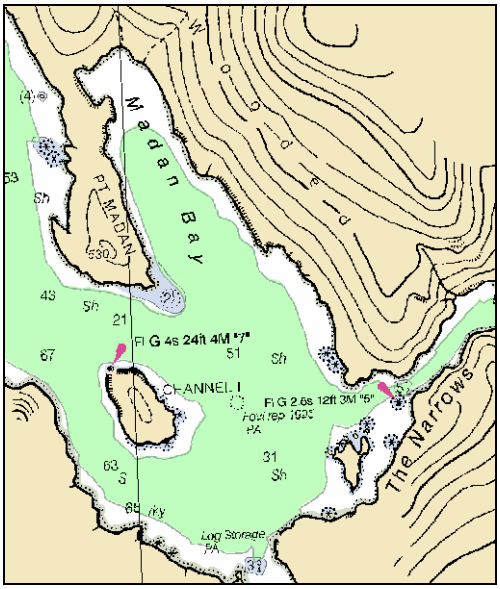


**Figure 18: POS/MV GAMS Calibration test area.**

## Recommendations:

The patch test calibration results, HVF Bias values for March 30th (DN 089) & April 5th (DN 095) in table 3 above, should be used for processing data for those respective days.

The patch test calibration results listed in table 5 for DN 098 should be used for launch 1018 until such a time or event warrants a new calibration.

The Optical Settlement and Squat delta draft values from March 13th, 2005 (DN 072) should be used until such a time or event warrants a new test.

The POS MV GAMS calibration results from March 28th (DN 087) should be used until such a time or event warrants a new calibration.

## Future Modifications Planned:

At the present time, installation of a dog-type latching mechanism is planned for launch 1018. The latch will be installed to permanently replace the ratcheting tie down strap and ensure the swing arm mount is stable and firmly up against the under hull stop.

**ADDENDUM 2**
**NOAA HYDROGRAPHIC SURVEY LAUNCH 1018**
**VESSEL REPORT 2005**

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## Background:

Launch 1018's swing arm mount was stabilized by utilizing a ratcheting tie down strap to ensure that the swing arm was stable and firmly up against the under hull stop. From testing discussed in Addendum 1 of this report and examination of data through August 15, 2005 (DN 225) it is apparent that this solution works.

A drawback of the swing arm mount occurs when the mount is lowered and debris can be caught between the swing arm and the under hull stop. This changes the roll bias for the system and it is apparent in the data.

### Roll:

On two occasions the roll value for Launch 1018 was affected by debris trapped between the swing arm and the under hull stop. During evening processing the data was found to exhibit a roll which was not consistent with the current HVF value.

On May 12th (DN 132), from 1600 through 2220 GMT, and August 6th (DN 218), from 1726 though 2359 GMT roll bias issues were detected. In each case data were examined by the Field Operations Officer and a roll bias was determined utilizing the acquired data in the CARIS HIPS/SIPS 5.4 Calibration routine. The calculated roll biases were then entered into the .HVF for launch 1018. Roll biases were then returned to the base value of 3.020 following the time of data acquisition. Figure 1 shows the values in the HVF for Swath 1 on Launch 1018.

| | Date | Time | Time E | X | Y | Z | Pitch | Roll | Yaw | Manuf | Model | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 2005-132 | 16:00 | -0.010 | 0.302 | -0.164 | 0.550 | -0.170 | 1.020 | 0.000 | Reson | Reson SeaBat 8101 | Object wedged in Ducer Mount for sheet H11469. |
| 8 | 2005-132 | 22:20 | -0.010 | 0.302 | -0.164 | 0.550 | -0.170 | 3.020 | 0.000 | Reson | Reson SeaBat 8101 | Object cleared from Ducer Mount |
| 9 | 2005-218 | 17:26 | -0.010 | 0.302 | -0.164 | 0.550 | -0.170 | 0.640 | 0.000 | Reson | Reson SeaBat 8101 | Object wedged in Ducer Mount |
| 10 | 2005-219 | 00:00 | -0.010 | 0.302 | -0.164 | 0.550 | -0.170 | 3.020 | 0.000 | Reson | Reson SeaBat 8101 | Object cleared from Ducer Mount |

**Figure 1: Screen grab of HVF Swath 1 settings on Launch 1018**

Data from May 12th and August 6th were remerged using the updated .HVF and were examined by the Field Operations Officer. Data were found to meet or exceed the requirements in *NOS Hydrographic Surveys Specifications and Deliverables*, as updated for March, 2003.

## Recommendations:

Roll bias results for May 12th and August 6th should be used for processing data on those respective days only.

The patch test calibration results, HVF Bias values for March 30th (DN 089) & April 5th (DN 095) in table 3 of Addendum 1, should be used for processing data for those respective days only.

The patch test calibration results listed in table 5 of Addendum 1 for DN 098 should be used for launch 1018 until such a time or event warrants a new calibration.

The Optical Settlement and Squat delta draft values from March 13th, 2005 (DN 072) should be used until such a time or event warrants a new test.

The POS MV GAMS calibration results from March 28th (DN 087) should be used until such a time or event warrants a new calibration.

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

23 May 2005

**MEMORANDUM FOR:** W. Michael Gibson
Chief, Hydrographic Surveys Division

**THROUGH:** Commander Donald W. Haines, NOAA
Chief, Pacific Hydrographic Branch

**FROM:** For Megan Palmer
Physical Scientist

Shyla Allen
Physical Scientist

Lieutenant Mark Van Waes, NOAA
HSTP Field Support Liaison, Pacific

**SUBJECT:** System Certification Recommendation - Revised
NOAA Ship FAIRWEATHER (S220)

The purpose of this memorandum is to make recommendations for the certification of hydrographic survey systems aboard NOAA Ship FAIRWEATHER and her survey launches. These recommendations are based on review of the *2005 FAIRWEATHER System Certification Report, 2005 FAIRWEATHER Systems Certification Memorandum,* and supplemental correspondence[i]. This memorandum has been revised following a conference call with FAIRWEATHER, Pacific Hydrographic Branch, and HSTP personnel on 13 May, 2005.

*Certification status summary (as of 19 April 2005):*

The following systems are **recommended** for certification:

FAIRWEATHER (S220) – Reson 8111

The following systems are **recommended (with qualification)** for certification:

Launch 1010 – Reson 8101ER
Launch 1018 – Reson 8101ER

The following system is **not recommended** for certification:

FAIRWEATHER (S220) – Reson 8160

*Discussion and Qualifications*

FAIRWEATHER's hull-mounted Reson 8111 has been properly configured and tested. FAIRWEATHER personnel have demonstrated that the system is capable of meeting Office of Coast Survey requirements for acquiring hydrographic survey data. Subsequent to the submission of the System Certification Report, the ship's Dynamic Draft Settlement and Squat data has been processed. It will be documented in 2005 Data Acquisition and Processing Reports.

The Reson 8101ER systems aboard launches 1010 and 1018 are recommended for certification with qualification. Earlier stability issues with the transducer mounts on Launches 1010 and 1018 were documented in the System Certification Report. Temporary corrective action has stabilized the transducer arm (see Attachment 1 of this memorandum). Per this email correspondence from FAIRWEATHER, more frequent patch testing is planned to confirm the stability of the mount. PHB requests all patch test data be submitted with Data Acquisition and Processing Reports throughout the 2005 field season.

A patch test for FAIRWEATHER's Reson 8160 sonar system has not been conducted. Until such time as a patch test can be conducted and the biases verified, it should not be used to acquire survey data.

The following issues *do not warrant denial of certification for any system*, but may impact the ship's ability to meet programmatic requirements. They are highlighted here to bring them to the attention of OCS management for discussion with NMAO.

- **Davits.** Two of FAIRWEATHER's four survey launch davits are not functional, and the remaining two davits are only partially operational (in manual mode). Until all davits reliably operate per manufacturer specifications, there exists potential for negative impact on survey operations.

- **Survey Launches**. Though not specifically mentioned in the System Certification Report, FAIRWEATHER is currently sailing at half of its survey launch capacity. The addition of two survey launches will increase production capabilities.

- **Horizontal Control Equipment.** Equipment lost during the 2004 field season should be replaced prior to commencement of OPR-P183 on the Alaska Peninsula, scheduled for early June, as local DGPS correctors will be required for this project. Replacement gear is required for a complete DGPS "fly-away" station, as well as for replacement of static survey equipment.

- **Moving Vessel Profiler.** The MVP requires additional hardware in order to enable the bottom-detect functionality and operate in fully automatic mode. Currently it is only able to operate in a maximum-depth limit mode. As is, the system is meeting current operational requirements, and has proven to be a boon to efficiency. Once the

additional hardware is installed, the full capabilities of the MVP system will be available.

- **Engineering Department Staffing.** Survey operations have already been impacted this season due to staffing issues. Action is required at the appropriate levels to minimize the impact on operations due to staffing shortfalls.

*Documentation*

Modifications or changes that affect the certification status of the sonar systems aboard FAIRWEATHER will be documented in 2005 Data Acquisition and Processing Reports; the full system certification report does not need to be resubmitted this year.

Attachments

cc: Chief HSD Operations Branch N/CS31
Chief HSTP N/CS11
Commanding Officer, NOAA Ship FAIRWEATHER MOC-P/FA

[i] Lowell, J., *MBES Deployment Arm*, email to Stephen Curry, 24 April, 2005 (See Attachment 1).
Wetzler, M., *System cert and other questions,* email to Mark Van Waes, 28 April 2005 (See Attachment 2)

## Attachment 1

**Subject:**Re: MBES Deployment Arm
**Date:**Sun, 24 Apr 2005 11:48:23 -0700
**From:**co fairweather <co.fairweather@noaa.gov>
**To:**Stephen P Currie <Stephen.P.Currie@noaa.gov>

Not sure is everyone was notified, but after weeks of testing and twice a day patch tests, the arm is stable. Pls see our system certification report for photos and additional details.

The Glostin design needs to rest against the under hull stop.
Unfortunately, during the fabrication, installation, redesign etc., this key component was overlooked. The transducer must be hard against the under hull stop. No other resting position is acceptable. Do not secure the arm in the down position with a pin or topside hard
point. Cut away any obstructions to the interior arm and use pressure to hold the arm against the under hull stop. We cut wood decking and ground down the interior arm where it impacted the curved housing. It took us several attempts to get all the interference points identified and eliminated, they may not be obvious. Once all interference has been eliminated, simply secure it in place.

You can dbl. ck the hard rest by placing paper between the transducer arm and the stop. Shove hard and see if the paper can be removed.

We are using a ratchet strap to hold the arm down. Pressure variation
testing was done by conducting three patch tests, one at the normal
"secure" pressure, and two more, each with an additional cranking on the strap. No change to the orientation. The bottom line is once it is in place, it is in place. Getting it there turned to be more trouble that thought.

The permanent solution will be crafted shortly for our vessels, until
then, we are ratcheting. The TJ units look like they will have a dog
installed, this should work fine, but dbl., no, triple check the
fabrication and "as built" configuration. Hydraulic ram would be neat.

Our plan is to conduct more frequent patch tests, interval TBD. Just in case.

later, johnl

# Attachment 2

-------- Original Message --------
**Subject:**Re: System cert and other questions
**Date:**Thu, 28 Apr 2005 10:58:37 -0800
**From:**foo fairweather <foo.fairweather@noaa.gov>

**To:** Mark VanWaes <Mark.Vanwaes@noaa.gov>

Mark,
The best number to get us on is the Iridum number of 011 8816 7631 0054. Things are running fair, but there are our share of issues also. We have installed a tide gauge at CD, but it is transmitting intermittently.
Replies:
**System Cert.**
TH was applied to all vessels for patch testing.
The 3 mm was reported by the POS, not measured.
The sever vertical offset of 4.7m was an error. I think that Megan misspoke in the 1018 vessel report. The problem with DN 72 is that the tide is not applied when she produced the vessel report. Tides were applied (I looked at the data and it was fine) but then the tides were lost or zero tides were reapplied at some point. Ignore that issue.
**CeeDucer**
The Ceeducer system electronics corroded. The Ceeducer came with Doug Baird from the Nav Manager position. If we could get another Ceeducer system that would be beneficial for shoreline work.
**GPS Gear**
Would like to look at purchasing new systems. For compatibility reasons I would like the Ashtech Z-Xtremes. The report of the loss of the base station is sent in a separate Email. Please keep it internal.
It would also be nice to have the pacific crest base station and receivers for the possibility of setting up more flyaways.
I will also send another Email listing the lost gear.
Mark

Mark VanWaes wrote:
Mark,
I tried calling but wasn't able to get through on any of your lines. I see from your SEAS reporting that you're tucked away up above Lemon Pt. Hope the weather is agreeing with you. Have you tried to install another tide guage at CD yet?
I have a bunch of questions for you. They cover several topics, so I've broken them down. Here goes:
System Certification
- In the vessel reports you specifically stated that TrueHeave was applied for patching S220, but not 1010 or 1018. Was TH applied for those and just not specifically noted?
- On 1010, in the GAMS calibration section, after replacing the antennas the antenna separation changed by 3mm. a) why was this, and b) was this difference measured, or reported by the POS?
- Also on 1010, what happened to the antennas that caused them to be replaced?
- On 1018, you documented a severe vertical offset. Some amount of that can certainly be attributed to predicted/preliminary tides, but 4.7m? Any further thoughts as to the cause of this?
Ceeducer
- A while ago Lynn asked me to look into a replacement for your Ceeducer system. I asked her for some supporting information, but received no response. I'd like to know what happened to the system, how it happened, whether repair has been considered, and what the requirements are of a replacement system. If there is an inherent flaw with the Ceeducers, we need to know so that the issue can be addressed. There are two identical systems to yours here, one is PHB's and one is HSTP's. I may be able to get you one of them if that would suffice.
DGPS/HORCON

- The news that the DGPS fly-away station was destroyed was a surprise to Gerd at FPW. He would like more details on what happened than I've been able go give. Was there a report written about the incident? I seem to recall Grant working on something. If so, to whom was it sent, and could you send me a copy?

- What are the specifics of the fly-away setup? Do you have complete specs, system diagrams, etc. to facilitate a replacement? Who put that together in the first place (I'm assuming it wasn't completely off-the-shelf)? Could you send me any documentation you have on it?

- As I understand it, you are down to one complete Ashtech Z-Xtreme setup for static survey. That being the case you need at least one (preferably two) units to replace the two that were lost in the landslide, correct? Why was it that there were two of the receivers at the fly-away station again? I was there to help set up, but I didn't get into how the system was configured.

That's it for now. You should be hearing from Shyla and myself regarding the system cert soon. We're working on the memo now. Hope things are going well.

Mark

--

LT Mark Van Waes, NOAA
NOAA Coast Survey Development Lab, HSTP-West
c/o Pacific Hydrographic Branch
7600 Sand Point Way NE, Building 3
Seattle, WA 98115
206-526-6891 (voice)
206-526-4514 (fax)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Coast Survey
Silver Spring, Maryland 20910-3282

24 August 2005

MEMORANDUM FOR: Commander John Lowell, NOAA
Commanding Officer, NOAA Ship FAIRWEATHER

FROM: W. Michael Gibson
Chief, Hydrographic Surveys Division

THROUGH: Captain Roger L. Parsons, NOAA
Director

SUBJECT: Systems Certification Recommendation Approval

Following extensive review of your System Certification Report and accompanying documentation I approve your recommendation for readiness. Data acquisition should continue as normal at the discretion of the Lead Hydrographer.

The fact that this approval comes at this late date should not be interpreted to mean that the System Certification process is unimportant or that your extensive effort in this process is unappreciated. Review of a field unit's systems and personnel readiness is vital for ensuring that we are able to collect the highest quality data possible while operating safely and efficiently. The diligent effort of your crew and program representatives to fully and accurately evaluate your platform's state of readiness was highly evident in your System Certification Report and accompanying documentation.

The pre-season systems review was never intended to be as burdensome on the fleet as it was at the beginning of the 2005 field season. In future years the Systems Certification concept will evolve into a simplified Systems Readiness Review, which, with adequate preparation, will be completed in a matter of days with minimized reporting requirements. The new report will likely be composed of a systems readiness checklist with descriptions of specific deficiencies. This will reduce the workload of the Survey Department and facilitate a rapid review and response from Chief, HSD.

A detailed explanation of the revised System Readiness reporting process will be provided in Chapter 1 of the upcoming version of the Field Procedures Manual which will be made available prior to the January 2006 Field Procedures Workshop. Comments and recommendations regarding the System Readiness Review process should be directed to your Field Procedures Manual liaison, Physical Scientist Peter Holmberg, at the Pacific Hydrographic Branch.

cc: Chief, Operations Branch
Chief, HSTP
Chief, Pacific Hydrographic Branch
PS Shyla Allen
PS Megan Palmer
LT Ben Evans
LTJG Mark VanWaes
FOO, FAIRWEATHER

# SeaBat 8111 Noise Analysis

## 1.0 Overview

For mid and deep water sonar systems, noise emanating from the vessel on which the sonar is mounted is a major determinant in the performance of the sonar. In addition to sources such as echosounders and other acoustic devices, such as doppler logs, mechanical noise from the engines and drive trains, and flow noise will also affect performance, with the magnitude of the noise varying with vessel speed.

This document describes the noise analysis test done on the RESON SeaBat 8111 installed on the NOAA S/V Fairweather, on 11 October 2004.

## 2.0 Test Conduct

The following is a description of the system setup and test protocol used to test the SeaBat 8111 multibeam sonar.

### *2.1 Sonar Setup*

To determine the amount of in-band noise seen by the sonar, the system was configured as follows:

| Setting | Value |
|---|---|
| Power | Off |
| Gain | Manual Fixed 20 |
| Range | 100 meters |

Data collection was done using a RESON engineering utility, which collects the full amplitude and phase time series data from the sonar. Figure 1 shows a sample screen capture, in this case one of the data sets taken at six knots, with a shaft speed of 140 RPM. At least ten (10) collections were done for each test case, and the results for first 10 measurements each test case were averaged for the report.

### *2.2 Vessel Operation*

Normal survey speed for the vessel is approximately 10 knots. To bracket this range, and to check at possible lower survey speeds, the test protocol was defined to cover the range of 2 to 12 knots, in 2 knot steps. The tests were conducted at shaft speeds of 120 to 170 RPM, in 10 RPM steps, with the speed adjusted by changing the pitch on the propellers. For each RPM value, the speeds that could be achieved at that shaft speed were tested. A log of data collections for the tests is provided in Appendix A.

All the underway data collections were done in water depths of 120 to 160 fathoms. The zero speed data collections, with the engines on, were done at anchor in about 30 meters of water, and out in the bay, at water depths of about 130 fathoms.

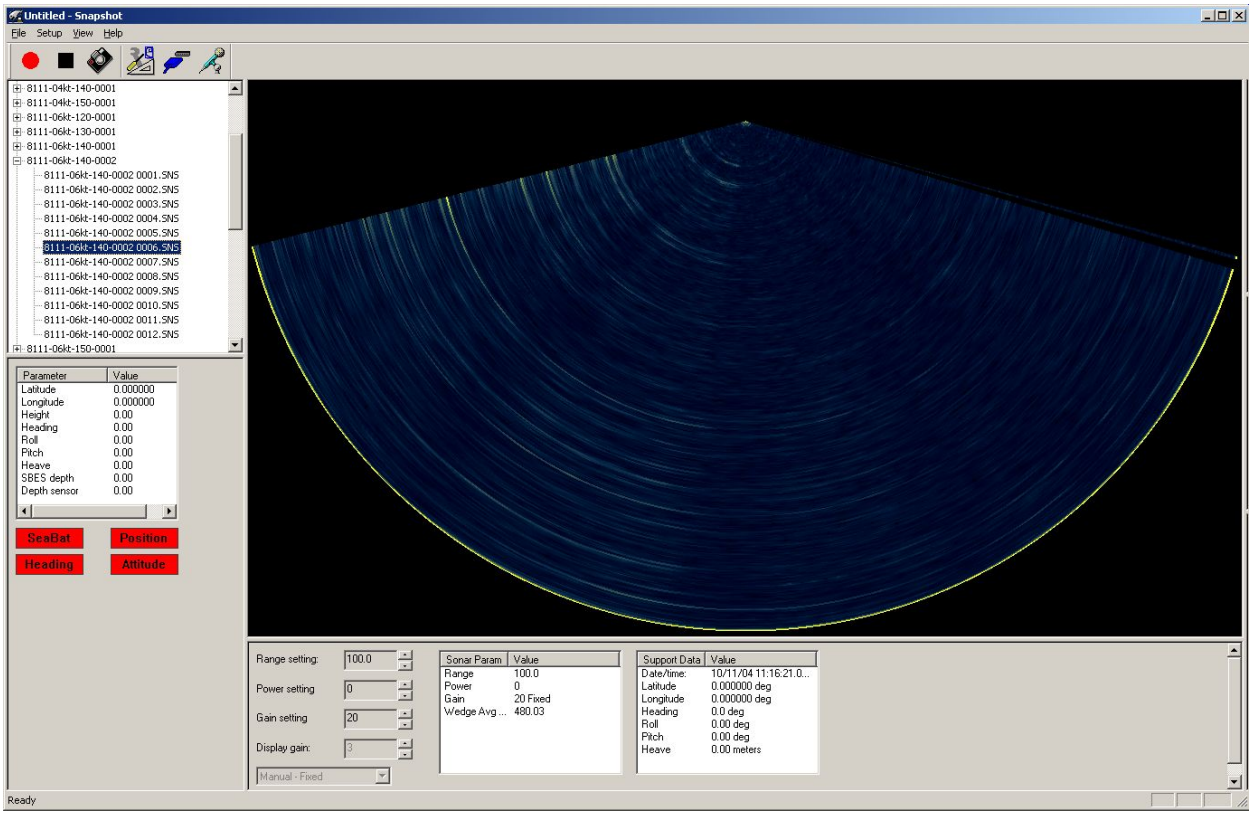



**Figure 1 - Snapshot Utility Screen Capture**

## 2.3 Data Analysis

The data from each of the test cases were collated in an Excel spreadsheet, shown in Appendix B. A graph of the measured noise levels, as a function of vessel speed and shaft RPM is shown in Figure 2. The noise level is a unitless value that represents the average of all the amplitude samples, from all the beams for the sampled sonar ping. This value represents a combination of the electrical noise in the sonar, and the response to all acoustic energy, within the bandwidth of the sonar, impinging on the receive array.

For each the tests, the plot shows the noise level as a function of vessel speed. Again, the tests were run at the speeds that could be achieved at the selected shaft RPM.

In an effort to resolve the cause of the high noise levels at anchor seen in the 8160 tests, noise tests with the engines at idle (110 shaft RPM, 0 pitch) in both shallow and deep water. In deeper

water, much lower noise levels were observed, apparently due to the greater attenuation of the noise from the various acoustic sources on the ship over the greater range.

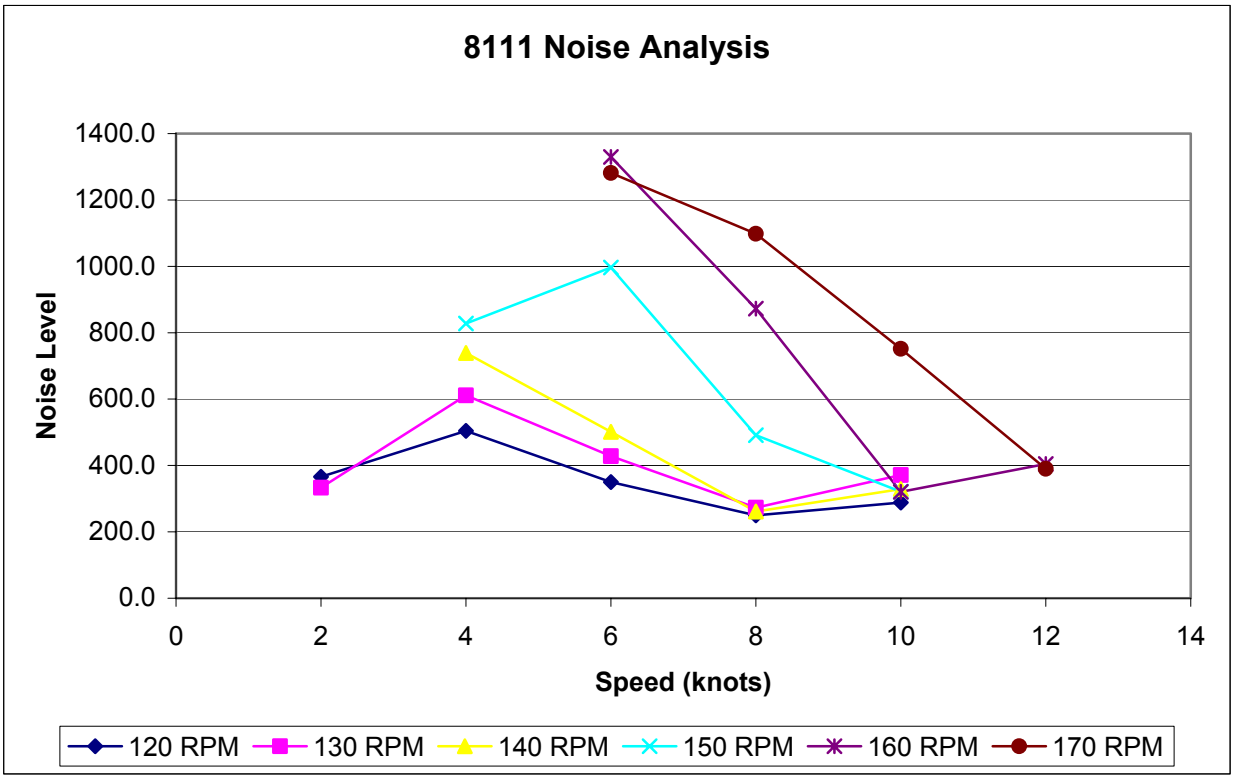



**Figure 2 - Noise Plot**

# 3.0 Conclusions

a. It appears that the best survey speed for the 8111, from a noise perspective, is in the range of 8 to 10 knots. Both lower and higher speeds correlate with higher noise levels.
b. It would be desirable to use shaft speeds of 140 RPM, or lower, to minimize the noise level seen by the sonar.
c. Significantly increased levels of reverberation from acoustic sources on the vessel are seen in shallower water. If this causes any degradation in the quality of the soundings in the 8111, increased power levels, higher than those recommended in the sonar settings guide, should be used to compensate.

# Appendix A – Test Logs

Survey Log - 8111 Noise Test.xls

| | A | B | C | D | E | F | G | H | I | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | RESON Inc. | | | | | | | | | | | | |
| 2 | Date: | 10/11/2004 | | | | Survey Area: | | Rudyerd Bay, AK | | | Page / Pages: | | 1 of 2 |
| 3 | Survey Name: | | 8111 Noise Test | | | Surveyors: | | B Bridge | | | TimeZone: | | -9 |
| 4 | Survey Vessel: | | NOAA Fairweather | | | Client: | | NOAA | | | | | |
| 5 | Offset Information | | | | | | | | | | | | |
| 6 | | | X | Y | Z | Latency | Roll | Pitch | Yaw | | SVP File: | | |
| 7 | *Sounder* | | | | | | | | | | Tide File | | |
| 8 | *DGPS* | | | | | | | | | | | | |
| 9 | *Motion Sensor* | | | | | | | | | | | Total Pole | |
| 10 | *Other* | | | | | Date of Patch Test | | | | | | minus Dry Pole | |
| 11 | | | | | | | | | | | | Draft (Z) | |

| 12 | Start | Stop | Line | Dir. | Speed | COMMENTS |
|---|---|---|---|---|---|---|
| 13 | | | 8111-00kt-EngOn-0001 | | 0 | Gain MF20, Power 0, Range 100, at anchor, 110 RPM |
| 14 | | | 8111-00kt-0001 | | 0 | 110 RPM 0 Pitch |
| 15 | | | 8111-02kt-120-0001 | | 2 | 120 RPM 1.0 Pitch 0.4 Doppler |
| 16 | | | 8111-04kt-120-0001 | | 4 | 120 RPM 3.0 Pitch 2.8 Doppler |
| 17 | | | 8111-06kt-120-0001 | | 6 | 120 RPM 6.0 Pitch 4.6 Doppler |
| 18 | | | 8111-08kt-120-0001 | | 8 | 120 RPM 8.5 Pitch 6.7 Doppler |
| 19 | | | 8111-10kt-120-0001 | | 9 | 120 RPM 10.0 Pitch 7.2 Doppler |
| 20 | | | 8111-10kt-130-0001 | | 10 | 130 RPM 10.0 Pitch 8.2 Doppler |
| 21 | | | 8111-08kt-130-0001 | | 8 | 130 RPM 7.0 Pitch 6.2 Doppler |
| 22 | | | 8111-06kt-130-0001 | | 6 | 130 RPM 5.0 Pitch 4.5 Doppler |
| 23 | | | 8111-04kt-130-0001 | | 4 | 130 RPM 3.0 Pitch 2.2 Doppler |
| 24 | | | 8111-02kt-130-0001 | | 2 | 130 RPM 1.5 Pitch 0.5 Doppler |
| 25 | | | 8111-04kt-140-0001 | | 4 | 140 RPM 2.5 Pitch 2.5 Doppler |
| 26 | | | 8111-06kt-140-0001 | | 6 | 140 RPM 4.75 Pitch 4.3 Doppler Too Shallow |
| 27 | | | 8111-06kt-140-0002 | | 6 | 140 RPM 5.3 Pitch 5.2 Doppler |
| 28 | | | 8111-08kt-140-0001 | | 8 | 140 RPM 7.4 Pitch 6.5 Doppler |
| 29 | | | 8111-10kt-140-0001 | | 10 | 140 RPM 9.0 Pitch 8.5 Doppler |
| 30 | | | | | | |
| 31 | | | | | | |
| 32 | Survey Manager: | | | | Client Representative: | |
| 33 | Signature: | | | | Signature: | |
| 34 | | | | | | |
| 35 | | | | | | |

Sheet1 Sheet2 Sheet3

Survey Log - 8111 Noise Test Pg2.xls

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | RESON Inc. | | | | | | | | | | | |
| 2 | **Date:** | 10/11/2004 | | | **Survey Area:** | | Rudyerd Bay, AK | | | **Page / Pages:** | 2 of 2 | |
| 3 | **Survey Name:** | 8111 Noise Test | | | **Surveyors:** | | B Bridge | | | **TimeZone:** | -9 | |
| 4 | **Survey Vessel:** | NOAA Fairweather | | | **Client:** | | NOAA | | | | | |
| 5 | **Offset Information** | | | | | | | | | | | |
| 6 | | **X** | **Y** | **Z** | **Latency** | **Roll** | **Pitch** | Yaw | | **SVP File:** | | |
| 7 | ***Sounder*** | | | | | | | | | **Tide File** | | |
| 8 | ***DGPS*** | | | | | | | | | | | |
| 9 | ***Motion Sensor*** | | | | | | | | | Total Pole | | |
| 10 | ***Other*** | | | | **Date of Patch Test** | | | | | minus Dry Pole | | |
| 11 | | | | | | | | | | **Draft (Z)** | | |
| 12 | **Start** | **Stop** | **Line** | | | **Dir.** | **Speed** | **COMMENTS** | | | | |
| 13 | | | 8111-10kt-150-0001 | | | | 10 | Gain MF20, Power 0, Range 100, 150, 8.2, 7.4 | | | | |
| 14 | | | 8111-08kt-150-0002 | | | | 8 | 150 RPM 6.1 Pitch 6.3 Doppler | | | | |
| 15 | | | 8111-06kt-150-0001 | | | | 6 | 150 RPM 4.3 Pitch 4.4 Doppler | | | | |
| 16 | | | 8111-04kt-150-0001 | | | | 4 | 150 RPM 3.0 Pitch 2.8 Doppler | | | | |
| 17 | | | 8111-06kt-160-0001 | | | | 6 | 160 RPM 4.0 Pitch 5.2 Doppler | | | | |
| 18 | | | 8111-08kt-160-0001 | | | | 8 | 160 RPM 6.1 Pitch 6.5 Doppler | | | | |
| 19 | | | 8111-10kt-160-0001 | | | | 10 | 160 RPM 8.2 Pitch 8.8 Doppler | | | | |
| 20 | | | 8111-12kt-160-0001 | | | | 11.7 | 160 RPM 10. Pitch 9.9 Doppler | | | | |
| 21 | | | 8111-12kt-170-0001 | | | | 12 | 170 RPM 9.0 Pitch 10.4 Doppler | | | | |
| 22 | | | 8111-06kt-170-0001 | | | | 6 | 170 RPM 4.0 Pitch 4.8 Doppler | | | | |
| 23 | | | 8111-08kt-170-0001 | | | | 8 | 170 RPM 5.9 Pitch 6.8 Doppler | | | | |
| 24 | | | 8111-10kt-170-0001 | | | | 10 | 170 RPM 7.0 Pitch 8.3 Doppler | | | | |
| 25 | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | |
| 27 | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 31 | | | | | | | | | | | | |
| 32 | Survey Manager: | | | | | Client Representative: | | | | | | |
| 33 | Signature: | | | | | Signature: | | | | | | |
| 34 | | | | | | | | | | | | |

Sheet1 Sheet2 Sheet3

# Appendix B – Noise Analysis Spreadsheet

8111 Noise Test Results

| Test Condition | Speed | Pitch (ft) | Test Case | | | | | | | | | | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| Eng On Shallow | 0 | 0 | 707.5 | 740.2 | 754.1 | 711.4 | 728.1 | 710.6 | 691.5 | 747.9 | 813.7 | 722.1 | 732.7 |
| Eng On Deep | 0 | 0 | 209.0 | 208.4 | 208.6 | 207.2 | 205.6 | 211.2 | 206.3 | 208.8 | 210.9 | 210.0 | 208.6 |
| 120 RPM | 2.0 | 1.0 | 382.8 | 363.0 | 363.6 | 330.6 | 447.5 | 315.2 | 389.0 | 322.1 | 371.9 | 371.1 | 365.7 |
| | 4.0 | 3.0 | 552.7 | 431.0 | 555.9 | 480.0 | 517.9 | 448.0 | 472.8 | 500.7 | 583.6 | 499.2 | 504.2 |
| | 6.0 | 6.0 | 325.5 | 332.9 | 302.5 | 322.9 | 324.8 | 364.2 | 325.8 | 384.3 | 409.1 | 407.4 | 349.9 |
| | 8.0 | 8.5 | 253.8 | 244.0 | 250.3 | 253.0 | 248.4 | 241.0 | 241.7 | 252.4 | 253.5 | 259.1 | 249.7 |
| | 9.0 | 10.0 | 298.8 | 296.8 | 277.4 | 306.1 | 284.1 | 274.0 | 274.1 | 290.1 | 287.5 | 291.9 | 288.1 |
| 130 RPM | 2.0 | 1.5 | 316.9 | 363.0 | 366.1 | 429.6 | 317.1 | 313.9 | 303.7 | 315.5 | 315.5 | 289.4 | 333.1 |
| | 4.0 | 3.0 | 671.0 | 657.4 | 700.4 | 632.7 | 602.6 | 631.0 | 552.5 | 605.8 | 537.9 | 523.7 | 611.5 |
| | 6.0 | 5.0 | 488.2 | 471.1 | 410.9 | 497.2 | 387.7 | 390.9 | 431.0 | 448.9 | 361.3 | 393.5 | 428.1 |
| | 8.0 | 7.0 | 285.2 | 279.1 | 276.7 | 266.2 | 287.8 | 268.3 | 271.0 | 262.5 | 283.4 | 249.9 | 273.0 |
| | 10.0 | 10.0 | 362.8 | 396.1 | 378.8 | 378.2 | 370.2 | 391.7 | 354.6 | 369.9 | 334.3 | 374.0 | 371.1 |
| RPM140 | 4 | 2.5 | 763.9 | 725.6 | 669.0 | 723.3 | 759.5 | 751.5 | 773.5 | 750.6 | 689.0 | 785.7 | 739.2 |
| | 6 | 5.3 | 487.1 | 551.5 | 605.3 | 596.4 | 444.3 | 480.0 | 416.2 | 500.0 | 452.6 | 478.9 | 501.2 |
| | 8 | 7.4 | 261.5 | 257.6 | 260.7 | 273.1 | 259.8 | 274.8 | 255.0 | 252.1 | 248.7 | 270.6 | 261.4 |
| | 10 | 9.0 | 301.5 | 365.3 | 328.4 | 360.1 | 359.9 | 328.4 | 326.2 | 315.0 | 302.7 | 300.4 | 328.8 |
| RPM150 | 4 | 3.0 | 775.2 | 766.3 | 916.9 | 809.7 | 815.4 | 860.6 | 710.5 | 801.1 | 892.1 | 928.6 | 827.6 |
| | 6 | 4.3 | 1058.7 | 926.7 | 737.5 | 1015.6 | 1028.1 | 1086.3 | 1048.8 | 1133.8 | 997.3 | 931.8 | 996.5 |
| | 8 | 6.1 | 507.8 | 567.2 | 535.4 | 486.4 | 507.3 | 443.4 | 460.9 | 537.6 | 461.0 | 406.4 | 491.3 |
| | 10 | 8.2 | 299.2 | 294.1 | 315.8 | 306.5 | 308.4 | 323.2 | 348.8 | 336.8 | 332.8 | 344.5 | 321.0 |
| 160 RPM | 6 | 4.0 | 1488.4 | 1551.6 | 1328.3 | 1454.8 | 1456.9 | 1518.9 | 1256.4 | 1146.3 | 1089.5 | 1005.8 | 1329.7 |
| | 8 | 6.1 | 740.7 | 777.4 | 926.5 | 904.7 | 851.6 | 817.7 | 886.5 | 801.0 | 1005.7 | 1015.9 | 872.8 |
| | 10 | 8.2 | 339.9 | 330.9 | 335.0 | 329.4 | 300.6 | 326.7 | 316.9 | 311.6 | 313.7 | 300.9 | 320.6 |
| | 12 | 10.0 | 581.4 | 396.6 | 351.5 | 360.6 | 344.6 | 410.5 | 466.2 | 357.1 | 389.6 | 386.4 | 404.5 |
| 170 RPM | 6 | 4.0 | 1240.1 | 1173.3 | 1016.2 | 1346.1 | 1301.8 | 1391.5 | 1520.2 | 1327.6 | 1320.2 | 1176.3 | 1281.3 |
| | 8 | 5.9 | 961.9 | 1096.9 | 1229.4 | 1017.2 | 1041.2 | 1168.9 | 1176.6 | 1060.5 | 1117.9 | 1112.2 | 1098.3 |
| | 10 | 7.0 | 756.2 | 751.3 | 747.9 | 640.1 | 769.5 | 844.8 | 714.6 | 795.6 | 787.4 | 709.4 | 751.7 |
| | 12 | 9.0 | 396.2 | 360.1 | 552.7 | 339.9 | 348.5 | 339.3 | 352.6 | 356.5 | 502.1 | 351.7 | 390.0 |

# PHB and FA Discussions of H11334 Survey Review

Meeting Notes

The Survey Certification Memo for H11334 was used as a guideline for discussion points. The following Notes reference the relevant portions of that memo. The double-starred items (**) indicate actions to be taken and/ or requests for feedback.

1. Exceptions to NOAA's standards:
   "The areas addressed in the Descriptive Report referring to data that does not meet IHO Order 1 standards should be qualified as IHO Order 2, which for depths less than 100 meters does not meet NOS HSSDM requirements."

   This point and the notes from the Survey Review Checklist were discussed and it was agreed upon that the BASE Surface should not be regarded as higher quality than the data itself, particularly in areas where the coverage contributing to computation of the BASE Surface is comprised primarily of outer beam data.

2. PHB's requests from FA:
   a. HDCS data that was removed from the submitted data set due to positioning problems should be submitted, with edits (if available).
      - FA deleted the edited HDCS data with positioning problems. The XTF data still exists, unprocessed, but will have to be re-converted.
      - CST Morgan has agreed to submit the converted HDCS data. She did, however, express considerable concern that the data be separated from the rest of the project data and used only to verify that no navigationally significant features exist in the areas lacking coverage, as stated in the DR.
      - **Further input is requested from PHB with regards to whether or not the HDCS data should be edited, prior to submission.
      - ** The HDCS data will be copied to a CD and I will submit it, upon returning from the FA to the office.
   b. The following remarks are in response to the detailed summary of discrepancies between the .hvf and the DAPR in the Survey Review Checklist, Comment 2.
      - The following Checklist comments relate to differences between Day Numbers, in the DAPR vs. .hvf's:
        - 101_8101, comments a & d;
        - 1018_8101, comments a & b;
        - S220, comment a;

        In each of these cases, the .hvf Day Numbers were earlier than the patch test acquisition dates listed in the DAPR. Both the CST and FOO confirmed that the acquired patch test values were used in .hvf's that were defined with earlier dates so that the patch values could be applied to data that was acquired prior to the patch test data (other-wise known as "back-timing").

- The following Checklist comments relate to differences between the Time Error as documented in the DAPR and the corresponding Swath 1 values in the .hvf's:
    - 1010_8101, comment b;
    - 1018_8101, comment c;
    - S220, comment b;

  Both the CST and FOO explained that the Time Error can either be entered in the Swath 1 Time Error or the Time Error data fields in the Navigation, Gyro, Heave, Pitch and Roll categories, but does not need to be entered into all of those fields. This explanation of the FA's application of the latency correctors is consistent with H11334's submitted .hvf's.
  **It was agreed that this explanation of the application of their latency correctors should be documented in the DAPR.

c. In the .hvf's for 1010_8101, 1018_8101 and S220, the DAPR indicates that the "MRU Align StdDev Gyro" and "MRU Align StdDev Roll/Pitch" values are unknown, but these fields are defined as 0.000 in the .hvf's. After discussing this amongst CO, FOO, CST and myself it was decided that the values are indeed unknown and, moreover, undocumented in Caris' Vessel Editor Help Manual.

   The question of the meaning of these values was posed to Brian Calder from UNH, who is currently aboard the FA. He explained that these error values are defined as the standard deviation of the error estimates for the "gyro" and "roll/ pitch" patch test values, as calculated from the compilation of these values from all of the individuals evaluating the patch test data.

   **I will email Caris to inform them of their lacking documentation with respect to the definition of these values in the Vessel Editor Help Manual.
   **The FA will calculate and enter these values into the .hvf's, for future patch tests.

3. The Survey Certification Memo contains an error that will be confusing to anyone reviewing it for future work. In the section introduced with "Special attention should be given to…", the first bullet contains the following statement:
   "The H11334_Office field sheet should be used by the Cartographers (instead of H11334_Final) to generate contours and soundings, since it does contain coverage for areas omitted due to positioning error (section B.2 of the DR)."
   Not only is this a double negative (as pointed out by the CO), but it implies the exact opposite action that the statement is intended to propose.

   **I will replace the statement with the following:
   "The H11334_Office field sheet should be used by the Cartographers (instead of H11334_Final) to generate contours and soundings, since the BASE surfaces in

the office generated field sheet only contain coverage from data with acceptable positioning."

4. The second bullet point in the "Special Attention" section of the memo (and comment 5 in the Checklist) pertains to the version of the chart that was used for the Chart Comparison.

   This comment brought up concerns about the availability of charts that are updated mid-field season, and whether arrangements can be made for HSD to provide these to the field units throughout the field season. Currently, the field uses the most updated charts that are available, as provided by HSD at the beginning of the field season. The following suggestions were made, to remedy the problem of chart comparisons with outdated charts:

   - Could HSD make a formal request to receive the most up-to-date charts from MCD, and then send those updates out to the field, as they become available?
   - Should the field units consider going outside HSD to find an alternative chart updating service?
   - Should the question of which chart was used for the Chart Comparison continue to be addressed in the Survey Review process, if the ship does not have access to the most recent chart updates, but continues to adhere to the policy of using the most updated chart that is available?

   **Additional suggestions/ recommendations from PHB would be appreciated.

The rest of the comments made in the Survey Certification Memo and the Checklist were noted and generally agreed upon.

## Fairweather CTD Maintenance and Periodic Testing

22-Mar-05 cleaned with bleach and Triton X-100 solution
23-Mar-05 performed DQA - 4585; test within specs. Files archived in
R:\System\2005\Appendices\Appendix V Addl Calibration Reports\CTD\FA_CTD_Tests_2005

1-Apr-05 cleaned 4616 and 4617 w/ Triton X-100. Ship's CTD 4585 inactive the week of Mar 27 to Apr 1

9-Apr-05 cleaned 4616 and 4617 w/ Triton X-100. Ship's CTD 4585 inactive week of Apr 3 to Apr 9

10-Apr-05 performed DQA - Comparison casts between 4986 (MVP 200) and 4585
message output- These readings fall within the expected deviation for two sensors perhaps in
slightly different water columns vertically and horizontally.
The cast was 4m in depth and the velocities were 1469.23 for 4986 and 1469.96 for 4585

15-Apr-05 cleaned 4616 and 4617 w/ Triton X-100. Ship's CTD inactive.

1-May-05 cleaned 4616 and 4617 w/ bleach and Triton X-100

12-May-05 performed DQA- Comparison between 4585 and 4617 w/in specs. Problem w/ Velocwin? Comparison between 4585 and 4616 not w/in specs.

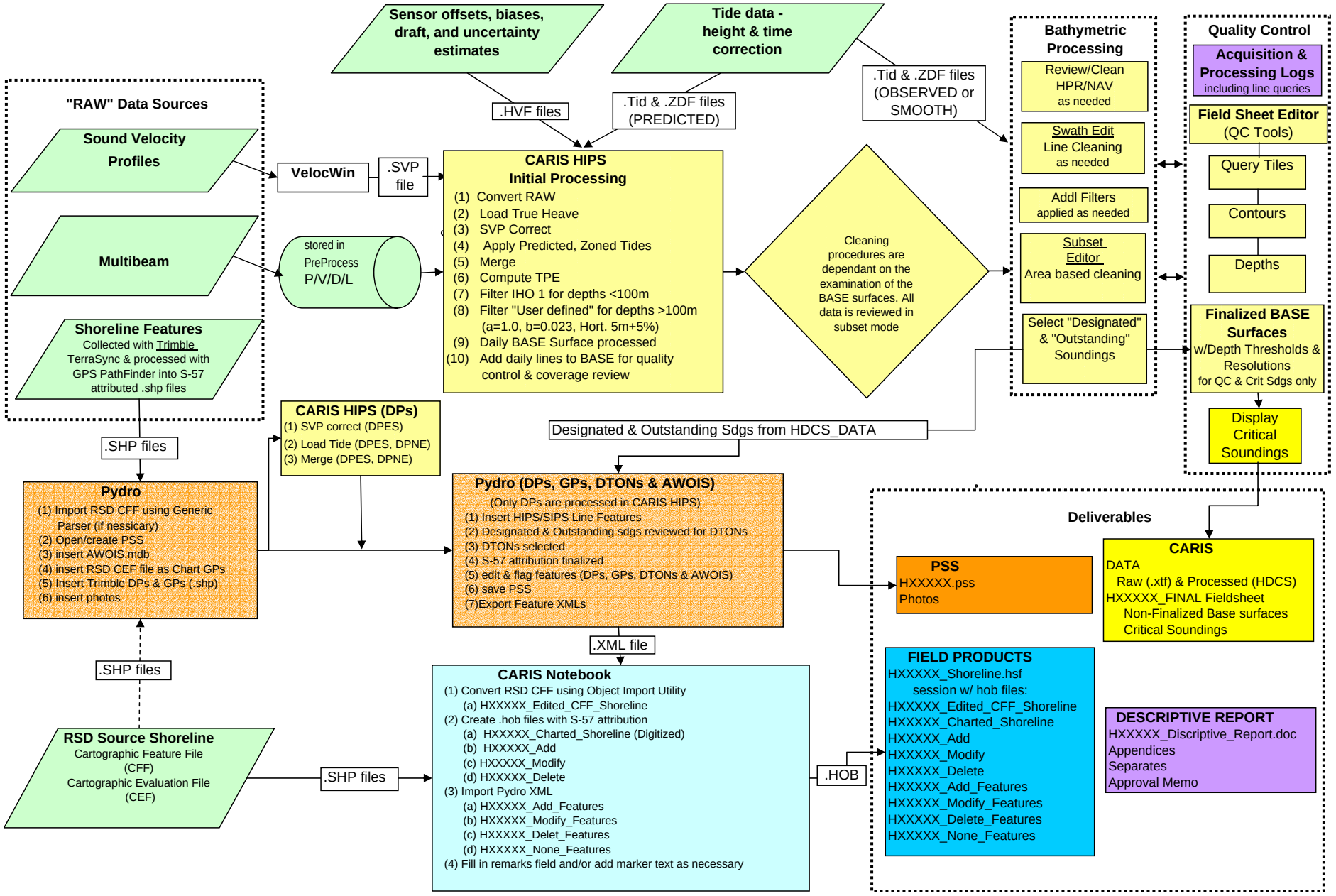
13-May-05 cleaned 4616 and 4617 W/ Triton X-100

14-May-05 performed DQA- Comparison between 4585 and 4616 w/ in specs.
cleaned 4585 w/ Triton X-100

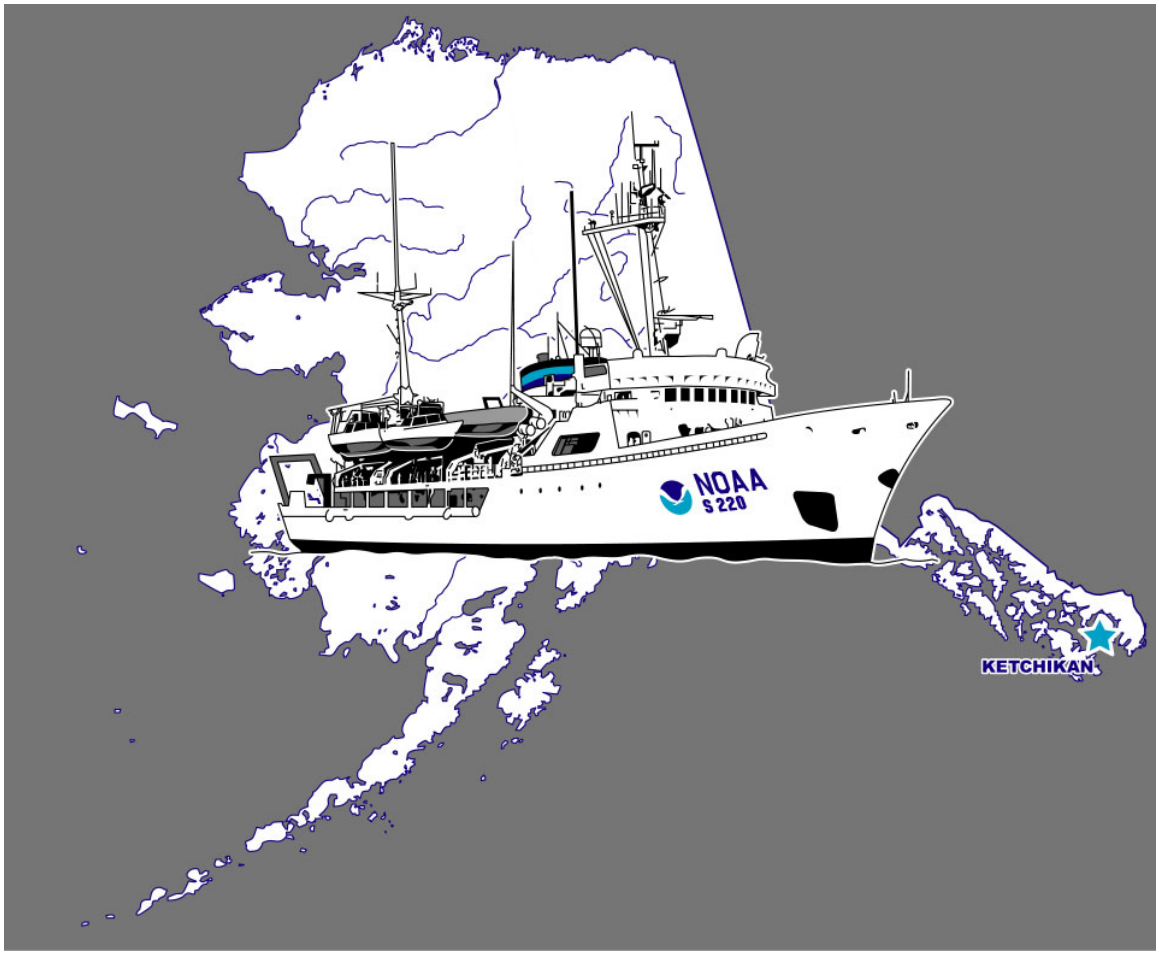
24-May-05 cleaned 4616 and 4617 w/ Triton X-100

31-May-05 cleaned 4616 and 4617 w/ Triton X-100

# FAIRWEATHER Data Processing 2005



# Survey Management



# Table of Contents

## 0.0 Document Scope

This document is meant to be used as a guideline for survey managers to insure that surveys are completed properly. There is a general order to this list. Some things have to be done in order, while others, like the Coast Pilot, DR and Final Fieldsheet prep can be started in advance. This document can be used in conjunction with the R:\Utilities\II_Forms_Lists_and_Templates\4_Quality_Control\QC Checksheet. Copy and rename to H#####_QC_Checksheet and put it into your Survey_Files\Quality_Control folder. This document and the QC_Checksheet should match fairly closely, beginning with the Post Acquisition section.

## 1.0 Survey Planning

Survey planning begins before arriving at the survey area and continues throughout the project.

### 1.1 Letter Instructions

Read and understand the project letter instructions, located here: *H:\OPR-XXXX-FA-Project\Project_Reports\I Letter_Instructions.*

### 1.2 Manager Responsibilities

The survey manager is responsible for creating polygon files, a shoreline workspace, boat sheets, setting up projects on the launches (including suitcase shoreline and ship if necessary for your survey). In addition, the Survey Manager is responsible for directing the daily work schedule (polygon plans and chartlets) of launches assigned to acquire data on the survey. See:
*R:\Utilities\FA_SOP\0_Management\File Management\Survey File Management*
*R:\Utilities\I_FA_SOP\1_Presurvey\Shoreline\Shoreline_Presurvey.doc*
*R:\Utilities\FA_SOP\1_Presurvey\AWOIS_Presurvey\ AWOIS_Setup.doc*
*R:\Utilities\FA_SOP\1_Presurvey\Creating_DelphMap_Projects_SOP.doc*
*R:\Utilities\FA_SOP\2_Acquisition\Shoreline\Shoreline_Guidelines*

## 2.0 Acquistion

### 2.1 Polygons

To convert Notebook polygons to shapefiles for DelphMap, see:
R:\Utilities\FA_SOP\1_Presurvey\Notebook Polygons to DelphMap.doc

The purpose of drawing polygons is to guide the launch crew acquiring multibeam data. Try to set them up in such a way that turns are minimized and lines are manageable length for processing. Be aware of any possible sources of fresh water, or other factors that will affect the water column and make smaller polygons in these areas. Ask the launch crew to do more CTD casts in these areas.

Remember to update your near shore polygons using the shoreline buffer, shoreline updates and new features to determine the inshore limit of hydro. Review polygons with shoreline data so you don't accidentally send a SWMB boat over a new rock, or into an area that is too shoal. Also, use the Buffer Lines that were collected to edit your near shore polygons.

DO NOT send multibeam boats inshore of the eight meter curve until shoreline verification has been run in that area. Once shoreline has been run, export your new features from Pydro into Isis for use by the multibeam boats during near shore acquisition.

### 2.2 Cross Lines

Cross lines are necessary for quality control checks of data. Looking at nadir beams from cross lines with outer beams of mainscheme lines, errors in the data such as sound velocity problems become much more apparent. Plan to get enough linear nautical miles of cross lines to equal 10% of the total linear nautical miles acquired on the sheet. This will insure that the specified 5% is met.

### 2.3 Survey Log

Keep a survey log in addition to the daily acquisition and processing logs to note any problems during the survey, or deviations from the DAPR. This will be useful when writing the DR. H#####_Survey_Log.doc should be in the Survey_Files\Quality_Control folder.

## 3.0 Post Acquisition

These steps are intended to be followed both during acquisition and immediately after data acquisition has been completed for the survey. The order should be generally the same as that of the QC Checksheet, offering more detail for following those steps.

### 3.1 Quality Control and Assessment of Soundings

During acquisition of data, the Sheet Manager is responsible for analyzing the quality of the soundings and insuring coverage and sounding density. Before leaving the survey area, the Sheet Manager must review the BASE child layers, using subset mode to check for sound velocity and tide problems, as well as checking for ample coverage, especially over navigationally significant areas. Unverified observed tides are usually available within a day or two and can then be applied to the data.

It may be beneficial to create a subset tile layer in CARIS to keep track of areas that have been reviewed. This review is not cleaning in subset. It's just a quick look in subset mode for lines that may not have been cleaned properly, holidays, SV, tide and other problems with the data. Have the BASE surfaces open in CARIS and use different sun illumination angles. Problem areas will look suspect.

### 3.2 Check for Immediate DTON's

Look for any items in the bathymetry which are extremely navigationally significant. These items should be brought to the attention of the FOO and the CO immediately, so they can be added to the relevant charts as soon as possible. Otherwise, the regular DTON review occurs at the end of post processing.

### 3.3 Document Deviations from DAPR

Be familiar with the System Certification Report for the year and DAPR for the project. Any deviations from the aforementioned reports should be recorded in the survey log, or

the acquisition and processing logs for possible inclusion into the DR if necessary. Changes to the HVF, or other unusual steps taken during data acquisition or processing should be noted and explained in the DR.

### 3.4 Shoreline Processing

Insure that shoreline verification is conducted in accordance with the Letter Instructions and that adequate annotations are made in the field to allow for complete description of the shoreline environment. Review Pydro and Notebook sessions, photos and DP forms for completeness prior to leaving the survey area. Pydro PSS features should be completely addressed, with the Chart, Significant, Primary and Report flags checked where applicable. See:
*R:\Utilities\I_FA_SOP\3_Processing\Shoreline\Pydro_Shoreline_Processing.doc*
*R:\Utilities\I_FA_SOP\3_Processing\Shoreline\Notebook_Shoreline_Processing.doc*
*R:\Utilities\FA_SOP\3_Processing\Pydro\Pydro Logic_SOP.doc* & *Pydro Editor Notebook_SOP.doc*

### 3.5 AWOIS Items

Insure that all AWOIS items listed for the survey are either verified or disproved through methods listed in the AWOIS database technique section, provided from the AWOIS database. Refer to the AWOIS section of the Field Procedures Manual v1.1 for further information. Update the AWOIS database using Pydro. If there are questions about which method is best for a particular item, consult the FOO, CST or an SST.

### 3.6 Coast Pilot Updates

The Coast Pilot should be updated while still in the survey area. Don't put it off! Reference depths, bottom samples and shoreline information as needed to update relevant paragraphs. See:
*R:\Utilities\FA_SOP\4_Deliverables\Coast_Pilot\Coast Pilot Survey PIC Instructions.doc*

The *HXXXXX _CP_Update.doc* should be saved in:*H:\OPR-XXXX-FA-Project \Project_Reports\IV Coast_Pilot*

### 3.7 Smooth Tide Request

Request for Smooth Tides letters should be drafted and submitted as soon as all survey acquisition is completed. These requests do not need to wait until all data processing is complete or the DR has been written. See:
*R:\Utilities\FA_SOP\4_Deliverables\SmoothTides\Smooth Tides Request.doc*

All of the files should be saved in: *H:\OPR-XXXX-FA-Project\Surveys\HXXXXX\ Descriptive_Report\Appendices\III Smooth_Tide_Request*

### 3.8 Create Survey Outlines

It may be necessary to make two or three outlines for the survey, depending on whether VBES and / or SSS are submitted as well as MBES. The table named H######_Survey_Outline.tab should outline all data. If only MBES is being submitted, only one table is needed. For step by step instructions on creating tables, see:
*R:\Utilities\FA_SOP\4_Deliverables\Survey_Outline*

If the survey has VBES or SSS, there will need to be an outline around the VBES coverage named H#####_VBES_Outline.tab and an outline around the SSS coverage named H#####_SSS_Outline.tab, as well as the MBES outline, named H#####_ MBES _Outline.tab.

All of the outline files should be saved in: *H:\OPR-XXXX-FA-Project\Surveys\HXXXXX\ Descriptive_Report\Appendices\II Survey_Outline*

### 3.9 Apply Observed Tides to CARIS Data

Check the observed tide file to be applied to the data. Make sure that all acquisition days are included in the tide file. Be sure that there is a buffer of one extra day at the end of the file, or before any gaps in acquisition days. This will cover any data collected after midnight GMT.

Using CARIS HIPS, open the file in Tide Editor to insure that it looks OK. Look for fliers and for problems with the data, such as a shift up or down in one section of the data, or any discontinuities. Alert the tides people if you see a problem, so it can be corrected. If you can't find, or don't know which tide file to use, check with the tides people.

At the end of acquisition, reload the observed tides with the zone file to all lines and DPs.

### 3.10 Review Sound Velocity Files

1) Check all SVPs, using CARIS Sound Velocity Editor to look for any fliers or other problems with the cast.
2) Display SVP Positions in CARIS with the MBES data open.
3) From the HDCS_Data folder, select the folder for one line from each boat day. Use a text editor to compare the SVP file listed to the cast that the acquisition log query lists as being applied.
4) Make sure that all casts listed in the acquisition logs have been copied to the appropriate folders to be applied to the data.
5) Insure that the concatenated folder contains all SV files for that vessel.
6) If discrepancies are found, assess whether SV should be re-applied.

### 3.11 Re-Merge CARIS Lines

Check the CARIS H#####_QC session to make sure that it contains all MBES lines. There should not be any DP files in the subset cleaning session. Re-merge all lines once observed tides have been applied.

### 3.12 Query All Lines

Query all HDCS lines and save the results in the H#####_Data_Query.xls, in the Survey_Files\Quality_Control folder. The blank data query form to use is located in *R:\Utilities\II_Forms_Lists_and_Templates\4_Quality_Control\HXXXXX_Data_Query.xls*. The (QCCheck) MBES QC Ssn Date and (QCCheck) DP-GP-BS Date are to be completed by the Survey PIC as part of the QC Check.

The data query is a mechanism to check all your HDCS lines for SV casts/Observed tide application, vessel speeds, etc as well as # of Raw files compared to # of HDCS folders. In addition there is a format for checking Pydro files to raw files and ensuring #s of features match in Pydro and Notebook. Check that the appropriate tide file has been applied and that the SV profile makes sense as far as time and position. Compare this query with the original queries recorded in the acquisition and processing logs and investigate any discrepancies.

## 4.0 Post Survey

These steps outline the process for final review of data before submission, continuing to follow the QC Checksheet.

### 4.1 Quality Control and Data Review

The Survey Manager must review the entire survey area in subset mode, using the H#####_QC session in CARIS HIPS. Refer to: *R:\Utilities\\FA_SOP\3_Processing\CARIS HIPS\Bathy_Processing_SOP.doc*

It may be helpful to create a subset tile layer for the entire survey to keep track of which areas have been checked. This requires a surface that is up to date and contains all MBES lines. The CARIS session should not include any DPs or BSs. The recommended tile size for a 1:10,000 scale survey is 20m. Bigger than that causes overlap between subsets to be too large and smaller is not necessary.

### 4.2 Designate Soundings

Use CARIS Subset Editor to review the data with a BASE surface in the background. Designate soundings in areas where the surface doesn't match the highest point of the data. Refer to: *R:\Utilities\\FA_SOP\3_Processing\CARIS HIPS\Bathy_Processing_SOP.doc*

Depth Threshold BASE Surfaces must be finalized in H#####_QC session for designated soundings to take effect and become critical soundings that will be submitted with data.

If you make a mistake in designating soundings or remove/add critical soundings after you have displayed the critical soundings in CARIS, you must delete the .hcsidx file that resides in your HDCS_DATA folder and then redisplay critical soundings to get them to display in CARIS.

### 4.3 Depth Checking for Flyers

Using CARIS Fieldsheet Editor, create contours and soundings in the H#####_QC session. Review the entire survey area and check areas with bulls eye contours or questionable depths using subset or line mode.

### 4.4 Chart Comparisons

Review depths in CARIS HIPS with the appropriate chart in the background. Write up results in the DR. Also, check the latest Local Notice to Mariners for the most recent updates to the chart. The .kap file header will tell you the NTM that has been applied to it if you open it in Wordpad.

### 4.5 DTONs

For information on selecting DTONs, refer to:
*R:\Utilities\FA_SOP\4_Deliverables\DTONs\Selecting DTONs.doc*

Select any possible DTONs in CARIS and mark soundings as outstanding or designated. Insert the item as a HIPS/SIPS Line Feature in Pydro and check the DTON flag. Also, new DPs/GPs can be possible DTONs, so review the new features and check the DTON flag if applicable. E-mail the FOO to review the possible DTONs in the PSS.

Once the DTONs have been approved by the FOO, continue with the instructions given in: *R:Utilities\FA_SOP\4_Deliverables\DTONs\DTONS_Procedure_XML.ppt*

Make sure all Remarks and Recommendations tabs have been filled in and then create an .xml of the DTONs. Have the FOO review the .xml and e-mail it to MCD, CC-ing the Sheet Manager. A digital copy of the e-mail should be kept in the PSS folder. This PSS folder should also include the H#####_DTON.xml and the H#####_DTON_Report.

### 4.6 Field Products

A CARIS Notebook session should be created for the survey, which includes all shoreline and bottom sample data. For the proper procedures, refer to:
*R:\Utilities\FA_SOP\3_Processing\Notebook_Shoreline_Processing.doc*
*R:\Utilities\FA_SOP\3_Processing\Pydro_Shoreline_Processing.doc*
*R:\Utilities\FA_SOP\3_Processing\CartoAction_Flagging.doc*

### 4.7 Create Depth Threshold BASE Surfaces

The H#####_QC session should contain all SWMB lines, but none of the DP or BS files. The fieldsheet can contain any BASE surfaces which were used during processing, but should also contain finalized BASE surfaces, with the appropriate depth thresholds. Refer to the Digital Submission Checksheet for suggested depth ranges and resolutions.

The H#####_Final CARIS session should contain a field sheet with non-finalized BASE surfaces. These surfaces should be named to reflect the resolution and depth ranges used for the finalized surfaces in the QC session.

### 4.8 Preliminary Smooth Sheet (PSS session in Pydro)

Open the PSS in Pydro. Use the Data Stats function to make sure that the data is not stale or outdated. Check the shoreline and bottom sample DPs to insure that the appropriate flags are checked, the Remarks and Recommendations tabs are filled in as necessary and that correctors have been properly applied.

### 4.9 Descriptive Report

In the DR, the Survey Manager describes what, where, why, when, how and with whom the survey was conducted. The DR is a legal document and can be brought up in court to prove (or disprove) the accuracy of the survey. Go to the template:
*H:\OPR-XXXX-FA-Projects\Surveys*

Save a copy to the survey folder:

*H:\OPR-XXXX-FA-Project\Surveys\HXXXXX\Descriptive_Report*
and name it H#####_Descriptive_Report. Use the survey log and acquisition and processing logs to write about any issues encountered, or deviations from standard procedures.

#### 4.9.1 Shoreline

Disprovals and anything ambiguous, about which further information would be helpful to the cartographer, should be flagged for Report in Pydro. Most shoreline discussion items will be in Pydro, if something was not positioned or could not be brought in as a GP, it will need a paragraph in the DR to address the item. A general write-up on how shoreline was conducted, what programs and processes were used, and any deviations from shoreline procedures outlined in the DAPR should be included in the shoreline section of the DR.

#### 4.9.2 Junction and Prior Survey Comparisons

Examine Junctions and Prior surveys in CARIS subset mode or Fledermaus (if possible). Measure the distance for a general difference range and note if agreement was good or not. Major discrepancies should be investigated and addressed in DR.

#### 4.9.3 Digital Images

Limits of Hydrography.jpg and Junctions.jpg are created in MapInfo with the survey limit displayed. These images should be saved to the survey Misc folder, NOT in the Descriptive Report folder. Insert the images directly into the DR. The digital images do not get submitted separately.

#### 4.9.4 Cross Line Analysis

Review crossline areas in subset mode. Discrepancies need to be investigated and written about in the DR if necessary.

With all MBES lines inserted into Pydro by type (Mainscheme or Checkline), use the built in function in Pydro to determine the mileage, or the Data Query mileage from CARIS could be utilized. Calculate the percentage of cross lines to mainscheme and report it in the DR. If requirements were not met, be sure to include an explanation.

#### 4.9.5 Discussion of Issues and Deviations from Standards

It is important to discuss any problems with the data, or processes that were done differently than those described in the DAPR.

#### 4.9.6 Cover and Title Pages

Copy the Excel templates from:
*R:\Utilities\II_Forms_Lists_and_Templates\3_Deliverables\DR\Descriptive_Report_Cover_Sheet_76-35A*

*R:\Utilities\II_Forms_Lists_and_Templates\3_Deliverables\DR\Hydrographic_Title_Sheet_77-28*
into the DR folder for the survey. Fill in all fields with information from the project letter instructions and acquisition and processing logs.

## 4.10 DR Appendices

### 4.10.1 Geographic Names

The Geographic Names form 76-155 will only need to be filled out if there are new geographic names in the survey area. Copy the form from: *R:\Utilities\II_Forms_Lists_and_Templates\3_Deliverables\Appendices\Geographic names form 76-155.xlt*

Name the file H#####_Geographic_Names and save it to the Appendix V - Geographic Names.

The names will also need to be added as marker text in a new edit layer in CARIS Notebook, named H#####_GeoNames.hob. This will go into the Final Fieldsheets\Notebook Files folder.

Make a note in the DR referring to the Geographic Names form in the Appendix. Also note that the names were included in the CARIS Notebook session.

### 4.10.2 Survey Outline

Refer to the Survey Outline section (2.8) above.

### 4.10.3 Smooth Tide Request

Refer to the Smoot Tide Request section (2.7) above.

### 4.10.4 Shoreline and AWOIS item(s) Report

After all Shoreline and AWOIS items have been reviewed and resolved in Pydro, use the For Descriptive Report generating function in Pydro to produce a H#####_Features.pdf from the features flagged Report in the PSS. The digital copy belongs in the DR Appendix I – Survey Feature Report.

## 4.11 DR Separates

### 4.11.1 Logs

Templates are located in
*OPR_XXXX_FA\Surveys\HXXXXX\Descriptive_Report\Separates\I Logs*

#### 4.11.1.1 Acquisition and Processing Logs

Clean up the binder. It should contain only official paperwork, boat sheets, acquisition logs and DP forms. Remove any personal items and unnecessary paperwork, such as polygon plans, PODs, etc.

Insure the Separates folder contains all of the digital acquisition and processing logs.

#### 4.11.1.2 Detached Positions

Check that all DP forms are in the binder, completely filled out, match the Pydro session entries and are properly labeled. Scan the DP forms and combine them into a single .pdf called HXXXXX_DP_Forms. Save the file to the folder:
*H######\Descriptive_Report\Separates\I_Logs\Detached_Positions*

### 4.11.2 Side Scan Contacts

Not applicable at this time.

## 5.0 Submission

### 5.1 Check Coverage and Accuracy Requirements

The coverage requirements for the survey are specified in the project letter instructions. Check the data to make sure the requirements were met. If they were not, be sure to make a note in the DR about what kind of coverage was achieved and why letter instructions could not be followed.

The accuracy standards are as stated in the Specifications and Deliverable, unless otherwise noted in the project letter instructions. Be sure the data meets standards and discuss any problems in the DR.

### 5.2 File Management

Please remove/delete all extraneous files from the I drive. This includes temp files, delete_me files, etc, which were used during processing but are no longer needed once the survey is approved. Once the necessary files are copied into the Field Products folder, the survey files folder and its contents can be deleted. Delete any non-official field sheets, surfaces and sessions from the CARIS folders. It should contain two sessions: H#####_QC and H#####_Final for each survey. The H#####_Final session should contain an H#####_Final fieldsheet, named with the official non-finalized depth threshold & resolution BASE surfaces. The H#####_QC session & fieldsheet can contain any surfaces, fieldsheets, contours, depths, etc. that were used during the review & QC of the survey and should be tidied it up for submission. All other sessions & FS should be deleted. Please note that the H & I drives will be cleaned up after data has been submitted.

### 5.3 Quality Control Review

Once all of the above processes have been completed, a reviewer (FOO, CST, SST) will be assigned to go through the QC Review portion of the checksheet

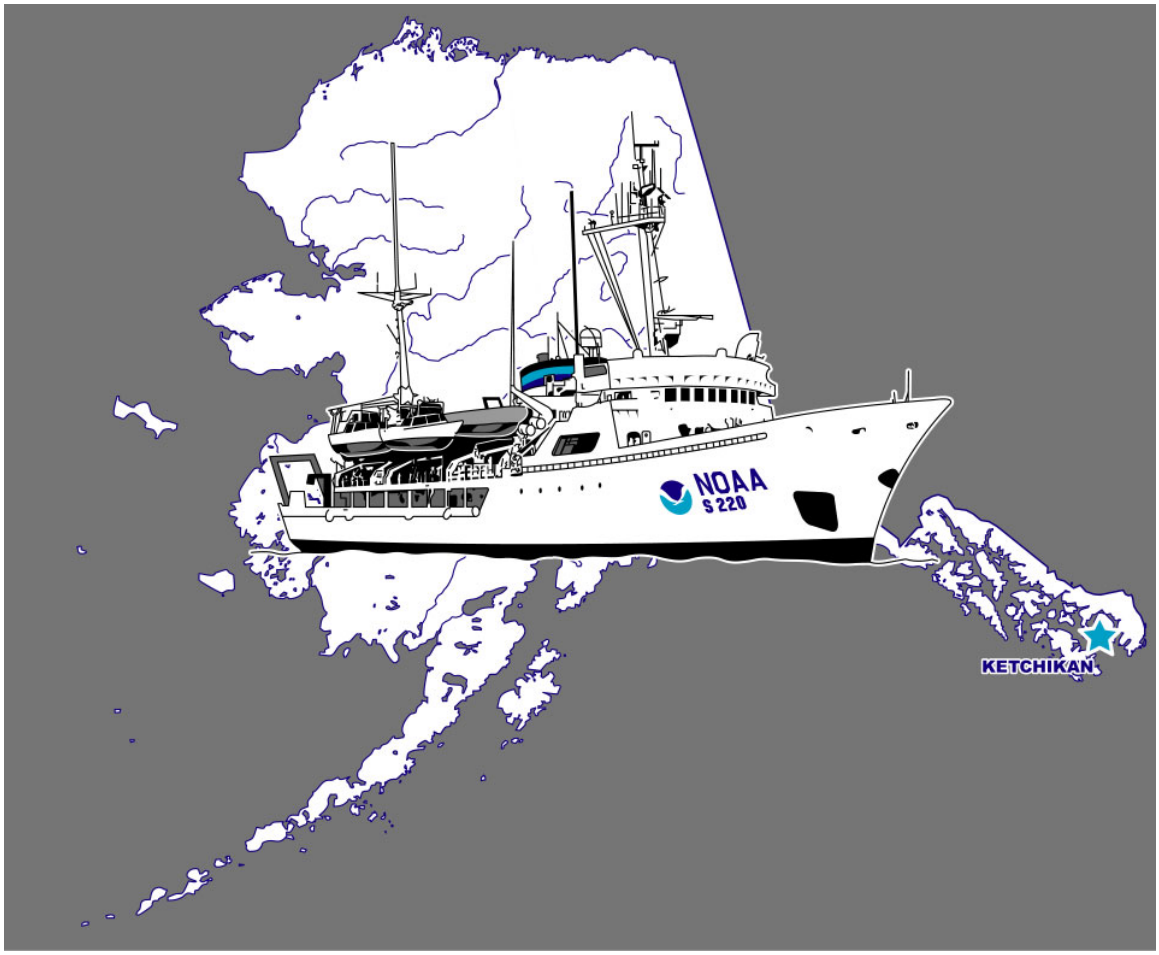
The (QCReview) MBES Final Ssn Date will be **completed by a reviewer**, who will compare this to the QC Ssn query. The two should match. If not, the Survey PIC should be notified of any discrepancies. The reviewer also checks the (QCCheck) DP-GP-BS Date. Boxes of the same color should have the same number, DPES DP files need to

have SV, tide and merge, DPNE only need tide and merge. CARIS lines should not be outdated. Notify the Survey PIC of discrepancies.

### 5.4 Submit to FOO

Submit the survey to the FOO for review and approval.

# SHORELINE PRE-SURVEY DUTIES



# Shoreline Pre-Survey Duties

## Table of Contents

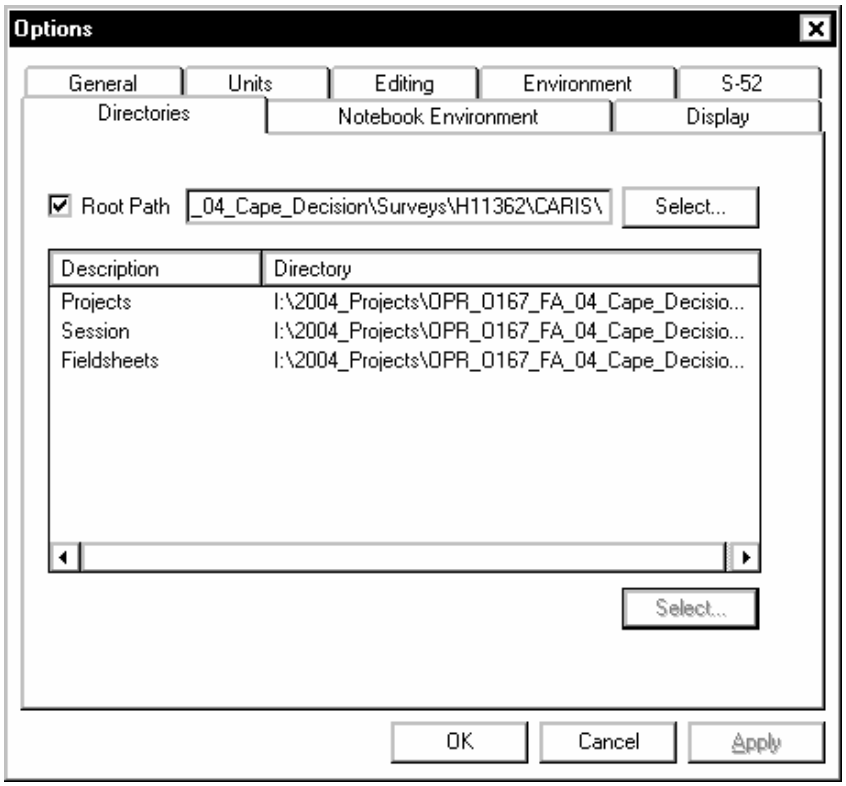
## 0.0 Document Scope

Before sending boats out in the field, it is important to know where to send them and what needs to be verified. This document is intended to guide sheet managers through setting up a shoreline project in CARIS Notebook. Other SOP's will be referenced for further guidance.

## 1.0 Setting the Directories

In order for CARIS Notebook to communicate properly with CARIS HIPS, the directories have to be properly set.

1. From the *Tools* menu, select *Options*.
2. Click on the *Directories* tab in the pop-up window.




3. Set the Root Path to the upper level CARIS folder associated with the survey. *I:\200#_Projects\OPR_O###_FA_0#\Surveys\H#####\CARIS*
4. The *Projects* directory should point to the *CARIS HDCS* folder for the survey.
5. The *Session* directory should point to the *CARIS Session* folder. This will allow HIPS sessions to be opened into Notebook for reviewing shoreline data with a BASE surface in the background.
6. The *Fieldsheets* directory should point to the *CARIS Fieldsheets* folder. Individual fieldsheets can be opened in Notebook for review.
7. Click on the *Environment* tab of the *Options* window.
8. In order to view the HIPS BASE surfaces properly, the color maps in Notebook have to match those of HIPS. Change the *Image Colour Map Directory* directory to match those of the HIPS system. (Not currently working in Notebook 2.2 Beta)

9. If pictures are going to be inserted in Notebook, the *Multimedia Folder* directory must be set to map the folder where the pictures are stored. This directory is also under the *Environment* tab of the *Options* window. (Not currently working in Notebook 2.2 Beta)
10. Once all directories have been properly set, click *Apply* and then *OK*.

## 2.0 Editing Files

### 2.1 Source Shoreline Files

Source shoreline files will be provided to the sheet manager in Notebook's .hob format with S57 attribution. Any additional items from the chart that should be addressed during verification will need to be digitized in Notebook.

1. From an explore window, browse to the H:*\OPR-ProjectName\Project Files\FA_Shoreline* and locate the *O###_CFF_Shoreline.hob* file.
2. Save a copy of this project wide .hob file as *H#####_Edited_CFF_Shoreline.hob* in *H:\OPR-ProjectName\Surveys\H#####\Field_Products\Final_Plots\Notebook_Files or in in your Survey_Files/Shoreline folder*.
3. Open CARIS Notebook.
4. From the *File* menu, select *Open*, or click on the *Open* icon in the toolbar.
5. Browse to the *Notebook_Files* folder and select the *H#####_Edited_CFF_Shoreline.hob* file.
6. Click *OK*. The file should appear in the *Layers* tab.
7. Select *Open* and browse to the survey limits, located in *H:\OPR-ProjectName \Surveys\H#####\Survey_Files\Survey_Planning\H#####_Survey_Limit.hob*
8. Use the survey limits to edit the source CFF shoreline data, deleting any features outside the limits. Make sure not to trim out too much, especially with line features.
9. Save the changes to the *H#####_Edited_CFF_Shoreline.hob* layer.

### 2.2 Creating New Edit Layers

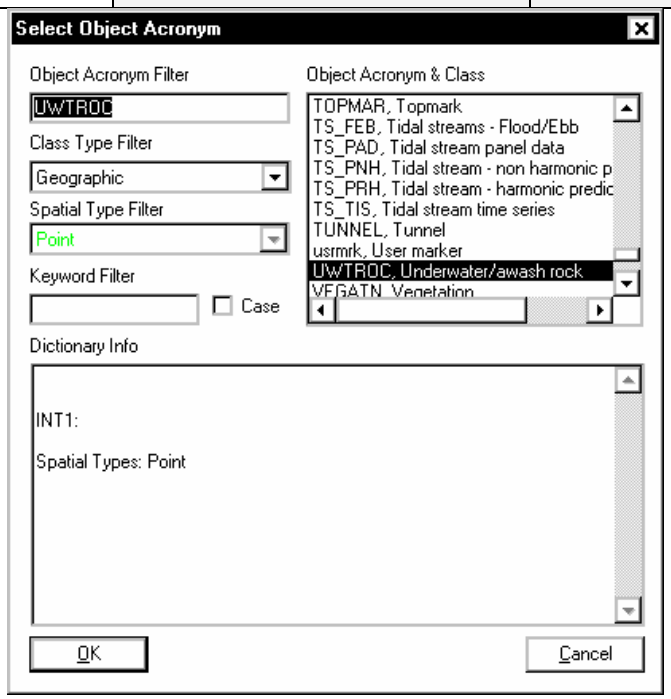
Editable layers are used for digitizing charted items or adding new shoreline features.

1. From the *File* menu, select *New Edit Layer*, or click on the *New* button in the toolbar.
2. Browse to the *Notebook_Files* folder and create a new .hob file, named *H#####_CHD_Shoreline.hob*
3. Digitize any items from the chart to the *CHD_Shoreline* layer, such as rocks or AtoNs that need to be addressed in the field and are not represented in the source shoreline files.
   i.e. if the chart scale is 1:40,000; do not digitize the rock that is within 40 meters of a CFF rk.
4. After acquiring shoreline data, addrtional layers named *H#####_Add, H#####_Modify,and H#####_Delete* will need to be created.

### 2.3 Digitizing Features

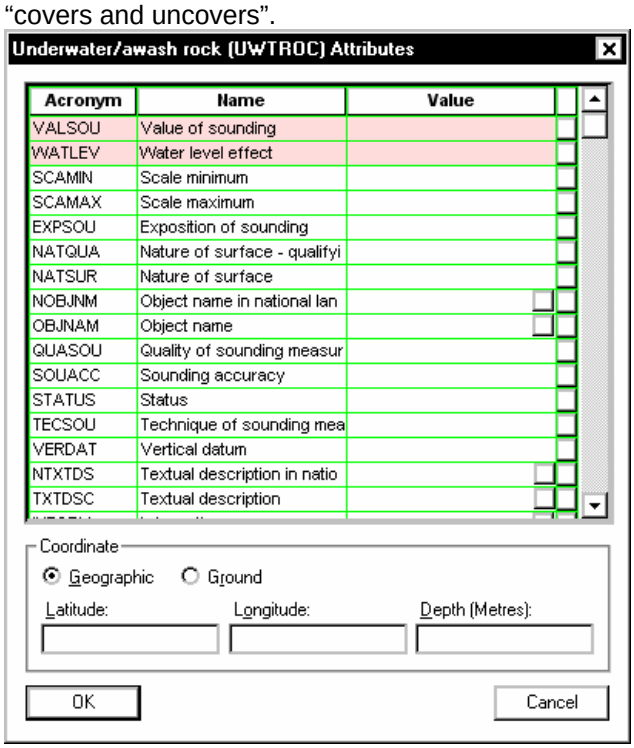
1. In the *Layers* tab, select the layer to be edited and *Set As Active Digitize Layer* from the *Edit* menu. When digitizing to a layer, that layer must be selected in the *Layers* tab.
2. Select the appropriate digitizing tool from the toolbar (point, line or area).

3. When a digitizing tool is selected, a *Select Object Acronym* window will appear. Choose the appropriate acronym from the list (UWTROC, $CSYMB, WEDKLP, etc) then click *OK*.
   Attribute ldg/reef as sbdare - rock
   Attribute Foul area as OBSTRN w/CATOBS - foul area




4. An *Attributes* window will appear. Fill in any required fields, which will appear red, and any desired optional fields, then click *OK.*

If a depth or valsou is required for something digitized off the chart enter -8888.88 and "covers and uncovers".

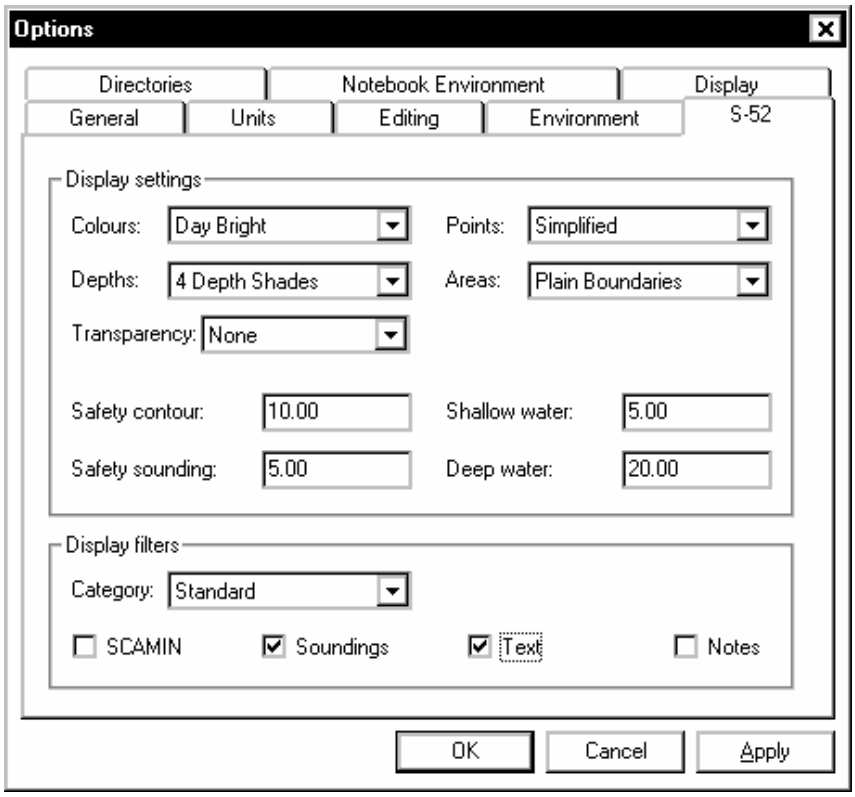


5. The cursor symbol will change. Click on the desired position for the digitized object, line or area.
6. To end a digitized line or area, right click on the last point dropped and select *End Line,* or *Close Line*.
7. Digitized features can be moved or edited using the *Edit Feature* tool in the toolbar.

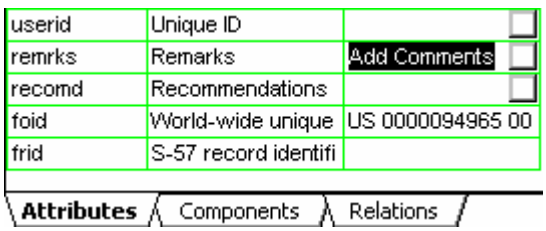
### 2.4 Turning on Text Display

Some text from Object ID, Inform and Remarks fields can be displayed with the digital data. It is not currently possible to select which text is displayed. It is either on or off.

1. Go to the *Tools* menu and select *Options.*
2. Select the *S52* tab.
3. There are several check boxes at the bottom of the window. Turn on the *Text* option, then click *OK*.



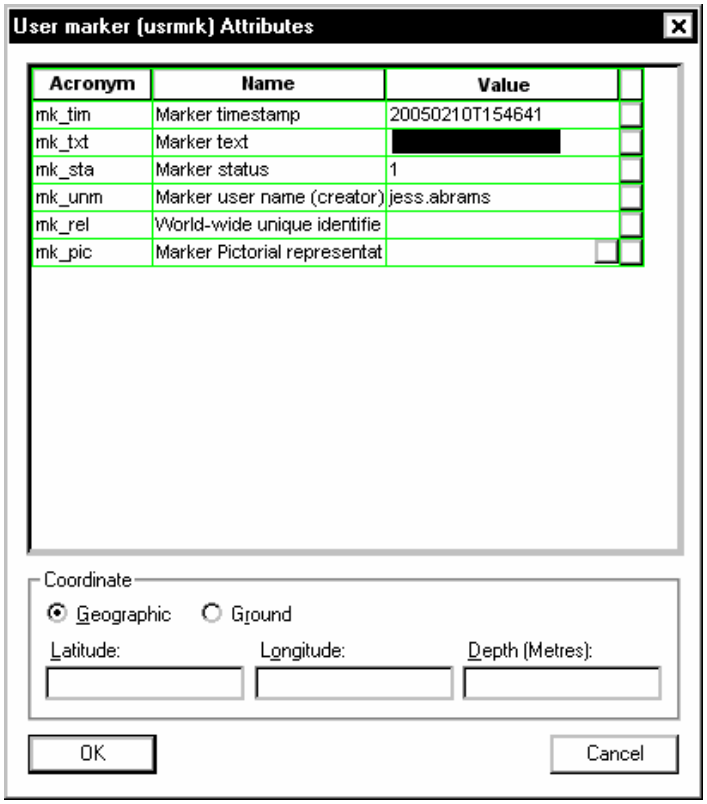

4. Text can be added to a feature by selecting it, then adding the desired comment to the *remrks* field. This ability to add text will be used in place of a marker layer for point features.




### 2.5 Marker Layers

Marker layers are not stand alone layers. They must be attached as a child layer to an Edit layer. Marker layers will be used to transfer notes made in the field from the boat sheet to line features in CARIS Notebook.

1. Highlight the parent layer to which a marker layer will be added (e.g. CFF or Lidar).
2. From the *File* menu, select *New Marker Layer*, or simply click the *M* icon in the tool bar.
3. A new Marker layer will appear in the *Layers* tab, with the same name as the parent layer. Select the Marker layer and *Set As Active Edit Layer*. It must be highlighted before digitzing.
4. Right click on the associated parent layer and *Set as Snap Target.*
5. Choose the appropriate digitizing tool (usually point). Even when digitizing a Marker for a line feature, a point Marker is generally used for simplicity.
6. An *Attributes* window will open and comments can be entered in the *Marker text* field.




ATTRIBUTES OF THE MARKER:
*mk_tim: Marker timestamp* Displays the date and time captured automatically from the computer
*mk_txt: Marker text* User text, description, recommendation, comment, etc., populated during entry
*mk_sta: Marker Status* Value is a number: 1. Active, 2. Dismissed, 3. Closed, 4. Unknown
*mk_unm: Marker User Name* Capture of the user account id. Can be changed later
*mk_rel*: *Related feature ids* Capture of the FOIDs when objects on the parent layer are selected
*mk_pic: Marker picture file* A multi-media file can be attached to the marker

7. Once the text has been entered and other fields set as desired, click *OK* and the digitizing tool will appear.

8. Hold down the left mouse button and the shift key. Position the mouse over the desired location and release. This will snap the marker to the object being marked.
9. To display the text of the markers in the *Display* window, follow the steps for Turning on Text Display above, but check the *Notes* box in the S52 window.

### 2.6 Capturing a FOID

If a marker layer is attached to a parent layer that contains S-57 objects, it is possible to capture the Feature Object Identification (FOID), which is the S-57 worldwide unique ID, and snap to the source object. A reference FOID can only be captured on the parent layer of a marker. This is not a necessary procedure, but if you need to do it, here's how.

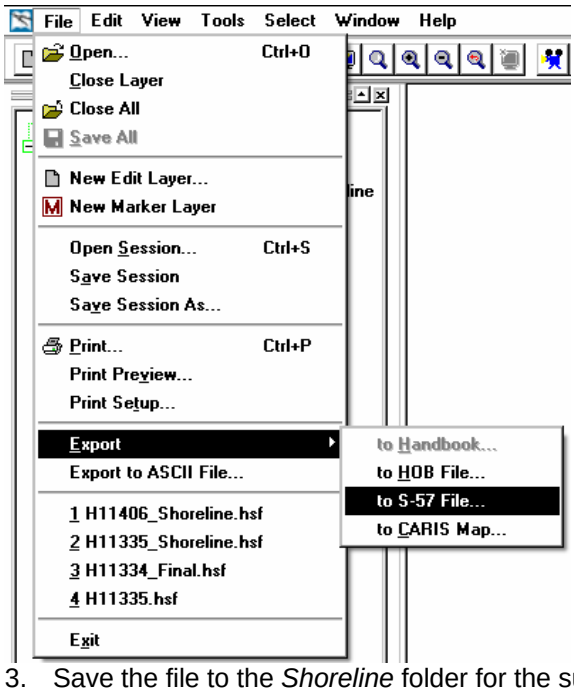
1. From the *Edit* menu, select *New Feature.*
2. Choose *Create Marker Reference from Superselection* when using just a single object highlighted in the worksheet window, or *Create Marker Reference from Selection* for several objects, or the entire parent layer.
3. Follow Steps 1-4 above, to create a new Marker layer for the desired S-57 layer.
4. Highlight the parent layer in the *Layers* window, then select the desired object (superselection) or objects (selection) from which to capture the FOID.
5. Follow Steps 5-8 above to complete the marker.

## 3.0 Creating TerraSync Background Files

In order to navigate through and collect good data, it will be necessary to create geo-referenced background files to be imported into TerraSync for shoreline acquisition. Beware! This is a round about way of doing things. Don't get too frustrated.

### 3.1 Exporting Layers as S57 .000 File

1. Highlight a source layer in Notebook and choose *Select All*.
2. From the *File* menu, select *Export, to S-57 File.*




3. Save the file to the *Shoreline* folder for the survey, with the same name as the .hob file.

### 3.2 Translating to MapInfo Format

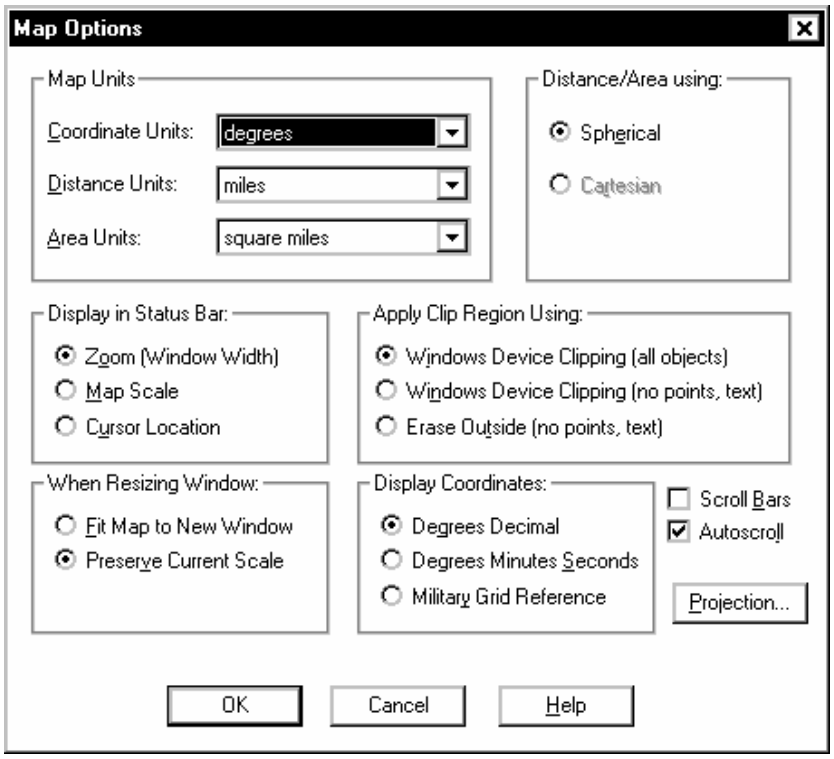
This procedure was adapted from the one written by Annaliese Eipert.

1. Copy the files exported above and paste them in *R:\Utilities\V_S57\S57Kit* temporarily.
2. Open a DOS Command Prompt window.
3. Type *r:* and press enter to change the directory to the R: drive.
4. Type *cd Utilities\V_S57\S57Kit* and press enter.
5. Enter the command:
   *ogr2ogr.exe –f "MapInfo File" DesiredNewOutputFolder YourS57File.000*
6. MapInfo tables will be created in the new folder named with the S57 attribution acronym.
7. Repeat this process for each .hob file with shoreline data for the survey.
   **NOTE:** It is important to create a new output folder for each file exported. Otherwise, files will be overwritten.
8. When all files have been converted to MapInfo tables, move the files and folders out of the *S57Kit* folder, back into the *Misc* folder for the survey.

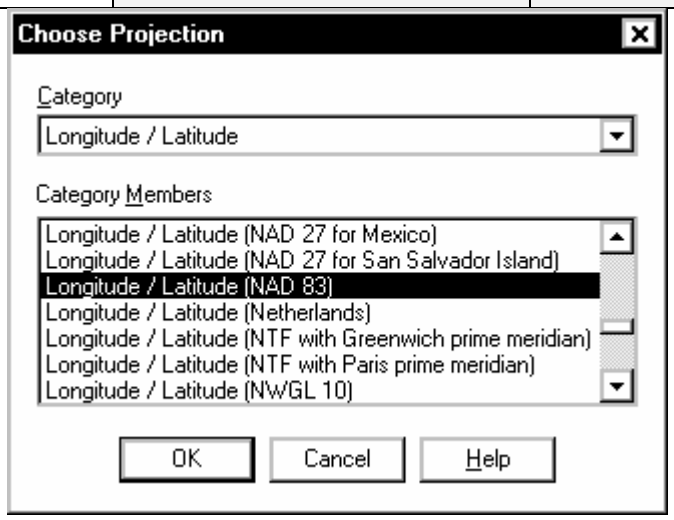
### 3.3 Change Projection in MapInfo

TerrSync cannot operate in the UTM coordinate system, so it is necessary to change the projection of the MI tables to Lat/Lon.

1. In order to open all files in MapInfo at the same time, some will have to be renamed. From an Explore window, rename all the files created in the previous step. (e.g. COALNE > CFF_COALNE)
2. Open the tables into MapInfo.
3. From the *Map* menu, select *Options*.
4. In the pop-up window, click the *Projection* button.



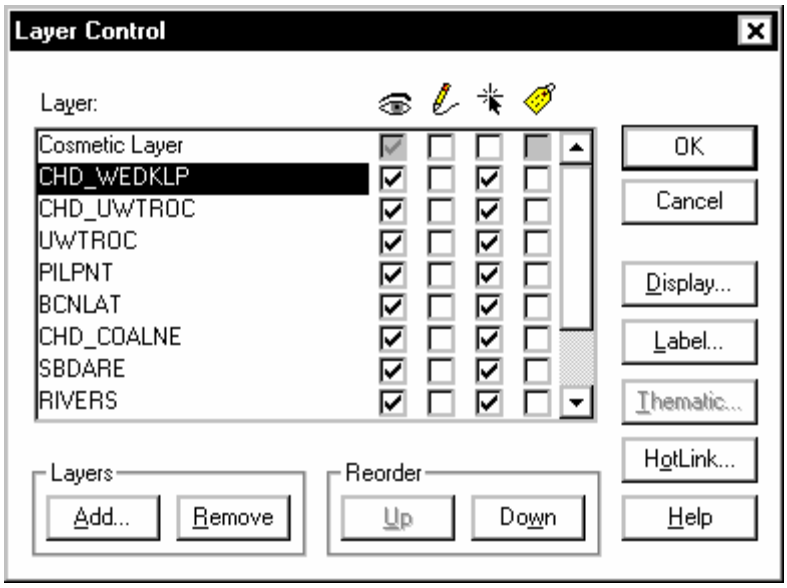

5. Change the projection to *Longitude/Latitude (NAD 83)* and click *OK*.



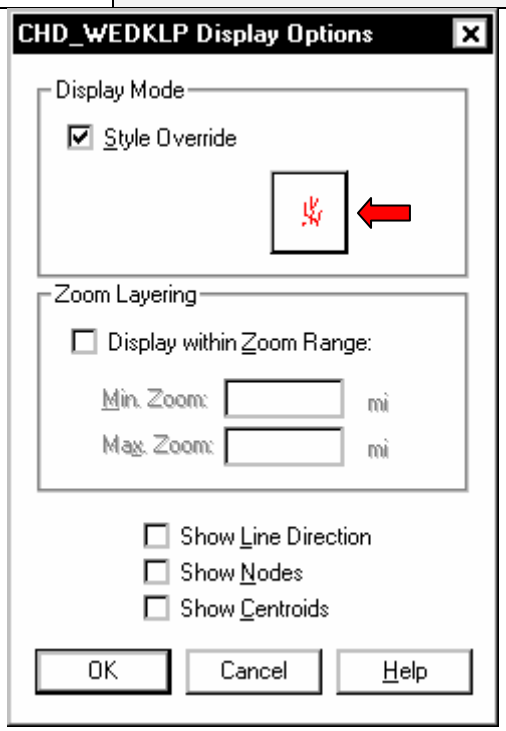

### 3.4 Change Color of Layers

For easier interpretation in the field, it is helpful to change the color of layers by feature type before generating background files. This is easily done in MapInfo.

1. Right click in the MapInfo main window and choose *Layer Control*.
2. Select a table in the window that appears and click the *Display* button.




3. Check the *Style Override* checkbox and then click on the square below it.

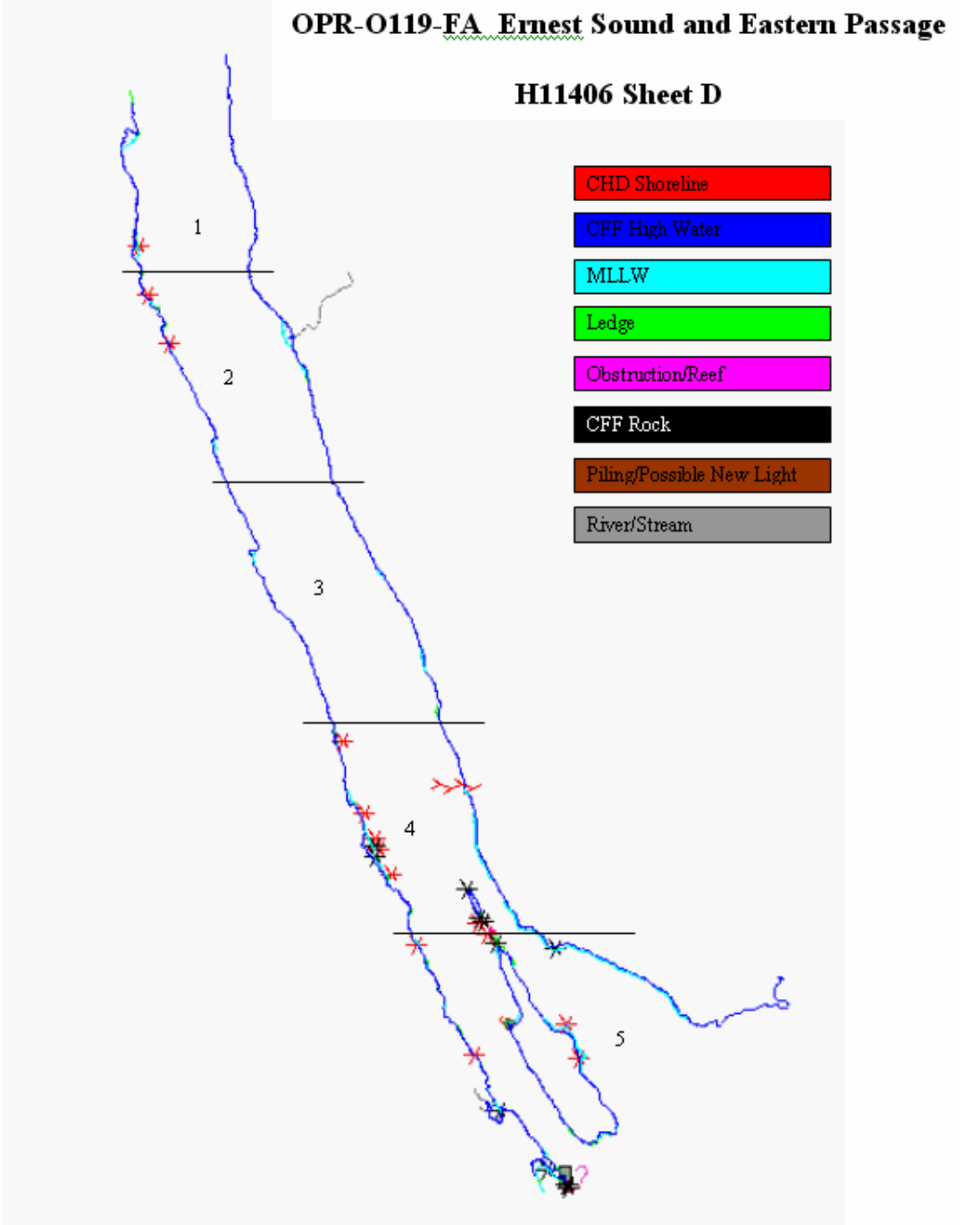



4. Choose and appropriate symbol and color, then click *OK* in both pop-up windows.
5. Choose another table from the *Layer Control* window and repeat this process until all layers are colored appropriately.

### 3.5 Creating a Legend

Once layers have been created and colored, it will be necessary to generate a legend.

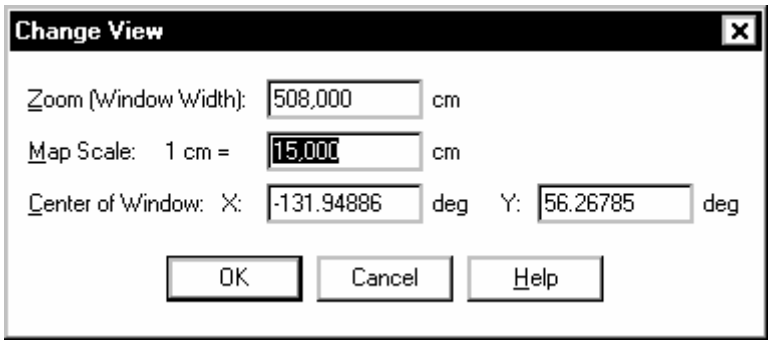
1. Zoom to an overview of the survey area and take a screen grab.
2. Open a new Word document and import the overview image.
3. Create text box labels, colored to match the corresponding features.
4. Add the project name, H# and sheet letter.
5. Save the file to the *Survey_Planning* folder.



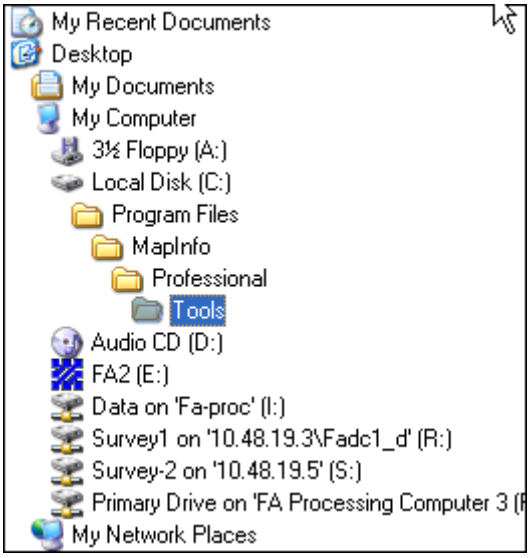

### 3.6 Generating GeoReferenced TIFFs

1. In the MapInfo display window, zoom in on the newly colored shoreline layers.
2. Right click in the window and choose *Change View*.

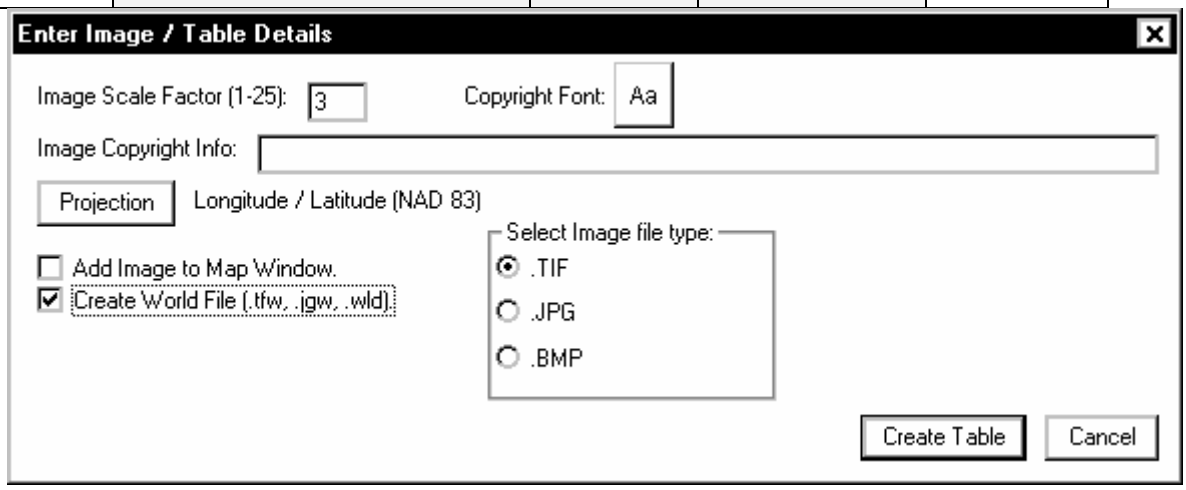
3. Set the *Map Scale* to between 1:10,000 and 1:15,000. (It may be necessary to change the distance units of the display from the *Map, Options* menu.)




4. Start at one end of the sheet and center the shoreline data in the display window.
5. From the *WorldReg* menu, select *Save Window as TAB.*
   If the *WorldReg* menu is not visible, it can be added from the *Tools* menu, by selecting *Tool Manager > Add Tool.* On the local drive, navigate to the WorldReg tool.




6. In the WorldReg pop-up window, make sure the projection is correct and check the *Create World File* checkbox.



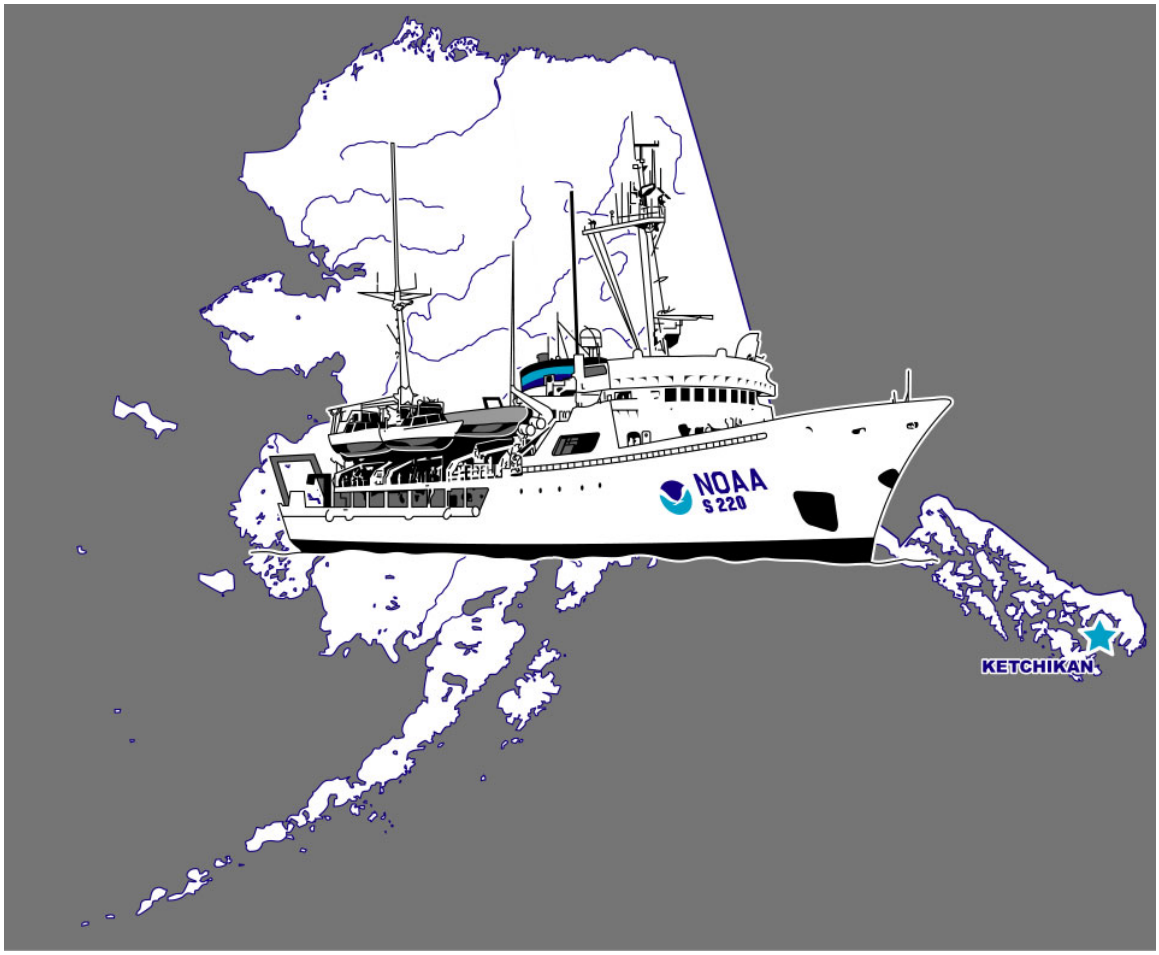

7. Click the *Create Table* button and save the files to the *Misc* folder. Naming convention is H#####_1, etc.
8. Repeat this process as many times as necessary to get images of the entire shoreline area. It is a good idea to have some overlap between the edges of the images.
9. It may be helpful to draw a rough delineation on the legend of where each background image ends. See the legend image above.

### 3.7 Printing Boat Sheets

Boat sheets will be used to make notes in the field regarding shoreline features.

1. Print a color copy of the Shoreline Legend for each shoreline boat on 8 ½ " x 11" paper.
2. Print color copies of each of the TIFFs on 8 ½ " x 11" rite in the rain paper.
3. Make sure all paper copies are clearly labeled with project and sheet information.

# Importing ESRI Shapefiles in Notebook




Standard Operating Procedure

# Importing ESRI Shape Files in Notebook

## Table of Contents

## 0. Document Scope

This document describes the process that the CARIS Notebook user should follow in order to successfully import ESRI Shapefiles into Notebook using Notebook's built-in Object Import Utility. The objective is to convert Shapefiles containing feature and attribute information into an editable S-57 compliant format in Notebook. It is intended to supplement existing Notebook Standard Operating Procedures so it is therefore assumed that the user of this document has a working knowledge of Notebook.

General notes, advanced tips, and troubleshooting are discussed at the end.

Specific notes for current buffer line import are highlighted in blue.

At time of writing this only works on CARIS Ntbk 2.2beta2 that is on FA_CST & FA_Process1.

## 1. Shape File Import

Importing ESRI Shapefiles in Notebook was previously a lengthy and cumbersome process as the Object Import Utility (OIU) did not support the direct importing of Shapefiles. In order for this procedure to work, you must be using a version of Notebook with the Shapefile import feature available in the OIU.

The overall procedure to import the Shapefiles is as follows.

1. Create/open an edit layer into which you will import the Shapefile features.
2. Create the OIU scripts that will convert the Shapefiles.
3. Execute the import scripts.
4. Import the temporary import layer into the edit layer.

### 1.1 Create/Open an Edit Layer

Create a new edit layer or open an existing one into which you would like to import your Shapefile.

To create a new edit layer, use the extents of the Shapefile you will be importing as the extents of the edit layer.

1. Open the Shapefile you will be importing. (File → Open)
2. Zoom to the extents of the Shapefile.
3. Create a new edit layer and use the current display or window selection tool when defining your extents. NOTE: Remember to use Geographic when defining the edit layer.

For buffer lines the file should be located in H:\OPR-XXXX-FA\Surveys \HXXXXX\Survey_Files\Survey_Planning and be called HXXXXX_Buffer_Lines.hob.

Alternatively, you can open an existing .hob file into which you would like to import your Shapefile, but be certain that the extents of the edit layer includes the geographic extents of the Shapefile features.

### 1.2 Use the Object Import Utility to Create Import Scripts

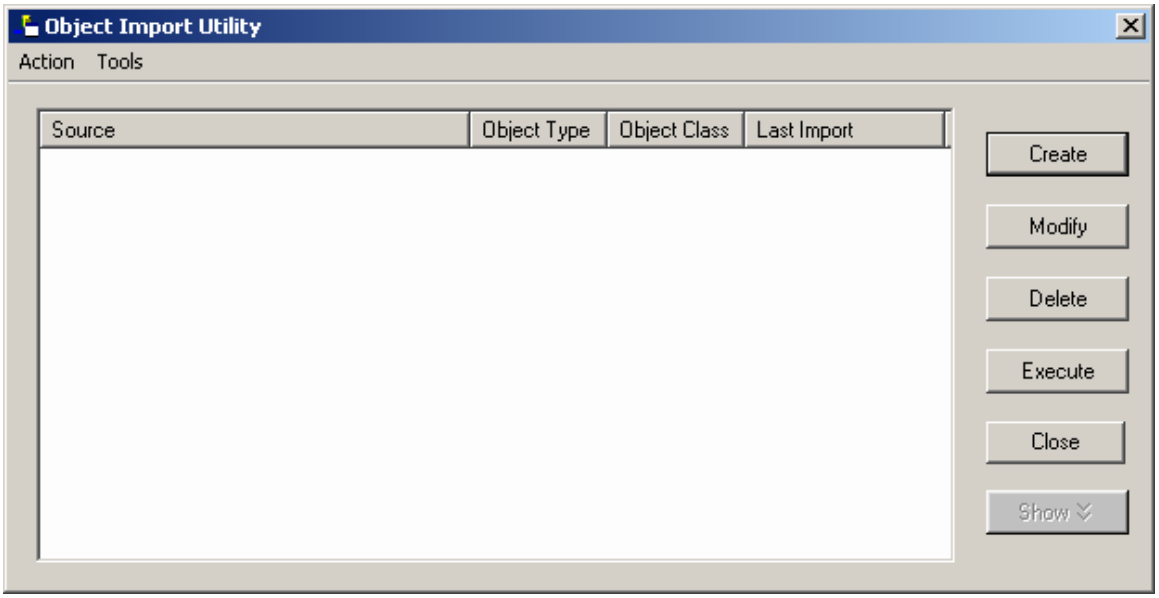
Creating the OIU conversion scripts is the most important part of the import process. First the OIU environment must be setup. Then the scripts can be created.

### 1.2.1 Object Import Utility Setup

First you need to open the OIU and set up the scripts directory.

1. Highlight the edit layer you just created or opened and select the Object Import Utility from the Tools menu (Tools → Object Import Utility…) or click the OIU button . The Object Import Utility window should appear.

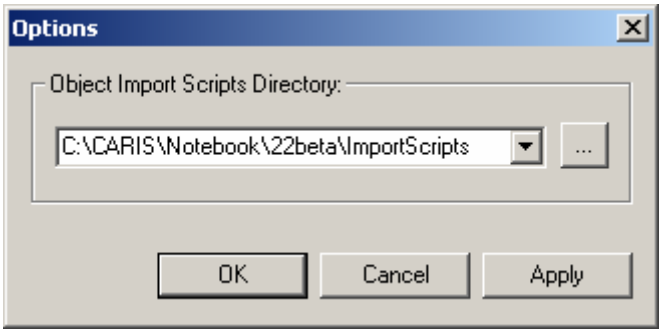
   NOTE: The first time you do this an error message will pop up. Click OK.




2. When the OIU window appears, select Tools → Options. Set the Object Import Scripts Directory (R:\Utilities\VI_CARIS\Notebook Import Scripts) then click OK.

   For Buffer lines use Line_Generic Buffer Line and skip to 1.2.2 #3

   You are now ready to create your script(s).

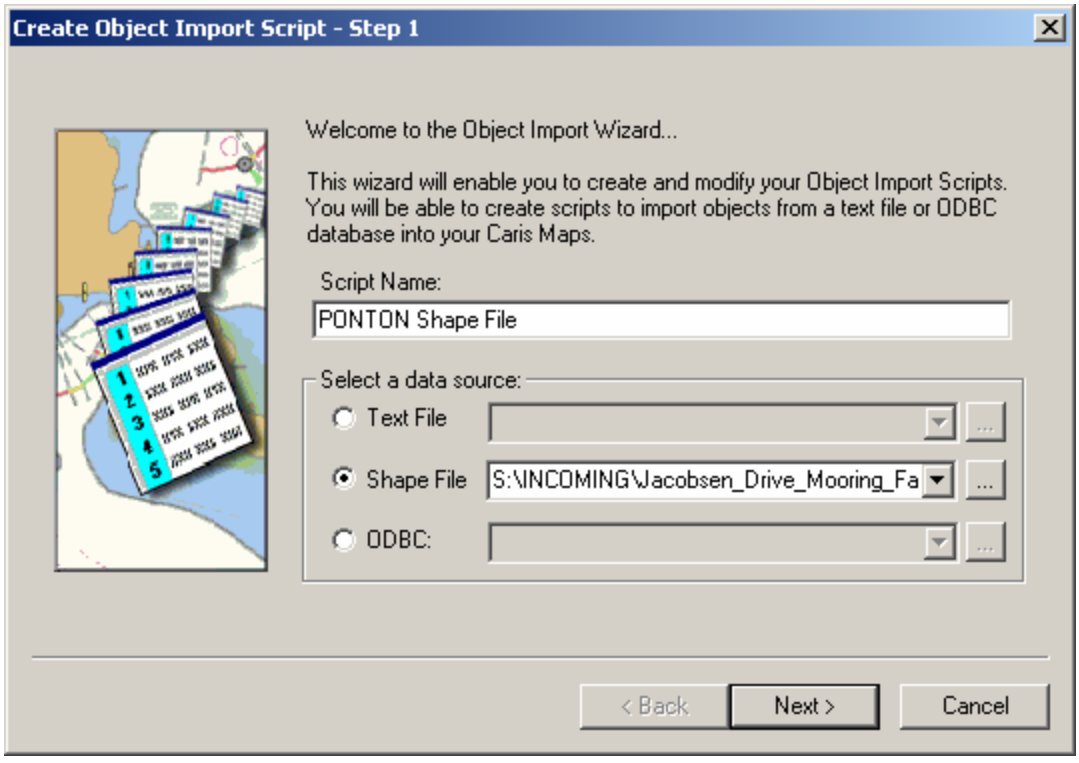


### 1.2.2 Import Scripts

You must create one script for every different S-57 Object that you will be importing. For example, if you are importing one Shapefile with pontoon information and another with shoreline construction information, you will need to create two different scripts. Similarly, you will need to create different scripts if you intend to import different S-57 Objects from one Shapefile.

1. Click the Create button in the OIU main window (or Action → Create).
2. Enter a script name. Choose a script name that is reflective of the feature type you are importing and optionally the kind of data. For example, “PONTON” or “Pontoon Shape File”.
3. Select the source Shapefile
   For buffer lines it should be in H:\OPR-O167-FA Cape Decision 2005\Surveys \H11469\CARIS\Preprocess\Trimble\Export\Buffer Lines\TRX_XXX_Line_gen.shp.

   NOTE: If the OIU does not give you a Shape File data source option to select, as shown below, your version of CARIS Notebook does not support this procedure and you cannot go on. You must be using a version of Notebook that includes this option.

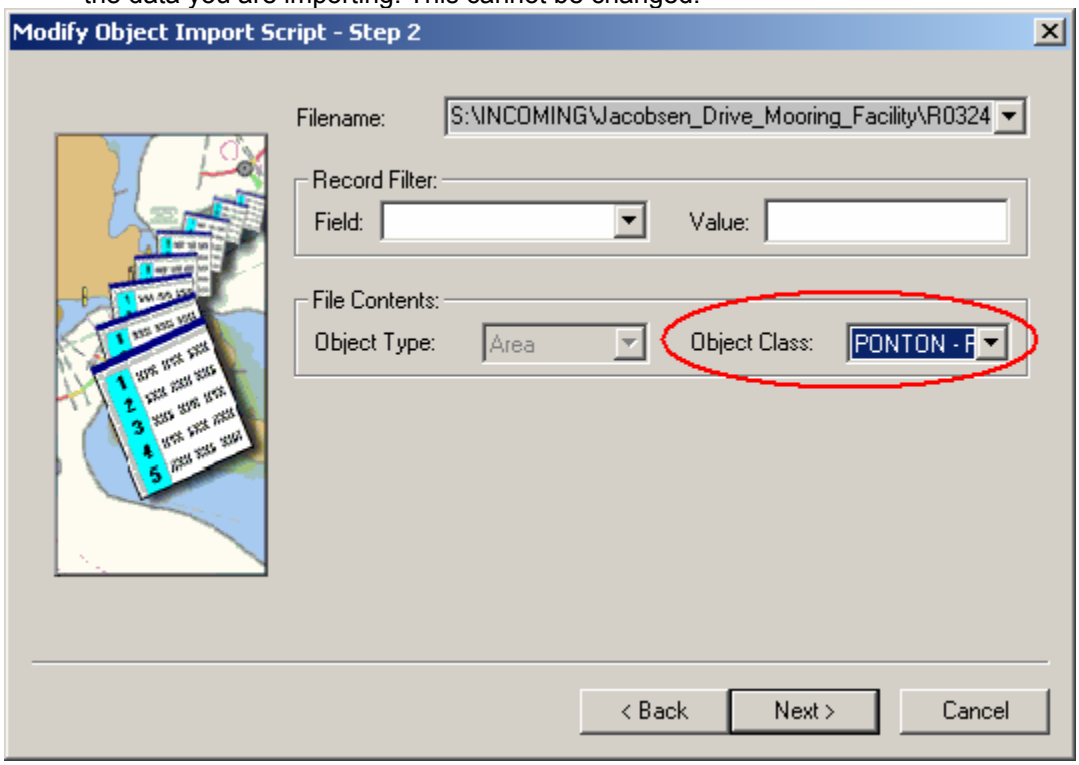



4. Click Next.
5. **(OPTIONAL)** Apply a data filter to the import. Choose a field (from the .dbf file) from the drop-down menu. Enter the field value that you would like to import. The filter will import only those features that match the attribute/value you select. Therefore, to ensure that the import filter value is entered correctly, open the .dbf file (with, say, Microsoft Excel) and verify the value. The filter is very useful for extracting a single feature type from a Shapefile containing many different features.

6. Select the S-57 Object Class that the feature will be converted to. **IMPORTANT**: It is critical that you choose the correct Object during this step, as this cannot be changed later.

   As an example for buffer lines Object Class should be *$LINES – Cartographic line*.

   NOTE: The File Contents: Object Type shows the geometric type (point, line, or area) of the data you are importing. This cannot be changed.




7. Click Next.
8. Now you must map the Shapefile fields to the appropriate S-57 Class Attributes in the resulting window, as explained in the following subsections.
9. Click Finish when mapping is complete.
10. Repeat the preceding steps as necessary for the various S-57 Object Classes for which you have Shapefiles.

    NOTE: To modify an existing script, select the script to be modified and click Modify. Nothing in the script will change unless you change it.

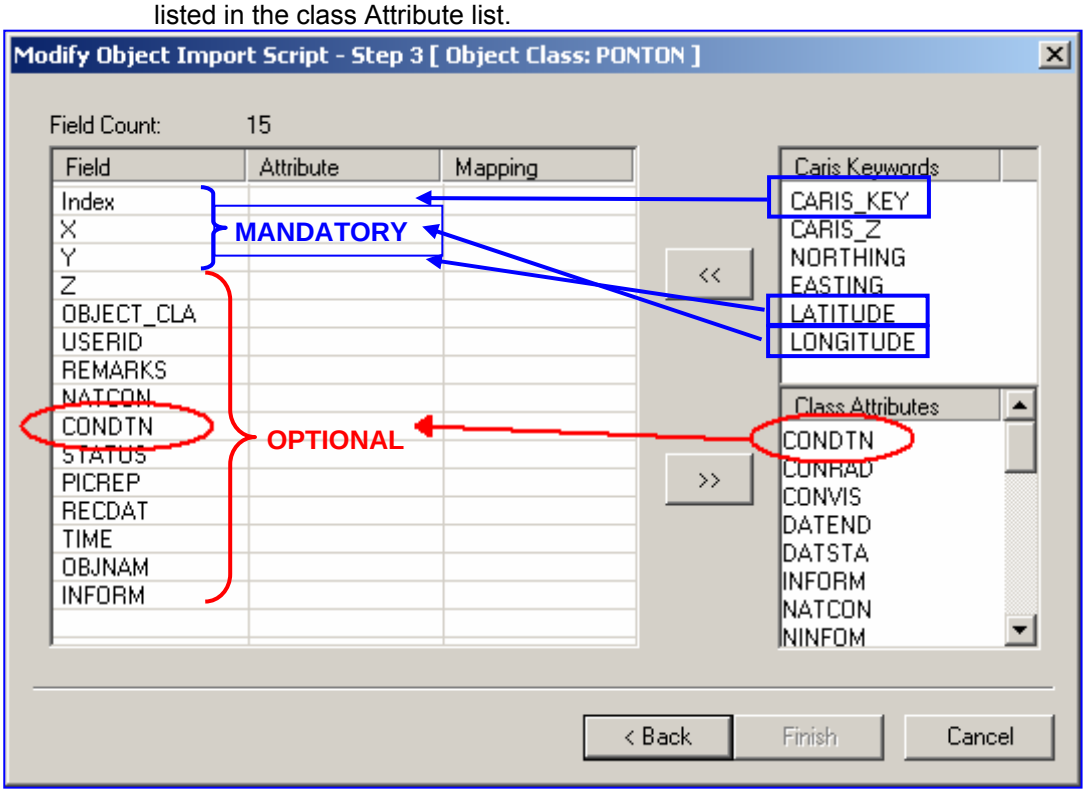
### 1.2.2.1 Map Shapefile Fields to S-57 Class Attributes

The Shapefile fields are listed on the left. Map either a Caris Keyword or a Class Attribute to a Field as follows:

1. Select the Shapefile field to be mapped.
2. Double-click the Keyword or Attribute to be mapped. Alternatively, select (single-click) the Field and Keyword/Attribute in any order and click the double-left arrow button (<<).

**IMPORTANT**: At a minimum, the following must be mapped: CARIS_KEY (to "Index"), LATITUDE or NORTHING (to "Y"), and LONGITUDE or EASTING (to "X"). (See figure below.) Then skip to steps 1.3 through 1.4.2.

NOTE: Only those Class Attributes relevant to the Object Class selected earlier are listed in the class Attribute list.



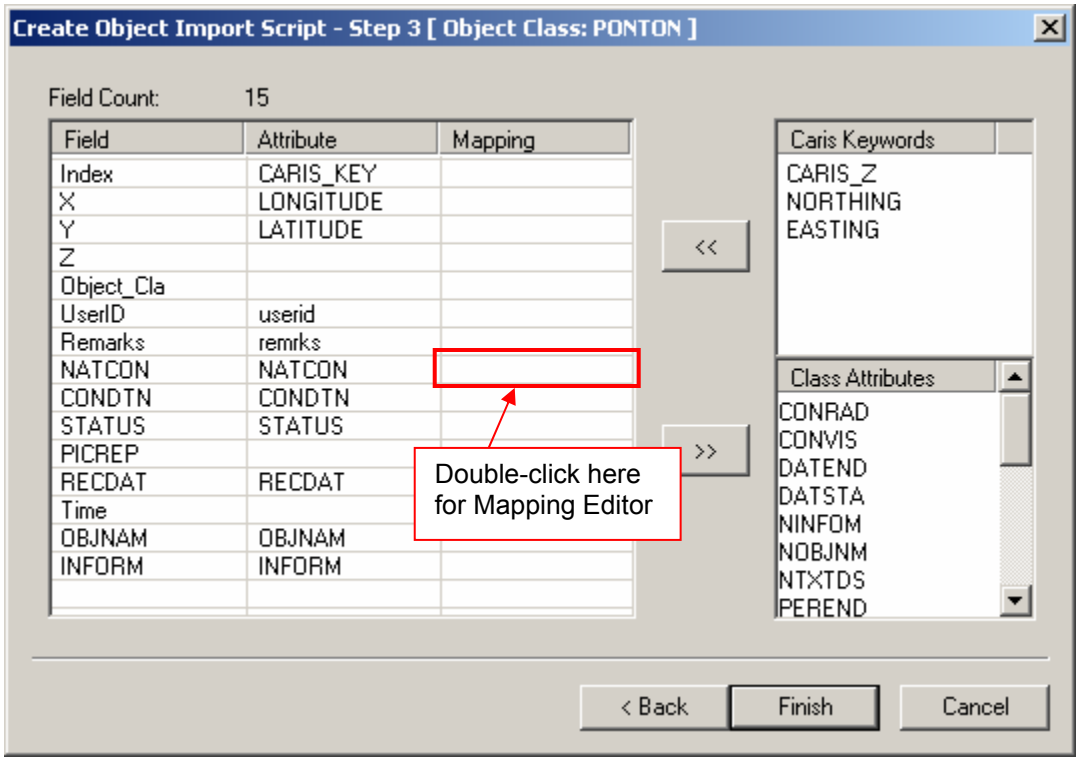

3. **For list type field values only**: Map the Field values to the Attribute values (see next subsection). **IMPORTANT**: If the Shapefile fields contain the code values instead of text (e.g. "6" instead of "yellow"), then this step can be skipped.
4. **(OPTIONAL)** To remove a mapping, double click the Attribute you wish to remove.
5. Click "Finish" when mapping is complete.

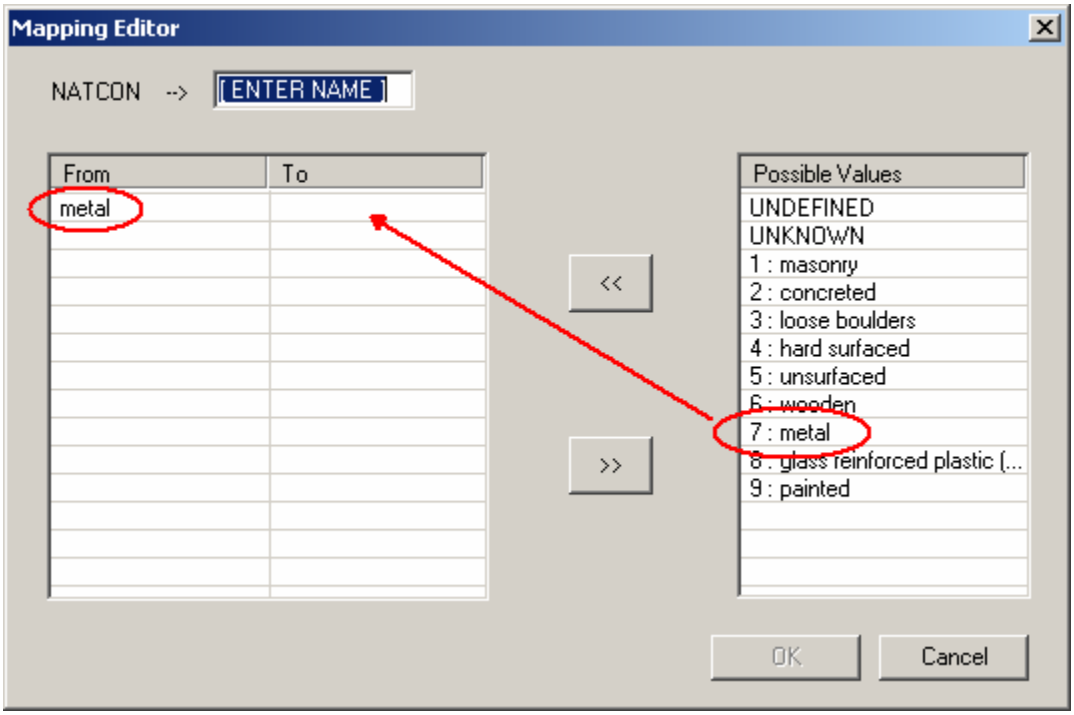
#### 1.2.2.1.1 Map Shapefile Field Values to S-57 Class Attribute Values

If the Class Attribute contains fixed value choices (e.g. COLOUR: 1: white; 2: black; 3: red; etc.) then the Shapefile field values must be mapped to the S-57 Class Attribute values.

As mentioned above, if the field values include the associated S-57 code values instead of the actual text values (e.g. "6" instead of "yellow"), then this process is not needed. Otherwise, it must be done manually, as follows:

1. Double-click the empty box in the Mapping column in the row containing the field whose values will be mapped. The Mapping Editor will appear, as shown below.
2. Give the mapping scheme a name.
3. Map the values as appropriate.
4. Click "OK" when finished.


Create Object Import Script - Step 3 [ Object Class: PONTON ]
Field Count: 15
Field
Attribute
Mapping
Index CARIS_KEY
X LONGITUDE
Y LATITUDE
Z
Object_Cla
UserID userid
Remarks remrks
NATCON NATCON
CONDTN CONDTN
STATUS STATUS
PICREP
RECDAT RECDAT
Time
OBJNAM OBJNAM
INFORM INFORM
<<
>>
Caris Keywords
CARIS_Z
NORTHING
EASTING
Class Attributes
CONRAD
CONVIS
DATEND
DATSTA
NINFOM
NOBJNM
NTXTDS
PEREND
Double-click here for Mapping Editor
< Back
Finish
Cancel


Mapping Editor
NATCON -->
[ ENTER NAME ]
From
To
metal
<<
>>
Possible Values
UNDEFINED
UNKNOWN
1 : masonry
2 : concreted
3 : loose boulders
4 : hard surfaced
5 : unsurfaced
6 : wooden
7 : metal
8 : glass reinforced plastic (...
9 : painted
OK
Cancel

### 1.3 Execute the Import Scripts

Once the scripts have been created or modified, they can now be executed.

1. Select the script(s) to be executed (use Ctrl to select more than one)
2. Click Execute.
3. Review the log that appears at the bottom of the window.
4. If there are no errors, click Close. If there are some errors, it is likely that your script was not set up correctly. See below for some explanations of and solutions to common problems and errors.

### 1.4 Import Temporary Layer into Edit Layer

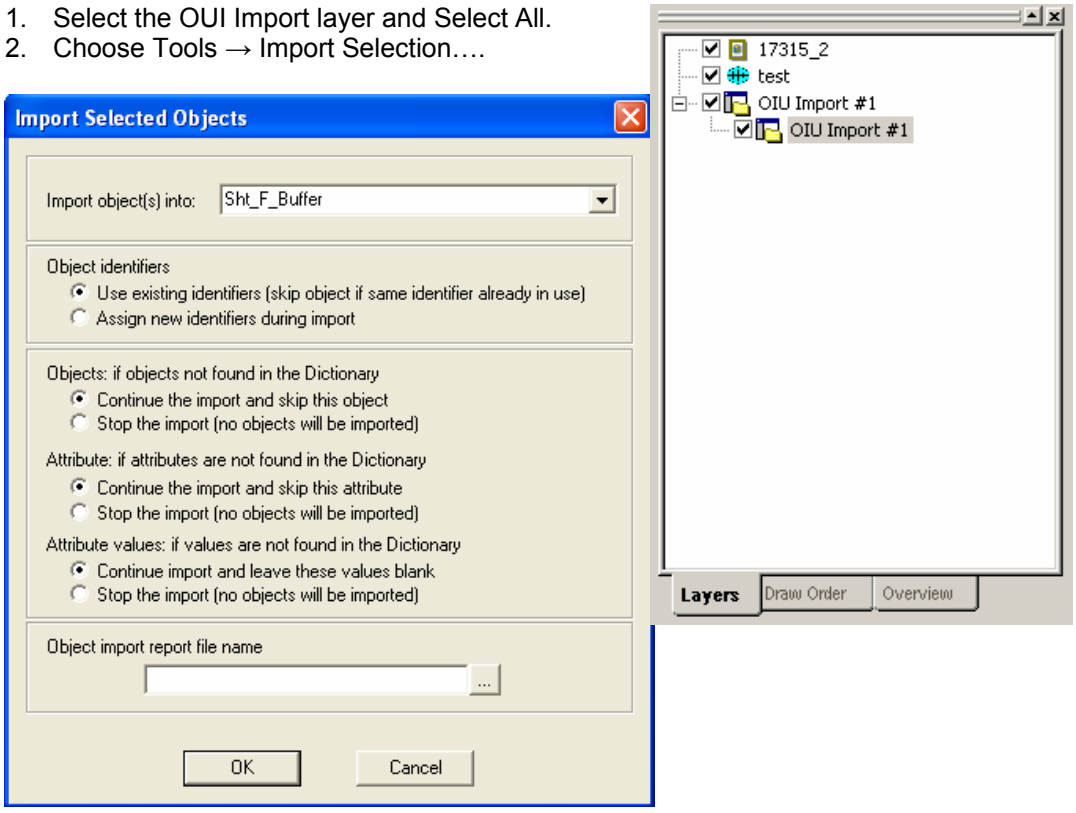
The Shapefiles have now been imported to Notebook. However, they have been imported into a temporary non-editable layer called OUI.Import #1 (or #2, etc.). This allows you to review your imported data to make sure everything in the data looks good before finalizing the import into your Notebook Edit Layer.

#### 1.4.1 Review Temporary OIU Import

To review the data, select the OIU Import layer and Select All. The imported features and their attribute fields/values should appear in the Worksheet Window.

#### 1.4.2 Finalize the Import

1. Select the OUI Import layer and Select All.
2. Choose Tools → Import Selection….



3. Select the Edit layer into which you would like to import your data.
4. Choose other options as desired.
5. Click OK.
6. Your Shapefile has now been successfully imported to an editable S-57 layer in Notebook. Click OK again.
7. Close the temporary OIU Import layer.

## 2. General Notes, Advanced Tips, and Troubleshooting

### 2.1 General notes

File naming

Every time you execute the script you are creating, you will need to ensure that the data source filename is set correctly. To save time in the future, you might maintain a consistent file naming scheme so that the files associated with the respective import scripts are the same as the previous import and in the same folder. The scripts, once created, would then not need to be modified, only executed, thus saving time.

Field naming

The field names, strictly speaking, do not need to be identical to the built-in S-57 Class Attributes in Notebook. However, as a practice it is a good idea to name the fields identical or very similar to their S-57 counterparts. They must be the same if they are to be imported into Pydro at any time. For shoreline collection these fields names are defined in the Data Dictionary Editor via GPS Pathfinder.

### 2.2 Advanced Tips

Mapping multiple-object, single position Shapefiles

Because a Shapefile can have many user-defined fields and because these fields are manually mapped in the OIU in multiple parallel scripts, several objects can be imported from one single feature (i.e. one single position) from one single file.

This is useful if you have, for example, a lateral beacon, a light, and a topmark (multiple objects) that share the exact same position. You can record attribution information during field data collection for each of these objects as attributes/fields of the same feature (this would need to be planned and set up before data collection, e.g. in the Data Dictionary Editor if using TerraSync/GPS Pathfinder).

The resulting Shapefile/feature would then have: 1) BCNLAT attribution fields/values, 2) LIGHTS attribution fields/values, and 3) TOPMAR attribution fields/values, this file can be imported into three separate objects (BCNLAT, LIGHTS, TOPMAR) using the OIU by creating three separate scripts as follows:

1. In the first script, you would set the Object Class to BCNLAT and map the lateral beacon fields in the Shapefile accordingly; you would simply ignore the light and topmark fields.

2. In the second script you would select the exact same Shapefile, set the Object Class to LIGHTS, and map only the light fields.
3. In the third script you would set the Object Class to TOPMAR, and map only the topmark fields.

Upon execution of all three of these scripts (each drawing information the same data source, just mapped differently), you will have three different objects in Notebook that share the exact same position.

The figures below show basic mapping schemes from the same file/feature: the one on the left has fields mapped to a S-57 BCNLAT while that on the right shows the mapping for a S-57 LIGHTS.

| Field | Attribute |
|---|---|
| Index | CARIS_KEY |
| X | LONGITUDE |
| Y | LATITUDE |
| Z | |
| OBJECT_CLA | |
| USERID | |
| REMARKS | |
| BCNSHP | BCNSHP |
| CATLAM | CATLAM |
| COLOUR | COLOUR |
| COLPAT | |
| CATLIT_L | |
| COLOUR_L | |
| LITCHR_L | |

| Field | Attribute |
|---|---|
| Index | CARIS_KEY |
| X | LONGITUDE |
| Y | LATITUDE |
| Z | |
| OBJECT_CLA | |
| USERID | |
| REMARKS | |
| BCNSHP | |
| CATLAM | |
| COLOUR | |
| COLPAT | |
| CATLIT_L | CATLIT |
| COLOUR_L | COLOUR |
| LITCHR_L | LITCHR |

It is important to note, however, that you should be certain that a feature actually exists before executing the script for that feature using this method. In other words, if you execute a topmark script using this approach (with lateral beacon position information in the Shapefile) then a topmark object will be created whether or not you collected data on it (there may have only been a light on that beacon).

NOTE: In this multiple-object import method, there may have been more than one field with the same name in the original Data Dictionary used when gathering the data. If so, duplicate fields have been renamed during the GPS Pathfinder export process by appending sequential numbers to the fields (e.g. COLOUR, COLOUR2, COLOUR3).

## 2.3 Troubleshooting

Object Import Utility Message Log Errors

The OIU Message Log appears upon execution of a script. Listed below are some error messages you may encounter.

**119025: Failed to create feature object. The attribute data does not match the type specified in the object catalog. Record 0 will be skipped.**

For each S-57 attribute the OIU expects a certain attribute value type such as text, numeric, or one of a predefined list of integers that correspond to menu values. This message will most likely occur if the OIU is expecting one of several integer values but

does not encounter it. Specifically, if attribute list values are identified by their text value instead of their numeric value, this message may occur. For example, if the COLOUR attribute values are “white” or “green” instead of their integer counterparts “2” or “6”, respectively, then this error would appear.

**Solution:**

First, you can manually map the values using the procedure described herein.

Second, you can re-export the source data to ensure that the numeric code value is exported instead of the text value. This assumes that numeric codes are associated with the list values in during the data collection process, which must be set up in the Data Dictionary, for example, if using TerraSync/GPS Pathfinder.

# Trimble PathFinder Setup

Table of Contents

## 0. Document Scope

This document outlines the standard operating procedures for creating a data dictionary and creating and configuring a project in TerraSync with the necessary settings for efficient and S-57 compliant shoreline data acquisition.

## 1. Data dictionary

The data dictionary is a customized list of features that allows the user to assign feature attribution directly in the field that can later be readily converted to a S-57 data format during processing back on the ship or in the office. The data dictionary itself does not contain positions or feature-specific information, but rather structures data collection in the field and prompts the user to enter relevant information. NOTE: Check your data logger under C:\MyDocuments\TerraSync for an existing data dictionary and verify it is the approved version (Fairweather_DD.ddf). If the data dictionary is created and up-to-date you can skip ahead to section 2: TerraSync Configuration.

### 1.1. Pathfinder Office

You will use GPS Pathfinder Office throughout the suitcase shoreline process, for everything from creating a data dictionary to processing GPS data and exporting shapefiles to Pydro. Upon opening GPS Pathfinder Office, a dialog box will prompt you to select a project. Later in the process you will create a new project; for now select Default.

### 1.2. Data dictionary creation to S57 standards

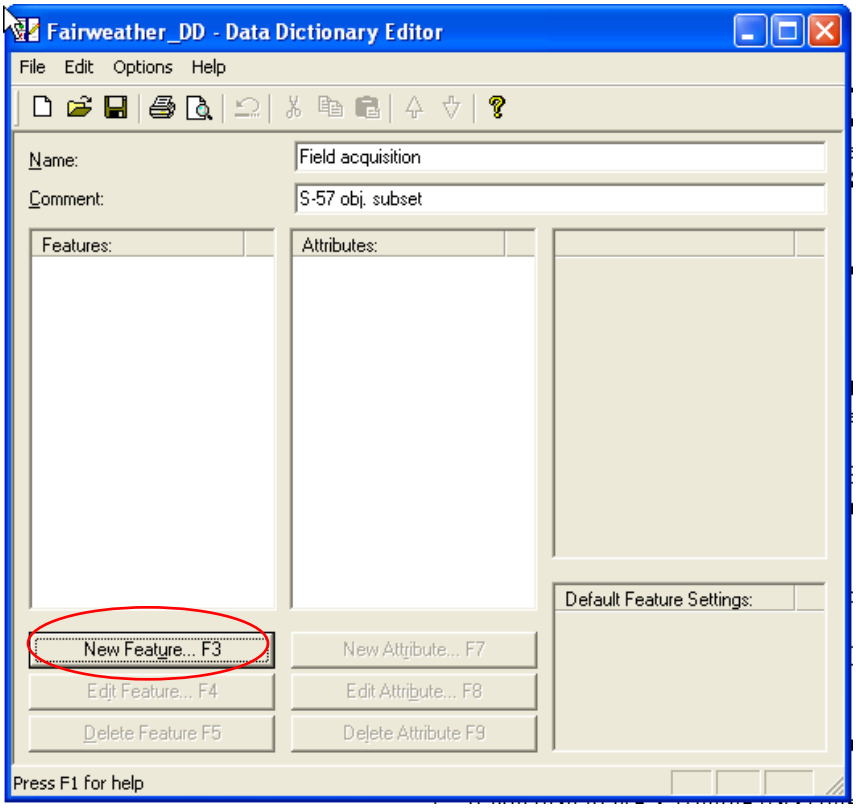
To create a new data dictionary, choose Data Dictionary Editor from the Utilities menu in Pathfinder Office. When the Data Dictionary Editor opens, select File → New. Fill out the Name and Comment fields. Give data dictionary a descriptive name and save (File → Save) to the ship's designated network folder (2005 Fairweather data dictionary: R:\Utilities\Shoreline_S57\Trimble\Data Dictionary\Fairweather_DD.ddf). Alternatively, select File → Open to modify an existing Data Dictionary. Eventually, the final data dictionary will be transferred to the TerraSync folder of the acquisition laptop or handheld data collector.

#### 1.2.1. Add new features

Now that the dictionary has been created, it must be populated with the potential features (S-57 objects) and attributes you will want to record in the field. Consult the CARIS S-57 ENC Catalogue (C:\Program Files\Python23\Pydro\S57\S57cat\frames\S57catalog.htm) for a list of S-57 objects, attributes, and coding information. The NOAA point features file (C:\Program Files\Python23\Pydro\forms\NOAAHydroS57PointObjects.xls) is a good resource to help determine which features and attributes are necessary to include. The Data Dictionary Record, an Excel spreadsheet

(R:\Utilities\IV_Trimble\Data Dictionary\Data_Dictionary_Record.xls), has been created and should be used to keep track of the Data Dictionary features and attributes and their relation to S-57 requirements.

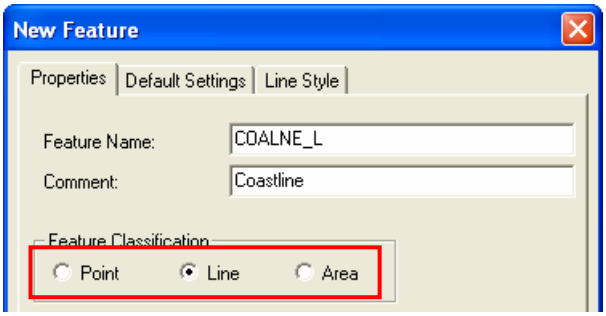
To add a new feature, click the New Feature button at the bottom of the left-hand (Feature) column.



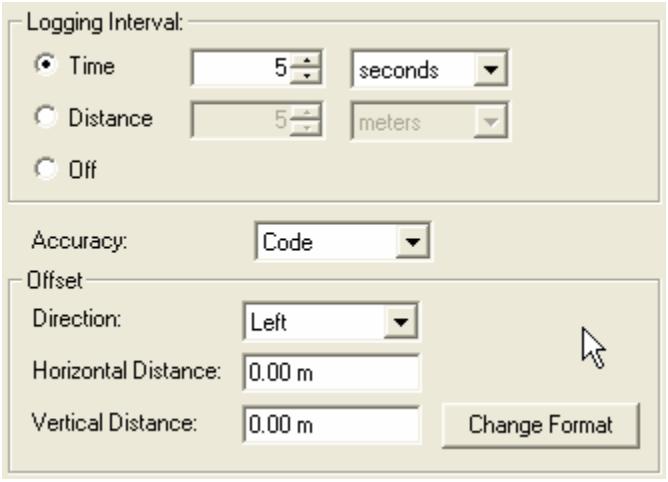

Click on the Properties tab and fill in the Name and Comments fields for your new feature: name the feature after the S57 feature object acronym, and use the comment field to describe what the code represents. It is recommended that you add a letter to the name to identify whether the feature is a point, area, or line. For example, OBSTRN_L for a line obstruction. This will maintain future filename uniqueness and avoid confusion.

NOTE: Non-S-57 Fields may be used for the Feature Name if the feature is only for field/office use. For example, UserID is used to give the feature a unique identifier, but is not a S-57 object.

Under Feature Classification, select either Point, Line, or Area.




In the Default settings tab, set GPS logging preferences:




Set the time interval to one (1) second for point features and five (5) seconds for line and area features. Leave Minimum Positions set at 1 (for point feature). Leave the default Offset settings as is.

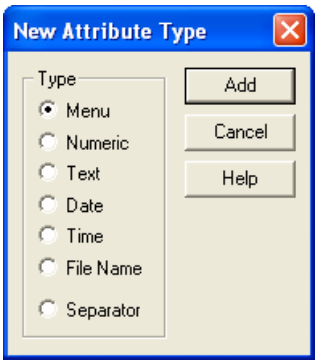
NOTE: Carrier phase logging can be collected, but requires a minimum lock of 10 minutes which is generally impractical and unnecessary for shoreline acquisition.

For a point feature, change the symbol style by clicking on the Symbol tab; these can be edited later as well. For line and area features, the line style can also be changed via the Line Style tab.

NOTE: To edit an existing feature, highlight the desired feature and click Edit Feature. Likewise, a feature is easily deleted by selecting the feature to be deleted and clicking Delete Feature.

### 1.2.2. Add new attributes

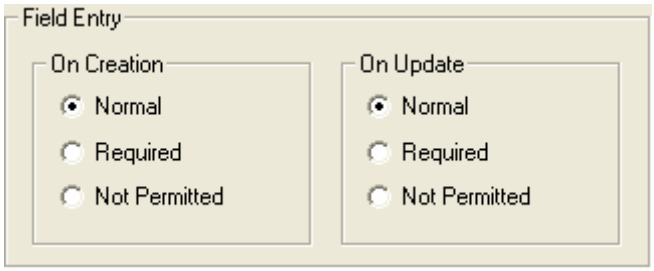
Each feature must have certain pieces of descriptive information, or attributes, attached to it in order to be useful. Highlight the feature you wish to add an attribute to, then click New Attribute in the right-hand (Attribute) column. Select attribute type, as shown. Most of your attributes will be Menu, Numeric, and Text types, but for each detached position (DP) you will also need Date and Time attributes. Refer to the Pathfinder Office help menu for more information on the different specific attribute types.




Each attribute allows for Attribute Name, Comment, attribute-specific values, Field Entry permissions and requirements, and an auto-increment option (numeric and text only).

For each attribute, fill in Attribute Name with the corresponding S-57 attribute name (e.g. “COLOUR”) and the Comment field.

You must decide whether you want this feature to be required for entry in the field. If you do not want this attribute to be required, leave the On Creation: Normal option selected in the Field Entry section at the bottom, otherwise choose Required. For On Update, select Normal.



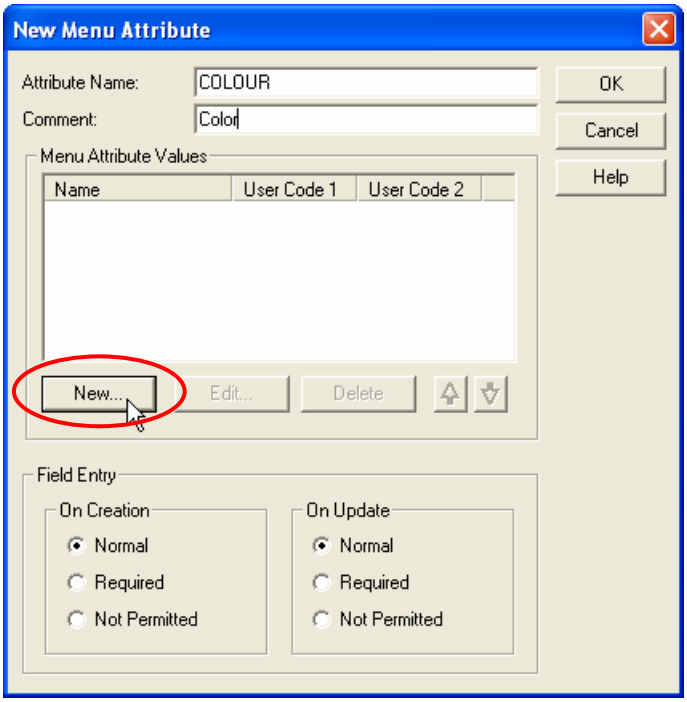

Note the distinction between a *mandatory* S-57 attribute and a *required* data dictionary attribute. In general, mandatory S-57 attributes should be required in the data dictionary, but sometimes the mandatory S-57 attributes can be assigned during office processing. The Data Dictionary Record spreadsheet should be used to keep track of what is mandatory per S-57 versus what is required in the Data Dictionary.

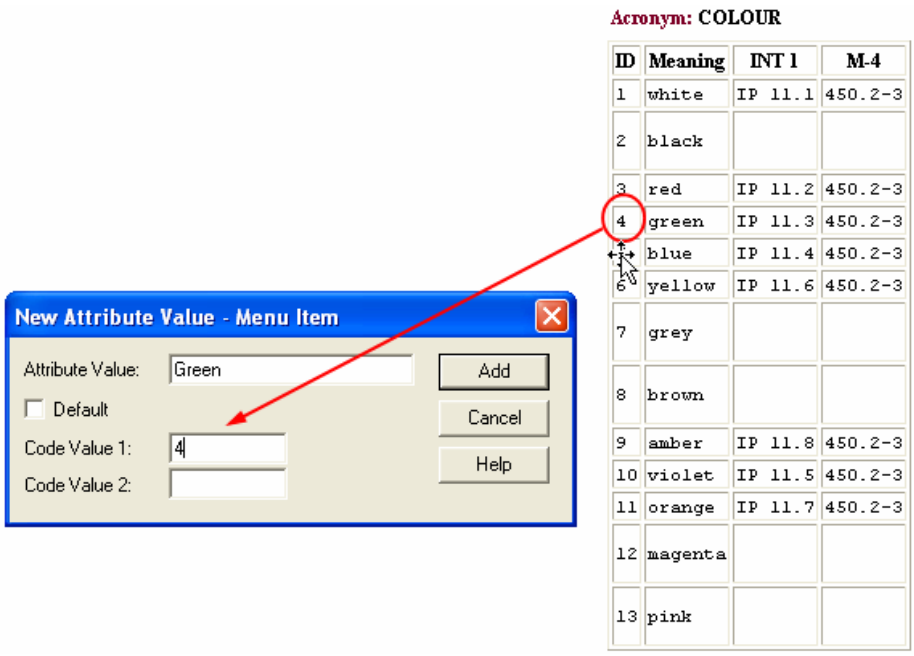
### 1.2.2.1. Add "menu" type attributes

After filling in the standard fields, click New.

Fill in Attribute Value (e.g. "Green") and check the Default box if you want to set this value as the default for the attribute, otherwise leave it unchecked. In order for Pydro to recognize the S-57 assignment, each menu-type attribute value must also have a code attached. Consult the attribute's entry in the S-57 catalog and fill this into the Code Value 1 field, as depicted below.

After you click Add, the New Attribute Value window will stay open for you to insert remaining attribute values. Close the window after all values have been added.



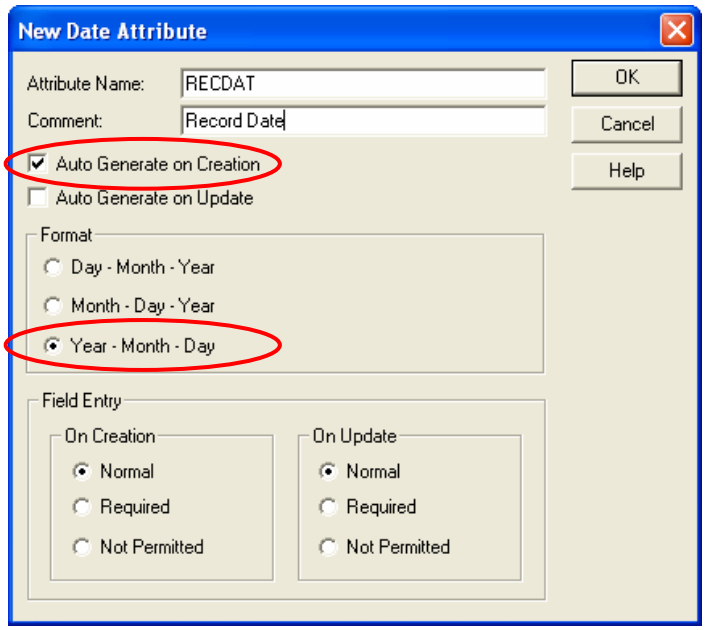


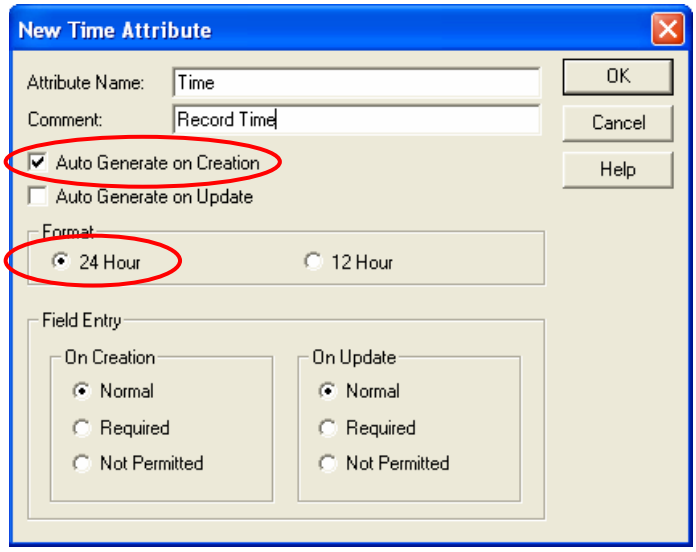

### 1.2.2.2. Add numeric, text, time, and date attributes

For numeric attributes (e.g., LENGTH), enter the number of decimal places allowed or required, the minimum and maximum values (the range), and the default value, using the S-57 catalog and experience as guidance.

For text attributes (e.g., INFORM), enter the maximum string length and the default value, if any.

For both date and time attributes (e.g. RECDAT and Time), Auto Generate on Creation should be checked. The date format should be Year – Month – Day and the time format should be 24 Hour. Refer to the screen shots below.

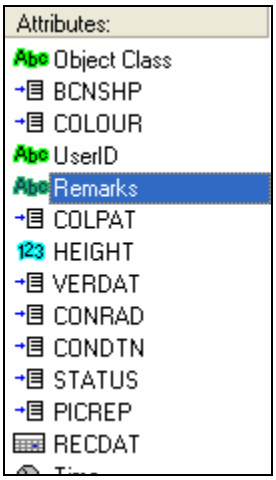



### 1.2.3. Organize features and attributes

Arrange features and attributes in a convenient order for field acquisition. The more efficient you are when collecting positions, the more data you will be able to gather. Using the up and down arrows on the toolbar at the top of the Data Dictionary Editor, arrange features so that the most commonly used ones are at the top of the list. In the attributes column, move required attributes to the top of the list for each feature. You may want to consider consistently putting a common attribute (e.g. Remarks) as the last required field so that, at a glance, you can tell which attributes are required and which are discretional (see below).

Recall, however, that the data gathering program (TerraSync) will prompt you for required fields.




## 2. TerraSync Configuration

TerraSync, the GPS logging interface you will be using during feature collection, has five modes: Map, Data, Navigation, Status, and Setup. The mode you're in is determined by which of these options is selected in the uppermost left-hand menu. When you switch modes, the display windows and menu options will automatically change.

There are two ways to change TerraSync GPS Settings. The first method will work in a pinch; the second is recommended.

### 2.1. Change GPS settings in TerraSync

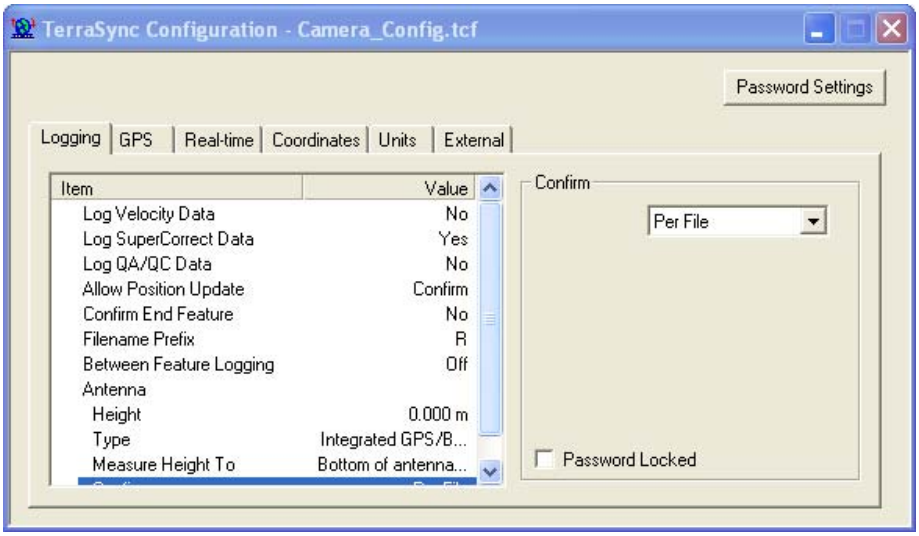
In Setup mode, click on each of the different buttons (Logging, GPS, Real-time, Coordinates, Units, and External) and set your preferences.

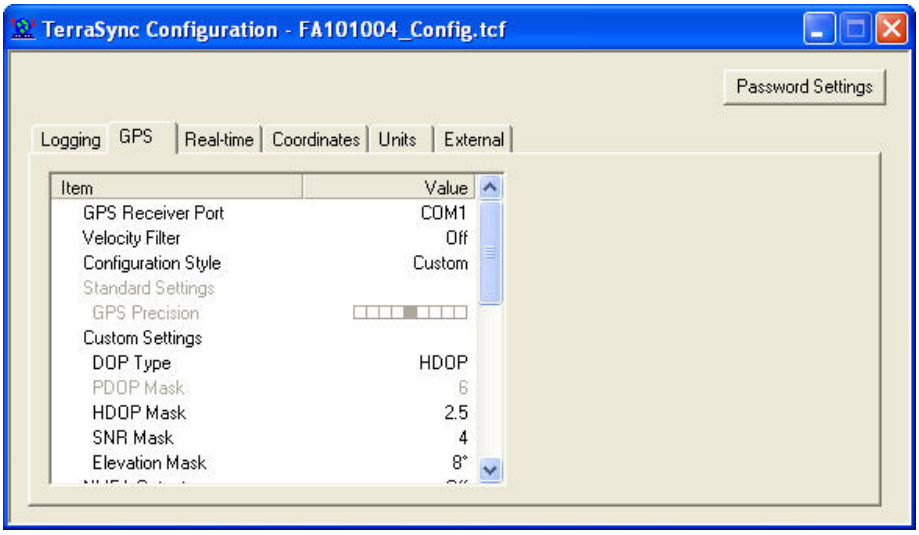
### 2.2. Change GPS settings by creating a Configuration File

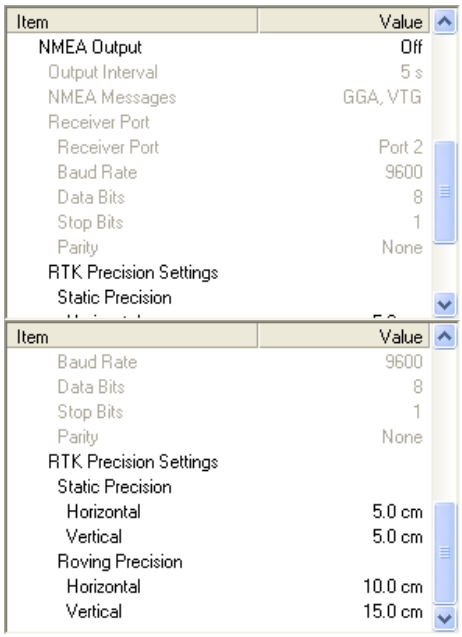
You can save your desired settings by creating a configuration file in Pathfinder Office Configuration Manager (located in Pathfinder Office folder from Windows Start menu, or Utilities→ Other→ Configuration Manager, if Pathfinder Office is already open). Through File→ New, choose TerraSync Configuration in the next window, and say OK. If multiple data collectors may be used, it is a good idea to save the configuration file in an accessible location (*R:\Utilities\Shoreline_S57\Trimble\Configuration Files*) rather than just the C:\\ drive of one computer or datalogger. This file can be referenced or updated easily for future projects.

NOTE: Creating a new configuration file for each project is recommended since the DGPS beacon frequency will change for each area. Each file should be well labeled with the project name and/or date. The project configuration file may have already been created so it is a good idea to check for an existing configuration file on the data logger under C:\MyDocuments\TerraSync\Configuration and verify if it is correct.

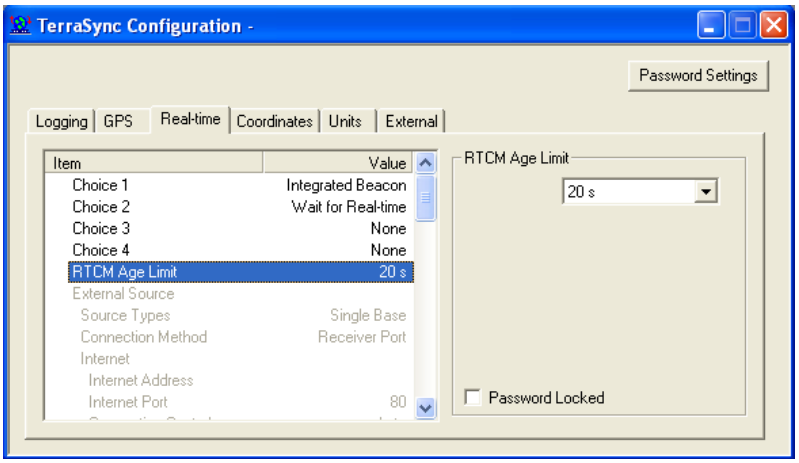
To create a new configuration file, click on each tab and set according to your preferences, or follow the examples:

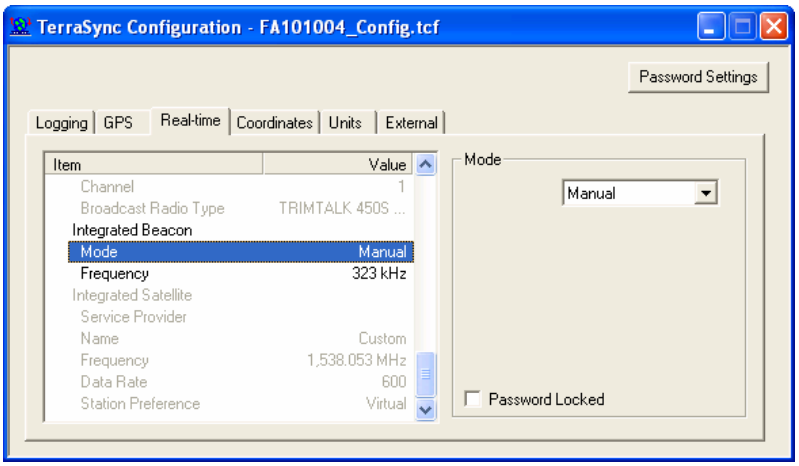


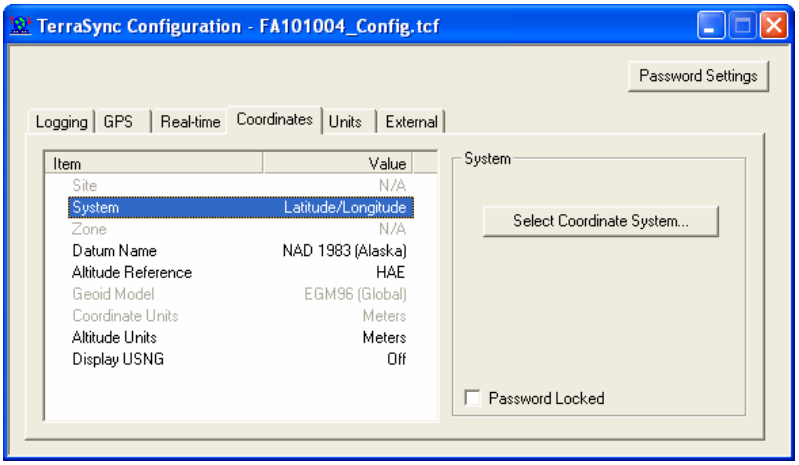



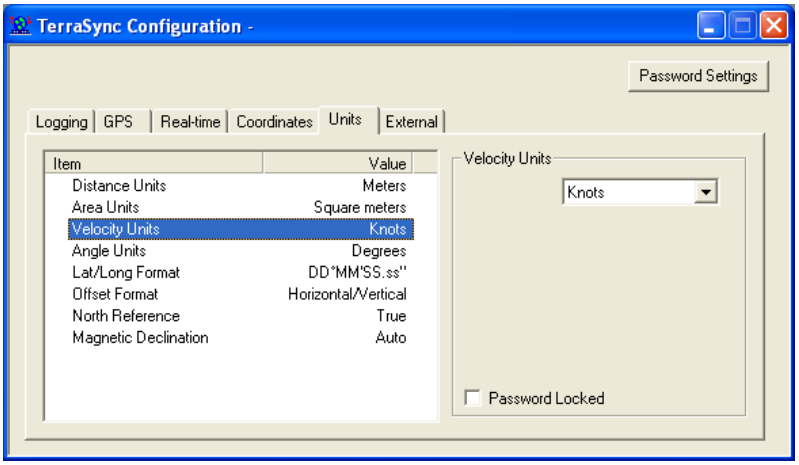



NOTE: In the Real-time tab, Frequency must be determined prior to configuration and entered manually. The frequency you will enter depends on which U.S. Coast Guard DGPS base station in the area is being utilized, which will vary by project and location.

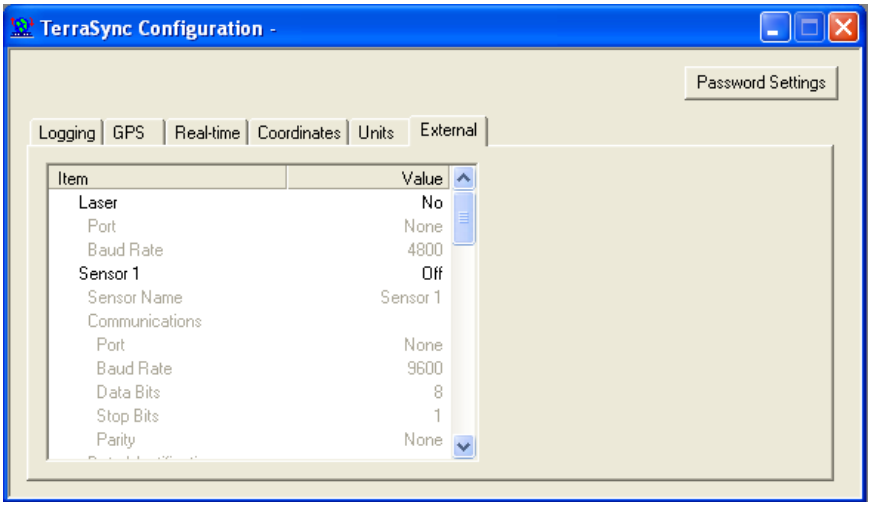


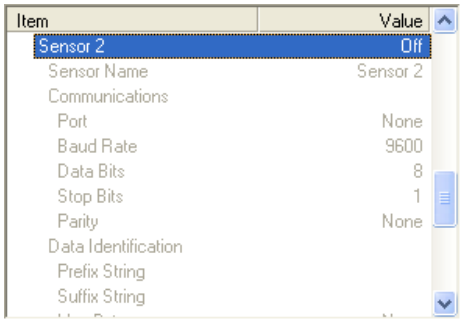

TerraSync Configuration - FA101004_Config.tcf
Password Settings
Logging
GPS
Real-time
Coordinates
Units
External
Item
Value
Channel
1
Broadcast Radio Type
TRIMTALK 450S ...
Integrated Beacon
Mode
Manual
Frequency
323 kHz
Integrated Satellite
Service Provider
Name
Custom
Frequency
1,538.053 MHz
Data Rate
600
Station Preference
Virtual
Mode
Manual
Password Locked


TerraSync Configuration - FA101004_Config.tcf
Password Settings
Logging
GPS
Real-time
Coordinates
Units
External
Item
Value
Site
N/A
System
Latitude/Longitude
Zone
N/A
Datum Name
NAD 1983 (Alaska)
Altitude Reference
HAE
Geoid Model
EGM96 (Global)
Coordinate Units
Meters
Altitude Units
Meters
Display USNG
Off
System
Select Coordinate System...
Password Locked


TerraSync Configuration -
Password Settings
Logging
GPS
Real-time
Coordinates
Units
External
Item
Value
Distance Units
Meters
Area Units
Square meters
Velocity Units
Knots
Angle Units
Degrees
Lat/Long Format
DD°MM'SS.ss"
Offset Format
Horizontal/Vertical
North Reference
True
Magnetic Declination
Auto
Velocity Units
Knots
Password Locked

NOTE: While it is possible to configure a laser range-finder or other external sensor to feed directly into the GPS log, this capability is not part of the Fairweather's procedure as of 2004. Thus far, the laser has not been accurate or consistent enough to warrant automatic association with GPS positions without first passing through a human filter. A digital camera with the proper functionality can also be connected to a laptop or data collector and set up as a sensor.




When all properties are set as desired, choose a descriptive name and File→ Save the configuration file to the data logger in the folder *C:\My documents\TerraSync\Configuration*.

## 3. Project and data file setup

### 3.1. Transfer data dictionary to datalogger

In order to use the data dictionary to collect and attribute positions in the field, you will need to transfer the data dictionary into TerraSync on a GPS data collector or field PC. If using a computer as the data logger, files can be transferred directly by connecting to the network.

NOTE: If your datalogger is a separate device from your processing computer, you will need to utilize some type of data transfer software. If no such program is included with your datalogger, download Microsoft ActiveSync to your processing computer: www.microsoft.com/windowsmobile/resources/downloads/default.mspx. Connect handheld unit and processing computer via serial port, USB, or infrared port (refer to device's User's Guide for details).

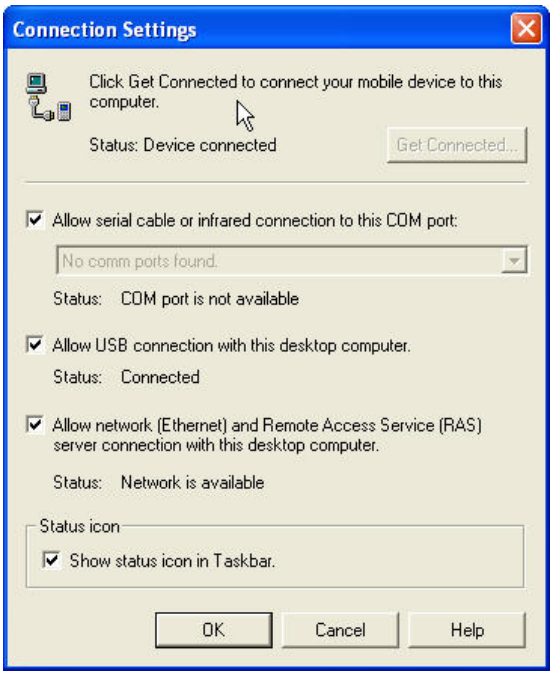
Under the Utilities menu in Pathfinder Office on your processing computer, select Data Transfer. If using the handheld unit, it will be necessary to connect the device to your processing computer using appropriate serial and/or USB cables. Choose a device from the pull-down menu, or add a new one by clicking the Devices button; then press New.

If you plan to use a Trimble data collector as your field device, choose GIS Datalogger on Windows CE.

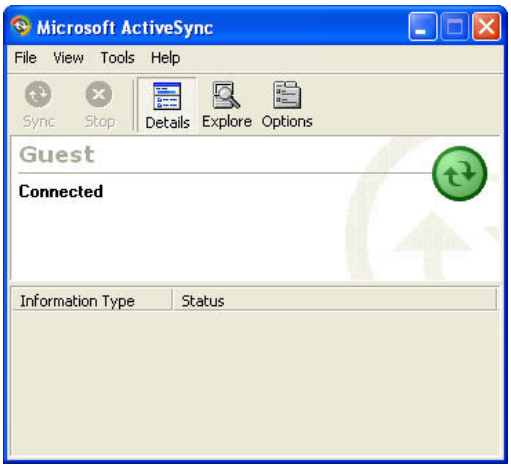

The follow-up screens will vary depending on the type of device you select. Fill in the location of your datalogger, enter the correct port when prompted if using an outside device, type in a name and click Finish. Minimize Pathfinder Office.

Turn datalogger on, and open Microsoft ActiveSync. In the Partnership window that pops up, just say No and set up a guest partnership.

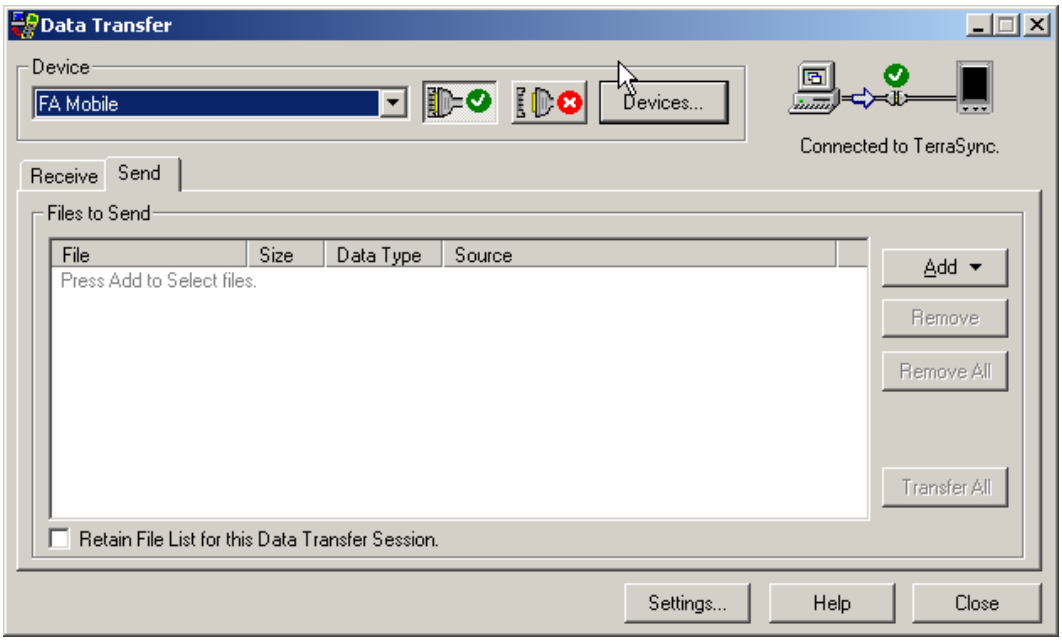
In ActiveSync, check to make sure the correct port for your device is allowed, through File→ Connection Settings, and say OK.




If ActiveSync does not automatically detect your device after this window closes, navigate to File→ Get Connected. After your device is found, ActiveSync should indicate that the status is connected:




Minimize ActiveSync and reopen Pathfinder Office. The icon in the upper right corner of the Data Transfer window (Utilities menu) indicates the status of your computer's connection with the field device. If "Not connected" is displayed, click the button with the green checkmark to connect to the device (the button with the red arrow disconnects).




Click the Send tab and then press Add; select Data dictionary from the pull-down menu. Navigate to your data dictionary and Open.

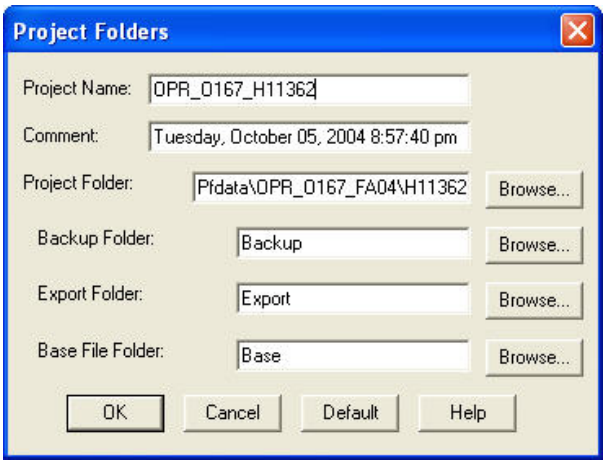
In the Data transfer window select Transfer All. Once the transfer is complete, press Close.

### 3.2. Create a new project

If creating a new project, it is best to first use an explorer window to manually create new folders with the desired Pathfinder project name (OPR_OXXX_FA_04\HXXXXX) in the Pathfinder local drive (C:\Pfdata\).

In Pathfinder Office, select File→ Projects. Choose a project from the drop-down menu or click New.

Type in desired project name and click Browse to find the folder you just created. Accept default settings for Backup, Base and Export folders.




Click OK in the Project Folders window, and again in the Select Project window. Exit Pathfinder Office.

NOTE: You are now ready to acquire shoreline data! Before actually venturing out in the field, you may want to set up a TerraSync data file and load it with the correct configuration settings so that you don't have to waste any time during your shoreline window. To create TerraSync data and configuration files, proceed on to Shoreline Acquisition SOP.

**Back to top**

# Shoreline Acquisition

## Standard Operating Procedure

Table of Contents

## 0. Document Scope

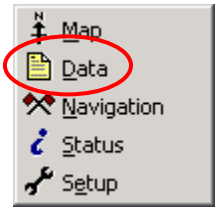
This document outlines the standard operating procedures for acquiring shoreline data and logging detached positions to meet S57 standards, as well as transferring that data back to the ship for processing. Effectively, this SOP outlines everything that needs to be done immediately before collecting data, in the field and immediately after collecting data.

## 1. Set up TerraSync for GPS logging

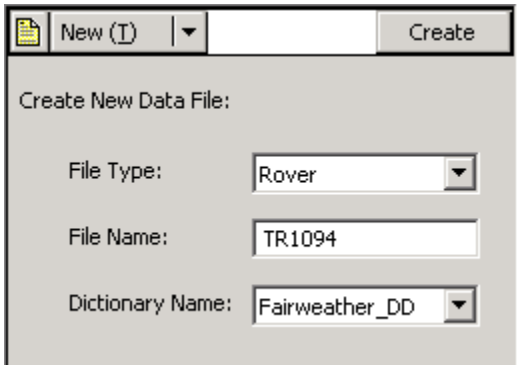
Everything in this section should be done in preparation for a specific survey, but should be set up before actually going out in the field.

NOTE: The setup procedures for a field PC and the handheld datalogger vary slightly. The primary difference is the screen size on the different platforms; there is no space on the handheld for multiple windows. Operational differences are noted where applicable.

### 1.1. Create a new TerraSync data file




1. In TerraSync, enter Data mode (select "Data" in the upper left-hand menu).
2. In the menu directly below it, choose New File (If you are resuming work from an old file, choose Existing File). All the data you acquire in a given session will be stored in the file you are now creating.
3. Name the file after the Trimble unit number and the day number in the form of TRXDn. For example, enter "TR1258" for data from Trimble unit 1 on day 258.
4. Select the data dictionary called Fairweather_DD from the pull-down menu (the data dictionary must be located in C:\My Documents\TerraSync).
5. Click Create.
6. In the following screen, leave Antenna Height and Measure To fields as default; these are not necessary as they apply only to vertical GPS positions.



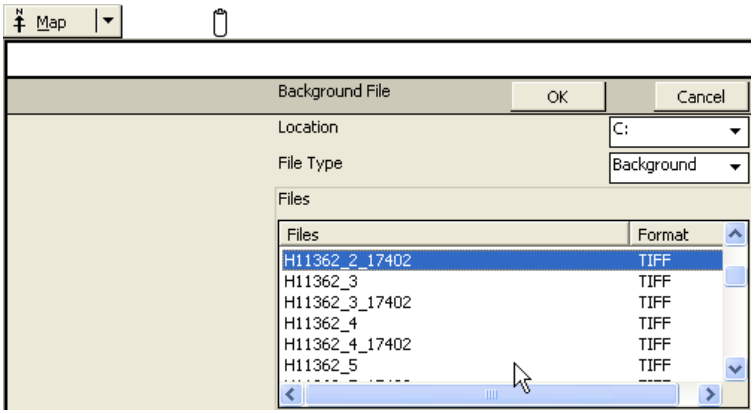
NOTE: When the user creates a new TerraSync file, TerraSync creates an associated set of files (DD, GIC, GIP, GIS, GIW, GIX, OBS, OBX). All these must be located directly in the TerraSync local drive (*C:\My Documents\TerraSync*) in order for the TerraSync file to be opened in the future.

### 1.2. Load background files into TerraSync

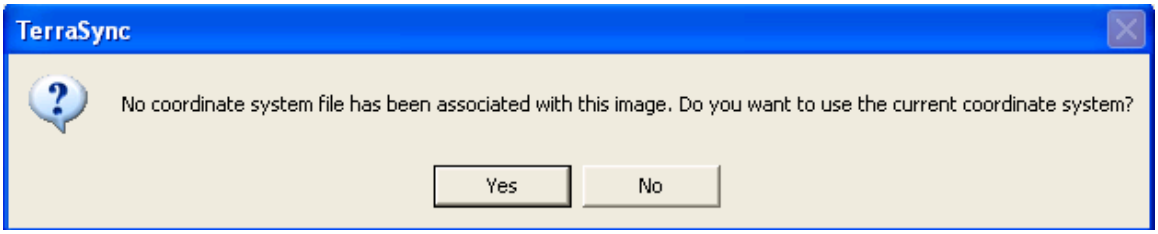
All final background files (TIF, TFW, CS) must be saved into the data logger's TerraSync folder (C:\My documents\TerraSync) to be accessible. If the datalogger is the same machine that background files are currently saved on, simply copy all TIF's and associated files to C:\My documents\TerraSync.

HANDHELD ONLY: If background files are located on a separate machine, these will need to be transferred in ActiveSync. Open ActiveSync and connect to datalogger and transfer the files with the procedure outlined above in Section 3.2 of the Trimble_Pathfinder_Setup SOP, substituting file type "Background" for "Data Dictionary."

Open TerraSync on your datalogger and select Map mode. From Layers→ Background File, navigate to your file. Select File Type→ Background, find the desired image, and click OK.




The first time you load a background image you will get this message (select yes):



If the image does not immediately appear in the map window, try pressing the Zoom Extents button (equal sign with a circle around it in the lower left-hand corner of the map window).

NOTE: Upon transfer of the georeferenced TIF file to TerraSync, a CS (coordinate system) file will be created, among others. If the coordinate system of the image is changed and then reloaded into TerraSync, the original CS file must be deleted before TerraSync will acknowledge the new coordinate system.

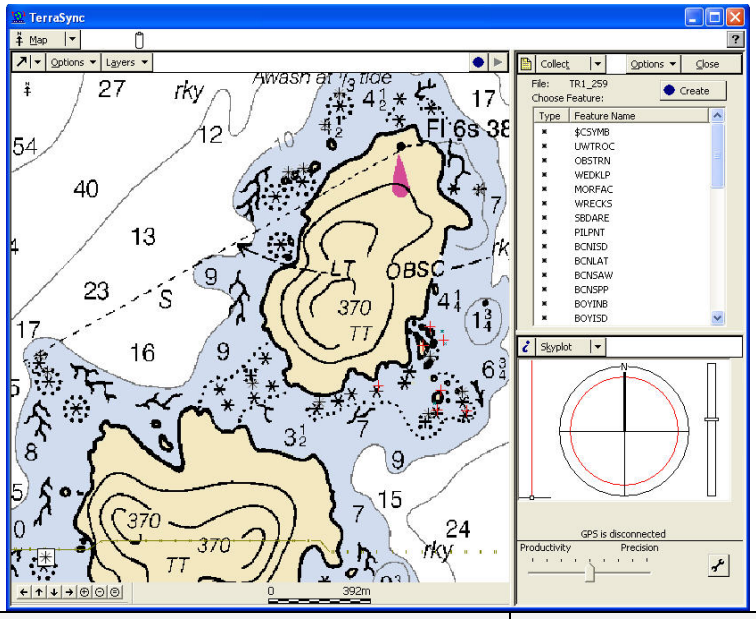
### 1.3. Load configuration file into TerraSync

Even if the correct configuration file is already listed, you may need to reload it if the GPS is not connecting: from Setup mode, press the Change button, and then Load. As long as it was saved directly into your datalogger's local TerraSync folder (C:\My documents\TerraSync\Configuration), the configuration file you created for the current project should be listed as an option. Select the file and then press Load.

### 1.4. Customize TerraSync Display

Immediately before going out to survey, open TerraSync and the project you created. If it is not already open, choose Existing File from the second menu in the Data window and select the file you created. If prompted for antenna height, leave as default; antenna height does not matter unless you are using GPS for vertical heights.

FIELD PC ONLY: There are three different windows that can simultaneously display different sections, or modes (i.e. Map, Data, and Status); set them up the way you want them to be when you start collecting points. Note that there is only space for one window on the handheld datalogger.

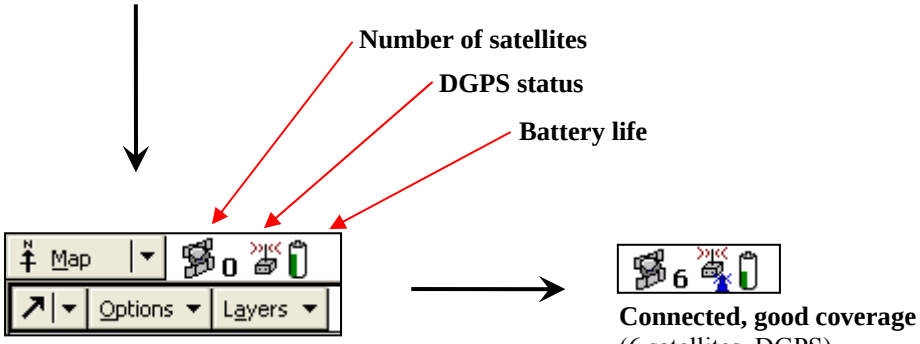


## 2. Collect GPS positions

### 2.1. Connect to GPS in TerraSync

Make sure your GPS receiver is connected to the data logger through the appropriate COM port (specified under GPS Settings in Setup mode). From Setup mode, Click on the Options button and choose Connect to GPS, or simply click the "GPS" button in the upper right-hand corner of the window. Icons on left-hand side of the upper toolbar display current status, as shown below; clicking on each icon provides additional details.


**Connecting to receiver**




**Connected, no coverage**
(no satellites, no DGPS)

**Connected, good coverage**
(6 satellites, DGPS)

In Data mode, choose Collect Features from the second pull-down menu, then Log Later from the Options menu. This setting is recommended for logging precise positions from a launch because the time required for S-57 attribution is most likely longer than the boat can stay still. Choosing Log Later allows you to enter feature attributions at a leisurely pace, and to acquire a GPS signal only when you are ready. Select Collect Features from the Data menu to prepare for acquisition.

### 2.2. Collect GPS data with S-57 attribution

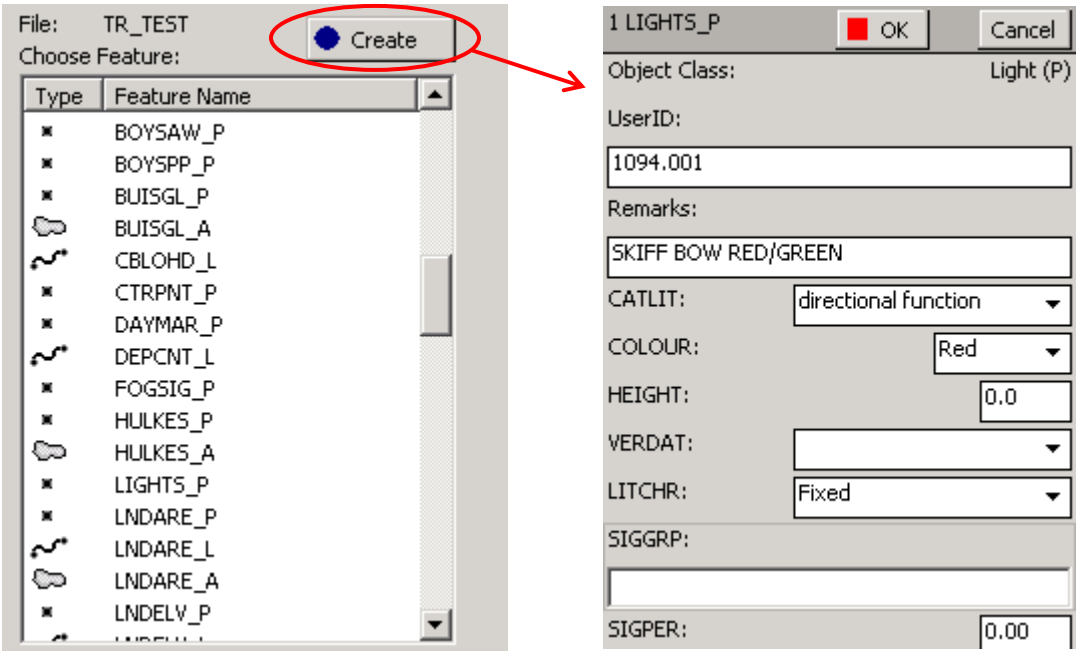
Features in TerraSync can collected as points, lines, or areas. In the feature list, these are represented as follows:

Point:  Line:  Area: 

The Data Dictionary is set up to indicate a point, line, or area in the feature name (e.g. MORFAC_L for a line mooring facility), as shown. The data collection procedure differs for each of point, line, or area, as described below.

When you are ready to begin taking a position, highlight the desired Feature Name (corresponding with the desired Type) from the list in TerraSync's Collect Features mode, and click Create (this will not begin logging).

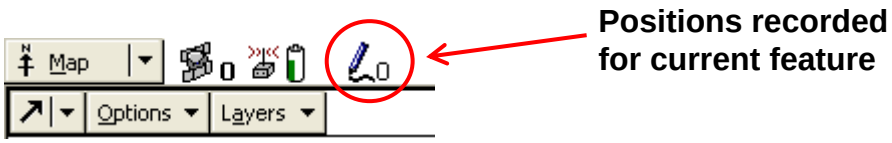
NOTE: It is important to enter the correct *feature* type before beginning to log; as attribute fields are specific to feature type you won't easily be able to change feature type in Pydro. *Attributes* can easily be altered in Pathfinder or Pydro, so it is fine to take more detailed notes by hand and electronically update attribute fields later.




Fill in all required fields (TerraSync will inform you if you are missing any required data) as well as any desired optional fields; click OK. To abandon the feature or switch feature types, click Cancel and start again.

### 2.2.1. Log Point data

To begin logging, click the Log button in the upper right hand corner of the Data window in Collect mode. The pencil icon on the left-hand side of the upper toolbar indicates that positions are being logged and displays the number of positions recorded for this point feature. The logging interval is predefined in the Data Dictionary, but may be changed by selecting Logging Interval from the Options menu. The default logging interval for point features is one second.




After several positions have been logged (if the boat is drifting it is better to get just a few localized points than many spread-out ones), press Pause to end logging for this feature.

NOTE: It is possible to add more positions to the feature by hitting Resume and then Pause, but this option should be used with discretion and not while drifting.

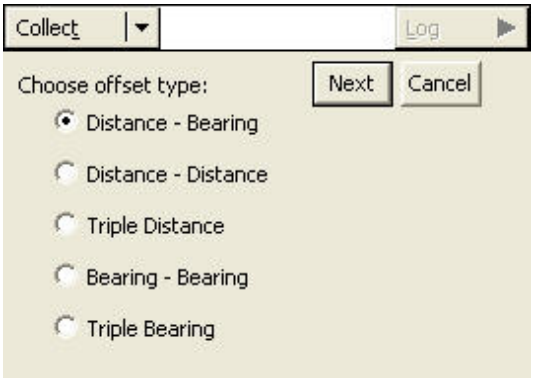
### 2.2.2. Log Line and Area data

To begin logging a line or an area (polygon), click Log, wait until one position is logged, then click Pause. Repeat this process for each line segment of the segmented line or area. The default logging interval for lines and areas is 5 seconds (as defined in the Data Dictionary) to allow sufficient time to pause between vertices.

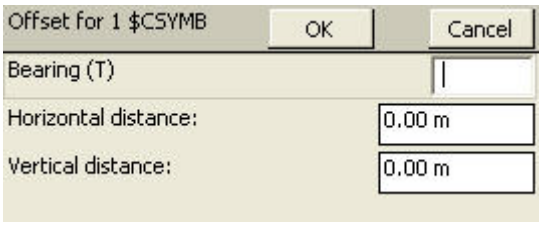
NOTE: Alternatively, TerraSync allows you to collect multiple positions for each line or area vertex. This feature is located in the Options menu by clicking New Vertex.

### 2.2.3. Account for offsets

Often, a feature will be at some distance and bearing from the actual GPS antenna when a position is logged. Offsets can be accounted for during creation of a new feature: from Data mode, choose Collect, and then click the Create button. From the Options menu select Offset. The simplest way to measure offset from a shoreline vessel is through the Distance - Bearing technique; select this option, then Next.



While logging the position, another person should determine range (visually or with a laser rangefinder) and bearing (with a compass adjusted for true North) from the Trimble antenna to the point of interest of the feature. After logging but before closing the position, follow instructions on the Offset screen to enter Bearing (T) and Horizontal distance in the blank fields. Vertical distance does not need to be entered.




Press OK to return to the feature attributes; press OK when values have been filled in and you are ready to record the position.

NOTE: It is possible to connect external sensors (i.e. a laser rangefinder or camera) to the GPS unit so that data transmitted by the sensor will automatically be recorded and associated with a DP. However, the laser rangefinder has not been consistently accurate enough in moving seas to make this option desirable.

**3. Complete Detached Positions (DP's) form**

To log a detached position (DP), fill out all information on the DP form: DP Form_FA_05.xls.

A system should be set in place in order to keep track of all the positions that are logged and to ensure that no positions with duplicate names are recorded. For example, use a Unit #, Day #, DP# format, where 12581 represents Trimble Unit 1, Day 258, DP 1, and 225913 represents Trimble Unit 2, Day 259, DP 13. This is the same unique number that is entered as OBJNAM attribute when entering information in the data logger.

For each DP, make sure to record the position number (i.e. 12581), feature type ($CSYMB, UWTROC, BCNLAT), and geometric type (point, line, area) as well as the position of the actual feature in relation to the GPS antenna. It is also important to record how the depth or height was determined. Range may be determined visually or with a laser rangefinder; use the "remarks" field to note any other relevant pieces of information.

**3.1. Associate photographs with DP's**

If possible and desirable to take photos, keep track of how many photos were taken of each feature or make some sort of notes to indicate which pictures correspond to each DP so they can be correlated back on the ship. It is helpful to mention any other

relevant information as well, such as the direction the picture was taken toward or the water level at the time.

## 4. Transfer data from field datalogger back to ship

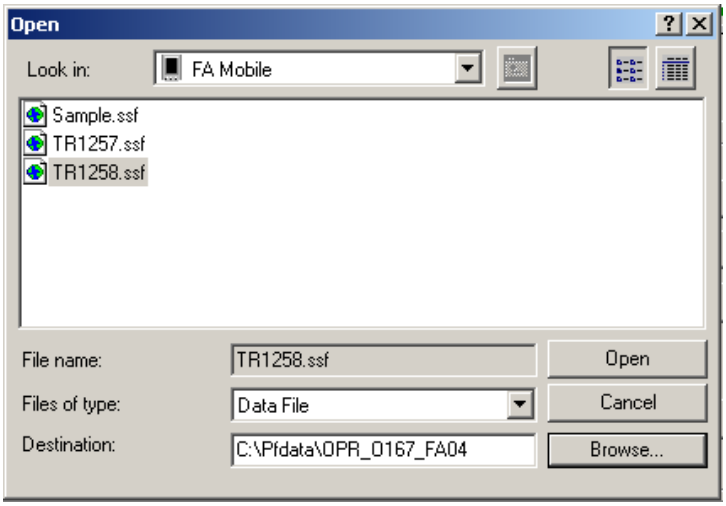
### 4.1. Boat sheets and DP forms

Boat sheets and DP forms are valuable pieces of data and must be kept track of and submitted as part of the DR. Completed DP forms should be filed in the appropriate sheet binder, and boat sheets should be stowed in a plastic sleeve in the back of the binder.

### 4.2. Data transfer

In GPS Pathfinder Office, select Data Transfer from the Utilities menu. Select a device from the pull-down menu. The icon in the upper right corner of the window indicates the status of Pathfinder's connection with TerraSync. If "Not connected" is displayed, click the button with the green checkmark to connect to TerraSync; the button with the red arrow disconnects.

Click the Receive tab and then press Add and select Data File from the pull-down menu. Navigate to your data file. Click Browse in order to find your project folder; set this as your destination location. Click Open.



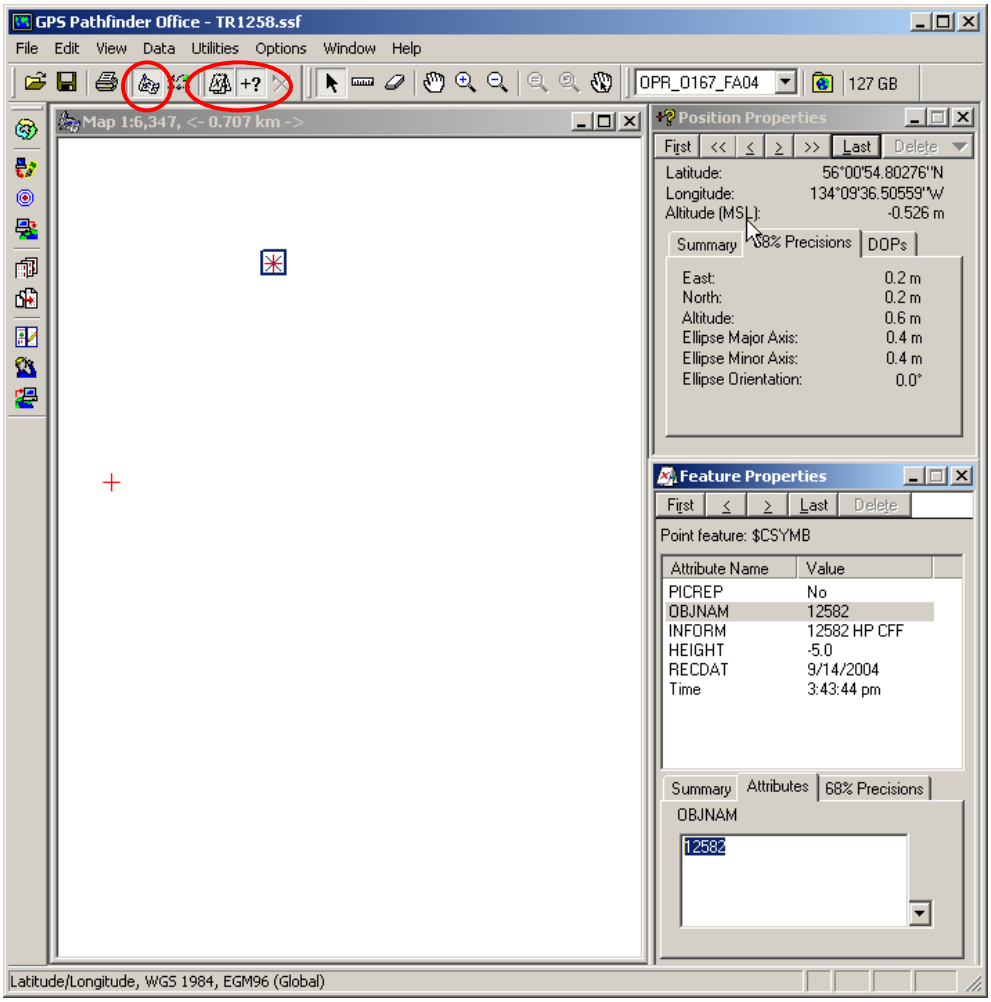

In the Data transfer window select Transfer All. Once the transfer is complete, press Close.

After transferring data into Pathfinder, a duplicate of the additional TerraSync data files (DD, GIC, GIP, GIS, GIW, GIX, OBS, OBX) will be created in the Pathfinder project's Backup folder. Save these files from the Backup folder to the following

network folder: H:\[OPR#]\Surveys\HXXXX\CARIS\Preprocess\Trimble\Backup\TRXDn\. After the files have been successfully reproduced in Pathfinder and copied onto the network, the files can be deleted from TerraSync.

### 4.3. Open Data

Go to File→ Open. Navigate to your project folder, find your file, and click Open. You can now view and manipulate your data in three different windows: Map, Feature Properties, and Position Properties. If these windows are not open, make sure the buttons encircled in below are selected.




## 5. Edit attribution information in Pathfinder

Before exporting the Shapefiles for use in Pydro, check to make sure that all information is correct, and that it matches any notes on the DP form. Scroll through all attribute fields for each point, line, and area and make sure all information is correct.

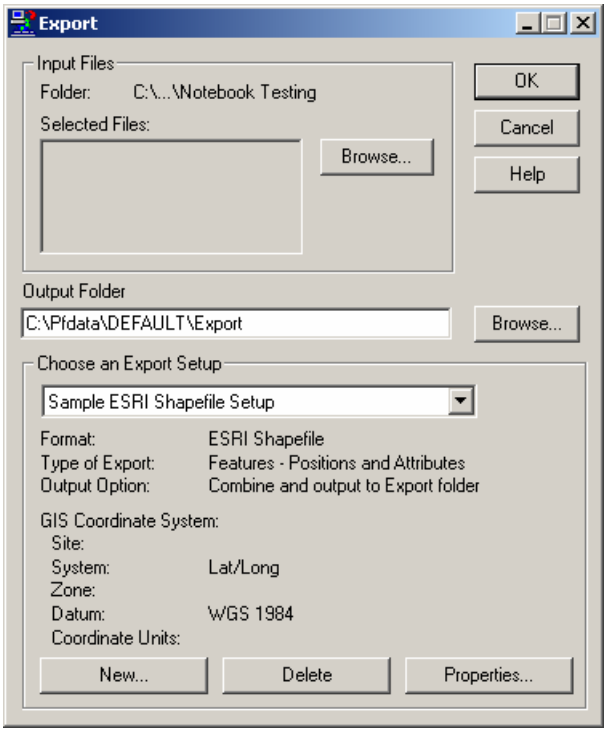
Clicking on a feature in the Map window will automatically select it and bring up its attribution information in the Feature Properties and Position Properties windows. In each of these windows, the forward and back arrows can also be used to scroll between features. Double-clicking an Attribute Name in the Feature Properties window will automatically bring up its Attributes tab and allow you to edit the field. Make sure to save any changes you make.

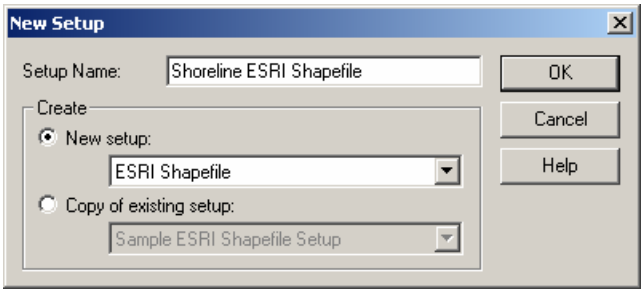
## 6. Prepare for Pydro

### 6.1. Export Shapefiles to Pydro

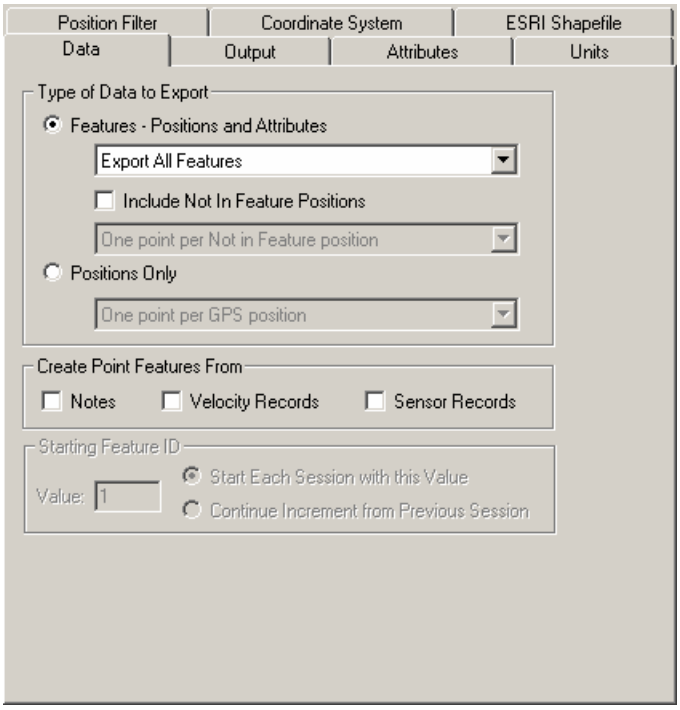
To export Shapefiles to Pydro, choose Export from the Utilities menu in GPS Pathfinder Office. Click Input Files: Browse in order to select the raw SSF Trimble data file(s) you wish to export. The default output folder is defined in the GPS Pathfinder project setup. Click Output Folder: Browse to change the output folder.

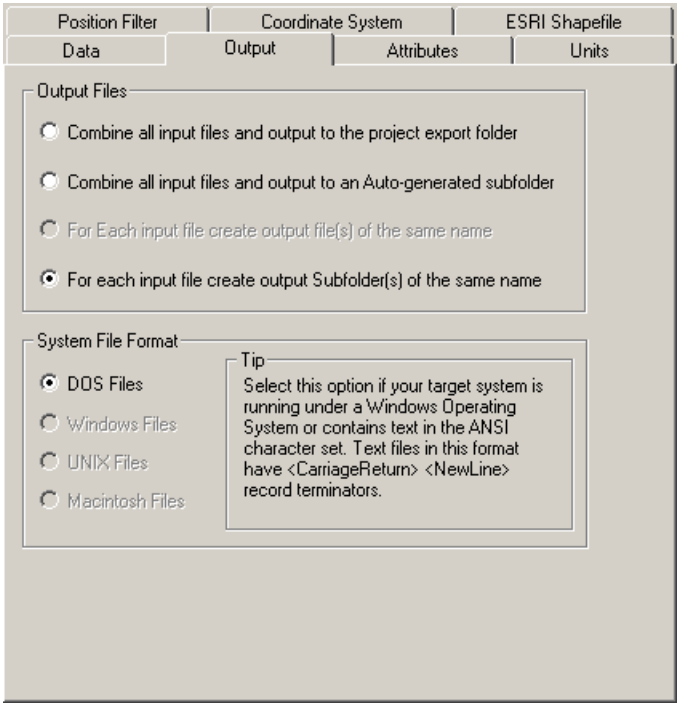
If an export setup has already been created, select it from the pull-down menu. Otherwise, select Sample ESRI Shapefile Setup from the pull-down menu and click New. Give the new setup a name (e.g. “Shoreline ESRI Shapefile”) and click OK.



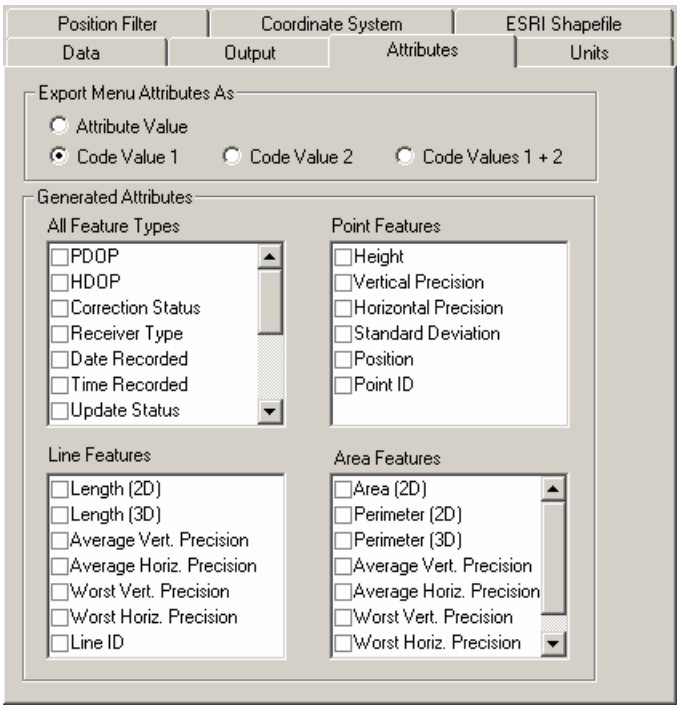



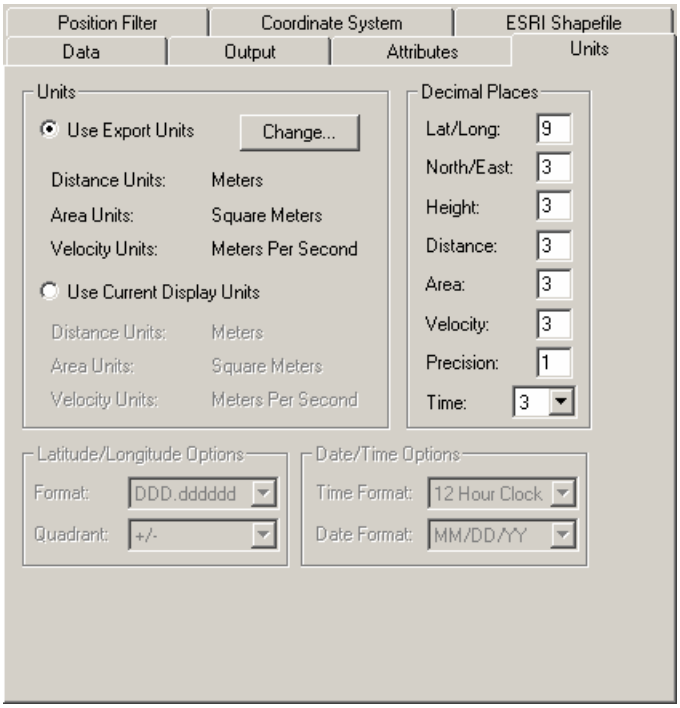

Click Properties and make sure all tabs are set according to the following examples.

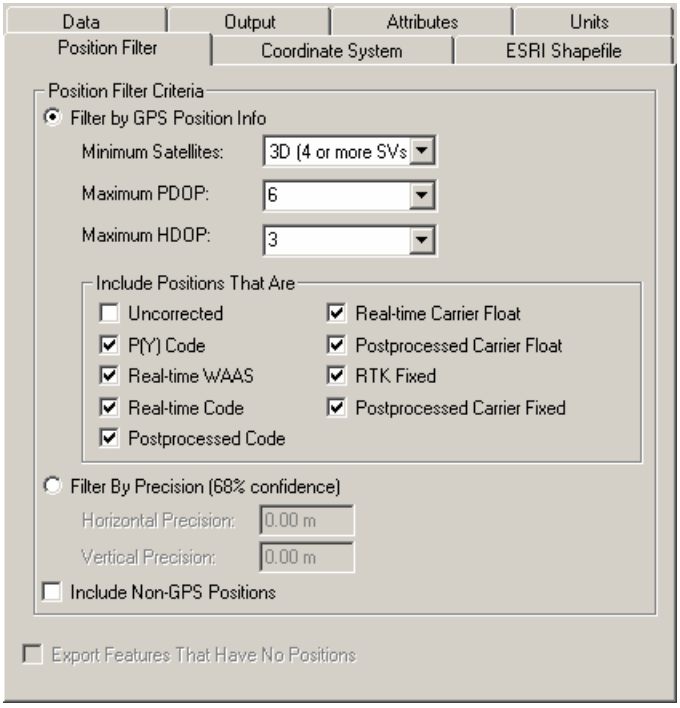

Position Filter
Coordinate System
ESRI Shapefile
Data
Output
Attributes
Units
Type of Data to Export
Features - Positions and Attributes
Export All Features
Include Not In Feature Positions
One point per Not in Feature position
Positions Only
One point per GPS position
Create Point Features From
Notes
Velocity Records
Sensor Records
Starting Feature ID
Value: 1
Start Each Session with this Value
Continue Increment from Previous Session


Position Filter
Coordinate System
ESRI Shapefile
Data
Output
Attributes
Units
Output Files
Combine all input files and output to the project export folder
Combine all input files and output to an Auto-generated subfolder
For Each input file create output file(s) of the same name
For each input file create output Subfolder(s) of the same name
System File Format
DOS Files
Windows Files
UNIX Files
Macintosh Files
Tip
Select this option if your target system is running under a Windows Operating System or contains text in the ANSI character set. Text files in this format have <CarriageReturn> <NewLine> record terminators.

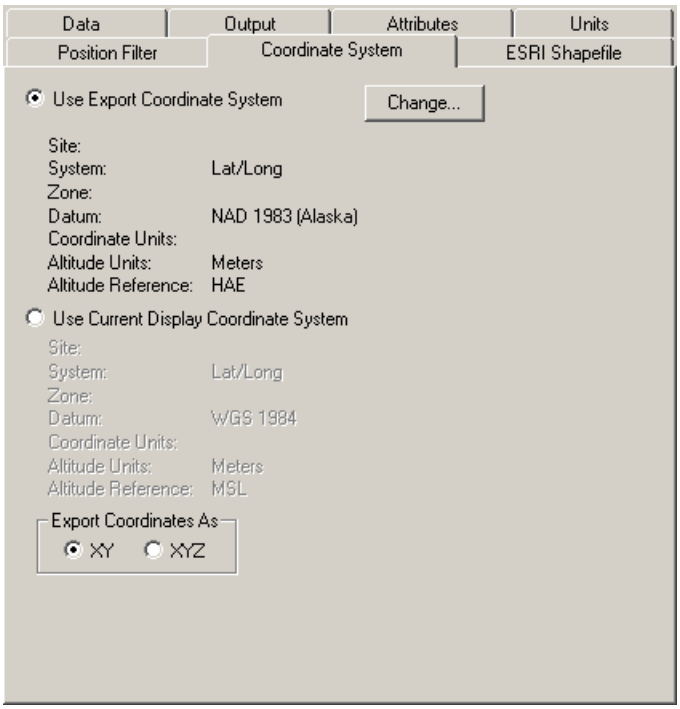
In the Attributes tab, Code Value 1 must be checked in the "Export Menu Attributes as" field so that Pydro (and Notebook if not using Pydro) can correctly interpret their S-57 attribute values.

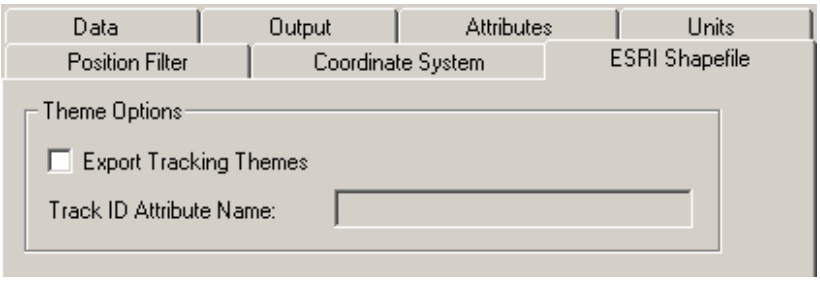





Change the coordinate system by clicking Change and set up the system as shown.






NOTE: If there is more than one feature with the same name the features after the first will be renamed (e.g. MORFAC to MORFAC2). This would occur if both a point and line feature share the same name and can be avoided by the naming scheme suggested in Section 2.2.

NOTE: One set of files (DBF, SHP, SHX) will be created per feature type ($CSYMB, UWTROC, WRECKS, etc.) so each file may contain one or many points/lines/areas, depending on how many DP's were given this feature name in the field.

After exporting, open the export folder in Windows Explorer, and find the files you just created. Rename each file, giving it the Trimble GPS unit and day number (TR1*XXX*_ or TR2*XXX*_) as a prefix. Files must be uniquely identified in this manner before transfer into Pydro, otherwise the next DP of the same feature type will repeat the file name.

Transfer the exported files to H:\[OPR#]\Surveys\HXXXXX\CARIS\Preprocess\Trimble\Export\TRX_Dn.

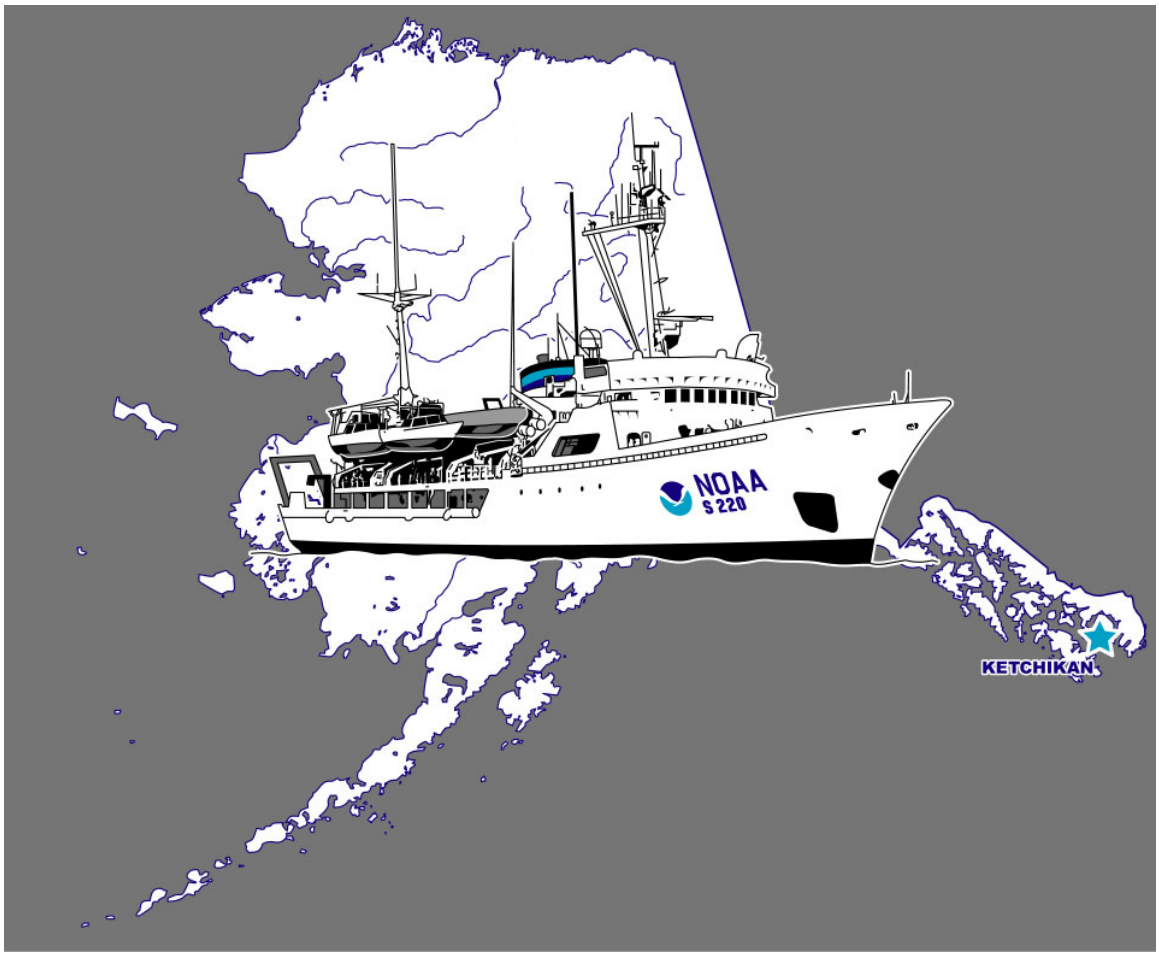
NOTE: Buffer lines will be named "Lin_gen" upon export. These files should also be renamed as per the other files and transferred to H:\...\Export\Buffer_Lines\.

### 6.2. Transfer Photos for DP's

Upload any photos from the field to H:\[OPR#]\Surveys\HXXXXX\PSS\Photos\ then erase them from the camera to avoid any future confusion. Name photos by their DP numbers and any other notes that will help the sheet manager and cartographers understand what the picture represents (i.e. the cartographer could interpret "12583_hp_toE" to mean that the photo is of the high point of DP 12583, and was taken towards the East).

If the subject of a photo is unclear or if multiple features are represented in the same picture, it may be useful to crop or label the picture with text and arrows in a photo editor. Save final copies of DP photos in a subfolder of the survey's PSS folder. It is fine to have multiple pictures for one feature, but any "fun" pictures from the day should be saved elsewhere.

# Pydro Shoreline Processing



# Pydro Shoreline Processing

## Table of Contents

## 0.0 Document Scope

This document is intended to guide sheet managers through shoreline processing in Pydro.

## 1.0 Launch End of Day

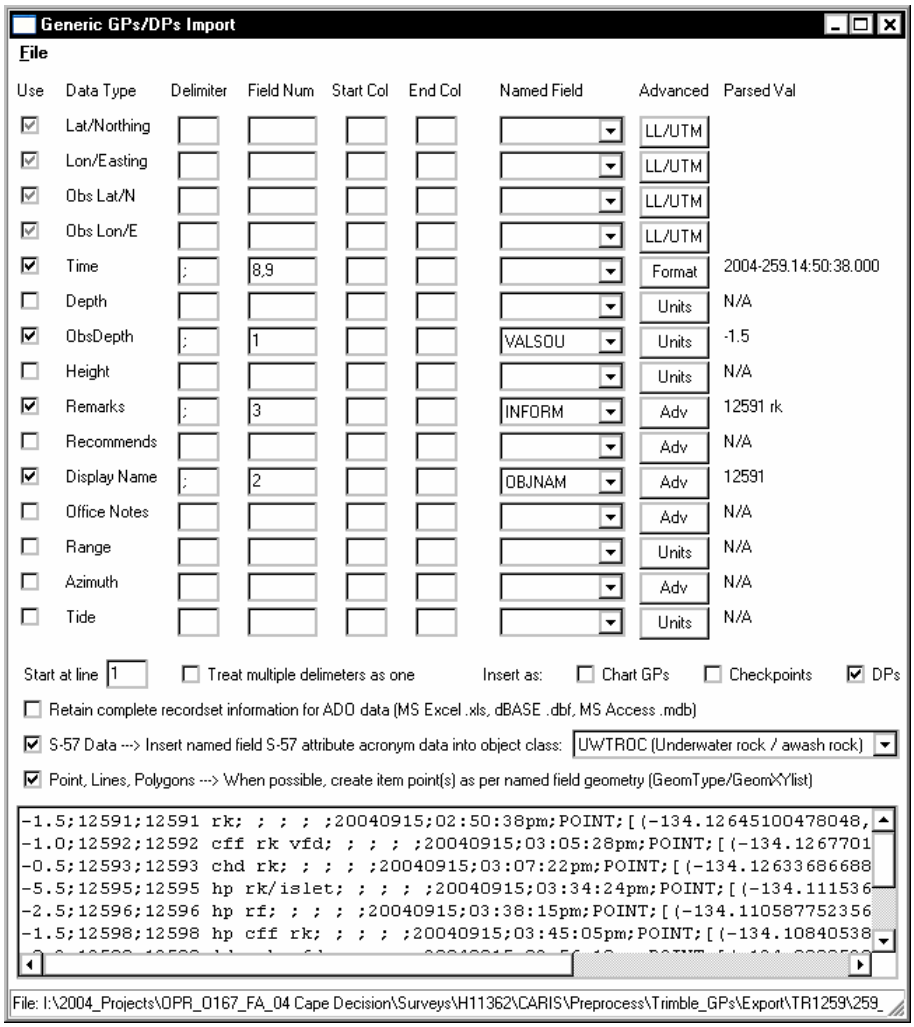
### 1.1 Import Features

Open the PSS for the survey, or create a new one if one does not exist. Be sure all metadata is entered and correct.

#### 1.1.1 Insert DPs and GPs

Positions recorded in the field must be imported into Pydro for processing. The boat crew will be responsible for transferring the Trimble files to the appropriate folder.

1. From the Pydro *Data* menu, select *Insert > Generic GPs/DPs*.
2. In the pop up window, go to the *File* menu and select *Open template.*
3. Browse to *R:\Utilities\III_Pydro\ Parser Templates* and open the appropriate template file (e.g. $CSYMB or UWTROC). Some fields in the *Import* window will be filled in automatically. (If a template does not exist for the feature to be imported, refer to the procedure for creating a parser template described below.)

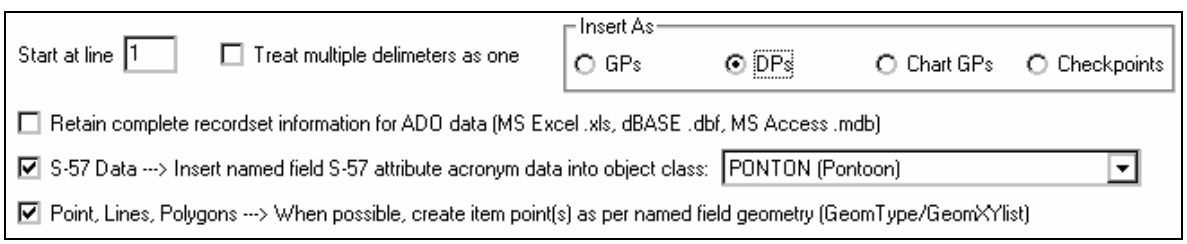


4. From the *File* menu, select *Open data file*.
5. Browse to the folder where the Trimble files were saved.
   *I:\200X_Projects\OPR_XXXX_FA_0X*
   *\Surveys\H######\CARIS\Preprocess\Trimble_GPs\Export\TRX_DDD*
6. Open the desired .shp file.
7. From the *File* menu, select *Process file(s)* and open the shape file used in Step 6. This seems redundant, but insures proper processing.
8. When importing DPs, Pydro will ask for an associated CARIS project. Point to the H###### folder within the HDCS Data folder for the project. When the PSS is saved, a new line will be written to the HDCS folder.
9. Repeat Steps 6 & 7 for all new .shp files.
10. Fill in the Pydro Feature Log for each file inserted. The template is located at *R:\Utilities\II_Forms_Lists_and_Templates\2_Acquisition and Processing\Shoreline.*
11. Save a copy of the log in *Descriptive_Report > Separates > 1_Logs > Detached_Positions*.
12. When all features have been imported, close the *Import* window and save the PSS. The field unit used to acquire the DP's should appear as a vessel in the associated HIPS project HDCS folder.

### 1.1.2 Create Parser Templates

If there are feature types to be inserted which to dnot have templates created, it is possible to create one. If a template already exists, skip this step.

1. From the Pydro *Data* menu, select *Insert > Generic GPs/DPs*.
2. In the pop-up window, go the the *File* menu and select *Open*.
3. Browse to the shapefile of the feature to be inserted and click *Open.*
4. On the left side of the *Import* window, check the boxes of all rows to be populated.
5. On the right side of the *Import* window, use the drop down menus to fill in the attribute to be associated with each *Data Type.*
6. Once the attribute is set, the *Field Delimiter* and *Field Num* columns will automatically be filled with the appropriate values.
7. The *Field Num* column can also be filled in manually, which is desireable when two separate data dictionary attributes (e.g. RECDAT and Time) must be used to fill in the Pydro *Data Type* (e.g. Time).
8. Use the window at the bottom of the *Import* window that lists all attributes to find the desired entries.
9. Determine the filed numbers of the desired attributes, counting the blank before the first semicolon as one.
10. Check the *S-57 Data* box at the bottom of the window and choose the appropriate acronym for the features from the drop down menu.
11. Check the *Point, Lines, Polygons* box.
12. Check the appropriate box to *Insert as: GPs, DPs, Chart GPs,* or *Checkpoints*.




13. Most features are classified as DPs. Check with the CST if there is a question.
14. From the *File* menu, select *Save Template*.

15. Give the template a name identifying the type of feature it is to be used for and save it in *R:\Utilities\III_Pydro\Parser Templates.*

### 1.2 Process Features

#### 1.2.1 Apply Correctors in CARIS HIPS

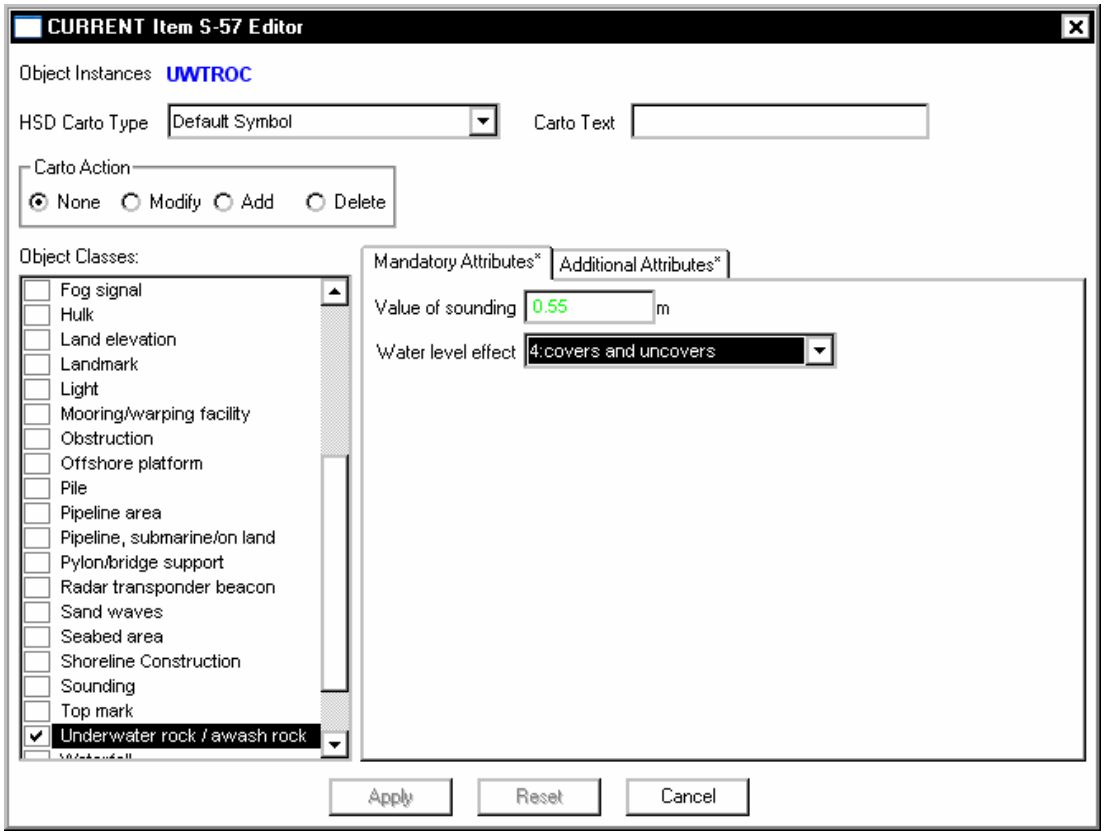
1. Open the CARIS HIPS.
2. From *File* > *Open* browse to the project folder and open the DPs. The vessel name will begin with TRB1 or TRB2 for the Trimble units used during acquisition.
3. Apply observed tides to all items.
   **NOTE:** Zoned tides can only be applied to files containing more than one position. A single tide station must be applied to any single DP.
4. Apply SVP correctors to any echosounder DPs. If necessary, use a nearby cast taken during hydrography.
5. Merge all data.

### 1.3 Review Features

1. Compare the items inserted in Pydro with the HXXXXX_Pydro_Feature_Log.xls in H:\OPR-XXXX-FA\Surveys\HXXXXX\Descriptive_Report\Separates\I_Logs\Detached_Positions, ensure it is completely filled out and up to date.
2. Check the Remarks tab with comments from the boat sheet edit if necessary.

### 1.4 S57 Attribution

1. Under the *Details* tab for a feature, click the *S57* button to open the *S57 Editor*.
2. A window will open with the information for the selected item.



3. Check that the *Object Instances* displays the correct object type (e.g. UWTROC, $CSYMB, etc).
4. Left click on the appropriate object type in the *Object Classes* box. It should already have a check mark in the box next to it.
5. Information will appear in the *Mandatory Attributes* box. Fill in the appropriate information, in *Mandatory and Additional Attributes*.
6. Click *Apply*.
7. Repeat this process for all features in the PSS.

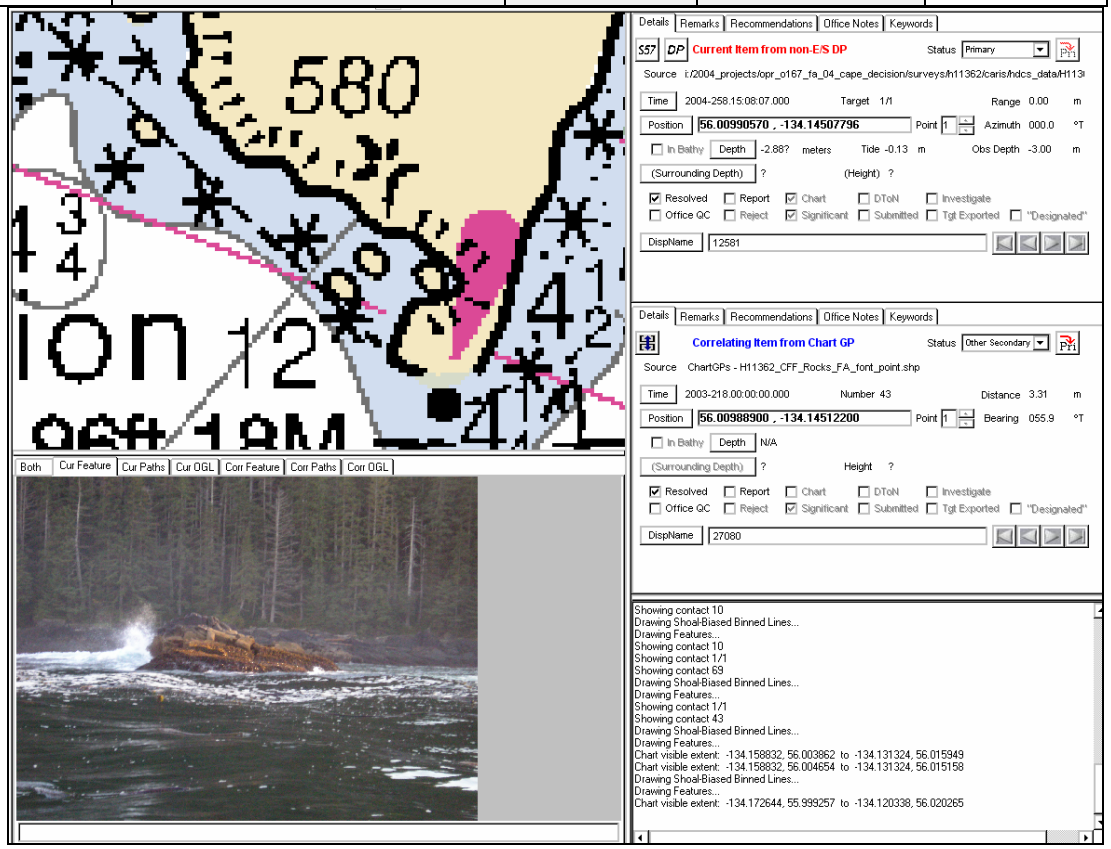
## 2.0 Sheet manager responsibilities

### 2.1 Review Features

1. Add chart numbers to chart items (e.g. Chd (17424) rk disproval).
2. Add Light List numbers to ATONs
3. Address and update AWOIS items using the Pydro Editor function.
4. Select the appropriate Carto Action as Add, Modify, Delete or None.
5. Use the Pydro Features Tree to edit flags, add Remarks and update Recommendations, especially with disproval methods and notes. Pydro flags should be updated to *Chart*, *Significant* and *Primary*. Check the *Report* flag if an item needs to be addressed in the DR.
6. Any item flagged as *Report* should have the surveying information in the *Remarks* tab. Necessary recommendations should be entered under the *Recommendations* tab.
   **Note:** Complete disprovals and changes to HW must be marked report and have a recommendation. Other instances are at the Hydrographers discretion. An item CAN be marked report and not have a recommendation. This is useful in instances where additional information would be useful to the cartographer but a recommendation is not warranted.
7. Check the DP Forms in the project binder. Make sure they are completely filled out and match the information entered in Pydro.
   **NOTE:** The distance and bearing entered in TerraSync as noted on the DP form will not appear in Pydro. The position is automatically updated.
8. Scan the finalized DP forms and save as a single PDF called HXXXXX_DPforms.pdf and located in*H:\OPR_XXXX_FA\Surveys\H######\Descriptive_Report\Separates\1_Logs\ Detached_ Positions.*

### 2.2 Add Images

1. Photos taken in the field should be saved in one *Photos* folder, within the survey PSS folder.
2. To associate a photo with a DP, select a feature and click on the *Cur Feature* tab below the chart.
3. Right-click in the blank space and choose *Add Image(s).*
4. Navigate to the *Photos* folder, highlight the appropriate image(s), and select *Open*. Once an image is displayed under the *Cur Feature* tab, the paths of all images can be displayed under the *Cur Path* tab.
5. Alternatively, images can be added by having the *Photos* folder open and dragging and dropping the images into the *Cur Feature* window.
6. To toggle between images, right-click in the image window with either the *Cur Path* or *Cur Feature* tab activated, and choose *Next Image*.
7. To remove an image, right-click and select *Remove Image*.
8. To add image as S-57 PICREP, choose the best one (if more than one photo), have it up in the Cur Feature window, rt click and Set S57 PICREP.




## 2.3 Check for Completeness

1. Check to make sure all items on the boat sheet and DP forms have been addressed. Insure that all remarks in Pydro are correct.
   **NOTE:** The Range and Bearing values recorded on the DP forms are also entered into TerraSync, which automatically updates the position. These fields in Pydro should be zeroes.
2. Check to make sure all AWOIS items have been addressed.
3. Make sure anything marked investigate has been investigated and that all HW VBES and SWMB disprovals have been obtained.
4. Use the Pydro decision tree to check flags and update Recommendations, especially with disproval methods and notes. Refer to *R:\FA_SOP\3_Processing\Pydro\Pydro Logic_SOP.doc*.
5. Update Pydro session flags to *Chart*, *Significant* and *Primary* prior to leaving the acquisition area.
6. Start marking things that will be addressed in the DR as *Report* and update the Recommendation tabs if necessary.
7. Mark a feature as *Resolved* once everything has been checked and finalized.

## 2.4 Export XML Data

Features will be imported to CARIS Notebook for further processing, so it is necessary to export the .xml data from Pydro.

1. From the *Data* menu, select *Export > XML Feature Data*.
2. Set the filter to export only *Primary* features, as well as *CartoAction*, *Add*.
3. Click *OK* and save the file as *H#####_Add_Features.xml* in the PSS folder for the sheet.

4. Repeat steps 1-3 for the remaining Carto Actions Modify, Delete and None. Name the .xml files appropriately.

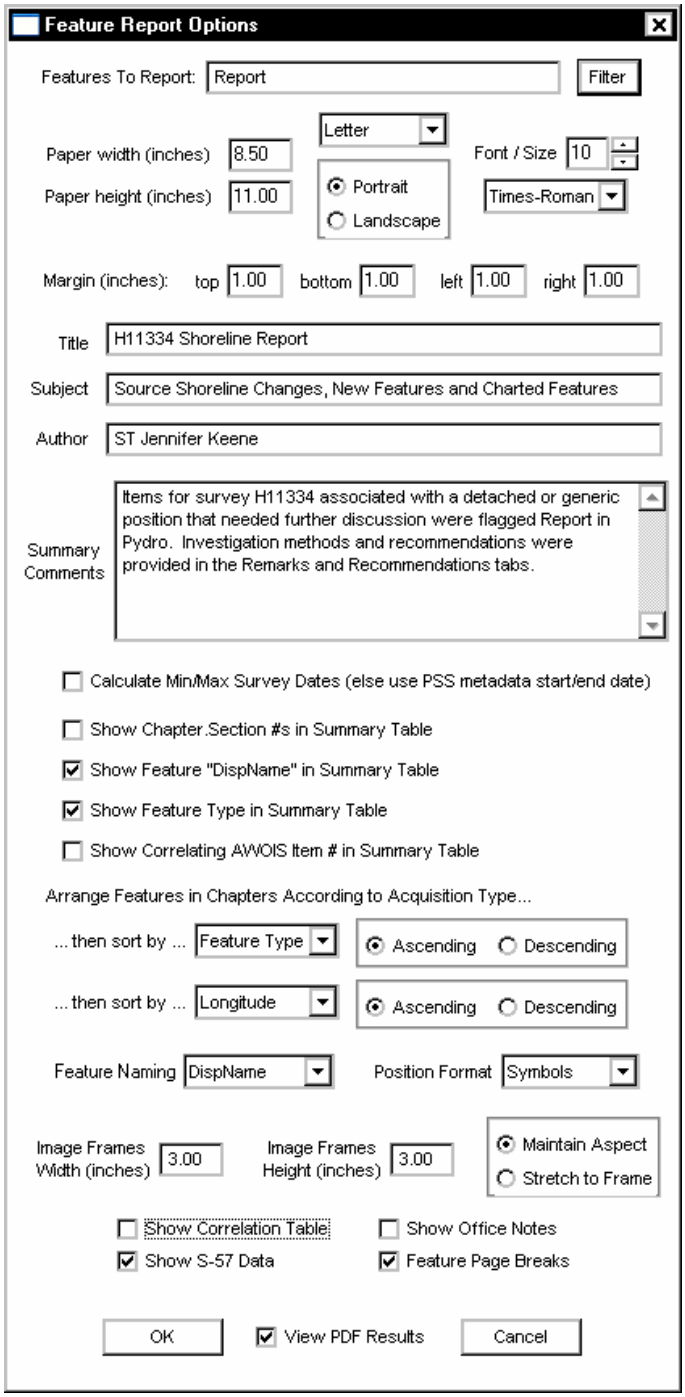
### 2.5 Generate a Shoreline Report

1. From the *Reports* menu, select *For List of Items.*
2. In the pop-up window, set the filter to *Report*.
3. Fill in the fields as shown below, with a short text description for the report, similar to that written below.

Title - "HXXXXX_Survey Feature Report"

Summary Comments -
"Items for survey HXXXXX associated with a detached, generic or chartGP position that needed further discussion were flagged Report in Pydro. Investigation methods and survey noted are provided in the Remarks tabs. Recommendations, when warranted are included in the Recommendations tabs."

4. Click *OK* and save the file as *HXXXXX_Feature.pdf* in the *A*ppendix 1 – Survey Feature Report of the DR.



# DRAFT CartoAction Flagging

# ADD, MODIFY, DELETE None, Designations

**ADD**
A new feature was identified during survey operations. The hydrographer recommends adding the feature to the chart.

- New features (hp or ext new reef or ldg, new rk, etc)
- Bottom Samples

**MODIFY**
The feature was found to be positioned or portrayed (e.g.) incorrectly on the chart.
The hydrographer recommends removing feature A and replacing it with feature B.
(Positions of both old and new features must be indicated.)
Or, The feature was found to be attributed incorrectly or insufficiently. The feature now reflects the additional or corrected attribution.

- DP'd for height (also needs to be marked Report)
- new pos chd or CFF rk
- chd rk is ldg (reclassification)
- visible wreck is clearly a submerged wreck
- new ldg found, chd rk disproval
  (DP/GP on rk would be delete, the DP/GP on ldg would be modify)
- *CFF rk is Lidar islet (choosing Lidar or chart over CFF is modify)

**DELETE**
The feature was disproved using approved search methods and guidelines. The hydrographer recommends removing it from the chart.

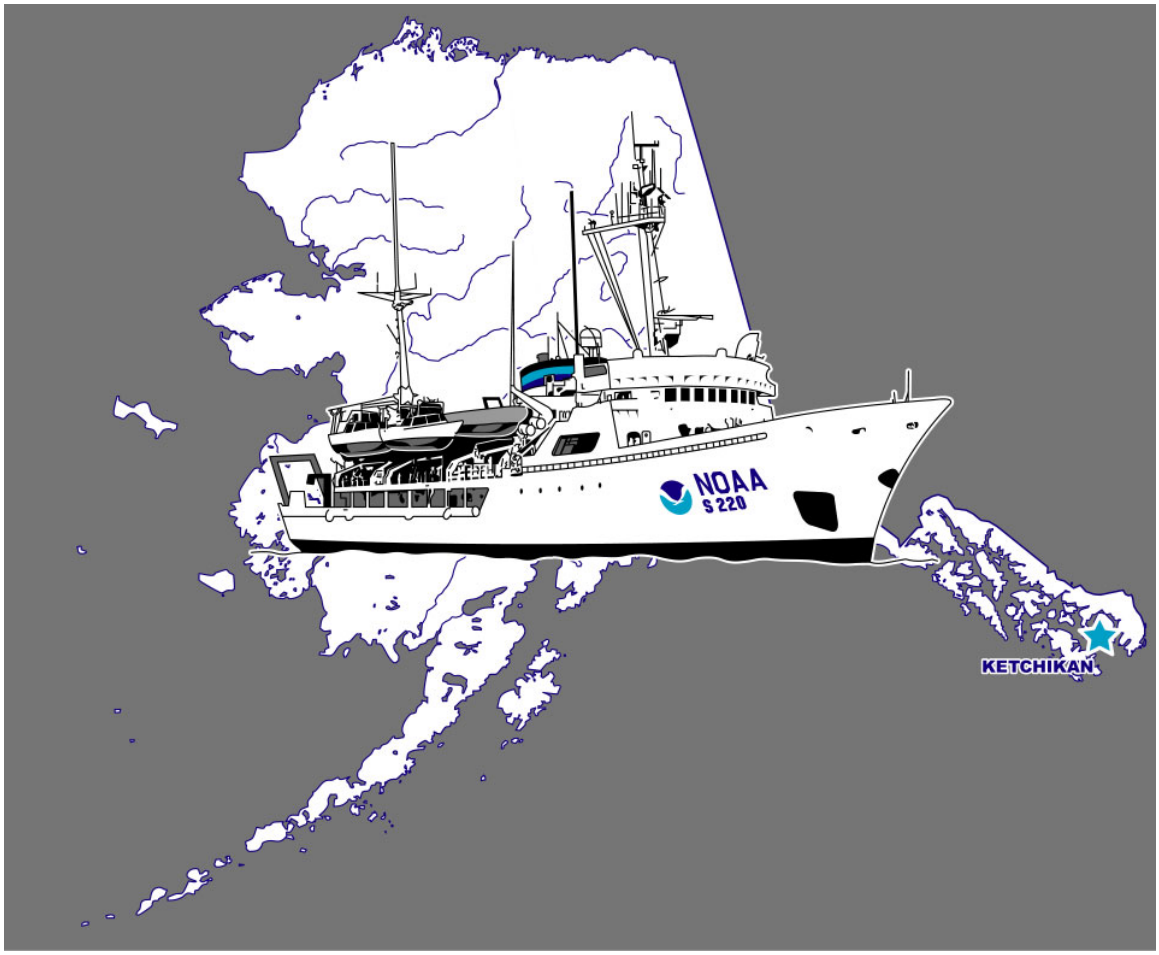
- complete disprovals
- anything that you don't want on there anymore (even if it is associated with a modify item)

**NONE** (aka Retain)
The feature was found during survey operations to be positioned correctly or was not investigated. The hydrographer recommends retaining the feature as charted.

- verified item without additional attribution, but not DP'd for height
- *Lidar rk verified (still a question if Lidar can be consider a source or it's considered new)

* These definitions are questionable, need feedback on whether this is the best approach. Additional source, like LIDAR, adds confusion.

# Notebook Shoreline Processing



# Notebook Shoreline Processing

## Table of Contents

## 0.0 Document Scope

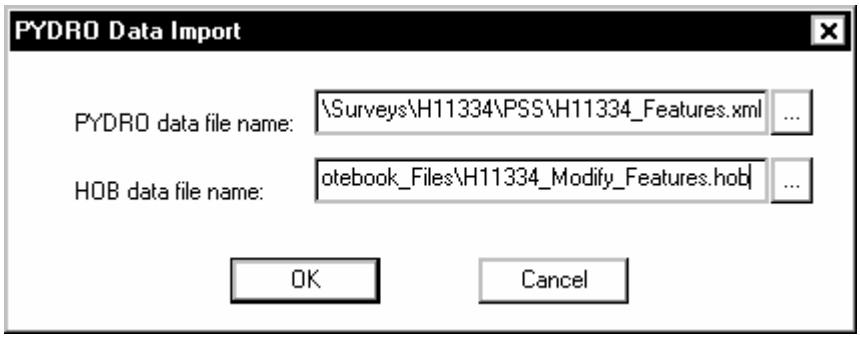
This document is intended to guide sheet managers through shoreline processing in CARIS Notebook. It should be used after the processing in Pydro has been completed. Refer to the Pydro_Shoreline_Processing and Notebook_Presurvey SOPs for further information.

## 1.0 Import Pydro Features

CARIS Notebook can read features directly from the Pydro .xml file, exported as described in the Pydro_Shoreline_Processing SOP. If some features do not import, it is possible that they do not have the correct S57 attribution. Check the attribution in Pydro and try re-exporting the .xml.

### 1.1 Create Add, Modify, Delete, Retain Layers

1. From the *Tools* menu in Notebook, select *PYDRO Data Import*.
2. In the *PYDRO data file name* field of the pop-up window, browse to the location of the exported H######*_Features.xml* files. There should be separate files for Add, Modify, Delete and possibly Retain.
3. In the *HOB data file name* field, browse to the *Notebook_Files* folder for the sheet and create a new .hob file called *H######_Add_Features,* etc*.*




4. Click *OK*. A new layer should appear in the *Layers* tab and the features should appear in the *Display* window of CARIS Notebook.
   **NOTE:** Bottom samples will not appear unless the text is set to display.
5. Repeat this process to create layers for all features exported from Pydro.

### 1.2 Adding Pictures to Features

This process will hopefully be eliminated in future versions of Pydro, which will automatically export the pictures associated with each feature in the .xml file.

1. Make sure the *Mulitmedia Folder* directory is mapped to the folder containing the pictures to be inserted. See the Setting the Directories section above.
2. Set the appropriate layer as editable.
3. Select the item with which the picture will be associated. The feature information will appear in the *Selection* tab at the bottom of the window.
4. Under the *Acronym* label, look for a *PICREP* option (cartosymbols have it, underwater rocks do not) and click on the … browse box.

| Acronym | Name | Geometry | Latitude | Longitude |
|---|---|---|---|---|
| $CSYMB | Cartographic | Point | 55-35-26.02N | 130-55-36.68 |

| Acronym | Name | Value |
|---|---|---|
| SCAMIN | Scale minimum | |
| SCAMAX | Scale maximum | |
| $SCALE | Symbol scaling fact | |
| $SCODE | Symbolization code | |
| ORIENT | Orientation | |
| NTXTDS | Textual description | |
| PICREP | Pictorial representa | |
| TXTDSC | Textual description | |

5. The *Multimedia Browser* window will pop up. Browse to the appropriate picture, then click *Add* and *OK*.

## 2.0 Shoreline Updates and Notes

### 2.1 Adding New Line Features

If there are new line features found during field verification, it will be necessary to create a new edit layer for digitizing the features.

1. Create a new layer named *H######_Add.hob* and save it to the *Notebook_Files* folder for the sheet.
2. Digitize any new line features to this layer, such as fouls, ledges, shoaling or new high water lines which are not on the current chart, or in the source files.
3. Use a Marker Layer to associate remarks with line features, if *remrks* field does not work. Be sure to use the snap function, by holding down the left mouse button and then shift key, hovering the pointer over the line, the releasing the mouse.
4. Do not add new point features to this layer. These should have DP's associated with them and brought into the H######_Add*_Features* layer using the *Pydro Data Import* described above.

### 2.2 Modify layer

If there are features in any source layers that are identified during field verification that need modification, it will be necessary to create a new edit layer for them.

1. Create a new layer named *H######_Modify.hob* and save it to the *Notebook_Files* folder for the sheet.
2. Move any source items into this layer that need modification either in position, height, or classification. Highlight the source layer, select the item and then import the feature into the *H######_Modify.hob.* Once the item is in the modify layer it can be deleted from the source layer. Prior to making any edits to the source layers make sure the you have an unedited version of the source files as a backup.

### 2.3 Delete layer

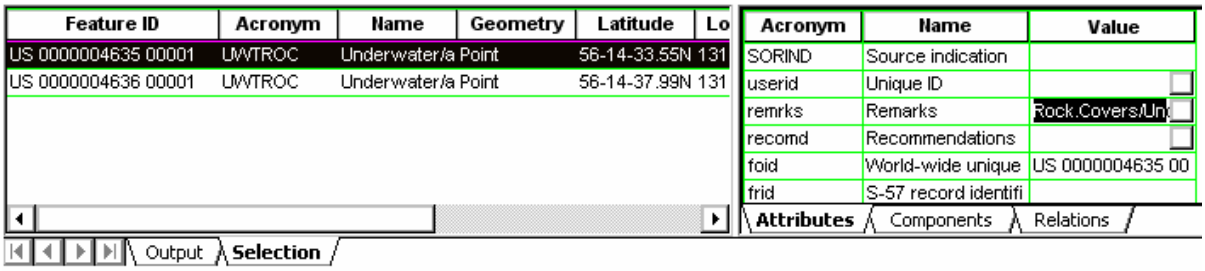
If there are features in any source layers that are identified during field verification to be deleted, it will be necessary to create a new edit layer for them.

1. Create a new layer named *H######_Delete.hob* and save it to the *Notebook_Files* folder for the sheet.
2. Move any source items into this layer that are to be deleted. Highlight the source layer, select the item and then import the feature into the *H######_ Delete.hob.* Once the item is in the delete layer, it can be removed from the source layer. Once again, prior to making any edits to the source layers make sure the you have an unedited version of the source files as a backup.

### 2.4 Adding Field Notes

Any notes made on the boat sheet in the field referencing source features will need to be added to the Notebook session. As a reminder any charted item must have the chart # added in parathesis, ie Chd (17324) rk ntd.

1. For point features, add text such as “CFF rk ntd” directly to the *remrks* field of the digitized object.
2. Highlight the source layer containing the object.
3. Select the feature to be commented. The feature will appear in the *Selection* tab at the bottom of the screen.
4. Scoll down to the *remrks* field in the *Attributes* tab and add any relevant notes from the boat sheet.




5. Add comments to source line features also, ie “CFF foul vrd” or “Chd (17400) ldg ntd”, they may require Marker layer text instead of notes being added to the *remrks* field, due to the segmented nature of the lines in the source files.

## 3.0 Final Review

### 3.1 Review with BASE Surface

1. From the *File* menu, select *Open Session*.
2. Select the appropriate CARIS HIPS session for review. The session should contain BASE surfaces, contours and soundings.
3. Open all Notebook files necessary for review.
   **NOTE:** Files must be opened individually. Choosing to open a Notebook session will close the HIPS session.
4. Individual fieldsheets can also be opened into Notebook as further reviewing tools.
5. Review shoreline remarks and features with SWMB surfaces with contours and depths to make sure there are no conflicts (i.e. SWMB over Chd (17324) rk ntd).

### 3.2 Finalizing

1. Check that the *H######_Add.hob, H######_Modify.hob and H######_Delete.hob* files are correctly attributed and complete.
2. Make sure all notes, shoreline additions and edits have been entered from the boat sheet to the appropriate layer.
3. make sure all deliverable hob files are in the *Notebook_Files* folder and delete any outdated or extra layers.
4. Save a session that includes all relevant files and appropriate charts to the *Notebook_Files* folder for the sheet named *H######_Shoreline.*

# 1 FAIRWEATHER Operational Survey Speeds

## 1.0 COMMENT

High quality hydrographic data collection is the reason FAIRWEATHER exists. The following speed guidelines have been determined through a noise analysis conducted onboard the NOAA Ship FAIRWEATHER on October 10-11, 2004. Pls see the reports *SeaBat 8111 Noise Analysis* and *SeaBat 8160 Noise Analysis* for additional details.

From these reports, it is generally desirable to use lower shaft RPM, combined with a higher pitch setting to minimize the noise level seen by the sonar systems. Significantly increased levels of reverberation from acoustic sources on the vessel are seen in shallower water.

In order to reduce emanated noise from the ship, the following RPM/Pitch combinations shall be followed.

## 1.1 REASON SeaBat 8111ER

Based on the referenced report, it appears that the best survey speed for the 8111ER system, from a noise perspective, is the range of 8 to 10 kts. Both lower and higher speeds correlate with higher noise levels.

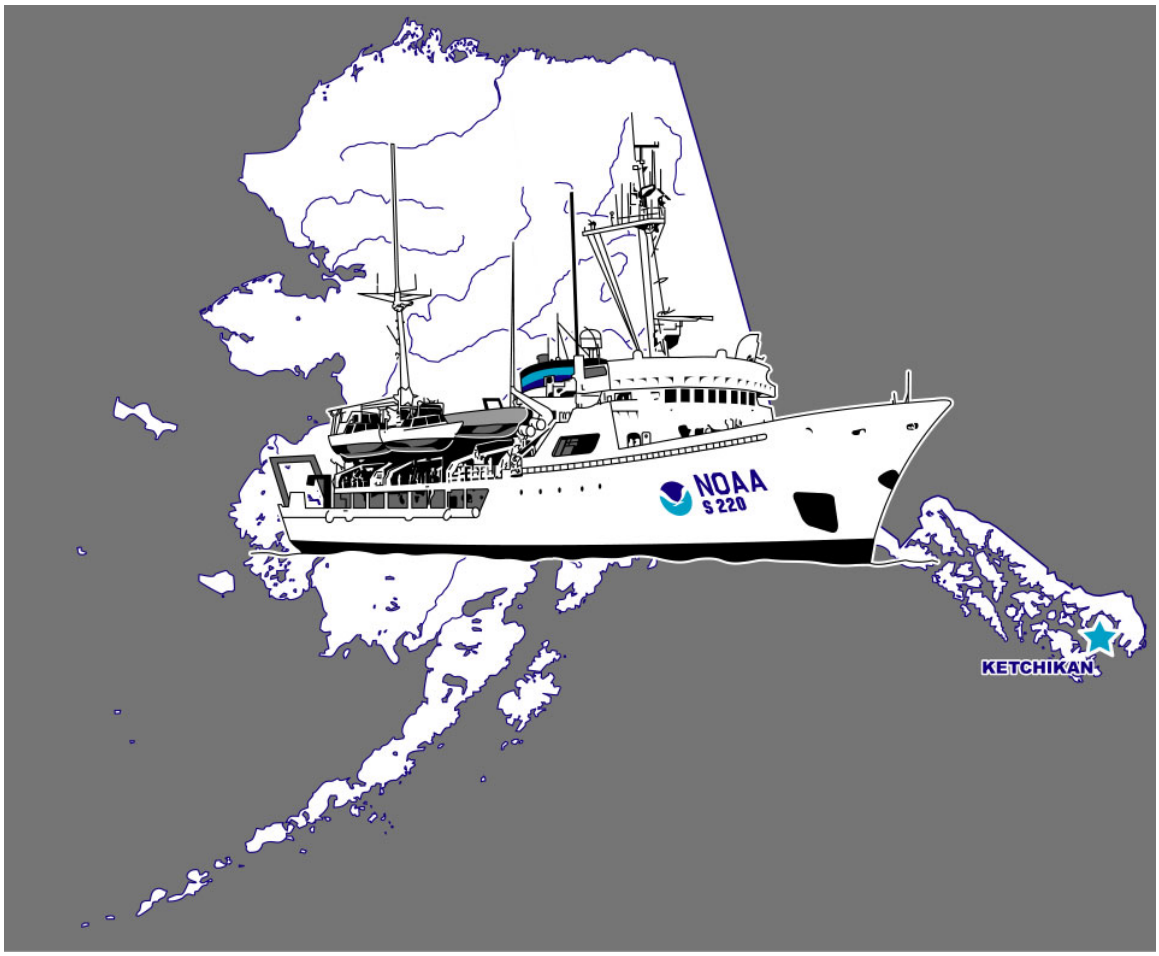
10 kts – Any combination of RPM and Pitch with RPM not to exceed 160 RPM
8 kts – Any combination of RPM and Pitch with RPM not to exceed 140 RPM
6 kts or below – Any combination of RPM and Pitch with RPM not to exceed 130

## 1.2 RESON SeaBat 8160

Based on the referenced report, it appears that the best survey speed for the 8160 system, from a noise perspective, is at 10 kts. Both lower and higher speeds correlate with higher noise levels.

10 kts – Any combination of RPM and Pitch with RPM not to exceed 160 RPM
8 kts – 130 RPM with required pitch setting
6 kts or below – RPM not to exceed 130 and required pitch

# RESON 8101/8111/8160
# Data Acquisition



# RESON 8101/8111/8160 Data Acquisition

**Table of Contents**

## 0.0 Document Scope

This is a step by step guide to 

acquiring RESON data.

## 1.0 Start-up Procedure

**1.1** Turn on ISIS computer.

**1.2** Make Day Number Folder on the Isis machine under appropriate project and sheet in Windows Explorer. It is also helpful to have this folder open and visible in Windows Explorer somewhere on screen to make sure that the lines are being recorded and saved correctly.

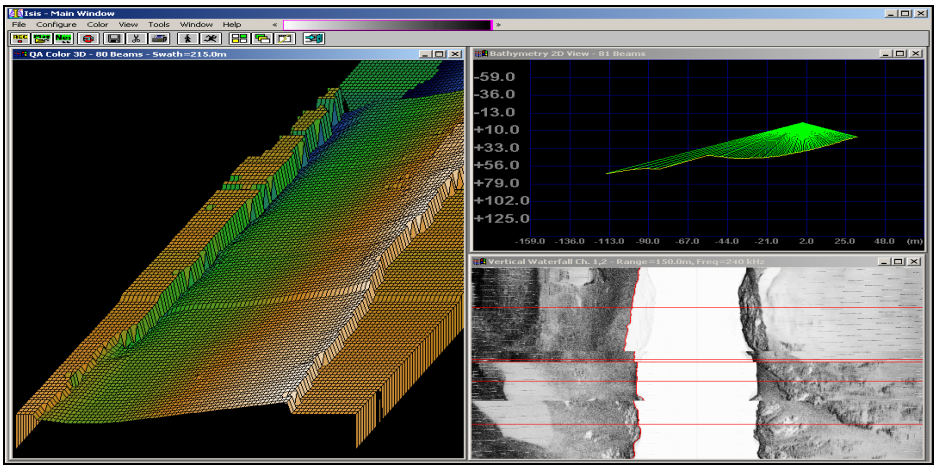
**1.3** Launch Isis Sonar from the desktop. An empty shell will come up.

**1.4** Turn on RESON machine.

**1.5** On the upper left hand corner of the ISIS screen, hit “REC” (RECORD).


**1.6** Three important image screens will come up in the Isis Main Window:

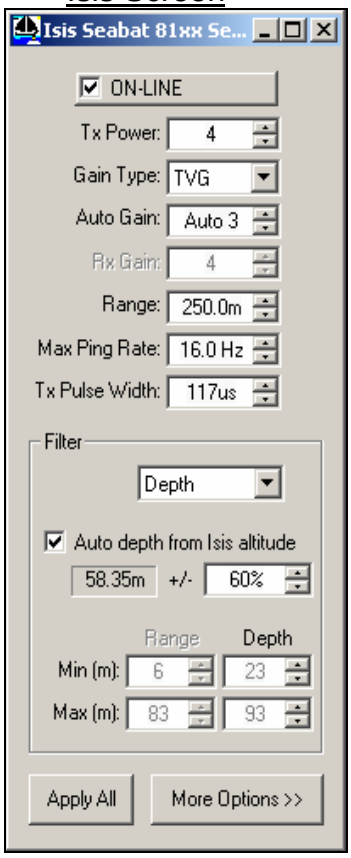
3-D Screen 2-D Screen



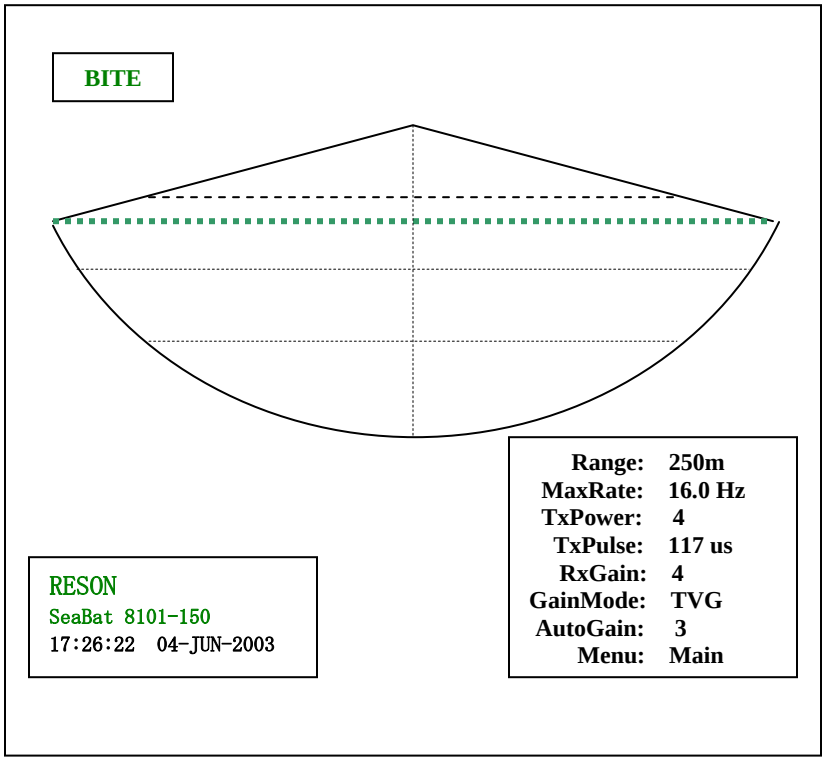

Vertical Waterfall/Sidescan

The Isis Seabat 81xx Server menu will come up that will allow you to change the settings that affect these three ISIS image screens as well as the RESON screen—i.e. general data quality of the sonar itself.

Isis Screen




Reson Screen




## 2.0 Isis Seabat 81xx Server

### 2.1 ON-LINE

This box should be checked all the time except to playback lines (See the Acquisition Tools section on page 12 for this procedure).

### 2.2 Tx Power

This controls how much power is going to the sonar. The power settings for the 8101 ranges from OFF to FULL with 1 to 7 in between. The power setting should be set as low as possible

without getting too many flyers. When the power is set too high, often there will be a glow or a halo around each ping (this can be a result of other settings being too high also), as well as flyers. Do what you can to prevent this from happening.

### 2.3 Gain Type

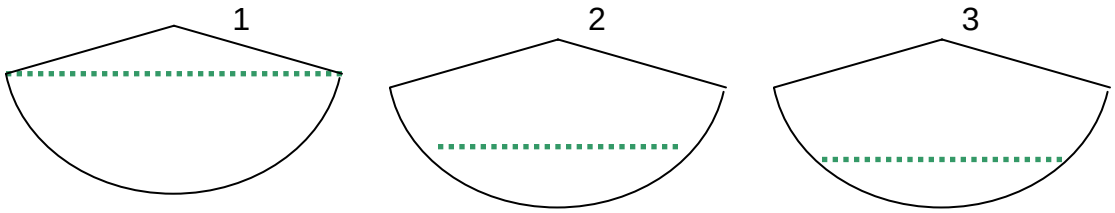
Gain type should always be TVG (Time Varied Gain).

Auto Gain – Auto Gain is an automatic gain function that can be used instead of Rx Gain, which is where the gain can be set manually. The setting for this ranges from Auto 1 to Auto 10. This will analyze the bottom return to increase or decrease the receiver gain. Auto 2 through 4 are the typical settings for acquisition. Again, try and set this as low as possible to prevent possible flyers and the "power glow" that will be seen if any setting is too high. To run the gain manually, hit "Off" on the drop down menu.

Rx Gain – Gain is the "ears" of the sonar. The Gain function controls the amount of receiver gain to be applied to the returned sonar signal. If you are using manual Gain mode, keep the number as low as possible, ranging from about 4 to 12 for best results.

### 2.4 Range

The Range setting determines ping rate and how far down the sonar will "see". The 8101 minimum range is 0 (though the setting will never be seen so low) and maximum is 400. This will be the setting that will most likely be changed the most because it is so closely linked with water depth. The 8111 minimum range is 5 and maximum is 1400. The 8160 minimum range is 5 and the maximum is 5000. The Range should be kept above or even with the widest part of the wedge on the RESON computer screen, as in the first illustration below.



Good Too Low Bad
Outer Beams are Lost

## 2.5 Max Ping Rate

This will be already be set 20.0 Hz for the 8101. For the 8111 it is set at 20.0 Hz. For the 8160 it is set to 15.0 Hz. The only reason to change these values is if the vessel is in shallow water and moving very slowly and you wish to reduce superfluous data. These values should never be changed without approval of the FOO.

## 2.6 Tx Pulse Width

Pulse Widths on the 8101 ranges from 21µs to 225 µs, but keep these numbers within 70µs to 120µs for best results during acquisition. On the 8111 this value ranges from 50 µs to 670 µs, the recommended/minimum value for the 8111 is 225 µs. Donot go below 225 µs, nothing is gained by going lower. On the 8160 this value ranges from 0.2 ms to 10 ms. For the 8160 the pulse width is range dependent. At 750m, the minimum is 150 micro sec, at 1000m the minimum 300 micro sec, and at 1750 the minimum is 1 milli sec (the minimum is listed here, pulse width can be set higher but resolution decreases). The smaller the number, the narrower the pulse width. A narrow pulse width means higher resolution while cutting back on range capabilities; likewise a larger pulse width lowers the resolution while increasing the range (better outer beam response. Therefore, in sloping areas, increasing the pulse width will increase how much slope the Reson can acquire.

## 2.7 Filter

There are two types of filters that can be used during acquisition: The “Auto Depth Filter from Isis Attitude” and the Filter based on “Depth”, “Range”, or “Both” for depth and range together.

### 2.7.1 Auto Depth Filter

Percentage ranging from 1% to 100%. This filter is most helpful in sloping areas, i.e. the steeper the slope, the better the sonar will pick it up when the percentage is set high. However, a high percentage on a flat area will create flyers, so keep the percentage low in these cases.

### 2.7.2 Filter based on Depth or Range

Auto Depth Filter must be unchecked. To select between Depth, Range, or Both, simply click on the drop down menu to highlight your choice. For multibeam, utilize only the Depth option. Under Min (m); and Max (m); set depth values appropriate to the depth of water that you are working in, keeping in mind that any depths outside of this minimum and maximum will not be acquired.

### 2.7.3 No Filter

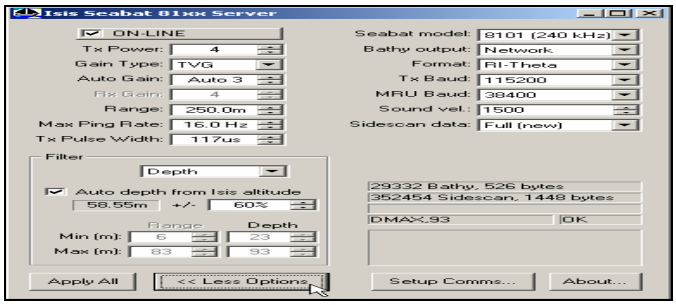
It is also possible to run with no filter by selecting “None” in the drop down menu.

## 2.8 Apply All

This button is inessential because every change made in the Seabat Server is immediately applied. Another reason it is not recommended to use this is it can cause the system to crash.

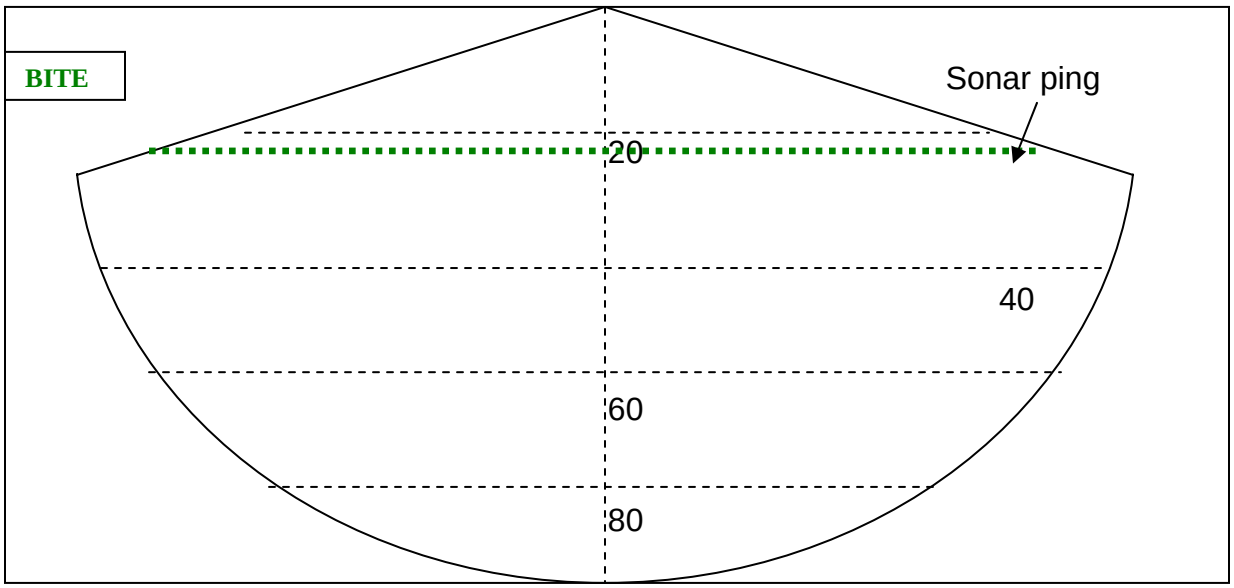
## 2.9 More Options

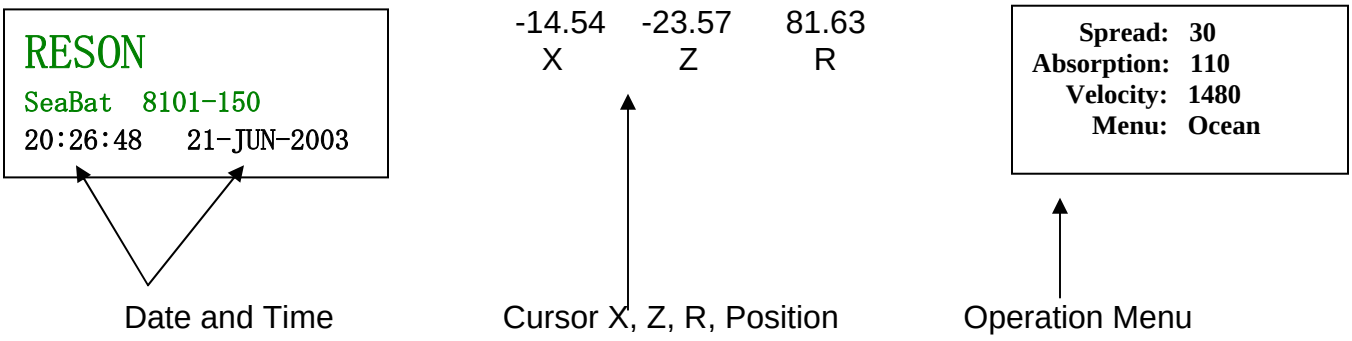
These are mainly configuration options. It is important to know where they are found, however these options should not be changed without FOO or CST approval.




## 3.0 Reson Display Screens

The Main Sonar Display Screen, which is used for acquisition, is shown below.




### 3.1 Cursor Position

When the cursor is within the wedge, its position is displayed. X = Across Track, Z = Depth, R = Range.

### 3.2 Operation Menu

There are four different menus, Main, Ocean, Filters, and Display. There is also the Menu Off option. To change between menus, simply click on Menu to scroll to the menu you need.

### 3.2.1 Main Menu

The Main Menu shares the same information that is found in the top half of the Isis Seabat Server: Range, Max (Ping) Rate, Tx Power, Tx Pulse (Width), Rx Gain, Gain Mode, and Auto Gain. These numbers should mirror the numbers in the Isis Seabat Server. If for some reason this is not the case, and changing settings in Isis has no effect on the sonar, the settings in the Main Menu can be changed by using the three-button trackball. The three buttons function as so: Left button—down, Right button—up, Middle button—speeds up the direction when held with the right or left button.

### 3.2.2 Ocean Menu

There are three options: Spread, Absorb, and Velocity. Spread and Absorption are linked together, where the numbers represent the amount of spreading and absorption loss that can be expected. These values will factor into the TVG, which in turn affect the return signal. For the 8101, keep these numbers at 30 and 70 in salt water and 30 and 20 for fresh water for the spread and absorption respectively. For the 8111, keep these numbers at 30 and 30 for salt water and 30 and 5 for fresh water.for the 8160 keep these numbers at 30 and 13 for salt water and 30 and 2 for fresh water. Velocity is the speed of sound for the area. This only applies for the 8160 which receives surface sound velocity via the SBE 45 TSG. This value should roughly correspond to the sound velocity seen during the last CTD cast. If it differs greatly then you should consider taking a new cast.

| System | Spread | Absorb (sea) | Absorb (fresh) |
|---|---|---|---|
| 8101 | 30 | 70 | 20 |
| 8111 | 30 | 30 | 5 |
| 8160 | 30 | 13 | 2 |

### 3.2.3 Filters Menu

Found in the bottom half of the Seabat Server, namely Filter,

Min Range, Max Range, Min Depth, Max Depth, and Head Tilt. Head Tilt has to do with if the transducer had been mounted with a roll offset, which does not apply to our Reson transducers.

### 3.2.4 Display Menu

Color, Contrast, Dots, Grid, and Freeze. This menu has to do with how objects on the Reson screen are being displayed. These options do not need to be changed.

## 3.3 BITE Menu

By clicking on "BITE" in the upper left-hand corner, the Built-In Test Environment (BITE) Screen opens up. This menu is available for viewing diagnostic and configuration information—like some of the information found in More Options of the Isis Seabat Server. The color of the BITE button shows if the Reson system is operational or not:

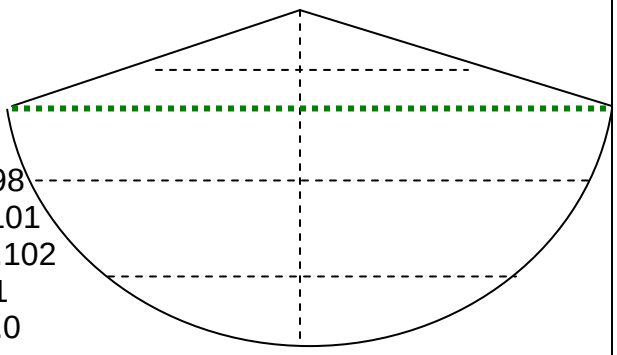
GREEN = System is operational;
YELLOW = System is operational but some areas are not working properly or are out of sync;
RED = System is not operational—there is a malfunction somewhere. Inside the BITE menu, the text will also be in one of three different colors depending on the status of each particular setting. The color code is same as above except that text will also be WHITE to show that the system is operating OK

The BITE Menu Screen looks something like this below:

**BITE** BUILT- IN TEST **CALIB** **RESET**

Wet-End Status
Leak: +5.0V
HeadTemp: +18.4°C
-5V: -4.8V
+12V: +12.0V
-12V: -12.0V
DipSwitch: 50

Commuication
Uplink: Good
Downlink: Good
Internal: Good
Ethernet: 00E0CB030498
Local: 192.168.195.101
Remote: 192.168.195.102
Gateway: 192.168.1.1
Subnet: 255.255.255.0



Firmware Version
Dry: 8101-2.09-E34D
Wet: 8101-1.08-C215

Sensor Inputs
Pitch:
Roll:
Heave:
Velocity:
UTC Date:
UTC Time:

Uplink:
Format:
Sidescan:
TestPtrn:
Output:
ProfilBd:
TimeBd:

Receiver Gain Offsets:

| |
|---|
| |

- 3db

ContrlBd:
MotionBd:
VeloctyBd:
UDP Base:
Oriented:

Receiver Phase Offsets:

| |
|---|
| |

- 45°

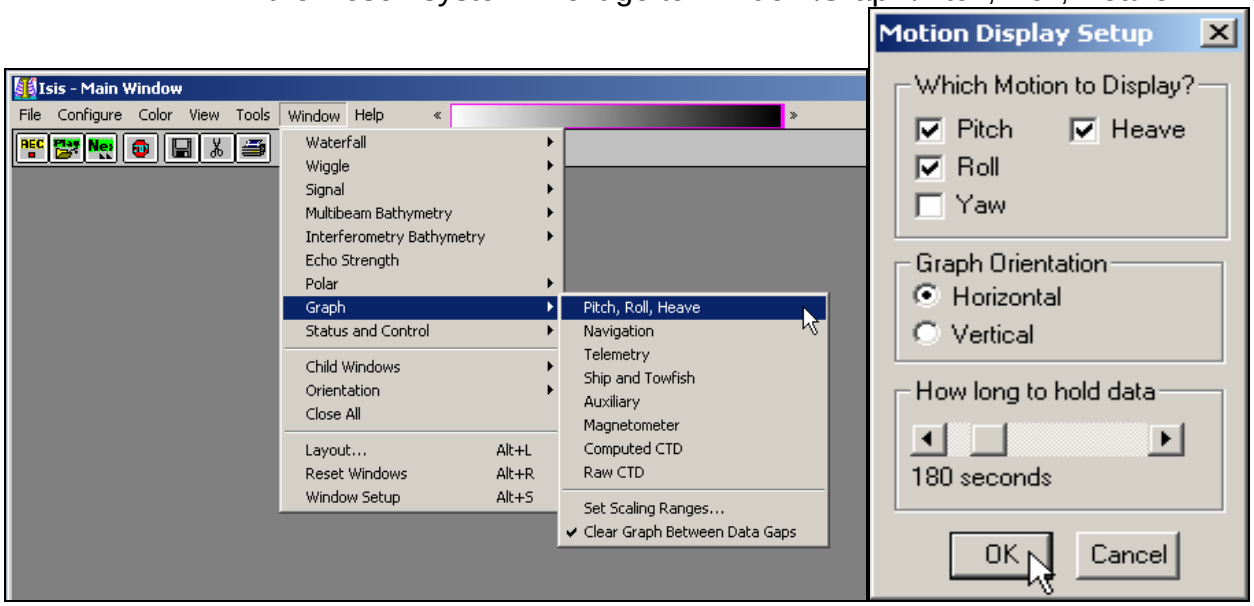
HeadSync:
Projectr:
MENU:

Config

In the upper right hand corner, the BITE menu displays the sonar data wedge, so that it can still be viewed while in this menu.

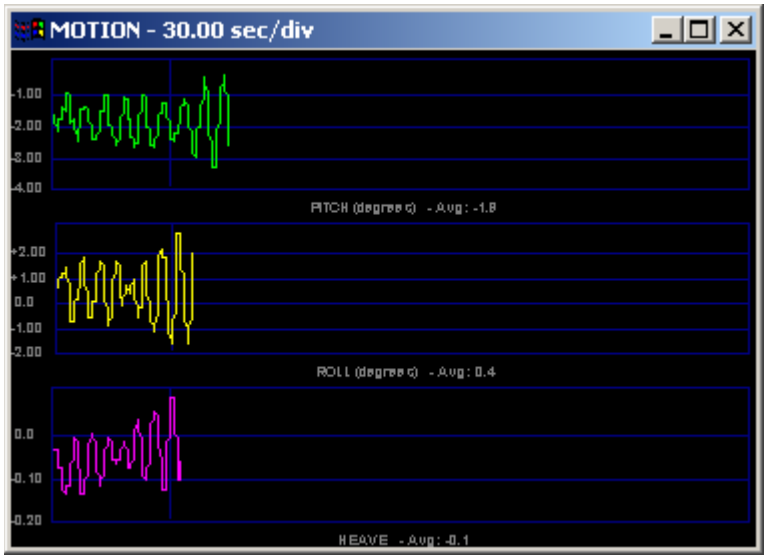
### 3.4 Sensor Inputs

Here are where the numbers are found for Heave, Pitch, and Roll for the Reson system. Next go to Window\Graph\Pitch, Roll, Heave




The window that pops up will only show Pitch values. In order to view Roll and Heave as well, right click inside the graph box and under “Which Motion to Display?” check each of the boxes for the other sensors.

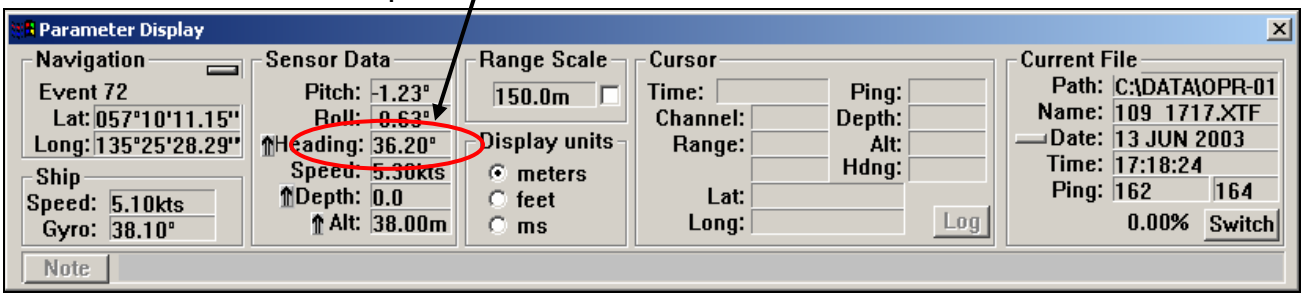
#### 3.4.1 Good motion sensor data will look like this



### 3.4.2 Parameter Display

Sensor data for heading in the parameter display is not correct (raw navigation packet is usually selected during processing- which comes from the posmv)

.



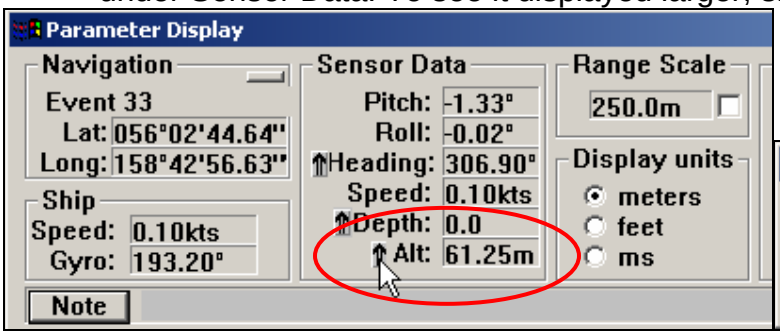

### 3.4.3 ISIS Shutdown

If any or all of these sensors values are not changing or flat-lining in the Pitch, Roll, and Heave Motion Window, the ISIS computer must be shut down—DO NOT RESTART, SHUT DOWN. After, beginning again with the start-up procedure; make sure that the RESON has been turned off before the Isis is brought up again.

A possible reason for this communication error is if the Isis computer was never shut down. Check to see if the Isis computer is on upon first getting in the launch. If it is, log in and shut down.

### 3.4.4 Altitude

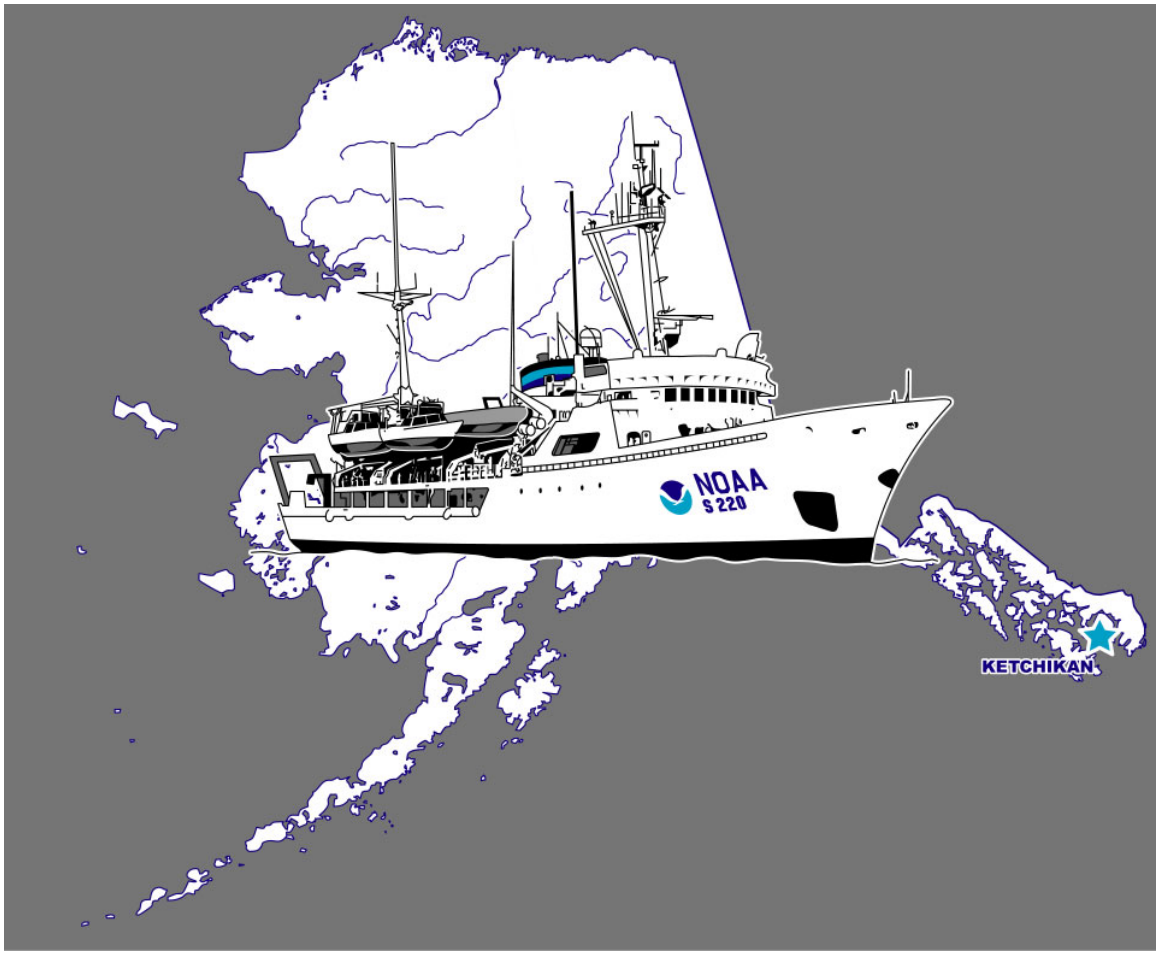
Another value to monitor is the Altitude. It is found in the Parameter Display under Sensor Data. To see it displayed larger, simply click left of the Alt button:





This is what will pop up:

# TEI Real Time Bathy SOP



# TEI Real Time Bathy SOP

Table of Contents



## 0.0 Document Scope

The scope of this document covers setting up and acquiring multibeam data using TEI Isis and TEI DelphMap/DelphNav/RT Bathy Programs.

## 1.0 RT Bathy Set Up

Currently you need a very high end computer to record multibeam data and have RT Bathy in operation. On the FA we are using dual 2.8 GHz processors with at least 1 GB of RAM and a Seagate Cheetah Ultra SCSI hard drive. You will also need two high end video cards to display all the information on 3 screens.

## 2.0 Setup

### 2.1 Isis Sonar

1. Open Isis
2. Tools→Realtime BathyPro Map→Multibeam Bathymetry

### 2.2 BathyPro Real Time

1. Open Project (HXXXXX.dmp) in **DelphMap** from C:\Project\OPR-XXXX-FA-XX\HXXXXX\RT_Bathy\. If you do not have DelphMap open, BathyPro will open it for you.
2. Set the **DTM File settings**. Under Encoding Type choose "Average". Save the DTM to the correct folder.
3. Set the **Map Projection and Settings**. *You must uncheck the Set Default Limit Box.*

4. Under Boundaries in the **Map Projection and Settings** menu, enter a bounding box for the area you wish to create the DTM for. Use a reasonable resolution for the DTM size (i.e. don't use 1m resolution for a 10,000m x 10,000m box).
5. Enter the North-West corner of the bounding box for the area you wish to create the DTM for.
6. The input projection is Not Projected (Lat/Long) (using NAD83 as datum)
7. The output projection is UTM with the correct zone (using NAD83 as datum)
8. Click on START
9. The box next to START should switch to "Waiting…"
10. Turn off the "Fill Gaps filter", so holidays will be visible.

### 2.3 DelphMap

1. Right click on Background
2. Import a Background Image
3. Browse to the folder where the coverage map is located and select it.
4. Click on "Change..." to change the projection of the chart. It should be in UTM with the correct zone number (using NAD83 as the datum).

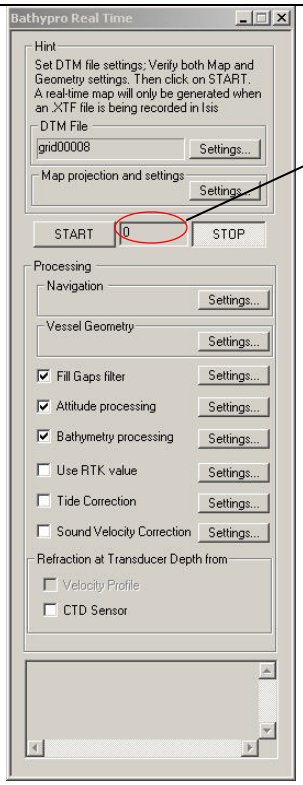



**Figure 1. RT Bathy Window**

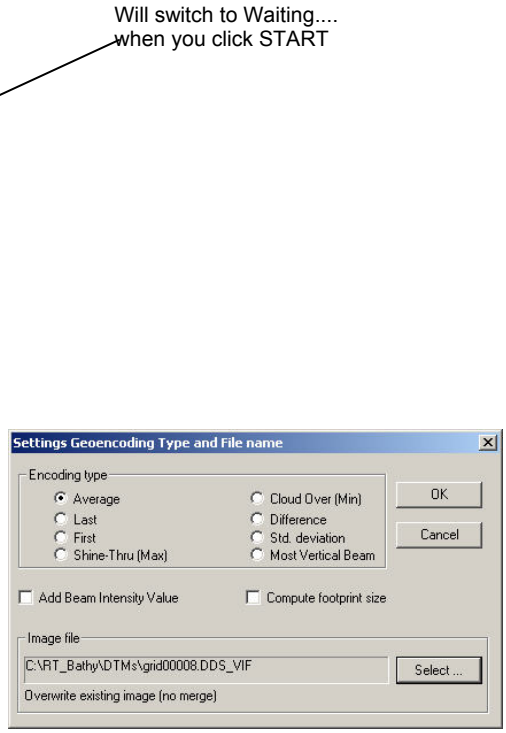



**Figure 2. Setting grid type and location**

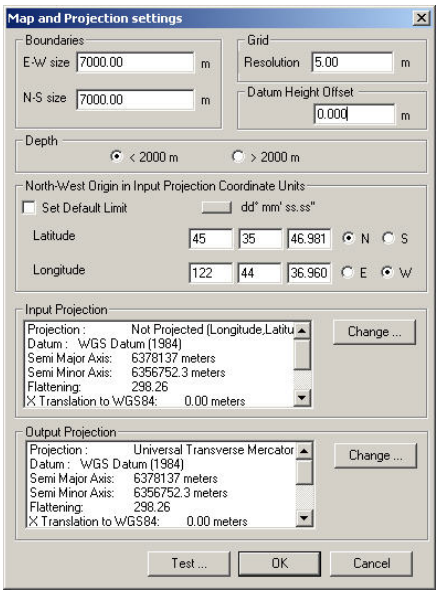



**Figure 3. Setting Bounding box and grid projection**

## 3.0 Recording data

1. Click on Switch button
2. Click on Record data to File Name radio button and browse to correct storage location
3. When ready to start recording, click on the Switch Now! button. This will start logging data.
4. When getting close to end of line click on the Display Only radio button
5. When ready to stop logging, click on the Switch Now! button. This will end data logging.

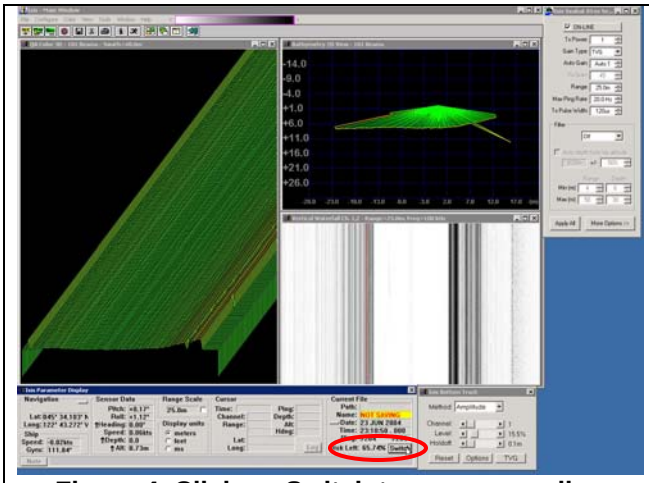


**Figure 4. Click on Switch to open recording dialog**

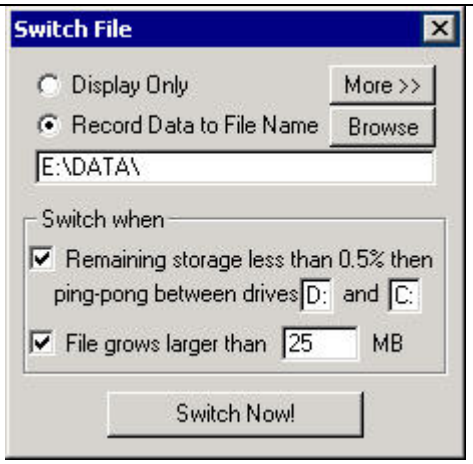



**Figure 5. Switch File Dialog**

## 4.0 BathyPro Real Time Display

### 4.1 Real Time Bathy

1. The box next to START should be counting up. The number should correlate to the ping number in the Isis parameter display. If the box says “Outside”, then Isis thinks your bounding box coordinates are off. Double check to make sure that they are correct.

### 4.2 DelphMap

1. Click on the center Plug in the upper left hand in the Survey Control Panel Window to display boat navigation.
2. Click on arrows to bring up Left/Right indicator

Boat Shape

1. Click on the far upper left hand plug in the Survey Control Panel Window to bring up the Serial Port data acquisition settings.
2. Select the Com 05 tab (for ship Com 06).
3. Select the Shape tab and then the modify button to change the length and width of the boat display.

## 5.0 Issues/Things to watch for

1. The Isis parameter display must display Lat/Long in Decimal Degrees (i.e. 34.9827271 -120.12891717) for navigation to display correctly.
2. Telemetry output must be on Form 2. Nicole Stagner (TEI Rep) thinks that Form 1 may not know how to correctly output at 1 Hz. Problems seem to arise.
3. The POS/MV Controller software must be started after you hit the record button in Isis. If this is not done, the POS/MV controller software will take control of the socket and Isis will not receive any navigation data.

# Fixing Data with Incorrect Date on Time Stamp

Written by SST Froelich

## Problem:

An error can occur due to unknown reasons during acquisition when data is logged through and past midnight. The error places the wrong day in the time stamp for the Raw Nav and Attitude packets. These packets have the correct time, but the date is incorrect. All other packets (Bathymetry, Side Scan, Snippets) have the correct date on the time stamp. Jack Riley was contacted for help and he provided a Pydro macro that creates a copy of the file and then changes the date in the Raw Navigation packet to whatever date is specified by the user.

## Procedure:

1) The SetXTFRawNavYMD.py macro sent from Jack Riley is located under python23\Pydro\Macros folder
2) Run Pydro and run SetXTFRawNavYMD.py macro from Misc. menu
3) Entered the correct date for the line(s) (ex. 2005-05-17)
4) Copy lines with adjusted dates which are automatically named DDD-HHMM_dt.xtf (ex. 137-1754_dt.xtf)
5) HDCS data with the bad dates is not retained (XTF was retained)
6) The new lines (DDD-HHMM_dt.xtf) are converted as usual

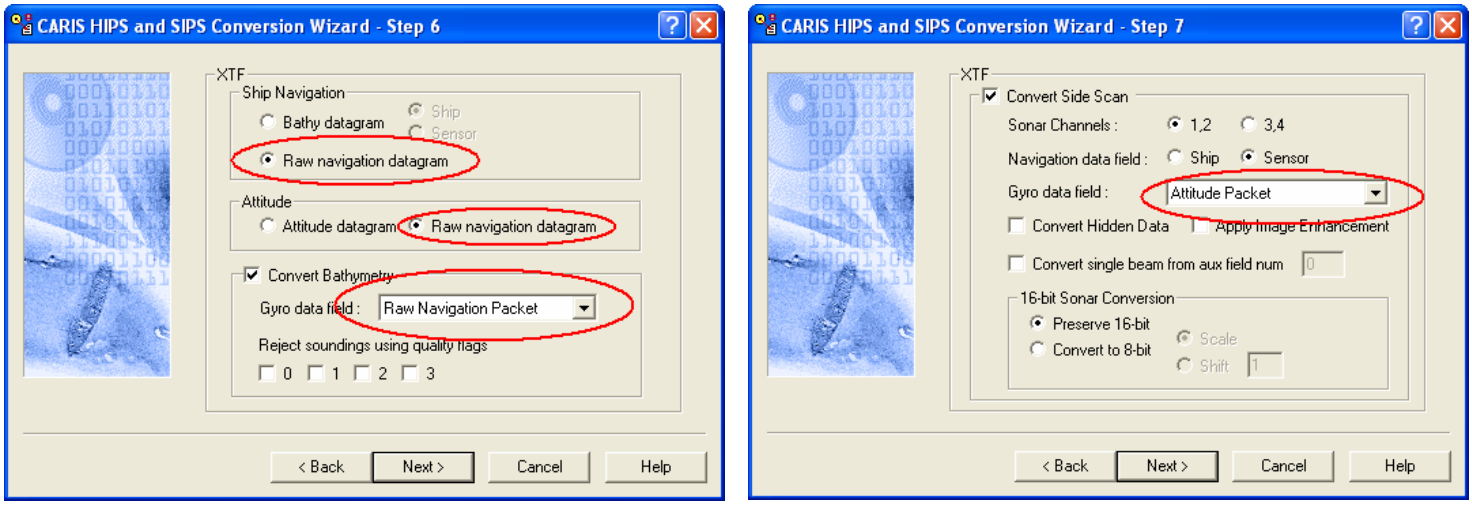



**Figure 1. Conversion Settings**

**Discussion:**

The Raw Navigation date was changed to the correct day, but the Attitude date was not changed. This is not a problem because attitude information is converted from the Raw Navigation packet. No change needs to be made to conversion process therefore. Upon conversion, CARIS HIPS reads navigation (speed, CMG and distance), attitude (heave, pitch and roll) and gyro from the Raw Navigation packet (now with the correct date and time) (see figure 1).

| Sensor | Packet read from | Correct date in packet? |
|---|---|---|
| Speed | Raw Navigation | Yes, after macro applied |
| CMG | Raw Navigation | Yes, after macro applied |
| Distance | Raw Navigation | Yes, after macro applied |
| Heave | Raw Navigation | Yes, after macro applied |
| Pitch | Raw Navigation | Yes, after macro applied |
| Roll | Raw Navigation | Yes, after macro applied |
| Bathy Gyro | Raw Navigation | Yes, after macro applied |
| Bathy | Bathy | Yes |
| SSS | SSS | Yes |
| Snippets | Snippets | Yes |
| SSS Navigation | SSS Sensor | Yes |
| SSS Gyro | Attitude | No* |

**Table 1. Summary of Sensor Data**

* Because it appears the Side Scan is getting the date and time stamp from the Side Scan Sensor packet, which has the correct date, and is just taking the gyro field from the attitude packet (with no date value from the attitude packet, just a time value and a gyro value) the Side Scan gyro matches the Bathy gyro for a given time stamp (see figures 2 & 3).

| | Time | d-Time | Value | d-Value | Status |
|---|---|---|---|---|---|
| ✓ | 2005-05-17 17:54:28.209 | 0.040 | 272.779 | 0.003 | Accept |
| ✓ | 2005-05-17 17:54:28.249 | 0.040 | 272.781 | 0.002 | Accept |
| ✓ | 2005-05-17 17:54:28.289 | 0.040 | 272.783 | 0.002 | Accept |
| ✓ | 2005-05-17 17:54:28.329 | 0.040 | 272.786 | 0.002 | Accept |
| ✓ | 2005-05-17 17:54:28.369 | 0.040 | 272.788 | 0.002 | Accept |
| ✓ | 2005-05-17 17:54:28.409 | 0.040 | 272.790 | 0.002 | Accept |
| ✓ | 2005-05-17 17:54:28.449 | 0.040 | 272.792 | 0.002 | Accept |

**Figure 2. Bathy Date/Time & Gyro**

| Day | TimeStamp | Period | Altitude | Port | Stbd | Gyro |
|---|---|---|---|---|---|---|
| 2005-137 | 17:54:28.195 | 533 | 95.60 | 2698 | 2698 | 272.778° |
| 2005-137 | 17:54:28.804 | 533 | 95.90 | 2698 | 2698 | 272.804° |
| 2005-137 | 17:54:29.399 | 533 | 96.20 | 2698 | 2698 | 272.786° |
| 2005-137 | 17:54:30.008 | 533 | 96.70 | 2698 | 2698 | 272.726° |
| 2005-137 | 17:54:30.601 | 533 | 96.70 | 2698 | 2698 | 272.654° |
| 2005-137 | 17:54:31.212 | 533 | 96.70 | 2698 | 2698 | 272.592° |
| 2005-137 | 17:54:31.804 | 533 | 96.70 | 2698 | 2698 | 272.554° |

**Figure 3. SSS Date/Time & Gyro**

# Hydrographic Survey Quality Control Checklist

Survey: HXXXXX Project: OPR-XXX-FA Survey PIC: _____

**Bold** underlines require a date and initials of when item was completed.
Refer to Survey Management SOP for detailed instructions to complete these steps.

## Post Acquisition - review of data

- _____ Quality Control of survey area in subset prior to departure from field (SV, Tide, Holidays, Noise)
  - _____ BASE surfaces reviewed
  - _____ Survey area reviewed in subset mode
  - _____ Review Acquisition and Processing logs for issues/problem data
- _____ Check for immediate DTONs
  - _____ Immediate DTONs submitted
- _____ Document special circumstances/problems and HVF changes/deviations from DAPR as occurred for DR
  - _____ Issues listed in HXXXXX_Survey_Log.doc
  - _____ Issues explained in DR
- _____ Shoreline Data Review
  - _____ Pydro
    - _____ DPs/GPs & Bottom Samples reviewed/flagged/S57 attributed/Add, Modify, Delete Selected
    - _____ Pictures labeled correctly, in one folder, & inserted
    - _____ AWOIS.mdb inserted
    - _____ Tide and SVP correctors applied where necessary
  - _____ CARIS Notebook
    - _____ All Pydro features imported
    - _____ Features reviewed with DP forms and boat sheet
    - _____ All items addressed (all data including CFF, Chart, Lidar, and new items)
    - _____ AWOIS investigations complete
- _____ Coast Pilot review & write up with edits completed
- _____ Smooth Tides Request (*.mif/mid and times of Hydro)
  - _____ Produced, Submitted, Archived [Digital-copy (letter, times, & mif/mid) in Appendix VI Smooth Tide Req fldr]
- _____ Survey Outline
  - _____ Produced, Submitted, & Archived (digital-copy in Appendix I Survey Outline folder)
- _____ Observed Tides
  - _____ Observed tide file verified & checked for gaps/flyers (txt in Notepad, .tid in Caris Tide Editor)
  - _____ Applied to lines
  - _____ Applied to DPs
  - _____ Data re-merged in CARIS after observed tides have been re-applied.
- _____ Verify Sound Velocity files
  - _____ SVP files compared in digital acquisition logs vs. I drive – all should match
  - _____ Each cast profile reviewed individually in CARIS
  - _____ SV cast positions displayed in CARIS (check for gross error)
  - _____ SV cast list produced (digital copy in Separates III SV Profile List folder)
  - _____ SV acquisition/processing deviations from the DAPR are noted in the DR.
- _____ Data queried in CARIS (compare to digital acquisition logs)
  - _____ Query all lines in CARIS
    - _____ Save query to H#####_Data_Query log
    - _____ Compare query to SVP file in HDCS line directory (random sample)
    - _____ Tide and SVP files applied are correct and most current (observed or verified)
  - _____ Problems/discrepancies investigated
  - _____ Vessel speeds queried in CARIS and reviewed
    - _____ Vessel speeds meet object detection requirements for relevant depths

## Post Survey - post spatial (subset) review of data

_____ Quality Control of cleaning performed by others and general QC of survey area
- _____ All lines re-inserted into HXXXXX_QC session, for BASE/subset review (not DP lines)
- _____ Complete Subset Review (include looking at rejected and BASE child layers)
  - _____ Subset tiles created for review process
- _____ Review all examined soundings (to designate, mark outstanding, or reaccept)
- _____ Data checked for systematic errors (Std deviation child layer especially useful)
- _____ Data issues discussed in DR if present

_____ Designate soundings in areas where surface does not accurately represent the bottom
- _____ # of Designated Soundings

_____ Depth checking for flyers (CARIS Field Sheet Editor)
- _____ Contours & Soundings generated (CARIS Field Sheet Editor)

_____ Chart comparisons completed and documented in DR
- _____ Local Notice to Mariners checked for recent updates
- _____ Chart edition & date corrected through included in DR

_____ DTONs (Dangers to Navigation)
- _____ Selected (marked outstanding in CARIS and inserted as CARIS Line Feature)
- _____ Reviewed by FOO
- _____ Pydro session updated/.xml produced
- _____ FOO emailed
- _____ Submittal email/DTON Report archived (digital copies in PSS folder)

_____ CARIS Fieldsheets & Sessions cleaned up and submission ready
- _____ HXXXXX_QC Fieldsheet & Session tidied up
  - _____ Depth Threshold BASE surfaces finalized to produce critical soundings
  - _____ Use Finalized (clipped by depth range) surfaces to assess coverage requirements were met
- _____ Non-Finalized BASE Surfaces produced (in HXXXXX_FINAL Fieldsheet & Session)
  - _____ BASE surfaces include Depth Threshold ranges and resolutions

_____ Pydro
- _____ PSS data IS NOT Stale or Outdated
- _____ All features resolved
- _____ DP forms match PSS & scanned into DP Log folder
- _____ Correct Vessels were selected for all data
- _____ Correctors were applied properly
- _____ Remarks/Recommendations completed in Pydro
- _____ AWOIS items finalized
- _____ Features Report produced and archived (digital copy in folder)

_____ Descriptive Report completed
- _____ Cross-line (SWMB) comparisons completed and documented in DR
  - _____ Required quantity of XLs met. If not, addressed in DR.
- _____ Junction comparisons completed and documented in DR
- _____ Prior surveys were reviewed because of special issues _____
  - _____ Did the issues require an explanation in the DR
- _____ Special circumstances/problems/issues/HVF changes/deviations from DAPR documented in DR
  - _____ Does the data meet specifications? Discuss in DR.
- _____ Shoreline Processes described in DR
- _____ Cover & Title sheets produced (digital copy in folder)
- _____ Appropriate Appendices completed and included with digital data
- _____ Separates completed and included with digital data

**Submission**

_____ Coverage requirements were met.
_____ If not, addressed in DR.

_____ Accuracy requirements were met.
_____ If not, addressed in DR

_____ Digital folders cleaned up
_____ HXXXXX_FINAL Fieldsheet folder contains only official Non-Finalized BASE Surfaces
_____ Sessions & Fieldsheets open in CARIS and are not outdated
_____ All .hob files are in the Notebook session, named properly, & are in the Field Products/Notebook folder
_____ Extraneous files are removed from the Field Products folder

_____ Content of all submission folders (CARIS, DR, Field Products, & PSS folders) checked for completeness and suitability

_____ Data checks
_____ HVFs match current DAPR (check HVF database for which applies)
_____ If not, addressed in DR.

_____ Hydrographic Survey Quality Control Review Checklist completed
List name of reviewer _____
Date completed _____

_____ All data and DR submitted to FOO for approval

The quality and completion of all tasks are the responsibility of the Sheet Manager (OIC) (meaning if someone else completed a task, the OIC has verified the accuracy).

Standard field surveying and processing procedures were followed in conducting the above mentioned survey.

The digital data and supporting records have been fully reviewed and are considered complete and adequate for review and approval.

| _____ | _____ | _____ |
|---|---|---|
| Sheet PIC Name Printed | Sheet PIC Signature | Date |

**Field Operations Officer (FOO) Review**

_____ Data and DR are approved
_____ Descriptive Report & Appendices reviewed
_____ Shoreline Report reviewed
_____ Pydro/Notebook Sessions reviewed
_____ Processed HDCS Data reviewed in Fledermaus

| _____ | _____ | _____ |
|---|---|---|
| FOO Name Printed | FOO Signature | Date |

# Hydrographic Survey Quality Control Review Checklist

Survey: _____ Project: _____ Survey Reviewer: _____

**Bold** underlines require and date and initials when item is completed.

_____ Descriptive Report reviewed
- _____ Special circumstances/problems/issues/HVF changes/deviations from SysCert/DAPR documented in DR
- _____ Were data requirements met?

_____ Quality Control Checklist reviewed

_____ Logs reviewed
- _____ Digital Acquisition & Processing Logs
- _____ Pydro Feature Log
- _____ Survey Log

_____ Quality and flyer check of depths/surfaces (review in CARIS w/ HXXXXX_QC Session & Fieldsheets)
- _____ Subset (include looking at rejected) – just need to look at around 10% of area
- _____ Shoals and Navigationally Significant areas reviewed
- _____ Contours & Depths checked
- _____ Designated soundings reviewed
- _____ Errors discussed in DR if present

_____ HXXXXX_Data_Query
- _____ DPES lines are SVP/Tide/Merged, DPNE lines are just Tide/Merged
- _____ DP GP BS Query reviewed
- _____ Final Session Query

_____ Outside Review of Shoreline & Pydro session
- _____ All features resolved
- _____ Remarks/Recommendations make sense
- _____ AWOIS Items resolved sufficiently
- _____ Files in Notebook folder open in CARIS Notebook
- _____ Review Notebook shoreline files with Caris Map .des from BASE surface for survey

_____ DTONs (Dangers to Navigation)
- _____ Reviewed/Verified

_____ Chart comparisons reviewed
- _____ Ensure chart edition and date corrected through included in DR

_____ Coverage and accuracy requirements were met
- _____ If not, addressed in DR.

_____ Check that all lines are in HXXXXX_FINAL CARIS session
- _____ Session & Fieldsheet open correctly
- _____ HXXXXX_FINAL Fieldsheet folder contains official Depth Threshold BASE surfaces
- _____ Depth Threshold BASE surfaces open correctly and are not outdated

# Digital Data Submission Checklist

OPR-A###-FA-##

HXXXXX Survey X

## CARIS

### Fieldsheets

_____ HXXXXX_FINAL (Non-Finalized BASE Surfaces)

Naming convention: HXXXXX_DepthRange_Resolution(m)

List all Non-Finalized BASE Surfaces - the number of surfaces submitted is dependent on the depth range of the data and the finest resolution the data can support.

- _____ HXXXXX__0to30_0p8m
- _____ HXXXXX__20to60_2m
- _____ HXXXXX__50to150_5m
- _____ HXXXXX__140to300_12m
- _____ HXXXXX__280toXXX_22m

_____ HXXXXX_QC (Working fieldsheet used throughout the survey for coverage and QC. May not be submitted.)

(The following are examples of possible files)

- _____ Preliminary Finalized BASE Surfaces
- _____ Subset Tiles
- _____ Depths and Contours

### HDCS_Data

_____ HXXXXX (processed CARIS HDCS data)

_____ VesselConfig (only vessels that apply to this survey)

_____ DeviceModel.xml (DeviceModel used for processing this survey)

### Preprocess

_____ ISIS (raw XTF data and True Heave from ISIS)

_____ SVP_raw (raw SV data from Velocwin)

_____ Trimble (raw data from TerraSync & exported SHP files from GPS PathFinder)

### Session

_____ HXXXXX_FINAL.hsf (CARIS session)

_____ HXXXXX_QC.hsf (CARIS session)

### SVP (processed CARIS SVP data files separated by vessel)

_____ 1010

_____ 1018

_____ S220

### Tide

_____ Observed .tid and .zdf (Tide files applied to the data at the time of submission)

## DESCRIPTIVE REPORT

_____ HXXXXX_DR.doc

### Appendices

**I. Survey Feature Report**

_____ HXXXXX_Survey_Feature_Report.pdf (report produced in Pydro)

**II. Survey Outline**

_____ HXXXXX_Survey_Outline.tab (survey outline of hydrography)

**III. Smooth Tide Request**

_____ HXXXXX.pdf (Smooth Tides Request & Abstract Times of Hydro)

_____ HXXXXX.mif/mid files

**IV. Supplemental Correspondence**

_____ HXXXXX_Correspondence.xxx (digital copies of emails, request & correspondence)

**V. Geographic Names**

_____ HXXXXX_Geographic_Names

### Separates

**I. Logs**

**Acquisition & Processing**

_____ HXXXXX_1010_8101_Log.xls

_____ HXXXXX_1010_8101_Log.xls

_____ HXXXXX_S220_8111_Log.xls

_____ HXXXXX_S220_8160_Log.xls

**Detached Positions**

_____ HXXXXX_Pydro_Feature_Log.xls

_____ HXXXXX_DPForms.pdf (Scanned DP forms)

**I. Logs**

N/A HXXXXX_Sidescan_Contact_List

## FIELD PRODUCTS

**Final Fieldsheet**

**Notebook Files**

_____ HXXXXX_Edited_CFF_Shoreline.hob
_____ HXXXXX_Charted_Shoreline.hob
_____ HXXXXX_Add.hob
_____ HXXXXX_Modify.hob
_____ HXXXXX_Delete.hob
_____ HXXXXX_Add_Features.hob (hob file created from xml import)
_____ HXXXXX_Modify_Features.hob (hob file created from xml import)
_____ HXXXXX_Delete_Features.hob (hob file created from xml import)
_____ HXXXXX_None_Features.hob (hob file created from xml import)
_____ HXXXXX.hsf (Notebook session)

**PR and Constituent Products**

_____ Include all products that were provided to constituents

## PSS (Pydro Preliminary Smooth Sheet)

_____ HXXXXX.PSS
_____ Photos (Non-SSS contact images associated with Pydro features, named w/unique identifier )
_____ HXXXXX_DTON.xml (XML of DTONs exported from Pydro)
_____ HXXXXX_DTON_Report.pdf (report produced in Pydro)
_____ HXXXXX_DTON_email.txt (copy of submission email)

## HXXXXX Contents

_____ size
_____ number of files
_____ number of folders

_____ Survey data included in transmittal list text file

# Analog Data Submission checklist

HXXXXX  Sheet X

_____ Digital Data on Hard Drive (listed on Digital Data tab)

_____ Shoreline boatsheets

_____ DP Forms

_____ Daily acquisition forms

# Data Query (QC Check MBES QC Session)

***Date:*** _____ ***Name:*** _____

***Total Mileage***
**0**

***Total Lines in Session*** _____ lines in HDCS_DATA folder
**0** _____ lines in PreProcess folder

| Length | Line | TideLoaded | Project | Vessel | Day | TideFile | SVPCorrecte | SVPFile | Merged | Outdated | TPE Comput | Speed | Heading | TotalTime |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

# Data Query (Features)

***Date:*** _____ ***Filled out by:*** _____

***Date:*** _____ ***Reviewed by:*** _____

***List of Acquired GP Files below***

_____ **Total # of Features in Pydro**

_____ **# of Primary in Pydro**

_____ **# of Add Features in Pydro**

_____ **# of Modify Features in Pydro**

_____ **# of Delete Features in Pydro**

_____ **# of None Features in Pydro**

0

_____ **# of Secondary in Pydro***

_____ **# of Rejected in Pydro***

** Not exported to Ntbk*

_____ **# of DP Files in HDCS_DATA folder**

_____ **# of DP Files in PreProcess/Trimble/Export folder**

_____ **# of GP Files in PreProcess/Trimble/Export folder**

_____ **Total # of Files in PreProcess/Trimble/Export folder**

_____ **# of Digitized ChartGP & Bathy Files in Pydro**

0 **Preprocess + Digitized + Bathy**

_____ **# of Position Files in Pydro**

_____ **# of Add Features in Ntbk**

_____ **# of Modify Features in Ntbk**

_____ **# of Delete Features in Ntbk**

_____ **# of None Features in Ntbk**

0 **Total # of Features in Ntbk**

***Total Acquired GP Files*** 0

***Total DP Files in CARIS*** 0

0

***CARIS Query***

| Line | Project | Vessel | Day | SVPCorre | SVPFile | TideLoade | TideFile | Merged | Outdated |
|---|---|---|---|---|---|---|---|---|---|

# Data Query (QC Review MBES Final Session)

***Date:*** _____ ***Name:*** _____

***Total Mileage***
**0**

***Total Lines in Session*** _____ lines in HDCS_DATA folder
**0** _____ lines in PreProcess folder

| Length | Line | TideLoaded | Project | Vessel | Day | TideFile | SVPCorrecte | SVPFile | Merged | Outdated | TPE Comput | Speed | Heading | SR Correctec | TotalTime |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|