



#### DESCRIPTIVE NOTES

A pilot mapping project was undertaken in 2000 using a pole-mounted Reson 8101 SeaBat™ (240 kHz) swath (150° swath coverage) multibeam echosounder (MBES) system mounted aboard the R/V *MacGinitie*, with the data collected under contract with the Seafloor Mapping Lab of California State University Monterey Bay through the Center for Habitat Studies, Moss Landing Marine Laboratories (MLML). A series of disparate "postage stamp size" (Davis Point (Cattle Pass), Neck Point, Pile Point, Turn Island, and Lawson Reef) areas within the San Juan Archipelago were mapped and the boat was positioned using a differential global positioning system (DGPS). Attitude information such as heave, pitch, and roll, were recorded using a heading motion sensor (HDM5) with the data logged and integrated using Triton Elecs International ISIS® and Coastal Oceanographic Hypack™ software. Water column sound velocity profiles were collected daily at each site using an AML SV+ sound velocity profiler. In addition, tidal information was obtained from local tide stations. Data acquisition was maximized for collection of accurate bathymetry rather than backscatter data. Consequently, the quality of the backscatter data was substandard and unusable.

For the pilot project the bathymetric data were processed using CARIS HIPS® hydrographic data cleaning software. Soundings were corrected for vessel motion and water column sound velocity and adjusted to mean lower low water (MLLW) using predicted tides for the San Juan Islands. Erroneous soundings were removed in CARIS HIPS through both automated filtering and manual editing. After processing of all lines for each of the five survey sites, the data were exported from CARIS as a geo-referenced, artificially illuminated (from NW) image, and as a binned (2 m) ASCII text (xyz) file. A 2-m ArcView® ASCII raster (.asc) grids were created from the xyz data using Fledermaus®, a 3D imaging software.

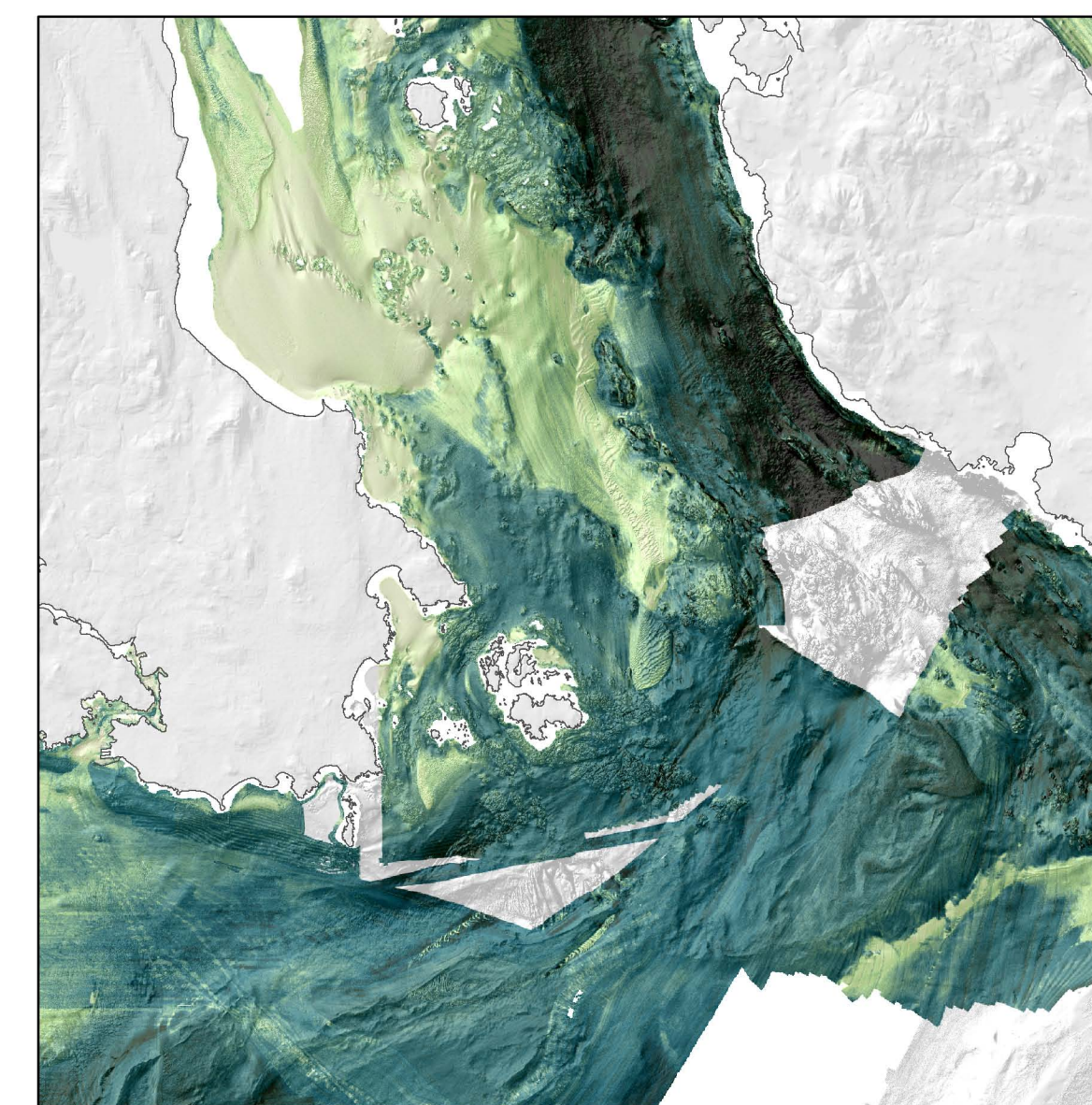
From 2001 through 2008 the Canadian Coast Guard vessels *Otter Bay*, *Revisor*, *R.B. Young* and *Vector*, and under the direction of the Canadian Hydrographic Service (CHS) in cooperation with the Geological Survey of Canada (GSC) and MLML's Center for Habitat Studies/Tombolo/SeaDoc Society, acquired extensive high-resolution bathymetric datasets of the waterways surrounding the Southern Gulf Islands and the San Juan Archipelago. The MBES Simrad EM 1002 (95kHz frequency) and EM 3000-3002 (300 kHz frequency) systems were used for deep (>80 m) and shallow (<80

m) waters respectively. The dataset resolutions were 5 and 2 m respectively. In most of the areas, the tracks were positioned so as to insonify 100% of the seafloor with a 100% overlap, providing 200% coverage. Positioning was accomplished using a broadcast Differential Global Positioning System (DGPS) and MBES data were corrected for sound speed variations in the stratified water column using frequent sound speed casts.

The bathymetric data were carefully processed by CHS with CARIS Hydrographic Information Processing Software (HIPS®). The outlying navigation and attitude sensor data were rejected, the gaps restored using linear interpolation, and the filtered data were then merged with DGPS and POS/MV input. Subsequently, automatic coarse filters were applied to swath data (+/- 60° swath angle). Spurious data points were removed manually in the SwathEdit module of HIPS on a line-by-line basis, and tidal corrections were applied (predicted, or observed, if available). After merging the data (depths/tides/navigation) HIPS Subset module cleaning was completed, a beam-weighted-mean base surface (grid) was generated and the gridded data were exported to an ASCII format as XYZ triplets and transferred to the GSC for further processing.

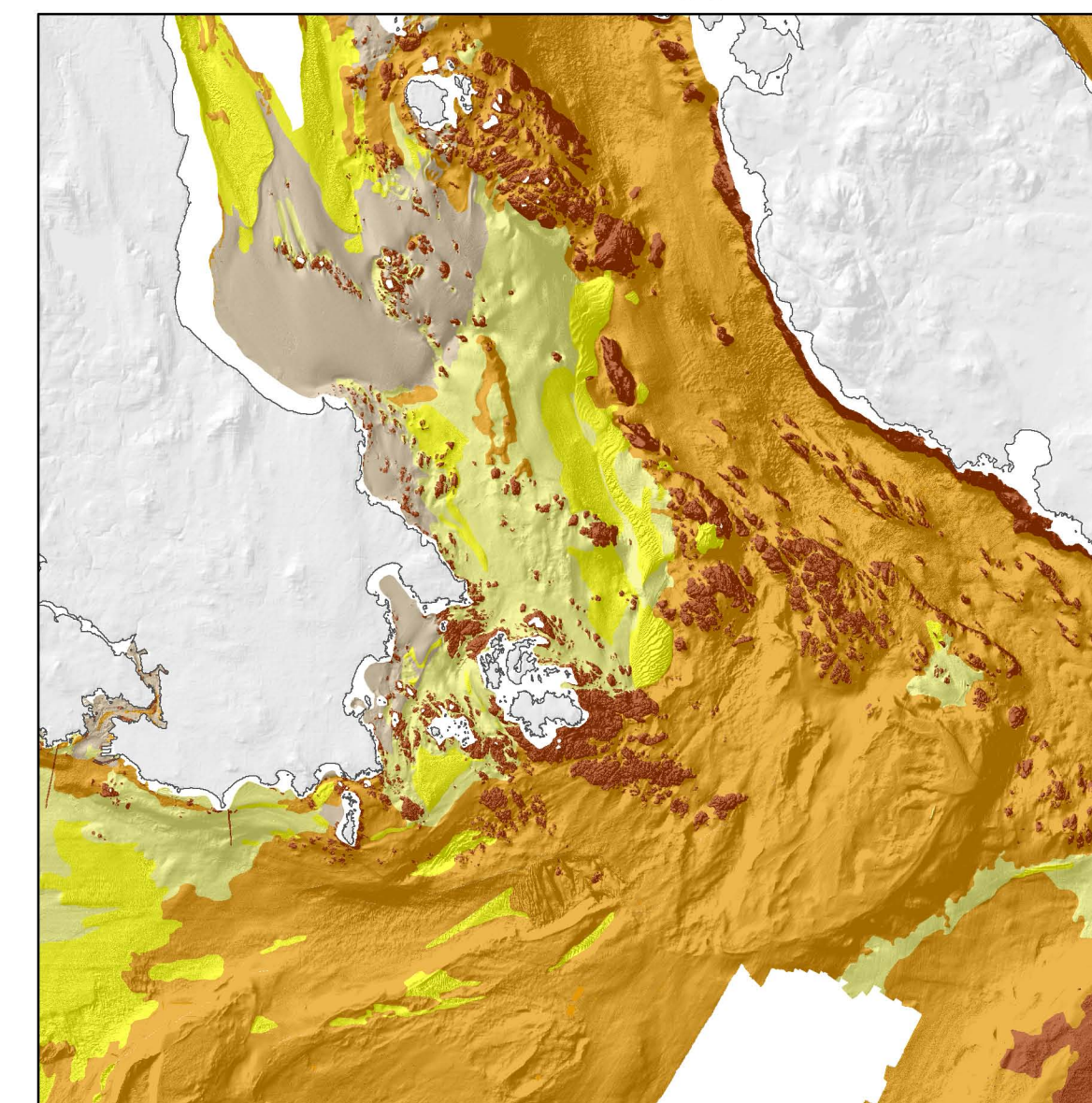
The Transboundary region covered by this map series has been divided into four quadrants and this sheet (Sheet 1 of 4; Haro Strait area) covers most of the Haro Strait located between southern Vancouver Island (Victoria), B.C. Canada and San Juan Island, WA, USA and part of north central Strait of Juan de Fuca.

#### Backscatter Intensity

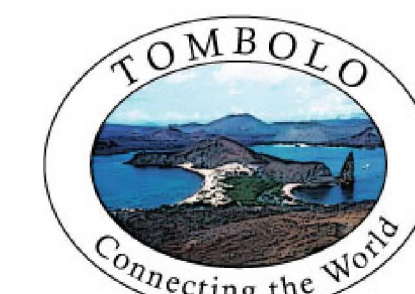
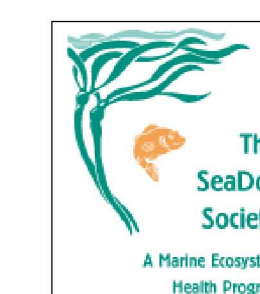


Low High

#### Sediment Type



Rocks, pinnacles, or boulders Sand/Gravel Sand  
Sand/Mud Mud



## SUN-ILLUMINATED BATHYMETRY and SEAFLOOR CHARACTERISTICS of the Southern Gulf Islands and San Juan Archipelago, Canada and USA

EDITORS: H. Gary Greene, J. Vaughn Barrie  
2010

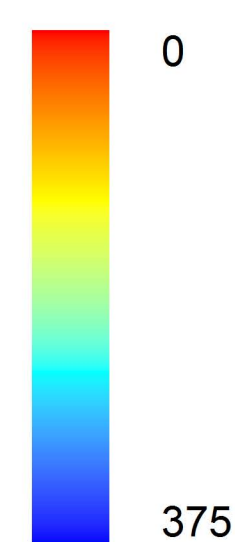
AUTHORS: Charlie Endris and Kim Picard

ACKNOWLEDGEMENTS: Canadian Hydrographic Service participants R. Hare, K. Czotter, E. Sargent, P. Milner, J. Gagne, C. Lessels, D. Cartwright, K. Lyngberg, and Canadian Coast Guard participants G. Allison and A. Keene

This map was produced by the Center for Habitat Studies at Moss Landing Marine Laboratories in cooperation with Tombolo, the SeaDoc Society, Natural Resources Canada, and the Canadian Hydrographic Service

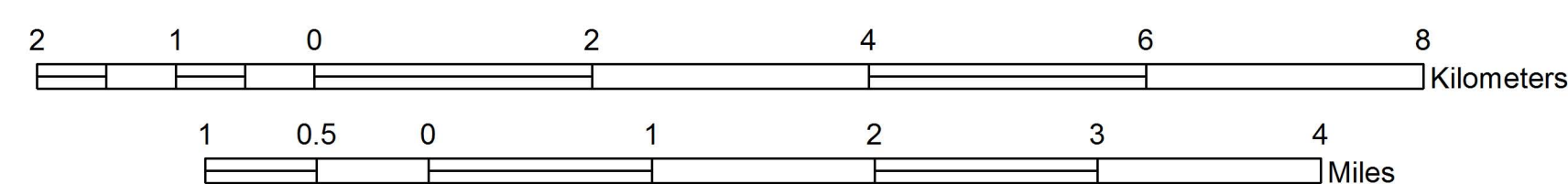
Digital Cartography by Charlie Endris, Center for Habitat Studies

Depth (m)



Map Sheet 1 of 4

Scale 1:50,000



Universal Transverse Mercator Projection, Zone 10 North  
North American Datum 1983

#### Map Index

