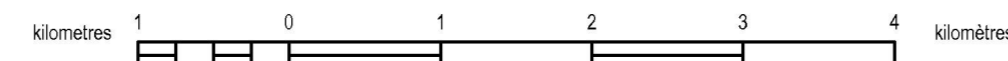


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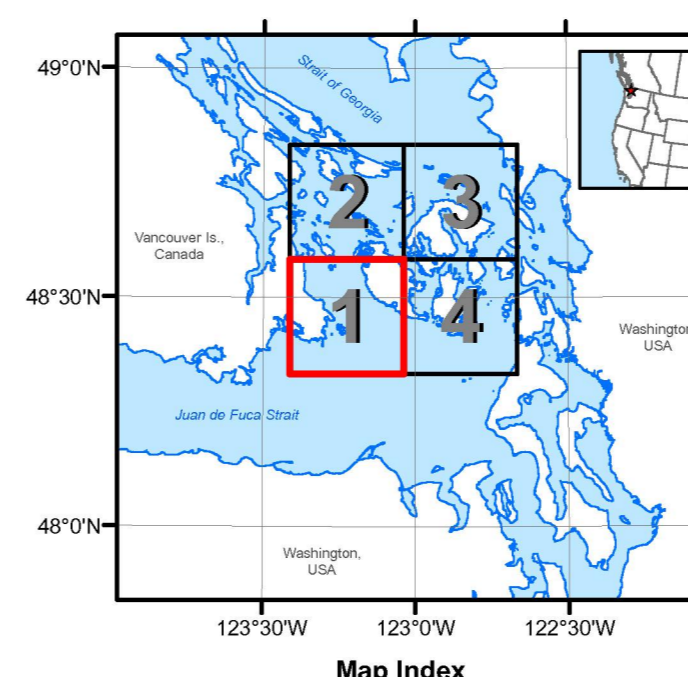
OPEN FILE 6627  
 SHADED SEAFLOOR RELIEF  
**SOUTHERN GULF ISLANDS AND  
 SAN JUAN ARCHIPELAGO**  
 CANADA AND U.S.A.  
**Sheet 1: Haro Strait**

Scale 1:50 000/Echelle 1/50 000



Universal Transverse Mercator Projection, Zone 10  
 North American Datum 1983  
 © Her Majesty the Queen in Right of Canada 2011  
 This map is not to be used for navigational purposes

Projection transversale universelle de Mercator, Zone 10  
 Système de référence géodésique nord-américain, 1983  
 © Sa Majesté la Reine du chef du Canada 2011  
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DESCRIPTIVE NOTES

A pilot mapping project was undertaken in 2000 where a series of disparate "postage stamp size" (Davis Point (Cattle Pass), Neck Point, Pike Point, Turn Island, and Lawson Reef) areas within the San Juan Archipelago were mapped using a pole-mounted Reson 9101 SeaBat (240 kHz) swath (150° swath coverage) multibeam echosounder (MBES) mounted aboard the R/V MacGinitie. The data was 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). Positioning was acquired using a differential global positioning system (DGPS). Attitude information such as heave, pitch, and roll, were recorded using a heading motion sensor (HMS) with the data logged and integrated using Triton Seica International ISIS and Coastal Oceanographic Hyapak 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.

From 2001 through 2008, the Canadian Coast Guard Research Vessels (CCGS) Otter Bay, Revisor, R.B. Young and Vector, 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/Tomlinson/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 (95 kHz frequency) and EM 3000-3002 (300 kHz frequency) systems were used for deep (>80 m) and shallow (<80 m) waters respectively. The systems covered both an arc of 120 degrees and in most of the areas, the tracks were positioned so as to insure 100% of the seafloor with a 100% overlap, providing 200% coverage. Positioning was accomplished using a broadcast Differential Global Positioning System (DGPS), providing potential accuracy of a 3 m. MBES data were corrected for motion using a POS/MV attitude sensor and for sound speed variations in the stratified water column using frequent sound speed casts measured from a moving vessel profile (MVP30).

The bathymetric data collected from the early pilot project and the extensive surveys by CHS were processed independently by each agency. Both, however, used CARIS Hydrographic Information Processing Software (HIPS®) to process the data. Soundings were corrected for vessel motion and water column sound velocity, and adjusted to mean lower low water (MLLW) using predicted or observed tides, if available, for the San Juan and the Southern Gulf Islands. Erroneous soundings were removed in CARIS HIPS through both automated filtering and manual editing. After merging the data (depth/depth/navigation), HIPS Subset module cleaning was completed and beam-weighted-mean base surfaces (grid) were generated and then exported to an ASCII format as XYZ triplets, which were later converted into ESR ArcGIS datasets by the GSC.

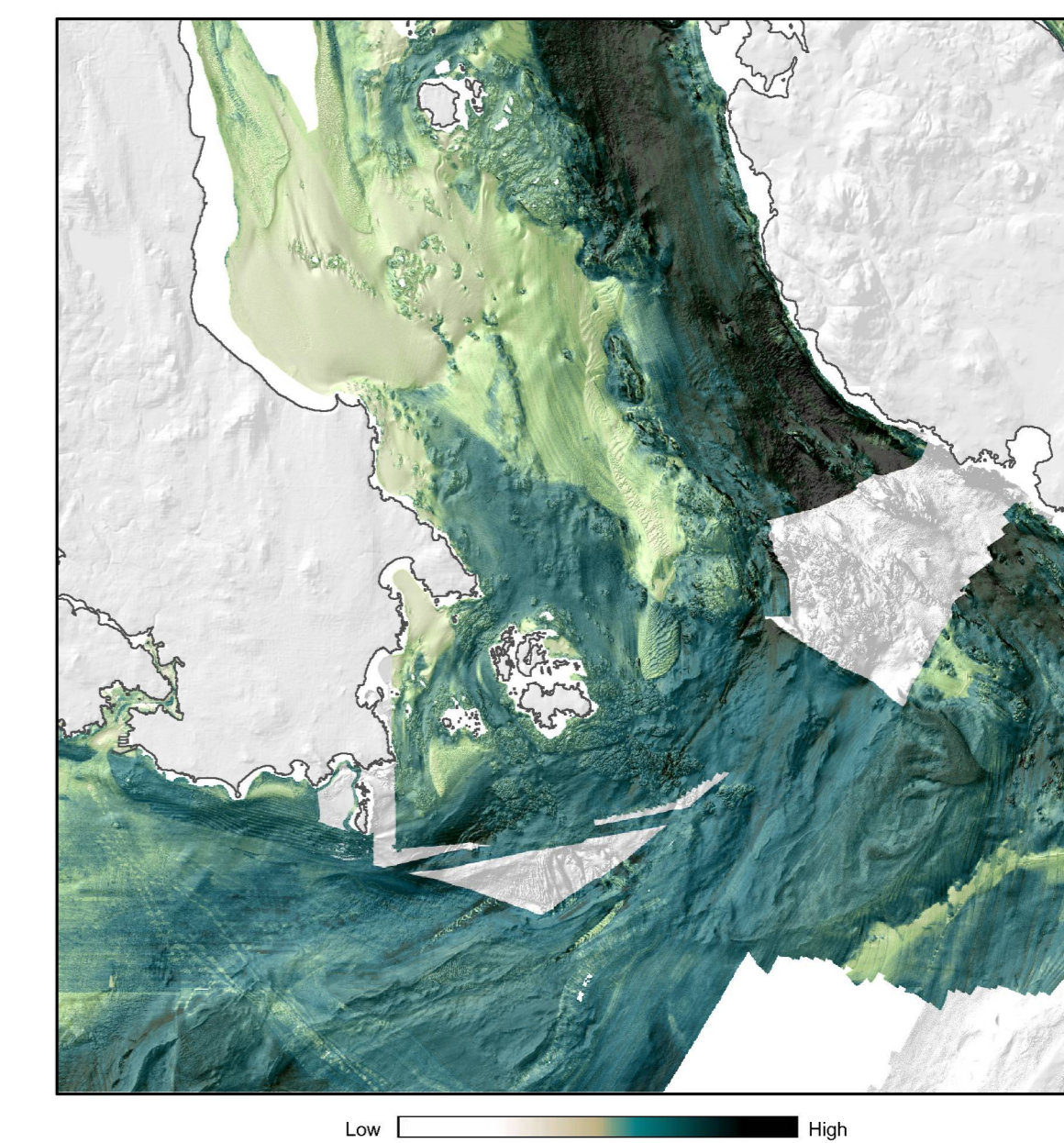
For both the early pilot project and the EM 3000-3002 data, the multibeam bathymetric data are represented at 2 m pixel for shallow waters surveyed with the EM 3000/3002 and at 5 m pixel horizontal resolution for the deep waters surveyed using the multibeam EM 1002. Using ESRI ArcGIS software, a shaded relief image was created by vertically exaggerating the topography five times and then sun illuminating the relief by a virtual light source positioned 45 degrees above the horizon at an azimuth of 315 degrees. Superimposed on the shaded relief image are contours assigned to water depths, ranging from red (shallow) to violet (deep).

The transboundary region covered by this open file has been divided into four quadrants represented as one sheet each. This sheet (Sheet 1 of 4, Haro Strait area) covers most of Haro Strait located between southern Vancouver Island (Victoria), B.C., Canada and San Juan Island, WA, USA, and part of north central Juan de Fuca Strait. This seafloor topographic dataset is the first product presented as part of an open file map series. Co-registered along with multibeam swath bathymetric data, backscatter strength data is presented as the second open file of the series (Greene & Barrie (Eds), 2011a). Potential marine benthic habitats, interpreted using multibeam bathymetric and backscatter intensity datasets, are presented as a third open file (Greene & Barrie (Eds), 2011b).

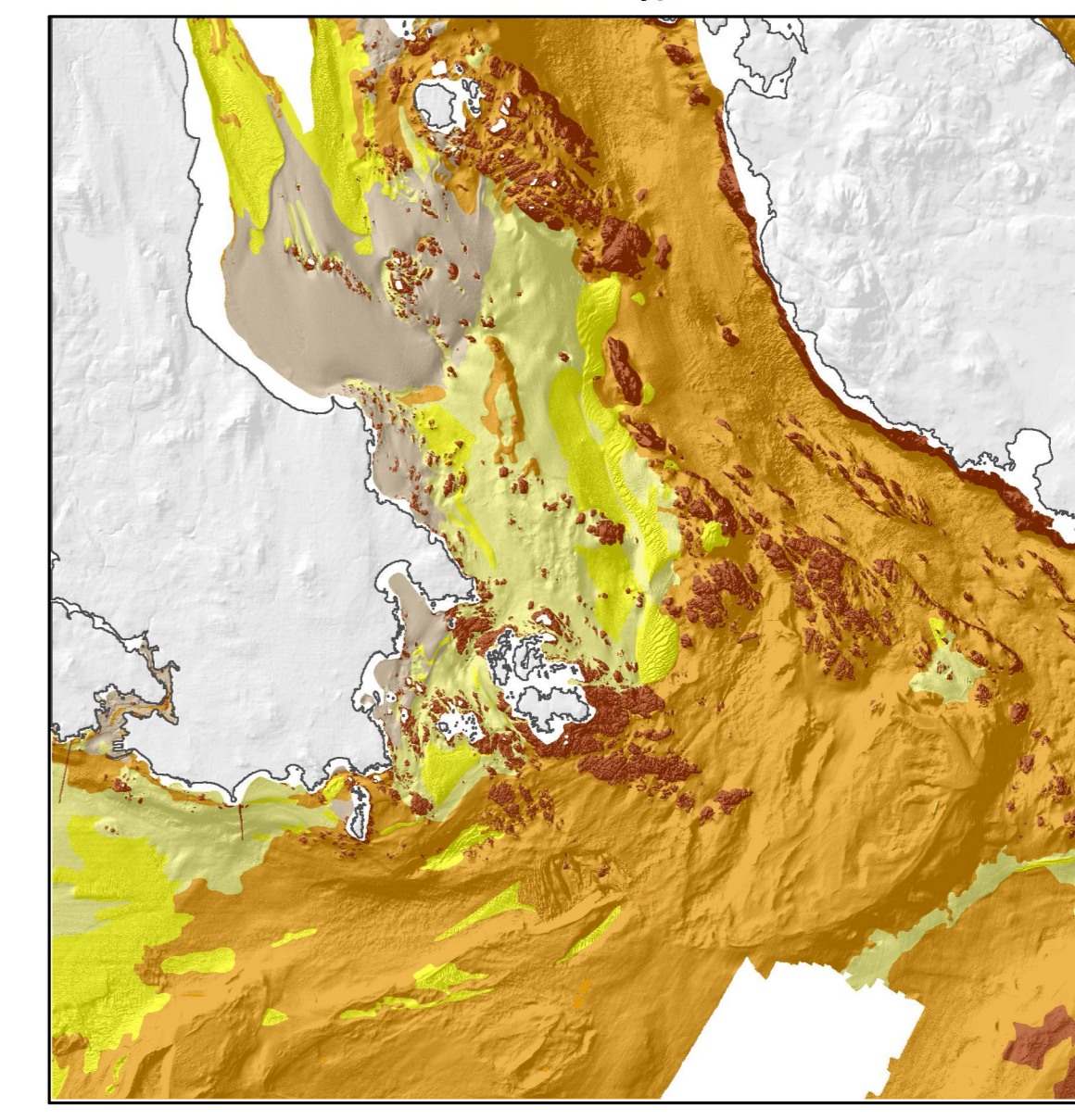
REFERENCES

- Greene, H.G. (ed.), and Barrie, J.V. (ed.), 2011a. Backscatter strength and shaded seafloor relief, southern Gulf Islands and San Juan Archipelago, Canada and U.S.A. Geological Survey of Canada, Open File 6627, 4 sheets.
- Greene, H.G. (ed.), and Barrie, J.V. (ed.), 2011b. Potential marine benthic habitats and shaded seafloor relief, southern Gulf Islands and San Juan Archipelago, Canada and U.S.A. Geological Survey of Canada, Open File 6625, 4 sheets.

Backscatter strength and shaded seafloor relief  
 (Greene and Barrie (Eds), 2011a)



Sediment Type



The sediment type was derived using a combination of the backscatter strength and bathymetry-derived data. Where no backscatter strength data was available, the interpretation was done using only the bathymetric data and knowledge from the surrounding areas. For more details, see Greene and Barrie (Eds, 2011b).

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**6627**  
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 SHEET 1 OF 4  
 FEUILLE 1 DE 4

Sheet 1 of 4, Haro Strait  
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