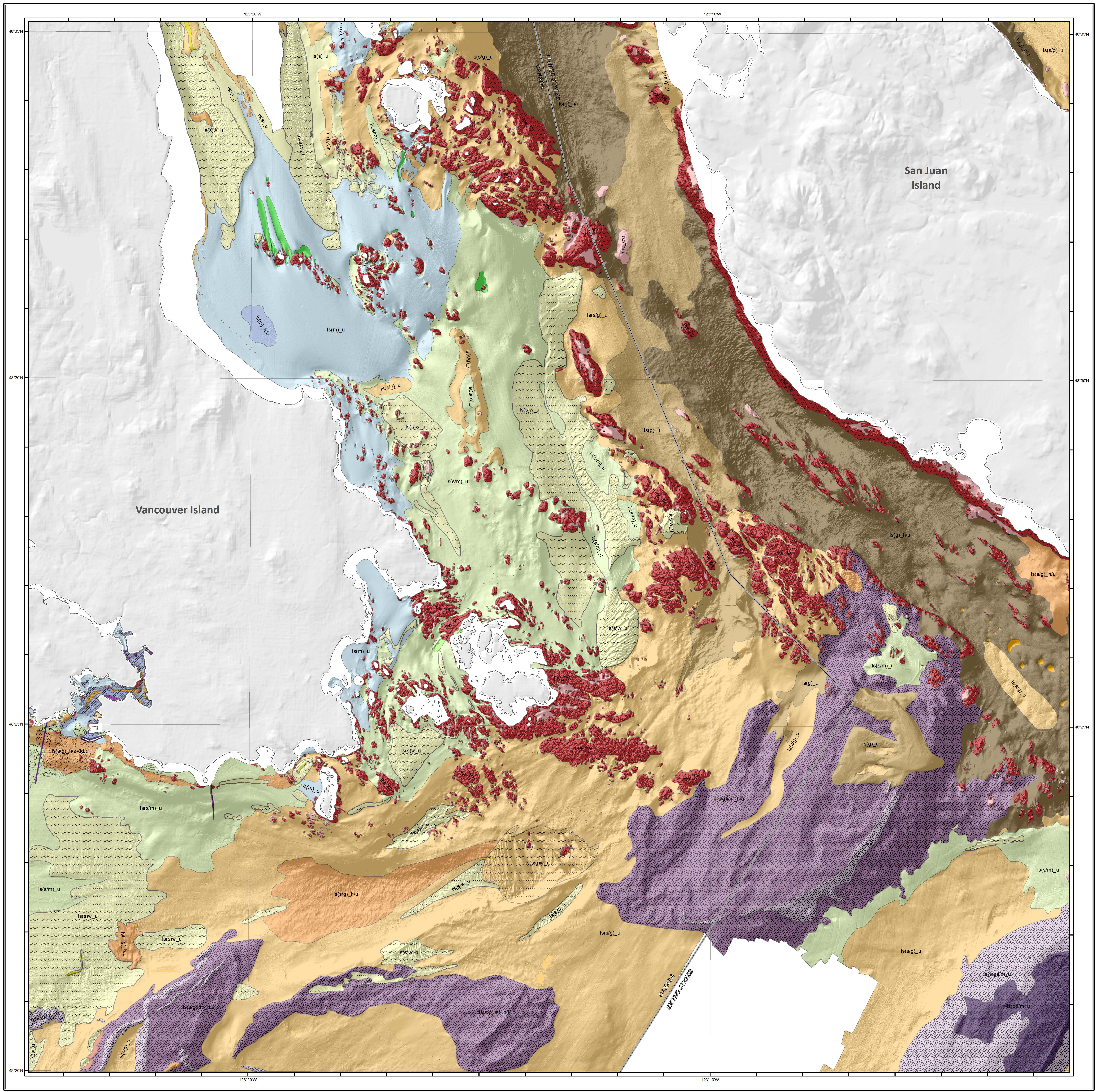

DESCRIPTIVE NOTES

The San Juan Archipelago-Southern Gulf Islands seafloor-mapping effort is an ongoing mapping program focused on the characterization of marine benthic habitats and the mapping of geology within the Salish Sea. The Salish Sea has suffered a severe decline in several species of bottom fish over the past several decades likely due to environmental degradation and overfishing (Puget Sound Ambient Monitoring Program, 2002; Fisheries and Oceans Canada, Rockfish Conservations Areas, 2006). The primary objective of this mapping effort is to characterize potential[i] marine benthic habitats and geology. The final product includes interpretive maps that can be used to identify rockfish (*Sebastes* sp.) habitats, which then can be used by both Canada and the US to manage, conserve and sustain economically significant fisheries (considered outcomes) in the Transboundary region. A mechanism that has been developed to address fisheries conservation and sustainability is the establishment of Marine Protected Areas (MPAs) and voluntary or mandatory no-take zones whose evaluation as a benthic habitat can be done using potential habitat maps. Therefore, a secondary objective of this mapping effort is to provide data where assessment, and if necessary modification, of established MPAs, and the establishment of new MPAs, can be made. Additional mapping objectives that evolved from this project include the identification of specific deep-water foraging habitats such as dynamic bedforms that harbor sand lance (*Ammodytes hexapterus*) and potential siliceous sponge reefs (hexactinellid), although these are not specifically identified in the maps as characterization of these specific habitat types is continuing.

The San Juan Archipelago-Georgia Basin region is an active tectonic province whose physiography and geomorphology reflect both Mesozoic to Cenozoic convergent (subduction/accretion) plate tectonic processes and Pleistocene glaciation (glacial scouring/deposition). These processes have juxtaposed and deformed Jurassic-Cretaceous metamorphic rocks with Tertiary-Quaternary sedimentary rocks producing a complex of fjords, grooved and polished bedrock outcrops, and erratic boulders and moraines. Banks of till and glacial advance outwash deposits have also formed and contribute to the variety of relief within the region. Present day tidal action has fashioned much of the relic glacial-marine sediments into dynamic bedforms consisting of sand and gravel wave and dune fields. Modern day sedimentary deposits (sand and mud banks) represent materials being supplied to the region by the Fraser River of British Columbia, Canada.

This tectonic province can be divided into two distinct zones based on bedrock types: a northern sedimentary bedrock zone and a southern metamorphic rock zone separated by the Haro fault (see map sheets 2 and 3). Both zones provide good hard bedrock exposures, however the sedimentary rock type is differentially eroded, thus forming ledges and overhangs while the metamorphic bedrock are highly fractured and faulted forming cracks, crevices, and blocky boulder aprons. The severity and variety of tectonic, geologic and physical processes active in the province are directly responsible for forming the large variety of potential marine benthic habitat types mapped in the region.

The habitat classification was done following an existing habitat classification code, which was established to distinguish habitat types for species of interest and to facilitate ease of use and queries in GIS and other database programs. The code used in this map is modified from the scheme developed by Greene et al. (1999, 2007) for deep-water habitat characterisation.

The seafloor imagery interpretation and habitat type delineation were based on knowledge of the geology of the seafloor and seafloor processes in the study area (Thompson, 1981, Mosher et al., 2000; Barrie et al., 2005; 2009). Geological processes, structure and morphology depicted in the imagery were used to distinguish distinct potential habitat types. Resolution of the seafloor interpretation varied with the type of MBES systems that were used in the various surveys. However, for most of the area, seafloor features such as bedrock types (e.g., sedimentary, metamorphic, volcanic, and granitic rocks), structures (e.g., faults, folds, scours, and landslides), and bedforms of unconsolidated sediments were easily distinguished. To differentiate pinnacle and/or boulders (Ih(b)/p) habitat from simple bedrock habitat, a specific rule was assigned where any known bedrock polygons with a surface area smaller than 500 m^2 became identified with "Ih(b)/p".

The Transboundary region covered by this map series has been divided into four quadrants and this sheet (Sheet 1 of 4; Haro Strait) 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 Starits of Juan de Fuca. Habitat types here are predominantly composed of hard faulted and fractured metamorphic rocks, boulders and dynamic bedforms. Strong currents in Haro Strait sweep the bedrock clean and produce sediment waves and dune fields.

[i] "Potential" is used here to indicate that the habitat mapped on the basis of morphology and substrate type may not have a known species or assemblage of organisms that are identified to use the habitat.

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Key to Habitat Types

Unconsolidated substrate (mud)

Is(m)_u	Unconsolidated sediments
Is(m)_h/u	Hummocky unconsolidated sediments
Is(m)h_e/u	Pockmark
Is(m)_h/a-dd/u	Hummocky dredge or anchor disturbances
Is(m)g_a-dg/u	Dredge channel

Unconsolidated substrate (sand / mud)

Is(s/m)_u	Unconsolidated sediments
Is(s/m)_h/u	Hummocky unconsolidated sediments
Is(s/m)h_s/u	Scour depression
Is(s/m)_h/a-dd/u	Hummocky dredge or anchor disturbances

Unconsolidated substrate (sand / gravel)

Is(s/g)_u	Unconsolidated sediments
Is(s/g)_h/u	Hummocky unconsolidated sediments
Is(s/g)w_u	Sediment bedforms
Is(s/g)m_u	Mound or linear ridge
Is(s/g)i/m_u	Ice-formed mound, esker or moraine
Is(s/g)i/m_h/u	Hummocky ice-formed mound
Is(s/g)h_u	Depression
Is(s/g)i/h_s/u	Dropstone depression
Is(s/g)s_s/u	Current-scoured scarp
Is(s/g)_h/a-dd/u	Hummocky dredge or anchor disturbances
Is(s/g)g_a-dg/u	Dredge channel

Unconsolidated substrate (sand)

Is(s)_u	Unconsolidated sediments
Is(s)w_u	Sediment bedforms
Is(s)m_u	Mound or Linear ridge
Is(s)m_s/u	Scour ridge

Unconsolidated substrate (gravel)

Is(g)_u	Unconsolidated sediments
Is(g)_h/u	Hummocky unconsolidated sediments

Unconsolidated substrate (boulders)

Is(b)i/m_u	Moraine

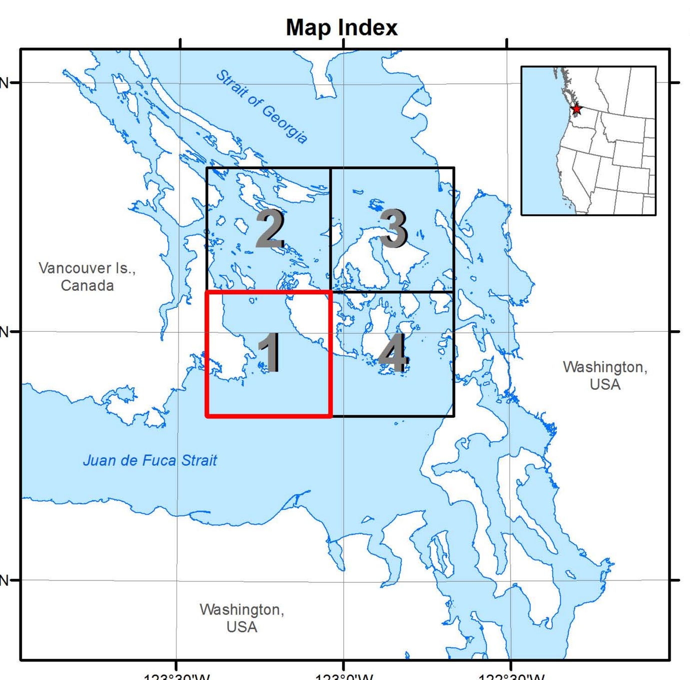
Sediment covered bedrock

Ime_c/u	Sediment covered bedrock

Hard substrate

Ih(b)/p	Pinnacle or boulder
Ihe_f/s	Fractured bedrock
Ih_a-s	Anthropogenic structure - Supports
Ih_a-p	Anthropogenic structure - Pipeline
Ih_a-g	Anthropogenic structure - Former vessel loading facility, jetty or riprap

Map Index



POTENTIAL MARINE BENTHIC HABITATS and SUN-ILLUMINATED BATHYMETRY of the

Southern Gulf Islands and San Juan Archipelago, Canada and USA

Map Sheet 1 of 4

Scale 1:50,000

2 1 0 2 4 6 8 Kilometers

1 0.5 0 1 2 3 4 Miles

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

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2010

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