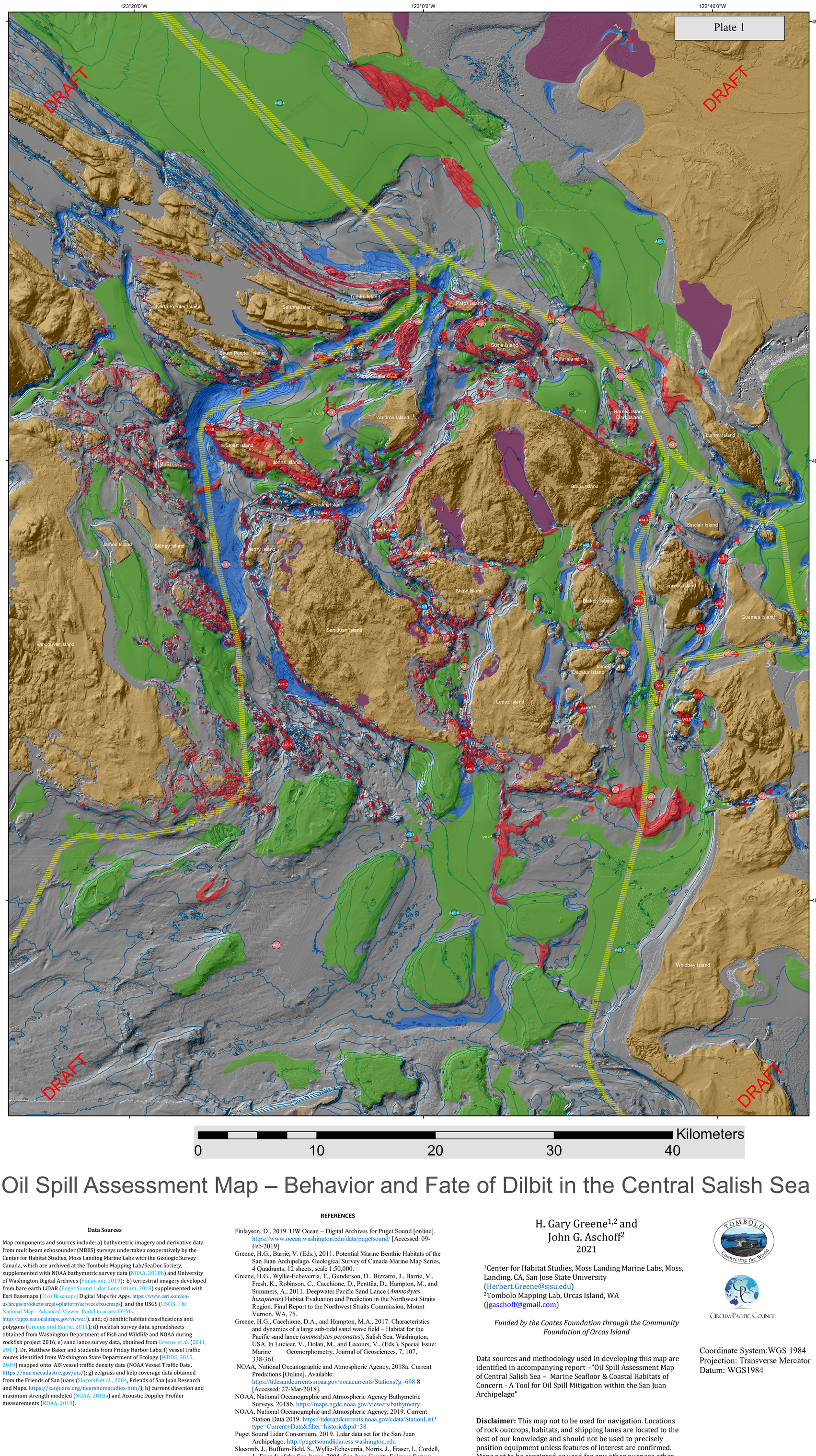


Legend

- Accumulate
- Embed
- Disperse
- Trap
- Flood Direction
- Ebb Direction

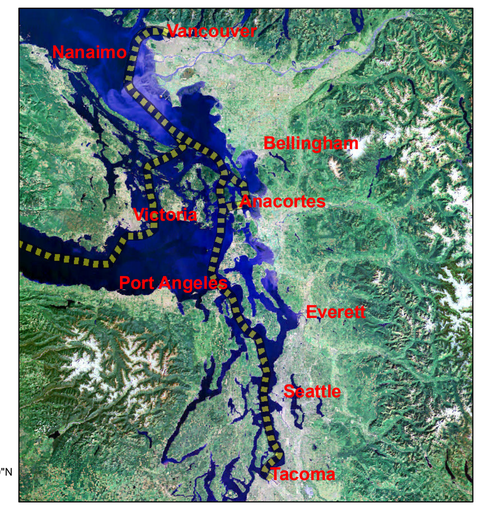
Currents - Measured

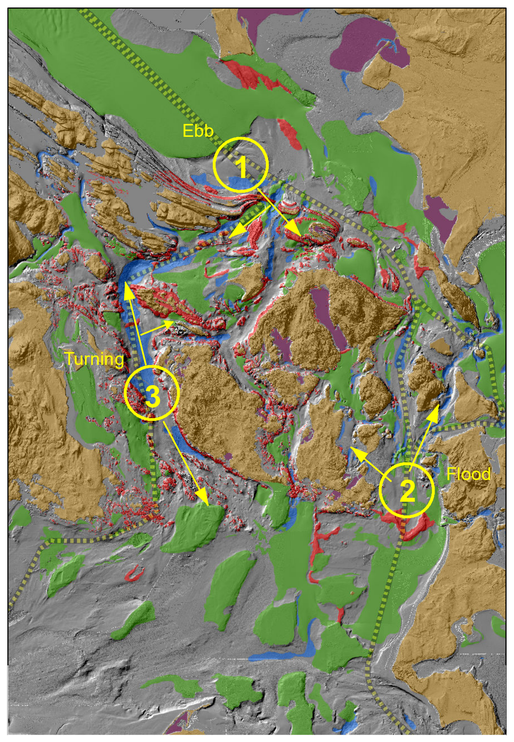
MaxKnots

- 1.1 - 2.5
- 2.6 - 3.6
- 3.7 - 5.6
- Vessel Transit Routes

How to Use This Map

This map is one of two maps within a two-map series constructed to illustrate the potential behavior and fate of spilled dilbit that might be needed to visualize the projection of sinking and sunken oil towards critical habitats (see Plate 2) within the San Juan Archipelago. Sinking oil dispersal corridors, embedment sites, accumulation locations, and traps are interpreted from the seabed geomorphologic features, substrate types, and tidal current data. Predicted current strength (P=x.xx) and directions are plotted for flood (red arrows) and ebb (gray arrows) tidal cycles and current strength (A=x.xx) at NOAA's deepest positions on Acoustic Doppler Current Profiler (ADCP) stations are shown in colored filled circles with measured current velocity noted. This map can be used to locate areas where dilbit may accumulate on the seafloor by locating a spill and determining where the currents would sweep tar balls and other oil-particle aggregates (OPAs) across the seafloor. OPAs may be swept rapidly along the seafloor in dispersal corridors (blue) to be embedded at embedment (rock outcrop, red) sites, or swept into accumulation locations (green) to be eventually buried or trapped in bays and sounds. Those depressions that are not current scoured but located in areas of potential low bottom current flow and lie in the path of a forecasted trajectory of the dilbit, could be targeted for investigation and possible removal of the accumulated material. See insert map on how this map can be utilized during a sinking oil or sunken oil spill.





Oil Spill Assessment Map – Behavior and Fate of Dilbit in the Central Salish Sea

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2021

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Data sources and methodology used in developing this map are identified in accompanying report –"Oil Spill Assessment Map of Central Salish Sea – Marine Seafloor & Coastal Habitats of Concern - A Tool for Oil Spill Mitigation within the San Juan Archipelago"

Disclaimer: This map not to be used for navigation. Locations of rock outcrops, habitats, and shipping lanes are located to the best of our knowledge and should not be used to precisely position equipment unless features of interest are confirmed. Maps not to be reprinted or used for any other purpose other than that stated in the accompanying report without the authors permission.

Coordinate System:WGS 1984
Projection: Transverse Mercator
Datum: WGS1984

Data Sources

Map components and sources include: a) bathymetric imagery and derivative data from multibeam echosounder (MBES) surveys undertaken cooperatively by the Center for Habitat Studies, Moss Landing Marine Labs with the Geologic Survey Canada, which are archived at the Tombolo Mapping Lab/SeaDoc Society, supplemented with NOAA bathymetric survey data (NOAA, 2018b) and University of Washington Digital Archives (Finlayson, 2019); b) terrestrial imagery developed from bare earth LiDAR (Puget Sound Lidar Consortium, 2019) supplemented with Esri Basemaps (Esri Basemaps | Digital Maps for Apps. https://www.esri.com/en-us/arcgis/products/arcgis-platform/services/basemaps) and the USGS (USGS, The National Map - Advanced Viewer. Portal to access DEMs, https://apps.nationalmaps.gov/viewer/), and; c) benthic habitat classifications and polygons (Greene and Barrie, 2011); d) rockfish survey data, spreadsheets obtained from Washington Department of Fish and Wildlife and NOAA during rockfish project 2016; e) sand lance survey data, obtained from Greene et al. (2011, 2017), Dr. Matthew Baker and students from Friday Harbor Labs; f) vessel traffic routes identified from Washington State Department of Ecology (WDOE, 2015, 2019) mapped onto AIS vessel traffic density data (NOAA Vessel Traffic Data. https://marinecadastre.gov/ais/); g) eelgrass and kelp coverage data obtained from the Friends of San Juans (Slocomb et al., 2004, Friends of San Juan Research and Maps. https://sanjuans.org/nearshorestudies-htm/); h) current direction and maximum strength modeled (NOAA, 2018a) and Acoustic Doppler Profiler measurements (NOAA, 2019).

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Oil Spill Scenarios

Three speculated scenarios are presented to provide guidance on how to use this map (see inset above). The three yellow numbers represent a site of an oil spill. The yellow arrows indicate direction that oil would move during a flood, ebb, or turning tide. The rate of weathering of the oil will dictate the time the oil will begin to sink and then real-time tidal information on water column and seabed currents will be needed to estimate vectoring.

Scenario 1: A dilbit oil spill in the southern Georgia Strait area during ebb tide would vector oil southward and westward where it could be mixed by turbulence at Boundary Pass. If this occurred during a Fraser River freshet or during a phytoplankton bloom oil-particle aggregates (OPAs) could form causing the oil to sink. This oil could then be directed toward the critical rockfish habitats of Sucia Island and toward Turn Point where embedment could occur on Skipjack Island Bank.

Scenario 2: A dilbit oil spill in southern Rosario Strait during flood tide would vector oil northward and eastward toward Bellingham Bay or westward toward Lopez Sound where sunken oil could settle and be incorporated into the soft sediments on the seabed. Few embedment sites are available in this area so mitigation actions would be directed toward recovering oil from unconsolidated sand and silt substrates.

Scenario 3: A dilbit oil spill in central Haro Strait during the end of a rising (flood) tide turning to a falling (ebb) would initially vector oil northward along the tidal strait and then return it and to the south. Once the oil sinks the strong seabed tidal flow would keep the oil mobilized within the distribution corridor with a possible eventual accumulation on the glacial banks near within the eastern Strait of Juan de Fuca.