

Nearshore Habitat Characterization on the Swinomish Reservation

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The nearshore environment is culturally important to the Swinomish Tribe as it provides habitat and resources for fish and shellfish. The Swinomish Water Resources Program (SWRP), in association with Skagit River System Cooperative (SRSC), initiated a nearshore habitat study on Skagit Bay, Washington. The SWRP portion of the study characterizes and monitors habitat changes over time for selected geomorphic conditions on beaches within the Swinomish Reservation, located on the southeast peninsula of Fidalgo Island about 70 miles north of Seattle, WA. The Reservation is the homeland for the Swinomish Indian Tribal community (Tribe) and comprises 7,431 acres of uplands within 24.62 miles of marine shoreline and 2,750 acres of tidelands. It is bounded to the east by the Swinomish Channel, to the north by Padilla Bay, to the west by Turners Bay and Kiket Bay, and to the south and southwest by Skagit Bay. The intertidal, or nearshore, zone between the Reservation uplands and these water bodies provides critical habitat to many culturally significant species. The Tribe relies on the fish, particularly salmonids, and shellfish that utilize this zone for subsistence, commercial harvest, and cultural uses. The fisheries and shellfisheries, in turn, are dependent on the environmental and ecological health of this zone.

In 2002, the Swinomish Office of Planning and Development Water Resources Program (WRP) initiated a nearshore habitat survey study in conjunction with a Skagit Systems Cooperative (now Skagit River System Cooperative) of the nearshore habitats of Skagit Bay. The initial study surveyed the morphology, substrate, and vegetation at transects on four Reservation Beaches: Turners Bay, Similk Bay, Kiket Bay, and Lone Tree Point. The WRP expanded their survey in 2003, adding transects on Sneeoosh Beach and revising the data collection procedures. The transects were surveyed monthly from May 2002 through November 2004, and continue to be surveyed on a bimonthly basis. The collected data will provide a baseline inventory for regulatory and restoration activities and should facilitate identification of any environmental changes over time. Observation of changes and trends in the environmental data may also improve our understanding of linkages between upland and shoreline land use and nearshore conditions.

Elevation, substrate, and vegetation are observed and documented along transects established perpendicular to the shoreline at each beach. Each transect extends from the extreme high water line to the low water line during the survey. Surveys are conducted during the lower tides of each monthly cycle, so most transects extend to at least mean lower low water lines. Stations are flagged at regular intervals along the transect line. The elevation of each station is determined using a transit and stadia rod and is recorded in a digital form on a PDA in the field. Substrate and vegetation are observed within a 25 cm grid positioned at each station. The percent area covered by each of ten vegetation classes is estimated and recorded in a digital form on the PDA. Sediment textural characteristics are recorded for the same grid area in another digital form. The data collected in the digital forms is downloaded to a PC in the office after field work is completed and then transferred to a database for later analysis.

The Skagit Bay beaches (SKA1,2,3,4,5) are categorized as flats. They are gravelly in the upper beach to an elevation of about +3' MLLW, where they transition to more sand-dominated substrate. SKA4 and SKA5 are vegetated with sparse brown algae (*Fucus*) between +3' and +7' MLLW during the summer. SKA3 is vegetated only below +3' MLLW where patches of eelgrass (*Zostera marina*) are present. These patches diminish slightly over the fall and winter.

LTP1 and KB1 are categorized as open beaches. LTP1 is gravelly throughout and dominated by green algae (*Ulva* and *Cladophora*), below +6' MLLW, with slight diminishing of density in the fall and winter except in the protected upper beach pools formed by dunes. KB1 is gravelly in the upper beach with a drop in grain size at about +3' MLLW. KB1 is dominated by green algae (*Cladophora*) and eelgrass (*Z. marina*), below +1' MLLW, and all vegetation goes dormant in the winter.

SB1 and TB1 are categorized as coves. SB1 is gravelly with irregular intermittent fining around 0' MLLW. SB1 is dominated by green algae (*Ulva* and *Cladophora*), below +5' MLLW, with sparse patches of eelgrass (*Zostera marina*) in the lower portion of the transect, below +1' MLLW. TB1 is gravelly in the upper beach with a band of finer material at about +6' MLLW and some additional summer fining in the lower portion of the transect. TB1 is

dominated by eelgrass (*Zostera japonica*) from +8' to +3' MLLW and *Ulva* with sparse patches of *Z. Marina* below +3' MLLW. The *Z. japonica* persists all year long while the other species go dormant in the winter.

The studied beaches show no consistent pattern of seasonal variation in morphology (profile) or substrate texture. Most do show seasonal variability in vegetation patterns that appears to be consistent with expected weather-related changes. The stability of the beach profile and sediment composition appear to indicate that these beaches are not depositional beaches, but rather are erosional and to a large degree geologically controlled. Beach sediments are generally coarse in texture and clay poor. The beaches are developed on Quaternary glacial units (TB1 on glacial outwash, the remaining beaches on glacial till) that would provide a source of gravel and sand. The lack of clay suggests winnowing occurs to remove the finer material from the beach, leaving behind the coarser material.

The current study has not yet generated sufficient data to determine whether these beaches are actively eroding and, if so, whether that erosion can be related to anthropogenic changes to the shoreline and/or adjacent land use. Monitoring is continuing to expand the dataset and specifically address these issues. SKA4, in particular, was established to identify any effects related to installation of a soft-armor bank stabilization. Additional targeted studies to more fully address affects of shoreline modifications are also under consideration.