Nearshore Habitat Mapping of the Elwha River Delta

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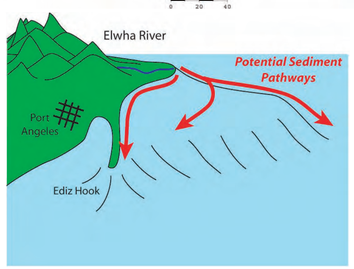
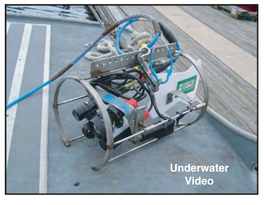
Objective

The pending dam removals on the Elwha River will release millions of tons of sediment to the nearshore and permanently reestablish sediment transport to the river mouth from the upper river. This influx of sediment will likely modify and restore coastal habitats. The objective of this work is to characterize the habitats offshore of the Elwha River delta by mapping bathymetry and substrate type offshore. This will allow for the detection of change with future mapping and the identification of sites for more detailed investigation.

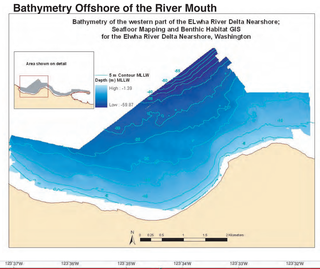


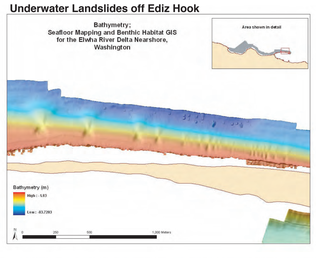
Techniques

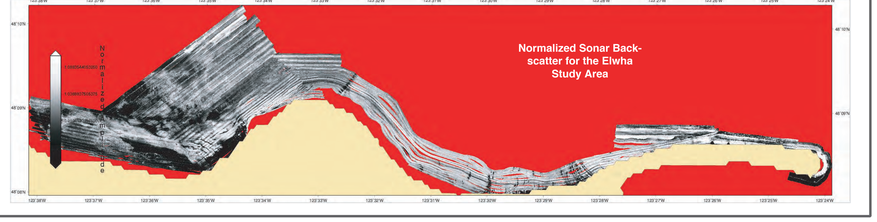
Benthic substrate and habitat mapping were conducted with combined interferometric sonar and underwater video-camera system operated from the research vessel (R/V) Karluk from March 15 – 31, 2005. Sonar data were collected using a 234 kHz SEA Swathplus interferometric sonar, which provides high-resolution images of the acoustic backscatter and bathymetry of the sea floor.



Bathymetry and Acoustic Backscatter

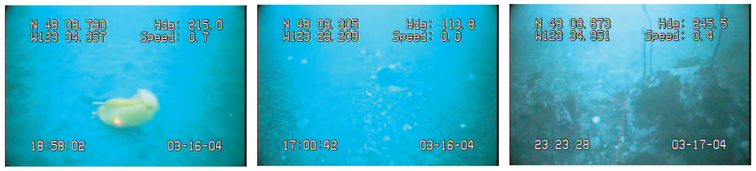


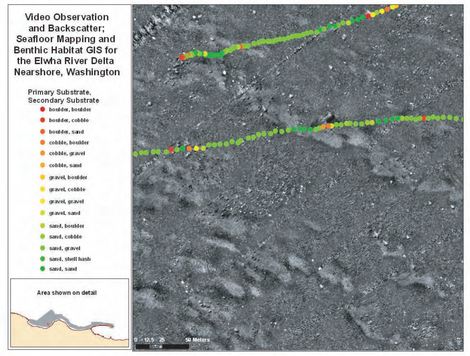




Comparison of Backscatter and Video

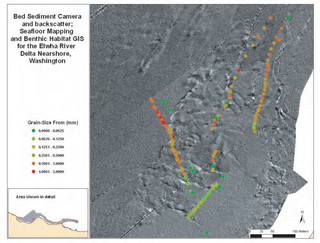
The video observations confirmed that distinct seafloor types (e.g., sand, gravel, boulder) are present in the study area Comparison of the video and sonar backscatter suggested that distinct bould field, sand waves and rippled gravel beds exist.

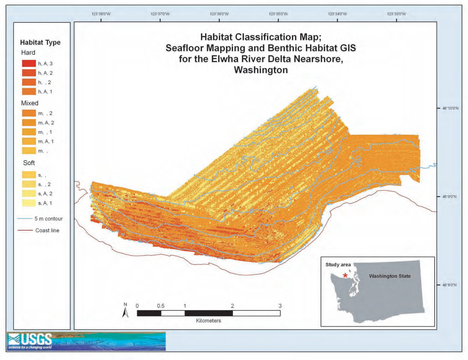


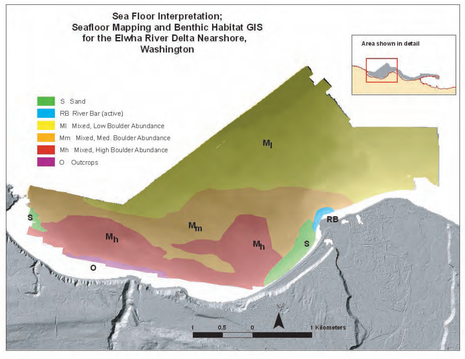


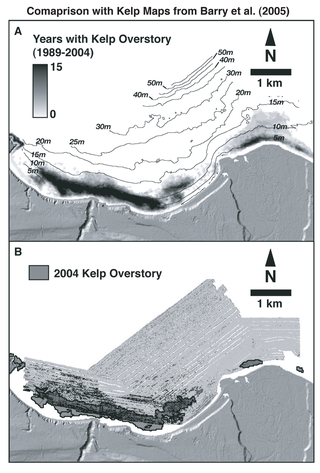
Grain Size Sampling

Grain size was sampled using a "floating eyeball" underwater camera (Rubin, 2004) and reaveled characteristics of the sandy region west of the river mouth.









Habitat Classification

The mapped seafloor area was classified using a supervised maximum likelihood classification technique based on the following characteristics: distance from boat track line, rugosity (or roughness) of the bathymetry, entropy and homogeneity of the backscatter, and the mean backscatter. Supervisory signatures of each variable were generated for a series of fixed sites, and it was found that four dominant seafloor substrate classes could be distinguished by the classification technique: sand, mixed (i.e., gravel and cobble), hard (boulders and bedrock), and sand-waves (continuous bodies of sand with length scales of ~10 m). An interpretation of the sea floor was made using the classification map and calculations of boulder abundance. Bull kelp (as mapped by Barry et al., 2005) was found to be most abundant on hard (cobble and boulder) substrate in shallow (<15 m) water depths.

For More Info... see the publications of this investigation:

1. GR Cochrane, Warrick JA, Y Sagy, J Harney. 2008. Seafloor Mapping and Benthic Habitat GIS for the Elwha River Delta Nearshore, Washington. U.S. Geological Survey Data Series Report 320.
2. Warrick JA, GR Cochrane, Y Sagy, G Gelfenbaum, In press. Nearshore substrate and morphology offshore of the Elwha River. Northwest Science. Special Issue on the Elwha River.