ASSESSING DAMAGE ON THE MAJOR SUBMARINE DELTAS OF SOUTHERN PUGET SOUND AFTER THE 2001 NISQUALLY EARTHQUAKE USING HIGH-RESOLUTION SEAFLOOR MULTIBEAM MAPPING

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NOAA and the U. S. Geological Survey conducted high-resolution multibeam mapping of portions of the seafloor of southern Puget Sound to assess the effects of the 28 February, 2001 Nisqually earthquake. Within a month of the earthquake a joint cruise was organized to examine the submerged portions of the Duwamish River delta in Seattle, the Puyallup River delta in Tacoma, and the Nisqually River delta, near the earthquake epicenter. Although no submarine failures were found on the Nisqually River delta, a variety of failures were observed on the Puyallup and Duwamish River deltas, some of which may be related to the earthquake. New bathymetric data along the Puyallup River delta in Commencement Bay show a few known historic submarine failures, many older looking failures, and several fresh features that may be related to the recent earthquake. Major submarine failures from 1894 along the southwestern delta front and from 1992 along the central delta front, as well as several other failures are easily identified in the new data. Features, including an arcuate-shaped headscarp and numerous craters, interpreted as expulsion pits, may be a result of the earthquake. The headscarp has about 2 meters of offset and is about 200 m wide. The craters are as much as 25 m across and 0.5 m deep and are the type of features that might be expected after severe ground shaking. Also on the Puyallup Delta is a marine disposal mound that has been cut by several landslides, some as large as 100 m wide, 15 m deep, and hundreds of meters long. The Duwamish River delta and the margins of Elliott Bay also have numerous submarine failures that are evident in the multibeam data. The delta front has several failures, ranging in width from less than 40 m to more than 300 m and in length from less than 100 m to more than 500 m. The heads of these submarine landslides are in less than 15 m of water and within a few tens of meters from the Seattle Port facility. Along the north side of Elliott Bay are a fresh looking landslide scar and a large crater. The crater has a 6-m wide floor, is 1.6 m deep, and has a raised rim.

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