U.S. DEPARTMENT OF THE INTERIOR
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QUATERNARY GEOLOGIC INVESTIGATIONS OF THE CONTINENTAL SHELF OFFSHORE SOUTHERN WASHINGTON AND NORTHERN OREGON

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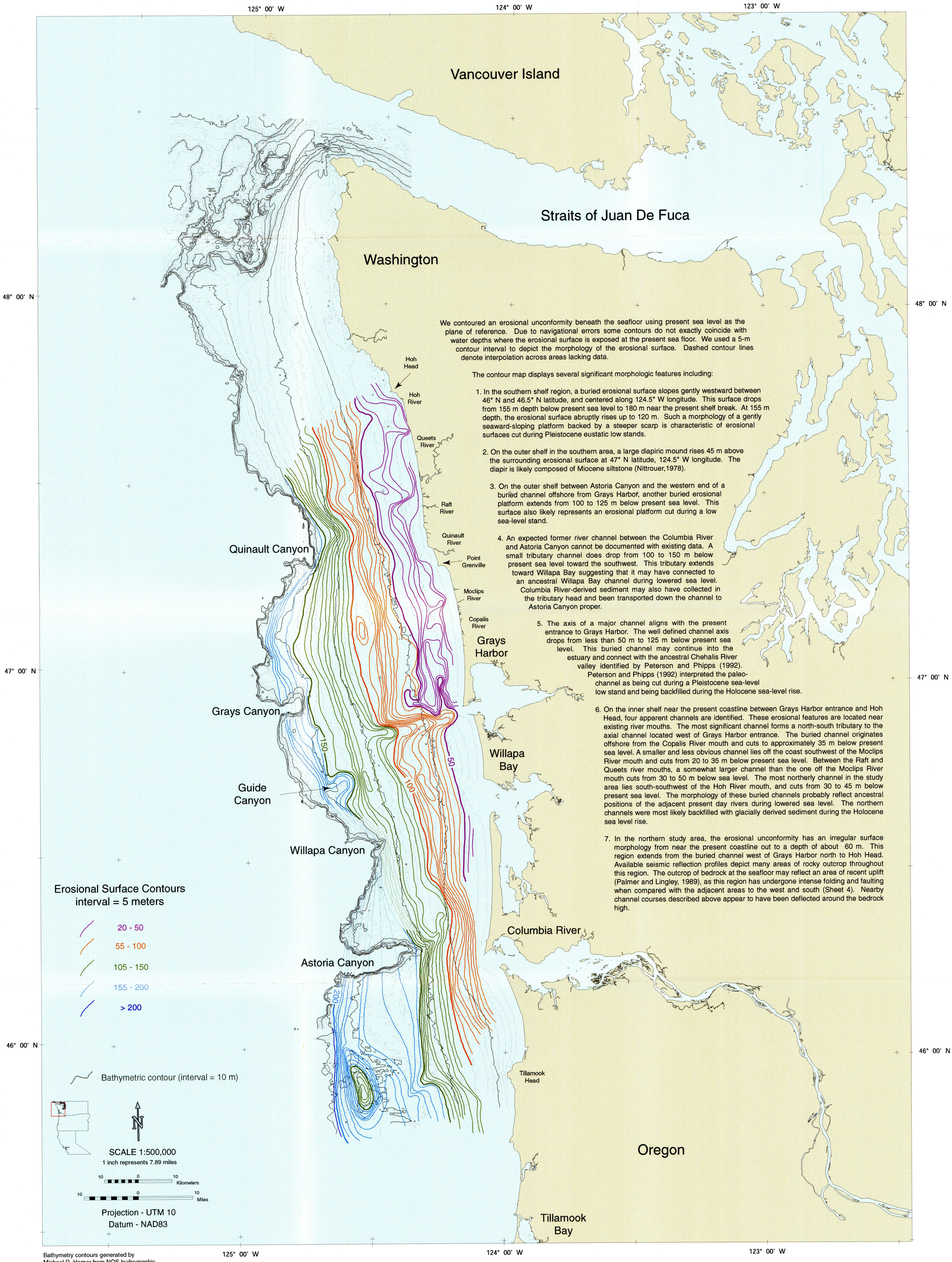
Sheet 2 of 4
Quaternary Erosional Surface



We contoured an erosional unconformity beneath the seafloor using present sea level as the plane of reference. Due to navigational errors some contours do not exactly coincide with water depths where the erosional surface is exposed at the present sea floor. We used a 5-m contour interval to depict the morphology of the erosional surface. Dashed contour lines denote interpolation across areas lacking data.

The contour map displays several significant morphologic features including:

1. In the southern shelf region, a buried erosional surface slopes gently westward between 46° N and 46.5° N latitude, and centered along 124.5° W longitude. This surface drops from 155 m depth below present sea level to 180 m near the present shelf break. At 155 m depth, the erosional surface abruptly rises up to 120 m. Such a morphology of a gently seaward-sloping platform backed by a steeper scarp is characteristic of erosional surfaces cut during Pleistocene eustatic low stands.

2. On the outer shelf in the southern area, a large diapiric mound rises 45 m above the surrounding erosional surface at 47° N latitude, 124.5° W longitude. The diapir is likely composed of Miocene siltstone (Nittrouer,1978).

3. On the outer shelf between Astoria Canyon and the western end of a buried channel offshore from Grays Harbor, another buried erosional platform extends from 100 to 125 m below present sea level. This surface also likely represents an erosional platform cut during a low sea-level stand.

4. An expected former river channel between the Columbia River and Astoria Canyon cannot be documented with existing data. A small tributary channel does drop from 100 to 150 m below present sea level toward the southwest. This tributary extends toward Willapa Bay suggesting that it may have connected to an ancestral Willapa Bay channel during lowered sea level. Columbia River-derived sediment may also have collected in the tributary head and been transported down the channel to Astoria Canyon proper.

5. The axis of a major channel aligns with the present entrance to Grays Harbor. The well defined channel axis drops from less than 50 m to 125 m below present sea level. This buried channel may continue into the estuary and connect with the ancestral Chehalis River valley identified by Peterson and Phipps (1992). Peterson and Phipps (1992) interpreted the paleo-channel as being cut during a Pleistocene sea-level low stand and being backfilled during the Holocene sea-level rise.

6. On the inner shelf near the present coastline between Grays Harbor entrance and Hoh Head, four apparent channels are identified. These erosional features are located near existing river mouths. The most significant channel forms a north-south tributary to the axial channel located west of Grays Harbor entrance. The buried channel originates offshore from the Copalis River mouth and cuts to approximately 35 m below present sea level. A smaller and less obvious channel lies off the coast southwest of the Moclips River mouth and cuts from 20 to 35 m below present sea level. Between the Raft and Queets river mouths, a somewhat larger channel than the one off the Moclips River mouth cuts from 30 to 50 m below sea level. The most northerly channel in the study area lies south-southwest of the Hoh River mouth, and cuts from 30 to 45 m below present sea level. The morphology of these buried channels probably reflect ancestral positions of the adjacent present day rivers during lowered sea level. The northern channels were most likely backfilled with glacially derived sediment during the Holocene sea level rise.

7. In the northern study area, the erosional unconformity has an irregular surface morphology from near the present coastline out to a depth of about 60 m. This region extends from the buried channel west of Grays Harbor north to Hoh Head. Available seismic reflection profiles depict many areas of rocky outcrop throughout this region. The outcrop of bedrock at the seafloor may reflect an area of recent uplift (Palmer and Lingley, 1989), as this region has undergone intense folding and faulting when compared with the adjacent areas to the west and south (Sheet 4). Nearby channel courses described above appear to have been deflected around the bedrock high.

Bathymetry contours generated by Michael R. Hamer from NOS hydrographic soundings obtained from NOAA.

SHEET 2

CONTOUR MAP OF LATE QUATERNARY EROSIONAL SURFACE