U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

THE WASHINGTON AND OREGON MID-SHELF SILT DEPOSIT AND ITS RELATION TO THE LATE HOLOCENE COLUMBIA RIVER SEDIMENT BUDGET

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MSSD/COLUMBIA RIVER SEDIMENT BUDGET

By
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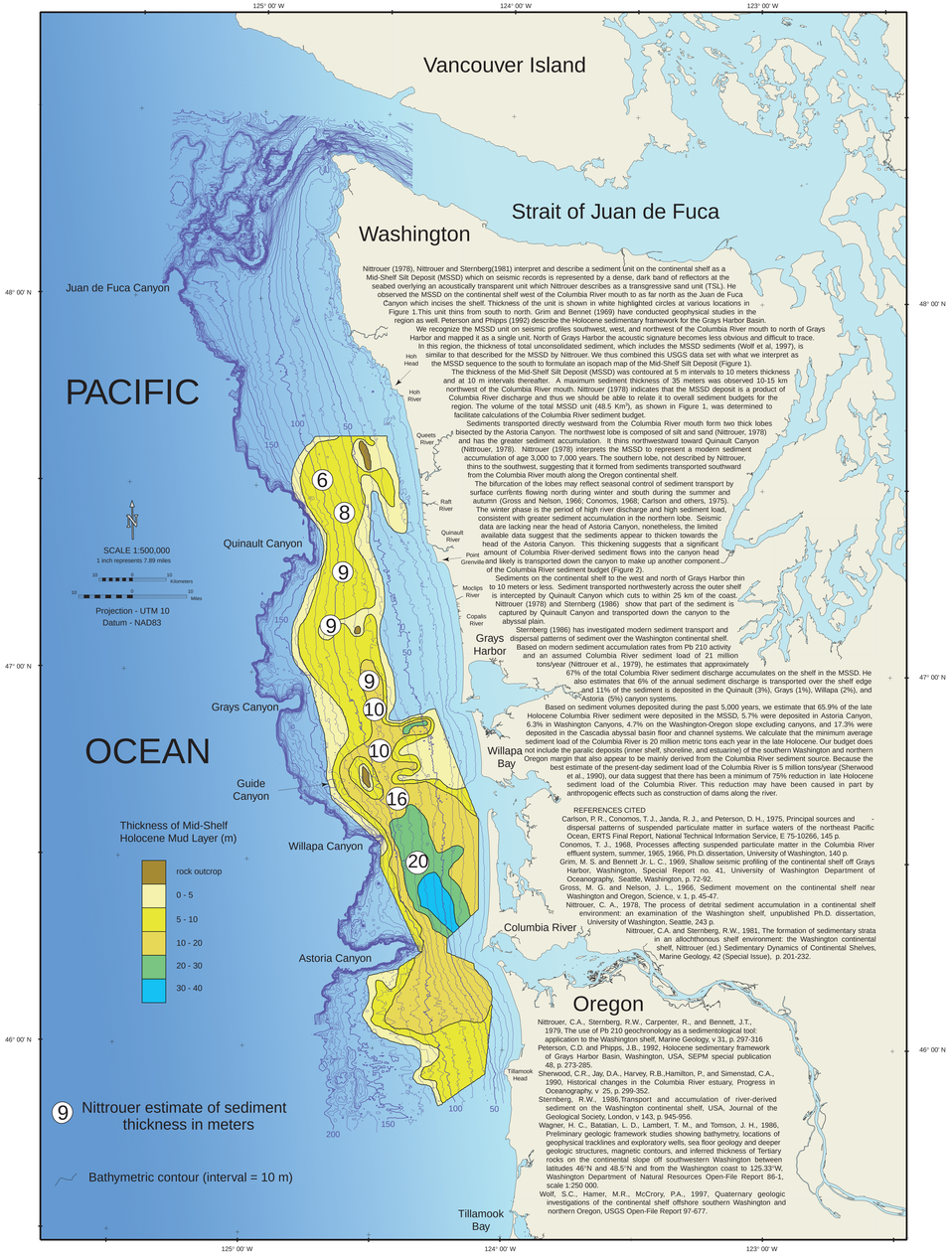

Figure 1. Isopach map of the Mid-Shelf Silt Deposit compiled from pre-existing USGS seismic survey data. Bathymetry contours generated by Michael R. Hamer from NOS hydrographic soundings obtained from NOAA

The purpose of this report is to compile and analyze existing data which lend support to the development of a sediment budget for the Columbia River, coastal, and offshore regions of southwest Washington. This will contribute to the construction of a sediment budget model which will reflect sediment sources, depocenters, and the contribution to each region. Figure 1 describes the origin, distribution, and thickness of the Mid-Shelf Silt Deposit (MSSD) based on analysis of seismic data acquired between 1976-1980 (Wolf et al., 1997). Sediment volumes deposited during the past 5000 years were calculated for each of the physiographic areal compartments shown in Figure 2. Table 1 organizes the data from Figures 1 and 2 into tabular form. This table provides a representation of the percent volume and weight of sediment types which contribute to the estimated Columbia River sediment budget. The compartments shown in Figure 2 are color co-ordinated with Table 1.

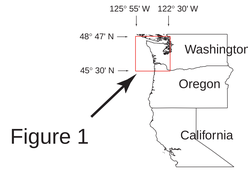

Figure 1

Figure 2

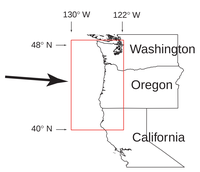

Table 1. Estimated Columbia River Sediment Budget

GEOGRAPHIC AREA	VOLUME Km³	DRY BULK (1) DENSITY (metric tons/m³)	WEIGHT (metric tons/yr)	CORRECTION FACTOR (2)	CORRECTED WEIGHT (TONS/YR)	% COLUMBIA R. BUDGET	
WA/OR MID/OUTER SHELF	48.500	1.41	13,677,000	-3.5%	13,198,305	65.87	Fig. 1
WASHINGTON SLOPE *	N/A	N/A	N/A	N/A	1,300,000	6.49	
WASHINGTON CANYONS *	N/A	N/A	N/A	N/A	1,255,000	6.27	
N. CASCADIA BASIN	2.612	0.85	444,040	-3.2%	429,830	2.15	
CASCADIA CHANNEL	5.757	0.85	978,690	-3.8%	941,499	4.70	
ASTORIA CANYON FLOOR	0.873	0.96	167,529	-2.9%	162,670	0.81	Astoria Canyon
NORTHERN OREGON SLOPE	3.493	0.96	670,656	-2.9%	651,206	3.25	
NORTHERN ASTORIA FAN	3.287	0.85	558,879	-3.0%	542,112	2.71	
CENTRAL ASTORIA FAN	7.809	0.85	1,327,530	-36.2%	846,964	4.23	
SOUTHERN ASTORIA FAN	14.138	0.85	2,403,460	-70.8%	701,810	3.50	
TOTAL OFFSHORE COLUMBIA RIVER SEDIMENT PER YEAR **					20,017,110	100.00	

* Washington slope and canyons from Sternberg (1986)
** not including inner shelf, shoreline, and estuarine sediments

ASTORIA CANYON ASTORIA CHANNEL	N/A	N/A	1,174,000	-2.9%	1,139,954	5.69
NORTHERN ASTORIA FAN	0.182	0.85	30,940	-3.0%	30,012	0.15
CENTRAL ASTORIA FAN	1.166	0.85	198,220	-36.2%	126,464	0.63
				TOTAL	1,296,430	6.47
WASHINGTON CANYONS	N/A	N/A	N/A	N/A	1,255,000	6.27
CASCADIA CHANNEL	5.757	0.85	978,690	-3.8%	941,499	4.7
				TOTAL	2,196,499	10.97

(1) Dry bulk density numbers were derived mainly from sediment water content and textural data of Carlson (1967), Griggs (1969), Nelson (1968), and Nittrouer (1978) converted to dry bulk density values with the formulas of Hamilton (1970) and Lambe and Whitman (1969). In addition, cores taken in 1998, on the Washington and Oregon shelf, along N-S and E-W transects had direct measurements of density that were taken by the core sediment logger.

(2) Correction factors account for autochthonous organic carbon and carbonate carbon contents measured in sediment cores from the different physiographic areal compartments: the shelf sediment factor is from Nittrouer (1978); N. Cascadia Basin and Cascadia channel factors are from Griggs (1969); Astoria Canyon floor and northern Oregon slope factor are from Carlson (1968); Astoria Fan factors are from Nelson (1968). The large central and southern Astoria Fan correction factors are derived from Holocene clay mineralogical analyses of Duncan et al (1970) which show that about 33% of clays in the central Astoria Fan and about 68% of clays from the southern Astoria Fan are from non-Columbia River sources .

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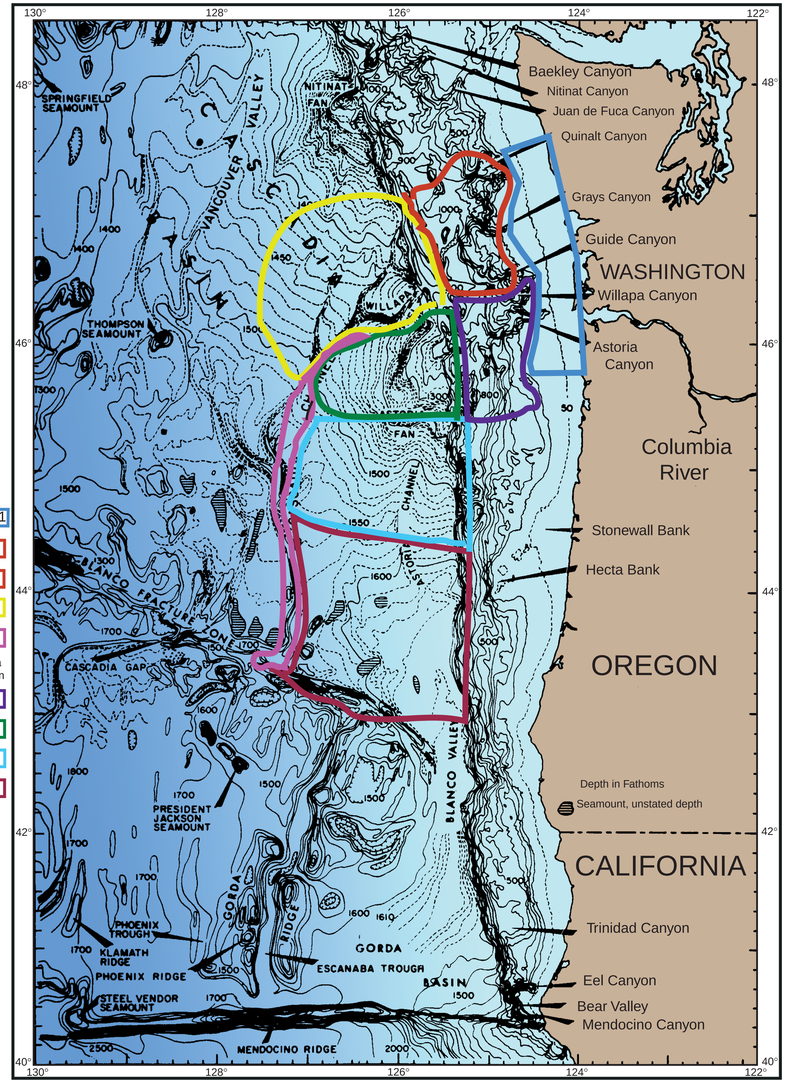

Figure 2. Shelf/slope/fan map showing area compartments for which calculations were made and tabulated in Table 1

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