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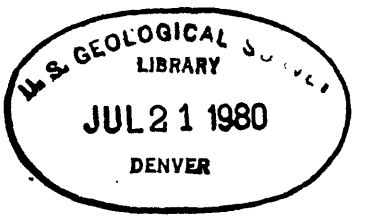
Preliminary map of offshore geology in the Protection Island-Point Partridge area, northern Puget Sound, Washington

BY

H. C. Wagner and M. C. Wiley



U. S. Geological Survey
OPEN FILE REPORT

80-548

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Introduction

The data presented herein are part of a regional study of the northern Puget Sound-eastern Strait of Juan de Fuca offshore area. This brief report addresses the offshore geology in this part of the northern Puget Sound area (Fig. 1).

Data used in the report consist mainly of high-resolution, shallow-penetration seismic reflection profiles and other geophysical data collected by the U.S. Geological Survey and the Geological Survey of Canada (Tiffin and others, 1974; Snavely and others, 1974, Snavely and others, 1976; Tiffin and others, 1976; MacLeod and others 1977; Snavely and Tiffin, 1980). Offshore projections of onshore faults and other structures shown by Gower (1978, 1980) have been verified and extended northward through the interpretation of the seismic profiles. Discussions of shorecliff exposures during a field study tour in 1979 with Fred Pessl and Ralph Keuler of the U.S. Geological Survey were most helpful in assessing field relations of Quaternary units in the Dungeness, Quimper Peninsula, and southern Whidbey Island Areas. Bathymetric maps of the Canada Hydrographic Service (1976) and Chrzastowski (1978) were helpful in relating offshore seafloor geologic features on seismic records with bathymetry.

The attached geologic map (Fig. 2) is based on the interpretation of high-resolution records that have been placed in the Open-File publication

series of the U.S. Geological Survey. Packets of similar geological structural units (faults and folds) were correlated from seismic line to seismic line. Trends of the correlative packets show continuity or discontinuity of structures between lines. Importantly, fault "G" of Gower (1980), which trends northwestward into Admiralty Inlet, is defined offshore by a line that goes through a fault zone on Parizeau line 43 and terminates offshore faults and folds both to the southeast and northwest. Other faults interpreted on the seismic profiles appear to connect with the offshore extention of onland faults mapped by Gower (1978, 1980). Most of the faults shown in figure 2 have apparently been active in Holocene time as indicated by the young age of the sediments they cut and their relations to offsets of the seafloor.

Other geologic features observed in the region include two landslides seen on lines 34 and 35 and two recent slumps on lines 34 and 36 of the Parizeau cruise of 1972 (Snavely and others, 1980). Two of the landslides could be parts of much larger features and extend to greater depths than indicated on figure 2. The slumps are probably fairly small. A portion of Parizeau lines 31 and 32, in which the reflecting horizons are missing or obscure, may indicate considerable gas or peat in the sediments.

Conclusions:

Several offshore faults that offset Pleistocene and Holocene sediments are present in the area. Landslides, slumps, areas of gas-charged or peaty sediments, and zones of Holocene folding and faulting probably warrant further investigation.

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123° 10'

122° 55'

122° 40'

48° 15'

48° 10'

SCALE 1:100,000

0 5 10 Km

0 5 miles

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FIGURE 1. MAP SHOWING SEISMIC REFLECTION PROFILE LINES IN THE PROTECTION ISLAND - POINT PARTRIDGE AREA, NORTHERN PUGET SOUND, WASHINGTON

WHIDBEY ISLAND

POINT PARTRIDGE

ADMIRALTY INLET

PROTECTION ISLAND

QUIMPER PENINSULA

Mc Curdy Point

LINE 31

LINE 32

LINE 33

LINE 34

LINE 35

LINE 36

LINE 37

LINE 38

LINE 42

LINE 43

LINE 362

MILLER D-1 76 (N)

MILLER D-1

MILLER E-76

MILLER R-78

SCALE 1:100,000

0 5 10 km

0 5 mi.

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FIGURE 2. PRELIMINARY MAP OF OFFSHORE GEOLOGIC STRUCTURES IN THE PROTECTION ISLAND - POINT PARTRIDGE AREA, NORTHERN PUGET SOUND, WASHINGTON

APRIL, 1980

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123° 10'
122° 55'
122° 40'
48° 15'
48° 10'

WHIDBEY ISLAND
POINT PARTRIDGE
PROTECTION ISLAND
McCURDY POINT
QUIMPER PENINSULA

Fault "D" of MacLeod and others (1977)
Fault "C" of MacLeod and others (1977)
Holocene Fault
Fault poss. offset seafloor
zone of Holocene faults
Holocene faults
Probable Holocene faults
Bar and ball on downthrown side of fault
Large slump
Holocene? fault
Fault zone
Onshore fault zone
Direction of dip of fault
Vertical Holocene fault
Area of gas-saturated or peaty sediments
Fault zone with series of faults that appear to cut only upper Pleistocene sediments
Landslide; northern limit unknown
Slump
Relation of fault to bedding suggests pre-Vashon faulting that generated large landslide; folded bedding and irregular seafloor
Extension of Fault "G" of Gower (1980).