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Quaternary Fault and Fold Database of the United States

As of January 12, 2017, the USGS maintains a limited number of metadata fields that characterize the Quaternary faults and folds of the United States. For the most up-to-date information, please refer to the interactive fault map.

unnamed fault south of Port Angeles (Class A) No. 555

Last Review Date: 2003-09-03

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Synopsis	This unnamed, east-striking fault occurs along the northern flank of the Olympic Mountains in deformed Tertiary rocks that are peripheral to more complexly deformed rocks of the Olympic subduction zone that forms the core of this mountain range. The fault occurs very low on the northern flank of the Olympic Mountains, within a few kilometers of the coast. This area between the Olympic Mountains and the coast was occupied several times during the Pleistocene by the edge of continental ice sheets, and this fault is largely inferred in glacial and glaciomarine deposits related to those Pleistocene glacial events. The character and position of the inferred trace of this fault is based on locations of deformed Quaternary sediments and on the characteristics of the deformation observed at those sites, as reported in Gower and others (1985 #4725). They reported three sites along or near the inferred trace of this fault where

	Quaternary sediments, which are probably older than about 16 ka, are deformed. At two of those sites they reported evidence for a south-dipping thrust fault; and at one of these two sites and at the other of these three sites, they reported that the deformed sediments are overlain by apparently undeformed Vashon drift, which is younger than about 16 ka in age. At a site near the coast that is about 2 km north-northeast of the inferred trace of this fault, Brown and others (1960 #6213) reported gentle arching of Vashon glacial outwash along the Swamp Creek anticline. Relations, if any, of this arching to this unnamed fault have not been reported.
Name comments	This unnamed east-striking fault is located directly south of Port Angeles, Washington, along the northern flank of the Olympic in the northeastern part of the Olympic Peninsula. Gower and others (1985 #4725) show this fault as an inferred fault on a 1-250,000-scale seismotectonic map of the Olympic Peninsula, and the fault is also shown on a 1:2,000,000-scale map of known or suspected Quaternary faults in the Pacific Northwest. The fault is not shown on geologic maps of this region that range in scale from 1:62,500 to 1:250,00 (Brown and others, 1960 #6213; 1970 #6212; Tabor and Cady, 1978 #6221; Dragovich and others, 2002 #5715). As shown on the seismotectonic map by Gower and others (1985 #4725), the inferred, east-striking trace of this fault crosses through southern rural areas of the town of Port Angeles, Washington, about 1-4 km south of the coast at Port Angeles Harbor. In this region south of Port Angeles, the trace is shown extending eastward from about 1 km west of Tumwater Creek to about 2 km east of Morse Creek.
County(s) and State(s)	CLALLAM COUNTY, WASHINGTON
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Fault trace is from the 1:250,000-scale seismotectonic map by Gower and others (1985 #4725); the trace was transferred directly onto a registered mylar overlay and digitized at 1:250,000 scale.
Geologic setting	This unnamed fault occurs along the northern flank of the

	Olympic Mountains near the physiographic boundary between the Olympic Mountains and the Straight of Juan de Fuca and Puget lowlands to the north and east, respectively. This physiographic boundary also nearly marks the approximate limit of a region to the north and east that was occupied several times during the Pleistocene by the Puget lobe of continental ice sheets (e.g., Gower and others, 1985 #4725). The Olympic Mountains are comprised of complexly deformed Eocene and younger Tertiary rocks. Rocks in the core of the Olympic Mountains are part of the Olympic subduction complex that formed during Paleogene subduction of the Juan de Fuca plate to the west (Tabor and Cady, 1978 #6221; 1978 #6222; Dragovich and others, 2002 #5715). In map view, rock units of the Olympic Mountains now show a map pattern that suggests they define a large, east plunging anticline that is superimposed on earlier formed thrust faults and folds related to subduction. The origin of this anticlinal form and pattern of the deformed rock units and thrust faults and folds is not fully understood, but it may have resulted from Neogene isostatic rebound and doming of the structurally thickened subduction complex (Tabor and Cady, 1978 #6222). Regardless of the origin of the apparently younger anticlinal form, the result is an east-plunging antiformal core of underplated, more highly deformed deep-marine siliciclastic rocks that are bordered by an open-to-the-west, horseshoe-shaped margin of basalt and marginal marine rocks. This unnamed fault occurs in the peripheral rocks and overlying Pleistocene glacial deposits along the northern, north-dipping limb of the antiform described above. Gower and others (1978 #6209) show this unnamed fault as an east-striking, south-dipping thrust fault that occurs directly north of several east-striking, north-dipping thrust fault segments that are part of the horseshoe-shaped system of deformed(?) thrust faults
Length (km)	11 km.
Average strike	N87°W
Sense of movement	Thrust *Comments:* Fault is shown as an inferred, south-dipping thrust fault on the seismotectonic map of Gower and others (1985 #4725).
Dip Direction	S

	Comments: Fault is shown as an inferred, south-dipping thrust fault on the seismotectonic map of Gower and others (1985 #4725), which suggests that the fault dips to the south. Furthermore they report a clay gouge zone that occurs in steeply dipping clay, silt and gravel; they suggest that the gouge zone may occur along this otherwise inferred fault, presumably implying that the gouge zone dips to the south.
Paleoseismology studies	
Geomorphic expression	Fault is shown as an inferred, south-dipping thrust fault on the seismotectonic map of Gower and others (1985 #4725), however, they report and briefly describe four sites along and near the inferred trace of the fault, which show deformation of Quaternary sediments. Scarps or other geomorphic features indicative of surface offsets have not been reported. However, the trace of this fault is shown in an area covered by glacial deposits that are assigned latest Pleistocene to Holocene ages on the geologic map by Dragovich and others (2002 #5715), and these deposits might obscure evidence for older Quaternary deformation.
Age of faulted surficial deposits	Gower and others (1985 #4725) reported four sites along and near the inferred trace of this fault, where Quaternary sediments are deformed. These sites are their sites 4-7, which are located on their seismotectonic map and listed and briefly described in their table 1. At three of these four sites, they reported that the age of the deformed sediment was pre-Fraser, older than about 16 ka (e.g., Porter and Swanson, 1998 #6237); at the fourth site, sediments of post-Fraser-age are reported to be gently arched. At their site 4, along or near the western part of the fault trace, they reported steep-dipping (up to 87?) sediments that are associated with a clay gouge zone that may lie along the inferred trace of the fault. For this site they further reported that the deformed sediments appear to be overlain by undeformed Vashon drift (younger than about 16 ka). At site 5, farther east along or near the western part of the fault trace, they reported sediments dipping 13? to the south and noted that they also appear to be overlain by undeformed Vashon drift. Along or near the eastern part of the fault trace, overturned glacial drift in fault contact with Oligocene siltstone along a south-dipping thrust fault is exposed in a road-cut along US 101 on the east side of Morse Creek (Site 6, P.D. Snavely, Jr., oral commun. in Gower and others, 1985 #4725). Gower and others (1985 #4725) reported that these

	overturned glacial drift deposits were pre-Fraser in age. At a site located about 2 km to the north-northeast of the east-end of the fault trace, Brown and others (1960 #6213) reported gentle arching of stratified Vashon glacial outwash along the Swamp Creek anticline (Site 7 in Gower and others, 1985 #4725).
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Deformation of Quaternary sediments along or near the inferred trace of this unnamed fault suggests one or more Quaternary faulting events along or in the vicinity of the mapped trace of this fault. Reported ages of deformed and undeformed sediments along and near the trace of this fault, suggest that the youngest event probably is older than latest Quaternary (>15 ka in age). Brown and others (1960 #6213) reported gentle arching of Vashon glacial deposits, which are younger than about 16 ka (e.g., Porter and Swanson, 1998 #6237), at a locality about 2 km to the north-northeast of this unnamed fault. Gower and others (1985 #4725), however, reported that apparently undeformed Vashon glacial deposits overlie deformed Quaternary sediments at sites along or near the inferred trace of this unnamed fault. No information has been reported on the likely maximum age of these deformed sediments, and consequently this unnamed, and largely inferred fault south of Port Angeles is assigned a Quaternary (<1.6 Ma) age for the time of the most recent prehistoric faulting event.
Recurrence interval	 *Comments:* Deformation of Quaternary sediments along or near the inferred trace of this unnamed fault suggests one or more Quaternary events along or in the vicinity of the mapped trace of this fault. Reported ages of deformed and undeformed sediments along and near the trace of this fault, suggest that the youngest event probably is older than latest Quaternary (>15 ka in age). However, there is no reported information that constrains the possible number of Quaternary events nor their timing.
Slip-rate category	Less than 0.2 mm/yr *Comments:* Existing data and interpretations do not specifically address or constrain the slip-rate(s) of this unnamed fault. Based

	mostly on this lack of information, a conservative <0.2 mm/yr slip-rate is assigned herein.
Date and Compiler(s)	2003 David J. Lidke, U.S. Geological Survey
References	#6212 Brown, R.D., Jr., 1970, Geologic map of the north-central part of the Olympic Peninsula, Washington: U.S. Geological Survey Open-File Report 70-43, 2 sheets, scale 1:62,500. #6213 Brown, R.D., Jr., Gower, H.D., and Snavely, P.D., Jr., 1960, Geology of the Port Angeles-Lake Crescent area, Clallam County, Washington: U.S. Geological Survey Oil and Gas Investigations Map OM-203, 1 sheet, scale 1:62,500. #5715 Dragovich, J.D., Logan, R.L., Schasse, H.W., Walsh, T.J., Lingley, W.S., Jr., Norman, D.K., Gerstel, W.J., Lapen, T.J., Schuster, J.E., and Meyers, K.D., 2002, Geologic map of Washington—Northwest quadrant: Washington Division of Geology and Earth Resources Geologic Map GM-50, 72 p. pamphlet, 3 sheets, scale 1:250,000. #6209 Gower, H.D., 1978, Tectonic map of the Puget Sound region, Washington, showing locations of faults, principal folds, and large-scale Quaternary deformation: U.S. Geological Survey Open-File Report 78-426, 22 p. #4725 Gower, H.D., Yount, J.C., and Crosson, R.S., 1985, Seismotectonic map of the Puget Sound region, Washington: U.S. Geological Survey Miscellaneous Investigations Map I-1613, scale 1:250,000. #6237 Porter, S.C., and Swanson, T.W., 1998, Radiocarbon age constraints on rates of advance and retreat of the Puget lobe of the Cordilleran ice sheet during the last glaciation: Quaternary Research, v. 50, p. 205-213. #6221 Tabor, R.W., and Cady, W.M., 1978, Geologic map of the Olympic Peninsula, Washington: U.S. Geological Survey Miscellaneous Investigations Map I-994, scale 1:125,000. #6222 Tabor, R.W., and Cady, W.M., 1978, The structure of the Olympic Mountains; analysis of a subduction zone: U.S. Geological Survey Professional Paper 1033, 39 p.