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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.

Willapa Canyon fault zone (Class A) No. 596

Last Review Date: 2000-07-03

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Synopsis	The northwest-striking, left-lateral Willapa Canyon fault zone offsets accretionary wedge sediments that underlie the continental slope in the forearc of the Cascadia subduction zone [#781]. The fault zone appears to offset the active deformation front, but evidence of offset of the subducting Juan de Fuca Plate is equivocal. The fault zone is mapped as multiple fault strands and aligned and offset fold axes in poorly consolidated sediments of unknown age on the lower continental slope; a submarine canyon of unknown age is offset 900 m across the zone. Similarities with other faults suggest most recent movement in the late Pleistocene and Holocene. However, the age of offset accretionary wedge sediments and a submarine channel along the fault zone are unknown. As with other folds and faults located in the Cascadia forearc, it is unknown if coseismic displacements on faults of this zone are always related to great megathrust earthquakes on the subduction zone, or whether some independent displacements are

	related to smaller earthquakes in the overriding North American Plate.
Name comments	The Willapa Canyon fault zone was originally mapped by Goldfinger and others (1992 #446) and named the Quinault Canyon fault by Goldfinger (1994 #3972). This northwest-striking zone of faults was renamed the Willapa Canyon fault zone by Goldfinger and others (1997 #4090); the latter name is retained herein.
County(s) and State(s)	PACIFIC COUNTY, WASHINGTON (offshore) CLATSOP COUNTY, OREGON (offshore)
Physiographic province(s)	PACIFIC BORDER (offshore)
Reliability of location	Poor Compiled at 1:250,000 scale. *Comments:* Fault traces are from offshore mapping of Goldfinger and others (1992 #446; 1994 #3972; 1997 #4090).
Geologic setting	The northwest-striking, left-lateral Willapa Canyon fault zone offsets accretionary wedge sediments that underlie the continental slope in the forearc of the Cascadia subduction zone [#781]. Faults of this zone appear to offset the active deformation front, but evidence of offset of the subducting Juan de Fuca Plate is equivocal (Goldfinger and others, 1992 #446; Goldfinger, 1994 #3972; Goldfinger and others, 1997 #4090). As with other folds and faults located in the Cascadia forearc, it is unknown if coseismic displacements on this fault zone are always related to great megathrust earthquakes on the subduction zone, or whether some independent displacements are related to smaller earthquakes in the overriding North American Plate (Goldfinger and others, 1992 #446; Goldfinger, 1994 #3972; Goldfinger and others, 1997 #4090; McNeill and others, 1998 #4089).
Length (km)	38 km.
Average strike	N80°W
Sense of movement	Left lateral *Comments:* The Willapa Canyon fault zone is mapped as a left-lateral strike slip fault zone (Goldfinger and others, 1992 #446; Goldfinger, 1994 #3972; Goldfinger and others, 1997 #4090).

Dip	90° *Comments:* Dip estimate based on geophysical data (Goldfinger, 1994 #3972; Goldfinger and others, 1997 #4090).
Paleoseismology studies	
Geomorphic expression	The Willapa Canyon fault zone is mapped as multiple fault strands and aligned and offset fold axes in poorly consolidated accretionary wedge sediments on the lower continental slope; The Willapa Canyon fault zone is best expressed near its center, where a submarine channel is offset 900 m left-laterally across the zone (Goldfinger, 1994 #3972; Goldfinger and others, 1997 #4090).
Age of faulted surficial deposits	The Willapa Canyon fault zone offsets poorly consolidated accretionary wedge sediments and a submarine channel of unknown age (Goldfinger, 1994 #3972; Goldfinger and others, 1997 #4090).
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* The Willapa Canyon fault zone offsets accretionary wedge sediments and a submarine channel of unknown age (Goldfinger, 1994 #3972; Goldfinger and others, 1997 #4090). However, its similarity to other active faults in the accretionary wedge suggest Quaternary movement, and possibly most recent movement in the latest Quaternary. It is assigned a Quaternary (<1.6 Ma) age category herein.
Recurrence interval	
Slip-rate category	Greater than 5.0 mm/yr *Comments:* No data on slip rates have been collected (Goldfinger, 1994 #3972; Goldfinger and others, 1997 #4090), but Goldfinger (1994 #3972) used values from other similar faults to estimate a slip rate of 5.5 mm/yr on the Willapa Canyon fault zone.
Date and Compiler(s)	2000 Stephen F. Personius, U.S. Geological Survey

References	#3972 Goldfinger, C., 1994, Active deformation of the Cascadia Forearc—Implications for great earthquake potential in Oregon and Washington: Oregon State University, unpublished Ph.D. dissertation, 246 p., http://hdl.handle.net/1957/36664. #446 Goldfinger, C., Kulm, L.D., Yeats, R.S., Appelgate, B., MacKay, M.E., and Moore, G.F., 1992, Transverse structural trends along the Oregon convergent margin—Implications for Cascadia earthquake potential and crustal rotations: Geology, v. 20, p. 141-144. #4090 Goldfinger, C., Kulm, L.D., Yeats, R.S., McNeill, L., and Hummon, C., 1997, Oblique strike-slip faulting of the central Cascadia submarine forearc: Journal of Geophysical Research, v. 102, no. B4, p. 8217-8243. #4089 McNeill, L.C., Goldfinger, C., Yeats, R.S., and Kulm, L.D., 1998, The effects of upper pl. deformation on records of prehistoric Cascadia subduction zone earthquakes, *in* Stewart, I.S., and Vita-Finzi, C., eds., Coastal tectonics: Geological Society Special Publication No. 146, p. 321-342.