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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.

Pioneer anticline (Class A) No. 892

Last Review Date: 2002-05-31

citation for this record: **Personius, S.F., compiler, 2002, Fault number 892, Pioneer anticline, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 12/14/2020 03:14 PM.**

Synopsis	The north-northwest striking, north- and southward-plunging Pioneer anticline was formed during ongoing east-west compression in the forearc of the Cascadia subduction zone [781]; the fold and associated faults are an onshore extension of a broad fold and thrust belt that is actively deforming the accretionary wedge offshore [784]. This deformation could be caused by localized folding and faulting during shallow upper-plate earthquakes or by local deformation during very large subduction zone earthquakes. The anticline does not appear to significantly affect underlying bedrock units, and thus is thought to be a very young structure. The anticline warps the 105 ka Pioneer marine terrace platform; the associated bedding plane faults in the Seven Devils fault zone offset 105 ka Pioneer and/or 125 ka Seven Devils marine terrace sediments. As with other folds and faults located in the Cascadia forearc, it is unknown if coseismic displacements on this fold are always related to great megathrust

	earthquakes on the subduction zone, or whether some displacements are related to smaller earthquakes in the North American plate.
Name comments	The Pioneer anticline is a north-northwest-striking anticline originally mapped by Newton (1980 #4144), and named by McInelly and Kelsey (1990 #4102) after the Pioneer marine-terrace platform that is well preserved in the area. The Seven Devils fault zone is included in the description herein, because these faults are likely bedding plane (flexural-slip) faults in the eastern and western (?) limbs of the Pioneer anticline (McInelly and Kelsey, 1990 #4102).
County(s) and State(s)	COOS COUNTY, OREGON
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Poor Compiled at 1:250,000 scale. *Comments:* The axial trace of the fold and fault traces are from 1:190,000-scale (approximate) figure 4 of McInelly and Kelsey (1990 #4102).
Geologic setting	The north-northwest striking, north- and southward-plunging Pioneer anticline was formed during ongoing east-west compression in the forearc of the Cascadia subduction zone [781] along the central Oregon coast (McInelly and Kelsey, 1990 #4102). The fold and associated faults are an onshore extension of a broad fold and thrust belt that is actively deforming the accretionary wedge offshore [784] (Goldfinger and others, 1992 #464; McNeill and others, 1998 #4089). This deformation could be caused by localized folding and faulting during shallow upper plate earthquakes or by local deformation during very large subduction zone earthquakes (McInelly and Kelsey, 1990 #4102). Unlike the nearby South Slough syncline, the Pioneer anticline does not appear to significantly affect underlying bedrock units and thus is thought to be a very young structure (McInelly and Kelsey, 1990 #4102). As with other folds and faults located in the Cascadia forearc, it is unknown if coseismic displacements on this fold are always related to great megathrust earthquakes on the subduction zone, or whether some displacements are related to smaller earthquakes in the North American plate.

Length (km)	14 km.
Average strike	N33°W
Sense of movement	Anticline, Normal
Dip Direction	E; W *Comments:* Anticline is north and south plunging.
Paleoseismology studies	
Geomorphic expression	The Pioneer anticline is a north-northwest-striking anticline that warps the Pioneer marine terrace platform; the associated bedding plane faults in the Seven Devils fault zone offset Pioneer and/or Seven Devils marine terrace sediments (Griggs, 1945 #4153; McInelly and Kelsey, 1990 #4102).
Age of faulted surficial deposits	The Pioneer anticline warps the Pioneer marine terrace platform, and faults in the Seven Devils fault zone offset the Seven Devils marine terrace sediments but are truncated by the Pioneer marine platform (Griggs, 1945 #4153; McInelly and Kelsey, 1990 #4102). The Pioneer and Seven Devils platforms are thought to correlate with the 105 ka and 125 ka marine highstands, respectively (McInelly and Kelsey, 1990 #4102; Kelsey and others, 1996 #4111).
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* The Pioneer anticline warps the 105 ka Pioneer terrace, so this structure has been active in the late Quaternary (McInelly and Kelsey, 1990 #4102). The fold and associated Seven Devils fault zone are shown as active in the late Pleistocene or Holocene by Goldfinger and others (1992 #464) and active in the Quaternary by Pezzopane (1993 #3544), but are not included on other recent compilations of Quaternary faults in Oregon (Geomatrix Consultants Inc., 1995 #3593; Madin and Mabey, 1996 #3575).
Recurrence	

interval	
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* McInelly and Kelsey, (1990 #4102) do not report uplift rates for the 105 ka Pioneer terrace, but the terrace platform lies at an elevation of about 40 m at the anticlinal axis, so uplift rates are relatively high.
Date and Compiler(s)	2002 Stephen F. Personius, U.S. Geological Survey
References	#3593 Geomatrix Consultants, Inc., 1995, Seismic design mapping, State of Oregon: Technical report to Oregon Department of Transportation, Salem, Oregon, under Contract 11688, January 1995, unpaginated, 5 pls., scale 1:1,250,000. #464 Goldfinger, C., Kulm, L.D., Yeats, R.S., Mitchell, C., Weldon, R., II, Peterson, C., Darienzo, M., Grant, W., and Priest, G.R., 1992, Neotectonic map of the Oregon continental margin and adjacent abyssal plain: State of Oregon, Department of Geology and Mineral Industries Open-File Report 0-92-4, 17 p., 2 pls. #4153 Griggs, A.B., 1945, Chromite-bearing sands of the southern part of the coast of Oregon: U.S. Geological Survey Bulletin 945-E, 113-150 p., 10 pls. #4111 Kelsey, H.M., Ticknor, R.L., Bockheim, J.G., and Mitchell, C.E., 1996, Quaternary upper pl. deformation in coastal Oregon: Geological Society of America Bulletin, v. 108, no. 7, p. 843-860. #3575 Madin, I.P., and Mabey, M.A., 1996, Earthquake hazard maps for Oregon: State of Oregon, Department of Geology and Mineral Industries Geological Map Series GMS-100, 1 sheet. #4102 McInelly, G.W., and Kelsey, H.M., 1990, Late Quaternary tectonic deformation in the Cape Arago-Bandon region of coastal Oregon as deduced from wave-cut platforms: Journal of Geophysical Research, v. 95, no. B5, p. 6699-6713. #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.

	#4144 Newton, V.C., Jr., 1980, Prospects for oil and gas in the Coos Basin, western Coos, Douglas, and Lane Counties, Oregon: State of Oregon, Department of Geology and Mineral Industries Oil and Gas Investigation 6, 74 p., 3 pls. #3544 Pezzopane, S.K., 1993, Active faults and earthquake ground motions in Oregon: Eugene, Oregon, University of Oregon, unpublished Ph.D. dissertation, 208 p.