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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.

Whaleshead fault zone (Class A) No. 897

Last Review Date: 2002-05-31

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Synopsis	The north-northwest-striking Whaleshead fault zone is part of a major right-latera shear zone mapped in Mesozoic bedrock in the northern Klamath Mountains part the Cascadia subduction zone [781]. The shear zone is a major boundary between Jurassic through Cretaceous rocks of the Gold Beach and Yolly Bolly accreted terranes; the timing of emplacement of the Gold Beach terrane is poorly known, b probably occurred in post-mid Eocene time. Most structures in the fault zone are mapped as high angle faults; recent tectonic analyses indicate overall right-lateral strike slip on this fault system, although detailed mapping of Quaternary marine t platforms near the southern end of the zone indicate a significant component of le lateral strike slip on some strands. Geomorphic expression of the fault zone has o been described at its southern end near Whaleshead Creek and its intersection wit coast; here the fault splits into two strands that vertically and left-laterally offset a extensive flight of marine terrace platforms and warps these terraces into an antic south of the fault trace. The fault zone and associated fold deform the 80 ka and o marine terraces, and thus has been active in the late Quaternary. Average late Quaternary vertical slip rates of 0.5 mm/yr and post-200-ka left-lateral slip rates o

	mm/yr indicate high rates of activity on at least one strand of the Whaleshead fau zone. As with other folds and faults located in the Cascadia forearc, it is unknowı coseismic displacements on these faults are always related to great megathrust earthquakes on the subduction zone, or whether some displacements are related tc smaller earthquakes in the North American plate.
Name comments	The Whaleshead fault zone is a complex of high angle faults mapped by various authors (Howard and Dott, 1961 #4104; Koch, 1966 #4114; Dott, 1971 #4160; Beaulieu and Hughes, 1976 #4161; Ramp and others, 1977 #4146; Walker and MacLeod, 1991 #3646) in southwestern Oregon. Parts of the fault zone have beer named the Pistol River, East Boundary, and Crook Point faults (Howard and Dott 1961 #4104) the Gold Beach shear zone (Koch, 1966 #4114), and the Carpenterv shear zone (Beaulieu and Hughes, 1976 #4161). The entire terrane-bounding faul system was named the Whalehead fault zone by Blake and others (1985 #4103), apparently after either Whalehead Island or Whalehead Creek near the southern e the fault system. The spelling of the fault was changed to "Whaleshead" by Kelse Bockheim (1994 #4108), probably because the spellings of these features were changed on later U.S. Geological Survey topographic maps. The latter spelling is consistent with modern maps and appears to be in common usage (Geomatrix Consultants Inc., 1995 #3593), so the name is retained herein. Blake and others (1 #4103) included the Battle Rock fault zone [896] in their terrane-bounding Whale fault zone in a small-scale figure, but detailed mapping in the region (Howard and Dott, 1961 #4104; Koch, 1966 #4114; Dott, 1971 #4160; Beaulieu and Hughes, 1 #4161; Ramp and others, 1977 #4146) does not show continuous faulting betwee Battle Rock fault zone and faults to the southwest. Geomatrix Consultants, Inc. (1 #3593) included all of these faults in their Whaleshead-Battle Rock fault zone, wl included the Battle Rock fault zone and the Whaleshead or Whaleshead Cove fau separate structures. Herein we restrict the Whaleshead fault zone to the zone of fa between Gold Beach and Brookings, and discuss the Battle Rock fault zone separ **Fault ID:** This fault is included in fault number 39 of Pezzopane (1993 #3544), a fault number 19b of Geomatrix Consultants, Inc. (1995 #3593).
County(s) and State(s)	CURRY COUNTY, OREGON
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Location of fault from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS downloaded 06/02/2016) attributed to Ramp and others (1977 #4146) and Ma (20

	#7789). Some locations attributed to Ramp and others (1977 #4146) are mistaken assigned to the Southwest Newberry fault zone.
Geologic setting	The north-northwest-striking Whaleshead fault zone is part of a major right-latera shear zone mapped in Mesozoic bedrock in the northern Klamath Mountains part the Cascadia subduction zone [781]. The shear zone is a major boundary between Jurassic through Cretaceous rocks of the Gold Beach and Yolly Bolly accreted terranes; the timing of emplacement of the Gold Beach terrane is poorly known, b probably occurred in post-mid Eocene time (Blake and others, 1985 #4103; Bour and Dott, 1985 #4106). As with other folds and faults located in the Cascadia fore it is unknown if coseismic displacements on these faults are always related to gre megathrust earthquakes on the subduction zone, or whether some displacements a related to smaller earthquakes in the North American Plate.
Length (km)	43 km.
Average strike	N12°W
Sense of movement	Right lateral, Left lateral *Comments:* Most structures in the fault zone are mapped as high angle faults; rec tectonic analyses indicate overall right-lateral strike slip on this fault system (Bla and others, 1985 #4103; Bourgeois and Dott, 1985 #4106) but detailed mapping c Quaternary marine terrace platforms near the southern end of the zone indicate a significant component of left-lateral strike slip (Kelsey and Bockheim, 1994 #41
Dip Direction	V
Paleoseismology studies	
Geomorphic expression	Geomorphic expression of the fault zone has only been described at its southern e near Whaleshead Creek and its intersection with the coast (Kelsey and Bockheim 1994 #4108). Here the fault splits into two strands that vertically and left-laterally offset an extensive flight of marine terrace platforms, and also warps these terrace an anticline 2–4 km south of the fault trace (Kelsey and Bockheim, 1994 #4108).
Age of faulted surficial deposits	The Whaleshead fault zone offsets an extensive flight of marine terraces near Whaleshead Creek and its intersection with the coast; these terraces have been correlated with the 80 ka and older sea level highstands (Kelsey and Bockheim, 1 #4108).
Historic earthquake	
Most recent	late Quaternary (<130 ka)

prehistoric deformation	*Comments:* The Whaleshead fault zone offsets 80 ka and older marine terraces, a thus has been active in the late Quaternary (Kelsey and Bockheim, 1994 #4108). fault was mapped as active in the Quaternary (<1.6 Ma) by Pezzopane (1993 #35 Geomatrix Consultants, Inc. (1995 #3593) and Madin and Mabey (1996 #3575) i Quaternary (<1.8 Ma) or middle and late Quaternary (<780 ka) movement on fau the Whaleshead fault zone.
Recurrence interval	
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Kelsey and Bockheim (1994 #4108) calculated an average late Quate vertical slip rate of 0.5 mm/yr and a post-200-ka left-lateral slip rate of 2.5 mm/y the southern Whaleshead fault zone. Geomatrix Consultants, Inc. (1995 #3593) u these data and unpublished data from Kelsey (pers. commun., 1994, in Geomatri Consultants Inc., 1995 #3593) to estimate a range of slip rates of 0.5-2.5 mm/yr, a estimated a horizontal slip rate error of ?1.2 mm/yr. Quaternary displacement has been documented on any other strands in the fault zone, so these high slip rates probably do not characterize the entire Whaleshead fault zone.
Date and Compiler(s)	2002 Stephen F. Personius, U.S. Geological Survey
References	#4161 Beaulieu, J.D., and Hughes, P.W., 1976, Land use geology of western Curr County, Oregon: State of Oregon, Department of Geology and Mineral Industries Bulletin 90, 148 p., 12 pls., scale 1:62,500. #4103 Blake, M.C., Jr., Engebretson, D.C., Jayko, A.S., and Jones, D.L., 1985, Tectonostratigraphic terranes in southwest Oregon, *in* Howell, D.G., ed., Tectonostratigraphic terranes of the Circum-Pacific Region: Circum-Pacific Coun for Energy and Mineral Resources Earth Science Series, Number 1, p. 147-157. #4106 Bourgeois, J., and Dott, R.H., Jr., 1985, Stratigraphy and sedimentology of Upper Cretaceous rocks in coastal southwest Oregon—Evidence for wrench-fault tectonics in a postulated accretionary terrane: Geological Society of America Bul v. 96, p. 1007-1019. #4160 Dott, R.H., Jr., 1971, Geology of the southwestern Oregon Coast west of tl 124th meridian: State of Oregon, Department of Geology and Mineral Industries Bulletin 69, 63 p., 2 pls. #3593 Geomatrix Consultants, Inc., 1995, Seismic design mapping, State of Oreg Technical report to Oregon Department of Transportation, Salem, Oregon, under

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#4104 Howard, J.K., and Dott, R.H., Jr., 1961, Geology of Cape Sebastian State I and its regional relationships: The ORE-BIN, v. 23, no. 8, p. 75-81.

#4108 Kelsey, H.M., and Bockheim, J.G., 1994, Coastal landscape evolution as a function of eustasy and surface uplift rate, Cascadia margin, southern Oregon: Geological Society of America Bulletin, v. 106, p. 840-854.

#4114 Koch, J.G., 1966, Late Mesozoic stratigraphy and tectonic history, Port Or Gold Beach Area, southwestern Oregon Coast: Bulletin of the American Associa of Petroleum Geologists, v. 50, no. 1, p. 25-71.

#3575 Madin, I.P., and Mabey, M.A., 1996, Earthquake hazard maps for Oregon: of Oregon, Department of Geology and Mineral Industries Geological Map Serie GMS-100, 1 sheet.

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#3646 Walker, G.W., and MacLeod, N.S., 1991, Geologic map of Oregon: U.S. Geological Survey, Special Geologic Map, 2 sheets, scale 1:500,000.