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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.

Happy Camp fault (Class A) No. 882

Last Review Date: 2002-05-31

citation for this record: **Personius, S.F., compiler, 2002, Fault number 882, Happy Camp fault, 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 Happy Camp fault is an east-striking thrust fault that offsets the Miocene sedimentary rocks of the Astoria Formation on the west flank of the Coast Range uplift. The fault may project offshore as the Nehalem Bank fault. Locally, the fau thrusts Miocene Grande Ronde Basalt over poorly dated Quaternary deposits in s cliffs near Happy Camp, at the north end of Netarts Bay. As with other folds and located in the Cascadia forearc, it is unknown if coseismic displacements on this are always related to great megathrust earthquakes on the subduction zone, or wh some displacements are related to smaller earthquakes in the North American Pla
Name comments	The Happy Camp fault was mapped by Parker (1990 #3971) and Wells and others (1994 #3988). The fault was named after the nearby community of Happy Camp Parker (1990 #3971). Geomatrix Consultants, Inc. (1995 #3593) used the name "Netarts Bay fault", but most later references use Happy Camp fault (McNeill and others, 1998 #4089; Wong and others, 1999 #4073), so that name is retained here The fault may be the onshore projection of the Nehalem Bank fault [789] (McNeill others, 1998 #4089).

	Fault ID: This is fault number 12 of Geomatrix Consultants, Inc. (1995 #3593).
County(s) and State(s)	TILLAMOOK COUNTY, OREGON
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:62,000 scale. *Comments:* Location of fault from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS downloaded 06/02/2016) attributed to 1:62,500-scale mapping of Wells and other (1994 #3988).
Geologic setting	The Happy Camp fault is an east-striking thrust fault that offsets the Miocene sedimentary rocks of the Astoria Formation on the west flank of the Coast Range (Wells and others, 1994 #3988). Locally, the fault offsets Miocene Grande Ronde Basalt in sea cliffs near Happy Camp at the north end of Netarts Bay (Parker, 199 #3971; Wells and Snavely, 1992 #4300; Wells and others, 1994 #3988). McNeill others (1998 #4089) show a parallel anticline and north-dipping thrust fault (Neh Bank fault) as offshore extensions of the Happy Camp fault. As with other folds a faults located in the Cascadia forearc, it is unknown if coseismic displacements o fault are always related to great megathrust earthquakes on the subduction zone, o whether some displacements are related to smaller earthquakes in the North Ame Plate.
Length (km)	3 km.
Average strike	N73°W
Sense of movement	Thrust *Comments:* Geologic mapping of a sea cliff shows low angle, north-dipping thrus faulting along this structure (Parker, 1990 #3971; Wells and Snavely, 1992 #4300
Dip	10–18° N. *Comments:* Parker (1990 #3971) measured a dip of 10° and R.E. Wells (pers. commun., 2000) measured a dip of 18° on the Happy Camp fault; no other fault d data are published (Wells and Snavely, 1992 #4300; Wells and others, 1994 #398
Paleoseismology	

studies	
Geomorphic expression	The Happy Camp fault is exposed in surficial deposits in a sea cliff near Happy C (Parker, 1990 #3971; Wells and Snavely, 1992 #4300), but no other geomorphic expression of the fault has been described.
Age of faulted surficial deposits	The Happy Camp fault offsets Miocene bedrock in the vicinity of Happy Camp (Parker, 1990 #3971; Wells and Snavely, 1992 #4300; Wells and others, 1994 #39 The ages of offset surficial deposits exposed in the Happy Camp sea cliff are poo known. Mulder (1992 #3969) observed no deformation of the 80-ka marine terrac across this fault zone. Soil development on late? Pleistocene (Wells and Snavely, #4300) offset channel deposits suggests an age of >125 ka (H.M. Kelsey, pers. commun., in Geomatrix Consultants Inc., 1995 #3593). More recent unpublished yield infinite (>50 ka) radiocarbon ages from the offset deposits, and a radiocarbo of about 3.9 ka in a probable unfaulted deposit overlying the zone (R.E. Wells, pe commun., 2000). The Happy Camp fault may be the onshore projection of the Nehalem Bank fault [789], which has been active in the Holocene (Niem and oth 1990 #4149; Goldfinger, 1994 #3972; McNeill and others, 1998 #4089).
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Geomatrix Consultants, Inc. (1995 #3593) and Madin and Mabey (19 #3575) mapped the Happy Camp fault as active in the Quaternary (<1.8 Ma). Pezzopane (1993 #3544) mapped the fault as active in the Holocene and McNeill others (1998 #4089) mapped the fault as late Pleistocene-Holocene, but given the age control at the Happy Camp exposure, the fault is mapped as Quaternary herei
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Parker (1990 #3971) measured about 1 m of offset of Columbia Rive Basalt Group rocks in a sea cliff exposure; no other detailed slip rate data have be published, but low rates of slip are likely.
Date and Compiler(s)	2002 Stephen F. Personius, U.S. Geological Survey
References	#3593 Geomatrix Consultants, Inc., 1995, Seismic design mapping, State of Oreg Technical report to Oregon Department of Transportation, Salem, Oregon, under Contract 11688, January 1995, unpaginated, 5 pls., scale 1:1,250,000. #3972 Goldfinger, C., 1994, Active deformation of the Cascadia Forearc—Implic

for great earthquake potential in Oregon and Washington: Oregon State Universit unpublished Ph.D. dissertation, 246 p., http://hdl.handle.net/1957/36664.

#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.

#4089 McNeill, L.C., Goldfinger, C., Yeats, R.S., and Kulm, L.D., 1998, The effe upper pl. deformation on records of prehistoric Cascadia subduction zone earthqu *in* Stewart, I.S., and Vita-Finzi, C., eds., Coastal tectonics: Geological Society Sp Publication No. 146, p. 321-342.

#3969 Mulder, R.A., 1992, Regional tectonic deformation of the northern Oregon as recorded by Pleistocene marine terraces: Portland, Oregon, Portland State University, unpublished M.S. thesis, 96 p.

#4149 Niem, A.R., Snavely, P.D., Jr., and Niem, W., A., 1990, Onshore-offshore geologic cross section from the Mist Gas Field, Northern Oregon Coast Range, to northwest Oregon continental shelf: State of Oregon, Department of Geology and Mineral Industries Oil and Gas Investigations 17, 46 p., 1 pl.

#3971 Parker, M.J., 1990, The Oligocene and Miocene geology of the Tillamook Embayment Tillamook County, northwest Oregon: Oregon State University, unpublished M.S. thesis, 515 p.

#3544 Pezzopane, S.K., 1993, Active faults and earthquake ground motions in Or Eugene, Oregon, University of Oregon, unpublished Ph.D. dissertation, 208 p.

#4300 Wells, R.E., and Snavely, P.D., Jr., 1992, Quaternary thrust faulting at Neta Bay, northern Oregon coast: Geological Society of America Abstracts with Progr v. 24, no. 5, p. 89.

#3988 Wells, R.E., Snavely, P.D., MacLeod, N.S., Kelly, M.M., and Parker, M.J., Geologic map of the Tillamook Highlands, northwest Oregon Coast Range: U.S. Geological Survey Open-File Report 94-21, 24 p., 2 pls., scale 1:62,500.

#4073 Wong, I., Silva, W., Bott, J., Wright, D., Thomas, P., Gregor, N., Li, S., Ma M., Sojourner, A., and Wang, Y., 1999, Earthquake scenario and probabilistic gro shaking maps for the Portland, Oregon metropolitan area: Technical report to U.S Geological Survey, under Contract 1434-HQ-96-GR-02727, 16 p., 12 pls.