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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.

Nehalem Bank fault (Class A) No. 789

Last Review Date: 2002-05-17

citation for this record: **Personius, S.F., compiler, 2002, Fault number 789, Nehalem Bank 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 03:16 PM.**

Synopsis	The north-and northwest-striking, right-lateral reverse Nehalem Bank fault offsets Miocene through Holocene sediment that underlies the continental shelf in the forearc of the Cascadia subduction zone [781]. The fault may form the boundary between Eocene basalts of the Siletzia terrane to the east and Miocene and younger accretionary wedge sediment to the west. Offsets of Holocene sediment on the continental shelf and sea floor offsets of 10-20 m that probably post-date the late Pleistocene sea-level lowstand suggest most recent movement in the latest Quaternary. However, as with other folds and faults located in the Cascadia forearc, it is unknown if coseismic displacements on this fault 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	The fault zone was originally mapped by Goldfinger and others

comments	(1992 #446; 1992 #464) and named the Nehalem Bank fault by Goldfinger (1994 #3972). Goldfinger (1994 #3972) correlates this fault with offshore faults "F" and "C" in cross sections of Niem and others (1990 #4149) and Niem and others (1992 #4148), respectively. Geomatrix Consultants, Inc, (1995 #3593) used Nehalem Bank fault and Fault "I" interchangeably. The Nehalem Bank fault may also correlate with the Happy Camp fault [882] onshore near Netarts Bay (Goldfinger, 1994 #3972; McNeill and others, 1998 #4089), but herein we retain these names as separate faults until better data establishing this correlation is available. **Fault ID:** The fault is included in fault number 21 of Pezzopane (1993 #3544) and is fault number 9 of Geomatrix Consultants, Inc, (1995 #3593).
County(s) and State(s)	CLATSOP COUNTY, OREGON (offshore) TILLAMOOK COUNTY, OREGON (offshore)
Physiographic province(s)	PACIFIC BORDER (offshore)
Reliability of location	Poor Compiled at 1:500,000 scale. *Comments:* The fault trace is from 1:500,000-scale mapping of Goldfinger and others (1992 #464).
Geologic setting	The north-and northwest-striking, right-lateral reverse Nehalem Bank fault offsets Miocene through Holocene sediment that underlies the continental shelf in the forearc of the Cascadia subduction zone [781] (Goldfinger and others, 1992 #464; Goldfinger, 1994 #3972; McNeill and others, 1998 #4089). Niem and others (1992 #4148) interpret a major fault in the same location as the Nehalem Bank fault as the boundary between Eocene basalts of the Siletzia terrane to the east and Miocene and younger accretionary wedge sediment to the west. As with other folds and faults located in the Cascadia forearc, it is unknown if coseismic displacements on this fault 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)	101 km.

Average strike	N15°W
Sense of movement	Right lateral, Reverse *Comments:* Sense of displacement on the Nehalem Bank fault is inferred as right-lateral strike slip along the north-striking section, and steeply northeast-dipping reverse displacement on the northwest-striking (Goldfinger, 1994 #3972; McNeill and others, 1998 #4089).
Dip Direction	V; NE
Paleoseismology studies	
Geomorphic expression	The Nehalem Bank fault is mapped as multiple fault strands and anticlinal axes in Miocene through Holocene sediment on the continental shelf (Niem and others, 1990 #4149; Goldfinger and others, 1992 #464; Goldfinger, 1994 #3972; McNeill and others, 1998 #4089). Vertical offsets or 10-20 m of the sea floor are apparent in sidescan and seismic records (Goldfinger, 1994 #3972; McNeill and others, 1998 #4089).
Age of faulted surficial deposits	The Nehalem Bank fault offsets Miocene through Holocene sediment on the continental shelf (Niem and others, 1990 #4149; Goldfinger, 1994 #3972; McNeill and others, 1998 #4089), and is marked by sea floor offsets of 10-20 m that probably post-date the late Pleistocene sea-level lowstand (Goldfinger, 1994 #3972; McNeill and others, 1998 #4089).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Offsets of Holocene sediment on the continental shelf (Niem and others, 1990 #4149; Goldfinger, 1994 #3972; McNeill and others, 1998 #4089), and sea floor offsets that probably post-date the late Pleistocene sea-level lowstand (Goldfinger, 1994 #3972; McNeill and others, 1998 #4089) suggest most recent movement in the latest Quaternary. The fault is mapped as active in the Holocene or late Pleistocene by Goldfinger and others (1992 #464), Pezzopane (1993 #3544), Geomatrix Consultants, Inc, (1995 #3593), and Madin and Mabey (1996 #3575).
Recurrence	

interval	
Slip-rate category	Between 1.0 and 5.0 mm/yr *Comments:* No data on slip rates have been collected, but Geomatrix Consultants, Inc, (1995 #3593) and Wong and others (1999 #4073; 2000 #5137) used estimated slip rates of 0.5-5.0 mm/yr in their analyses of earthquake hazards associated with the Nehalem Bank fault.
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. #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. #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. #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. #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.

#4148 Niem, A.M., MacLeod, N.S., Snavely, P.D., Jr., Huggins, D., Fortier, J.D., Meyer, J.H., Seeling, A., and Niem, W.A., 1992, Onshore-offshore geologic cross section, northern Oregon Coast Range to continental slope: State of Oregon, Department of Geology and Mineral Industries Special Paper 26, 10 p., 1 pl.

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

#4073 Wong, I., Silva, W., Bott, J., Wright, D., Thomas, P., Gregor, N., Li, S., Mabey, M., Sojourner, A., and Wang, Y., 1999, Earthquake scenario and probabilistic ground 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.

#5137 Wong, I., Silva, W., Bott, J., Wright, D., Thomas, P., Gregor, N., Li, S., Mabey, M., Sojourner, A., and Wang, Y., 2000, Earthquake scenario and probabilistic ground shaking maps for the Portland, Oregon, metropolitan area: State of Oregon, Department of Geology and Mineral Industries Interpretive Map Series IMS-16, 16 p. pamphlet, scale 1:62,500.