

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](#).

Helvetia fault (Class A) No. 714

Last Review Date: 2016-03-22

citation for this record: Personius, S.F., compiler, 2002, Fault number 714, Helvetia 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 02:03 PM.

Synopsis	The northwest-striking Helvetia fault forms part of the northeastern margin of the Tualatin basin in northwestern Oregon. The fault primarily is mapped in the subsurface on the basis of water well data, and has little aeromagnetic expression. The fault is expressed in the subsurface with down-to-the-southwest separation, but no data on fault dip or direction have been described. Most of the fault trace is covered by a thick sequence of silty sediment deposited by the Missoula floods which may bury evidence of pre-latest Quaternary displacement.
Name comments	The Helvetia fault was named after its location near Helvetia in the northern Tualatin basin of northwestern Oregon by Yeats and others (1991 #3953; 1996 #4291). Fault ID: This is fault number 28 of Geomatrix Consultants, Inc. (1995 #3593).
County(s) and	

County(s) and State(s)	WASHINGTON COUNTY, OREGON
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:100,000 scale. <i>Comments:</i> The fault trace is from 1:100,000-scale compilation of Yeats and others (1996 #4291).
Geologic setting	The northwest-striking Helvetia fault forms part of the northeastern margin of the Tualatin basin in northwestern Oregon. The fault primarily is mapped in the subsurface on the basis of water well data, and has little aeromagnetic expression (Yeats and others, 1991 #3953; Blakely and others, 1995 #4021; 1996 #4291; Popowski, 1996 #4677; Blakely and others, 2000 #4333).
Length (km)	7 km.
Average strike	N26°W
Sense of movement	Right lateral, Reverse <i>Comments:</i> The fault is expressed in the subsurface with down-to-the-southwest separation, but no data on fault dip or direction have been described (Yeats and others, 1991 #3953; 1996 #4291; Popowski, 1996 #4677). However, the fault is parallel with nearby faults [873–877] that have probable right-lateral/reverse senses of displacement. Sense of movement is assigned here by analogy.
Dip Direction	Unknown
Paleoseismology studies	
Geomorphic expression	No fault scarps on Quaternary deposits have been described anywhere along the Helvetia fault (Geomatrix Consultants Inc., 1995 #3593). Unruh and others (1994 #3597) found no geomorphic evidence of faulting, and mapped the structure as Tertiary in age. Most of the fault trace is covered by a thick sequence of silty sediment deposited by the Missoula floods, which may bury evidence of pre-latest Quaternary displacement.
Age of faulted	No unequivocal evidence of displacement in Quaternary deposits

surficial deposits	has been described (Geomatrix Consultants Inc., 1995 #3593). However, well data indicate that the Helvetia fault offsets rocks of the Miocene Columbia River Basalt Group and basin-fill sediments overlying the basalt (Yeats and others, 1991 #3953; 1996 #4291; Popowski, 1996 #4677). Seismic reflection data show reflectors in the upper part of the basin-fill sediments are offset about 20 m (Yeats and others, 1991 #3953; Yeats and Popowski, 1992 #4016). Recent work in the Tualatin basin shows that the upper part of these deposits are Pleistocene in age (Wilson, 1997 #5065; 1998 #5058), so the fault may offset Pleistocene deposits beneath the sedimentary cover of the Missoula flood deposits.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) <i>Comments:</i> Some Quaternary fault compilations do not include the Helvetia fault (Pezzopane, 1993 #3544; Unruh and others, 1994 #3597), but Geomatrix Consultants, Inc. (1995 #3593) and Madin and Mabey (1996 #3575) compiled these faults as active in the middle and late Quaternary (<780 ka). Given the lack of geomorphic expression and equivocal evidence of Quaternary displacement, the fault is herein classified as Quaternary (<1.6 Ma) until further studies are conducted.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr <i>Comments:</i> No detailed slip rate data have been published. Geomatrix Consultants, Inc. (1995 #3593) and Wong and others (1999 #4073; 2000 #5137) assigned slip rates of 0.005–0.05 mm/yr to the Helvetia fault. Given the equivocal evidence of displacement in Quaternary deposits, low rates of slip are assumed.
Date and Compiler(s)	2002 Stephen F. Personius, U.S. Geological Survey
References	#4333 Blakely, R.J., Wells, R.E., Tolan, T.L., Beeson, M.H., Trehu, A.M., and Liberty, L.M., 2000, New aeromagnetic data reveal large strike-slip (?) faults in the northern Willamette Valley, Oregon: Geological Society of America Bulletin, v. 112, p. 1225-1233.

#4021 Blakely, R.J., Wells, R.E., Yelin, T.S., Madin, I.P., and Beeson, M.H., 1995, Tectonic setting of the Portland-Vancouver area, Oregon and Washington—Constraints from low-altitude aeromagnetic data: Geological Society of America Bulletin, v. 107, no. 9, p. 1051-1062.

#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.

#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.

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

#4677 Popowski, T.A., 1996, Geology, structure, and tectonic history of the Tualatin Basin, northwestern Oregon: Corvallis, Oregon State University, M.S. Thesis, 126 p.

#3597 Unruh, J.R., Wong, I.G., Bott, J.D.J., Silva, W.J., and Lettis, W.R., 1994, Seismotectonic evaluation, Scoggins Dam, Tualatin Project, northwestern Oregon: Final Report prepared for U.S. Department of the Interior, Bureau of Reclamation, 206 p., 4 pls., scale 1:500,000.

#5065 Wilson, D.C., 1997, Post-middle Miocene geologic history of the Tualatin basin, Oregon with hydrogeologic implications: Portland, Oregon, Portland State University, unpublished Ph.D. dissertation, 431 p.

#5058 Wilson, D.C., 1998, Post-middle Miocene geologic evolution of the Tualatin basin, Oregon: Oregon Geology, v. 60, no. 5, p. 99-116.

#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.

#4016 Yeats, R.S., and Popowski, T.A., 1992, Crustal faults in the Willamette and Tualatin Valleys: Geological Society of America Abstracts with Programs, v. 24, no. 5, p. 92.

#3953 Yeats, R.S., Graven, E.P., Werner, K.S., Goldfinger, C., and Popowski, T., 1991, Tectonics of the Willamette Valley, Oregon: U.S. Geological Survey Open-File Report 91-441-P, 47 p., 3 pls.

#4291 Yeats, R.S., Graven, E.P., Werner, K.S., Goldfinger, C., and Popowski, T.A., 1996, Tectonics of the Willamette Valley, Oregon, *in* Rogers, A.M., Walsh, T.J., Kockelman, W.J., and Priest, G.R., eds., Assessing earthquake hazards and reducing risk in the Pacific Northwest: U.S. Geological Survey Professional Paper 1560, v. 1, p. 183-222.

[Questions or comments?](#)

[Facebook](#) [Twitter](#) [Google](#) [Email](#)

[Hazards](#)

[Design](#) [Ground Motions](#) [Seismic Hazard Maps & Site-Specific Data](#) [Faults](#) [Scenarios](#)

[Earthquakes](#) [Hazards](#) [Data](#) [Education](#) [Monitoring](#) [Research](#)

[Home](#) [About Us](#) [Contacts](#) [Legal](#)