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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.

Warm Springs fault zone (Class A) No. 851

Last Review Date: 2016-04-12

citation for this record: **Personius, S.F., compiler, 2002, Fault number 851, Warm Springs fault zone, 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 Warm Springs fault zone is a 30-km-wide zone of mostly west-dipping, north trending normal faults that offset early Pleistocene, Pliocene, and Miocene volcan rocks and sediments along the eastern margin of the Cascade Range in north-cent Oregon. Fault scarps with heights of 3–12 m have been identified along some stra of the Warm Springs fault zone; the geomorphic expression of the youngest scarp the zone suggest latest movement in the middle and late Quaternary.
Name comments	Faults in the central part of the Warm Springs Indian Reservation, including those mapped as the Shitike Creek faults by the U.S. Army Corps of Engineers (1983 # were included in the Warm Springs zone or fault zone of Pezzopane (1993 #3544 Herein we follow Geomatrix Consultants, Inc. (1995 #3593) in including all these faults in the Warm Springs fault zone. **Fault ID:** This fault zone is number 19 of Pezzopane (1993 #3544) and number 4 Geomatrix Consultants, Inc. (1995 #3593).
County(s) and	WASCO COUNTY, OREGON

State(s)	JEFFERSON COUNTY, OREGON
Physiographic province(s)	COLUMBIA PLATEAU CASCADE-SIERRA MOUNTAINS
Reliability of location	Good Compiled at 1:500,000 scale. *Comments:* Location of fault from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS downloaded 06/02/2016) attributed to 1:500,000-scale compilation of Walker and MacLeod (1991 #3646).
Geologic setting	The Warm Springs fault zone is comprised of numerous, mostly west-dipping, no trending normal faults (U.S. Army Corps of Engineers, 1983 #3485; Pezzopane, #3544) that offset volcanic rocks and sediments along the eastern margin of the Cascade Range in north-central Oregon. Only some of the faults in this 30-km-wi zone are shown on geologic or lineament maps of the region (Waters, 1968 #375 Newcomb, 1970 #3761; Venkatakrishnan and others, 1980 #3748; Smith, 1987 #. Walker and MacLeod, 1991 #3646; Sherrod and Smith, 2000 #5165).
Length (km)	34 km.
Average strike	N3°E
Sense of movement	Normal *Comments:* The numerous fault strands in the Warm Springs fault zone are mapp high angle or normal faults by U.S. Army Corps of Engineers (1983 #3485), Wal and MacLeod (1991 #3646), Pezzopane (1993 #3544), and Sherrod and Smith (2 #5165),
Dip	80°–90° *Comments:* U.S. Army Corps of Engineers, (1983 #3485) measured dips of 80° a "nearly vertical" on two strands of the Warm Springs fault zone. Geomatrix Consultants, Inc. (1995 #3593) use an estimated dip of 70° in their modeling of earthquake hazards associated with the Warm Springs fault zone.
Paleoseismology studies	
Geomorphic expression	The U.S. Army Corps of Engineers (1983 #3485) described colluvium covered, 3 12-m-high scarp-like slopes on flat lying surfaces along several strands of the Wa Springs fault zone. S.K. Pezzopane (pers. commun., 1993, in Geomatrix Consulta Inc., 1995 #3593) used airphoto reconnaissance to describe fault scarps up to 5 m

	on Pleistocene alluvium along some fault strands in the zone. Both the U.S. Army Corps of Engineers (1983 #3485) and S.K. Pezzopane (pers. commun., 1993, in Geomatrix Consultants Inc., 1995 #3593) noted that faults in the Warm Springs fa zone have geomorphic expressions similar to faults in the Sisters fault zone [852] the south. However, the U.S. Army Corps of Engineers (1983 #3485) stated that t entire zone appears to be about the same age, whereas S.K. Pezzopane (pers. com 1993, in Geomatrix Consultants Inc., 1995 #3593) noted that some scarps appear younger than others. Weldon and others (2002 #5648) map lineaments across Quaternary deposits based on interpretation of 1:100,000-scale DEMs of the area
Age of faulted surficial deposits	The faults mapped by the U.S. Army Corps of Engineers (1983 #3485), Pezzopan (1993 #3544), and Weldon and others (2002 #5648) mostly offset volcanic and sedimentary rocks of early Pleistocene, Pliocene, and Miocene age (Walker and MacLeod, 1991 #3646; Sherrod and Smith, 2000 #5165).
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* No evidence of Quaternary displacement has been documented along Warm Springs fault zone, but Pezzopane (1993 #3544) and subsequent compilatio (Geomatrix Consultants Inc., 1995 #3593; Madin and Mabey, 1996 #3575; Weldo others, 2002 #5648) classified these faults as active in the middle and late Quater (<700–780 ka). S.K. Pezzopane, (pers. commun., 1993, in Geomatrix Consultants 1995 #3593) described degradation of fault scarps in the Warm Springs fault zone consistent with latest displacement in the middle to late Pleistocene.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* No slip data are available for the Warm Springs fault zone, but Geom Consultants, Inc. (1995 #3593) used estimated slip rates of 0.005–0.01 mm/yr in analysis of earthquake hazards associated with the fault zone.
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. #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.

#3761 Newcomb, R.C., 1970, Tectonic structure of the main part of the basalt of Columbia River Group Washington, Oregon, and Idaho: U.S. Geological Survey Miscellaneous Geologic Investigations I-587, 1 sheet, scale 1:500,000.

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

#5165 Sherrod, D.R., and Smith, J.G., 2000, Geologic map of upper Eocene to Holocene volcanic and related rocks of the Cascade Range, Oregon: U.S. Geolog Survey Geologic Investigations Map I-2569, 2 sheets, scale 1:500,000.

#3758 Smith, G.A., 1987, Geologic map of the Seekseequa Junction and a portio the Metolius Bench quadrangles, Jefferson County, Oregon: State of Oregon, Department of Geology and Mineral Industries GMS-44, 1 sheet, scale 1:24,000.

#3485 U.S. Army Corps of Engineers, 1983, Detroit and Big Cliff Lakes earthqua and fault study—Design memorandum 4: U.S. Army Corps of Engineers, Portlan District, 93 p., 13 pls.

#3748 Venkatakrishnan, R., Bond, J.G., and Kauffman, J.D., 1980, Geological lin of the northern part of the Cascade Range, Oregon: Technical report to Geoscienc Research Consultants, Moscow, Idaho, under Contract DE FC 07-79-ID-12044, 2 5 pls.

#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.

#3755 Waters, A.C., 1968, Reconnaissance geologic map of the Dufur quadrangl Hood River, Sherman, and Wasco Counties, Oregon: U.S. Geological Survey Miscellaneous Geologic Investigations I-556, 1 sheet, scale 1:125,000.

#5648 Weldon, R.J., Fletcher, D.K., Weldon, E.M., Scharer, K.M., and McCrory, 2002, An update of Quaternary faults of central and eastern Oregon: U.S. Geolog Survey Open-File Report 02-301 (CD-ROM), 26 sheets, scale 1:100,000.

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