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Quaternary Fault and Fold Database of the United States

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East Grande Ronde Valley fault zone (Class A) No. 803

Last Review Date: 2016-03-21

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Synopsis	The East Grande Ronde Valley fault zone forms the eastern margin of a large gral system that forms the Grande Ronde Valley in northeastern Oregon. The graben i formed in Miocene and Pliocene volcanic rocks, and is floored by a thick sequenc Neogene and Quaternary alluvial sediments. The Grande Ronde Valley may be a apart basin related to displacement along a regional scale right-lateral strike-slip f system. The southern third of the East Grande Ronde Valley fault zone forms a st linear range front, from Mount Fanny north to Mount Harris. The fault trace is ma in this area by intermittent fault scarps in Quaternary deposits. North of Mount H the range front decreases in height and linearity, and the fault projects across the Grande Ronde River as a series of discontinuous scarps, tonal lineaments, and lin drainages. The most active, southern third of the fault zone may have moved as recently as the latest Pleistocene or Holocene.
Name	The fault zone along the eastern margin of the Grande Ronde Valley was original

comments	mapped by Hampton and Brown (1964 #3491), and later summarized by Newcon (1970 #3761) and Walker (1979 #3576). The fault trace as included herein was informally named the East Grande Ronde Valley fault by Simpson and others (19 #3596). Faults along the east side of the Grande Ronde Valley have been includec numerous reconnaissance Quaternary fault investigations and compilations (U.S. Corps of Engineers, 1983 #3480; Geomatrix Consultants Inc., 1989 #3546; Pezzc and Weldon, 1993 #149; Pezzopane, 1993 #3544; Simpson and others, 1993 #35 Geomatrix Consultants Inc., 1995 #3593; Madin and Mabey, 1996 #3575; Person 1998 #3508; Wood, 1999 #4042; Weldon and others, 2002 #5648). **Fault ID:** This structure is part of fault number 13 of Pezzopane (1993 #3544) ar fault number 68b of Geomatrix Consultants, Inc. (1995 #3593).
County(s) and State(s)	UNION COUNTY, OREGON
Physiographic province(s)	COLUMBIA PLATEAU
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Location of fault from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS downloaded 06/02/2016) attributed to 1:100,000-scale compilation of Ferns and c (2001 #5135).
Geologic setting	The East Grande Ronde Valley fault zone forms the eastern margin of a large gral system that forms the Grande Ronde Valley. The graben is formed in Miocene anc Pliocene volcanic rocks, and is floored by a thick sequence of Neogene and Quate alluvial sediments (Hampton and Brown, 1964 #3491; Walker, 1979 #3576; Walk and MacLeod, 1991 #3646; Ferns and others, 2001 #5135). Numerous northwest- trending faults are present throughout the region; some workers attribute graben formation to a pull apart basin related to displacement along a regional scale righ lateral strike-slip fault system (Gehrels and others, 1980 #3774).
Length (km)	50 km.
Average strike	N35°W
Sense of movement	Normal *Comments:* Although horizontal striations and other evidence of horizontal displacement have been observed on faults in the region (Hampton and Brown, 1 #3491; Gehrels and others, 1980 #3774), no evidence of significant lateral displacement has been described along the West Grande Ronde Valley fault zone

	(Ferns and Madin, 1999 #5160) or the East Grande Ronde Valley fault zone (U.S Army Corps of Engineers, 1983 #3480; Geomatrix Consultants Inc., 1989 #3546; Pezzopane, 1993 #3544; Simpson and others, 1993 #3596; Geomatrix Consultant 1995 #3593; Personius, 1998 #3508), so herein the East Grande Ronde Valley fau zone is assumed to be a normal fault.
Dip Direction	SW; NE *Comments:* No dip measurements have been published, but Simpson and others (#3596) and Geomatrix Consultants, Inc. (1995 #3593) modeled the East Grande I Valley fault zone as a 70° dipping normal fault in their analyses of paleo-earthqua magnitudes. Map and well data along the West Grande Ronde Valley fault zone [8 (Barrash and others, 1980 #3570; Ferns and Madin, 1999 #5160) support a 60–70
Paleoseismology studies	
Geomorphic expression	The East Grande Ronde Valley fault zone forms a steep, linear range front from M Fanny north to Mount Harris. The fault trace is marked in this area by discontinuo fault scarps on Quaternary deposits (Simpson and others, 1993 #3596; Personius, #3508). North of Mount Harris, the range front decreases in height and linearity, a the fault projects across the Grande Ronde River as a series of discontinuous scar tonal lineaments, and linear drainages (Simpson and others, 1993 #3596). Simpso others (1993 #3596) divided the East Grande Ronde Valley fault zone into three segments, the Cove, Mount Harris, and Rhinehart segments, based on apparent differences in geomorphic expression. However, these segments are only 12–15 k long, could rupture together (Simpson and others, 1993 #3596), and are not basec detailed paleoseismic investigations, so herein these segments are discussed toget
Age of faulted surficial deposits	Hampton and Brown (1964 #3491) map a short fault in Quaternary colluvium abo km north of Cove, but this feature is probably a landslide headscarp (Personius, 1 #3508). Simpson and others (1993 #3596) described low scarps, typically less tha in height, on late Pleistocene alluvial deposits, and locally higher scarps on older deposits. Personius (1998 #3508) measured surface offsets of 6–11 m in late Pleistocene alluvial deposits, but he found no evidence of faulted Holocene alluvi
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Simpson and others (1993 #3596) and Personius (1998 #3508) descri fault scarps on late Pleistocene alluvial deposits, and Personius (1998 #3508) use fault-scarp morphology to infer that some scarps along the East Grande Ronde Va fault zone may be latest Pleistocene in age. U.S. Army Corps of Engineers (1983

	#3480), Pezzopane (1993 #3544), Geomatrix Consultants, Inc. (1995 #3593), and Weldon and others (2002 #5648) show the southern third of the fault as having la Pleistocene or Holocene displacement.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Hampton and Brown (1964 #3491) estimate about 1,200 m of displacement of 15–17 Ma (Walker and MacLeod, 1991 #3646) Columbia River basalts across the East Grande Ronde Valley fault; such offsets suggest low rates long-term slip. No Quaternary slip-rate data are available for the East Grande Ron Valley fault zone, but the relatively small scarps on late Pleistocene deposits sugg low rates of Quaternary slip. Geomatrix Consultants, Inc. (1995 #3593) used esti rates of 0.05–0.005 mm/yr in their analysis of earthquake hazards associated with fault.
Date and Compiler(s)	2002 Stephen F. Personius, U.S. Geological Survey
References	#3570 Barrash, W., Bond, J.G., Kauffman, J.D., and Venkatakrishnan, R., 1980, Geology of the La Grande Area, Oregon: State of Oregon, Department of Geolog Mineral Industries Special Paper 6, 47 p., 5 pls., scale 1:24,000. #5160 Ferns, M.L., and Madin, I.P., 1999, Geologic map of the Summerville quadrangle, Union County, Oregon: State of Oregon, Department of Geology and Mineral Industries Geologic Map Series GMS-111, 23 p. pamphlet, 1 sheet, scale 1:24,000. #5135 Ferns, M.L., Madin, I.P., and Taubeneck, W.H., 2001, Reconnaissance geo map of the La Grande 30' x 60' quadrangle, Baker, Grant, Umatilla, and Union Counties, Oregon: State of Oregon, Department of Geology and Mineral Industri Reconnaissance Map Series RMS-1, 1 pl., scale 1:100,000. #3774 Gehrels, G.E., White, R.R., and David, G.A., 1980, The La Grande pull-ap basin, northeastern Oregon: Geological Society of America Abstracts with Progra v. 12, no. 3, p. 107. #3546 Geomatrix Consultants, Inc., 1989, Seismotectonic evaluation of Mann Cr and Mason Dam sites: Technical report to U.S. Department of Interior, Bureau of Reclamation, Denver, under Contract 6-CS-81-07310, 118 p., 2 pls., scale 1:250,(#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.

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#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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#3508 Personius, S.F., 1998, Surficial geology and neotectonics of selected areas western Idaho and northeastern Oregon: U.S. Geological Survey Open-File Repo 771, 25 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.

#149 Pezzopane, S.K., and Weldon, R.J., II, 1993, Tectonic role of active faulting central Oregon: Tectonics, v. 12, p. 1140-1169.

#3596 Simpson, G.D., Hemphill-Haley, M.A., Wong, I.G., Bott, J.D.J., Silva, W.J Lettis, W.R., 1993, Seismotectonic evaluation, Burnt River Project Unity Dam, B Project Thief Valley Dam, northeastern Oregon: Final Report prepared for U.S. Department of the Interior, Bureau of Reclamation, 167 p., 2 pls.

#3480 U.S. Army Corps of Engineers, 1983, The Dalles and John Day Lakes earthquake and fault study—Design memorandum 26: U.S. Army Corps of Engin Portland District, 66 p., 19 pls.

#3576 Walker, G.W., 1979, Reconnaissance geologic map of the Oregon part of t Grangeville quadrangle, Baker, Union, Umatilla, and Wallowa Counties, Oregon: Geological Survey Miscellaneous Investigations Map I-1116, 1 sheet, scale 1:250

#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.

#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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