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Quaternary Fault and Fold Database of the United States

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Santa Rosa Range fault system, Owyhee River section (Class A) No. 1508a

Last Review Date: 2017-06-13

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Synopsis	**General:** This long fault zone consists of two parts, a northern, northeast-striking of distributed faulting, and a north-striking southern part marked by nearly contin range-bounding and piedmont faults; the latter part forms an escarpment between western margin of the Santa Rosa Range and the eastern margin of the Quinn Riv Valley in northern Nevada and southeastern Oregon. The Santa Rosa Range is a r east-tilted fault block and the adjacent Quinn River Valley is a graben filled with thousands of meters of Tertiary-Quaternary fill. The Santa Rosa Range fault syste herein divided into three sections, from north to south, the Owyhee River, Quinn and Santa Rosa Peak sections, based on fault geometry and recency of fault move At the northern end of the system, faults in the Owyhee River section form a broa zone of northeast-striking, down-to-the-northwest and down-to-the-southeast faul scarps in Miocene to Pleistocene volcanic rocks. A few faults at the western end o section have latest Quaternary displacements, but the most-recent event on most f

	in the section appears to have occurred in the middle or late Pleistocene. A 7-km- gap in Quaternary fault scarps separates the northeast-striking Owyhee River sect from the north-striking Quinn River section at the northern end of the Quinn Rive Valley. The Quinn River section has three distinct parts: 1) a north-striking northe part consisting of the High Peaks fault, which forms the eastern margin of the upp Quinn River Valley, 2) a northwest-striking piedmont fault, the Hot Springs Hills and 3) a southeastern part that parallels the north-trending western flank of the Sa Rosa Range. The freshest fault morphology is found along the High Peaks and H Springs Hills faults, so apparently the most-recent fault activity on the fault syste stepped onto the piedmont Hot Springs Hills fault and has abandoned the western margin of the Santa Rosa Range north of Canyon Creek. The most-recent event o section appears to have occurred in the latest Quaternary. The Quinn River and Sa Rosa Peak sections are separated by an echelon right step and a nearly 90° bend i range front near Flat Creek in northern Nevada. The Santa Rosa Peak section is primarily characterized by a prominent range front with a secondary piedmont fau zone. The piedmont faults included in the section are expressed as small, west-fac scarps on Lahontan (13 ka) lacustrine deposits and post-Lahontan alluvium on the of the Quinn River Valley. The range-front fault oversteepens the base of the rang juxtaposes Quaternary alluvium against older bedrock, and is also characterized b west-facing scarps in alluvium. The most-recent event on the Santa Rosa Peak se also appears to have occurred in the latest Quaternary, but it is unknown if the lat events on the two southern sections occurred at the same time. The location and recency of fault movement may indicate that the Santa Rosa Range fault system i northern extension of the central Nevada seismic belt. **Sections:** This fault has 3 sections. Although detailed studies along the entire fau zone have not been completed, three sections are inferred based on geometry of t zone, the northernmost, northeast-striking Owyhee River section, and two north- striking sections, the Quinn River and Santa Rosa Peak sections. The Owyhee Ri section is separated from the Quinn River section by a 7-km-wide gap in Quatern fault scarps and a sharp change in fault strike near Blue Mountain Pass. The Quin River and Santa Rosa Peak sections are separated by an echelon right step and a n 90° bend in the range front near Flat Creek in northern Nevada. The Quinn River Santa Rosa Peak sections have range-front and piedmont fault zones, but the Sant Rosa Peak section has a much higher, more abrupt range front. The Owyhee Rive section is characterized by broad groups of northeast-striking scarps.
Name comments	**General:** **Section:** This section is herein informally named after the nearby Owyhee River; section was informally called the Owyhee zone or Owyhee River fault zone by Pezzopane (1993 #3544) and Pezzopane and Weldon (1993 #149). Narwold and Pezzopane (1997 #3011) and Narwold (1999 #4035; 2001 #3010) include faults i westernmost part of this section in their Quinn River fault zone.

	Fault ID: These structures are included in fault numbers 50 and 51 of Pezzopane (1993 #3544), fault number 63 of Geomatrix Consultants, Inc. (1995 #3593), and numbers MD2A and MD2B of dePolo (1998 #2845). The Nevada portion of this section is fault number MD2A of dePolo (1998 #2845).
County(s) and State(s)	MALHEUR COUNTY, OREGON
Physiographic province(s)	COLUMBIA PLATEAU BASIN AND RANGE
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Location of fault from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS downloaded 06/02/2016) attributed to 1:25,000-scale mapping of Walker and Repenning (1966 #3586).
Geologic setting	This long fault zone consists of two parts, a northern, northeast-striking zone of distributed faulting formed in Pliocene (?) and Miocene volcanic rocks of the Ow plateau, and a north-striking southern part marked by nearly continuous range-bounding and piedmont fault zones (Michetti and Wesnousky, 1993 #2540; Narw and Pezzopane, 1997 #3011; Narwold, 2001 #3010) that offset Pliocene (?) and Miocene volcanic rocks of the McDermitt Caldera complex (Walker and Repenni 1966 #3586; Walker and MacLeod, 1991 #3646). The latter part forms an escarpı between the western margin of the Santa Rosa Range, a major east-tilted fault blo (Stewart, 1978 #2866), and the eastern margin of the Quinn River Valley, a grabe filled with 1,200 to 2,450 m of Tertiary-Quaternary fill (Erwin and others, 1985 # Erwin, 1988 #3008). The Santa Rosa Range fault system may be a northern exter of the central Nevada seismic belt, a north-trending zone of historic surface ruptu (Pezzopane and Weldon, 1993 #149; Michetti and Wesnousky, 1993 #2540; Pezzopane, 1993 #3544).
Length (km)	This section is 54 km of a total fault length of 141 km.
Average strike	N58°E (for section) versus N15°E (for whole fault)
Sense of movement	Normal *Comments:* Faults in this section are mapped as normal or high-angle faults by W and Repenning (1966 #3586), Walker (1991 #3646), Narwold (2001 #3010), and Pezzopane (1993 #3544). Narwold and Pezzopane (1997 #3011) report a possible component of dextral shear on faults in their Quinn River fault zone, but Narwold (2001 #3010) concluded that the Quinn River fault zone has undergone primarily normal displacement.

Dip Direction	NW; SE
Paleoseismology studies	
Geomorphic expression	Faults in the Owyhee River section form a broad zone of northeast-striking, dow the-northwest and down-to-the-southeast fault scarps on Miocene to Pleistocene volcanic rocks (Walker and Repenning, 1966 #3586; Walker and MacLeod, 1991 #3646). Some of these fault scarps are hundreds of feet high, have broad, gentle s and form broad, flat-floored grabens and half grabens (Pezzopane, 1999 #4039). faults form sharp, prominent scarps on airphotos (Pezzopane, 1993 #3544), but o ground appear to be comprised of bedrock controlled platforms that have been modified by slope wash and ephemeral stream erosion (Pezzopane, 1999 #4039). Weldon and others (2002 #5648) observed lineaments across Quaternary deposits 1:100,000-scale DEMs of the area.
Age of faulted surficial deposits	Faults in the Owyhee River section are mapped as offsetting Miocene to Pleistoc volcanic rocks and late Pleistocene to Holocene alluvium (Walker and Repenning 1966 #3586; Walker and MacLeod, 1991 #3646). Some faults in the western part section offset "older(?)" Pleistocene alluvial-fan deposits at the mouths of Rattles and Battle Creeks (Pezzopane, 1999 #4039), while others offset the "youngest all surfaces" (Nakata and others, 1992 #3524).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Timing of the most-recent event on faults in the Owyhee River sectio poorly constrained and spatially variable. Narwold (2001 #3010) used scarp-profi analysis to infer a latest Pleistocene or Holocene age for three short scarps at the western end of the Owyhee River section; Nakata and others (1992 #3524) also r offsets of the "youngest alluvial surfaces" near Blue Mountain Pass at the wester of the section. Pezzopane (1993 #3544) and Weldon and others (2002 #5648) use airphoto and DEM analyses to infer latest movement on most faults in the section the Holocene or late Pleistocene, but field reconnaissance showed no evidence of young (Holocene?) faulting on faults near Grassy Mountain at the eastern end of section (Pezzopane, 1999 #4039). The apparent concentration of latest Pleistocen Holocene displacement on a few faults at the western end of the section suggests latest movements on this part of the section may be related to paleoearthquakes o more recently active Quinn River section to the south.
Recurrence interval	
Slip-rate	Less than 0.2 mm/yr

category	*Comments:* Pezzopane (1993 #3544) and Pezzopane and Weldon (1993 #149) use airphoto and limited field reconnaissance to infer a slip rate of 0.5–1.0 mm/yr acr broad zone of faulting from the Steens Mountain/Alvord desert area across the Sa Rosa Range fault system, but how this slip is partitioned on the numerous faults i area is unknown. Offsets of a few hundred feet in Miocene bedrock (Pezzopane, #4039) imply very low rates of long-term slip across faults in this section.
Date and Compiler(s)	2002 Stephen F. Personius, U.S. Geological Survey Kenneth Adams, Piedmont Geosciences, Inc. Thomas L. Sawyer, Piedmont Geosciences, Inc.
References	#2845 dePolo, C.M., 1998, A reconnaissance technique for estimating the slip rat normal-slip faults in the Great Basin, and application to faults in Nevada, U.S.A.: Reno, University of Nevada, unpublished Ph.D. dissertation, 199 p. #284 Dohrenwend, J.C., and Moring, B.C., 1991, Reconnaissance photogeologic of young faults in the McDermitt 1° by 2° quadrangle, Nevada, Oregon, and Idah U.S. Geological Survey Miscellaneous Field Studies Map MF-2177, 1 sheet, scal 1:250,000. #3008 Erwin, J.W., 1988, Discussion of the McDermitt gravity sheet, Map#86: N Bureau of Mines and Geology, Open File Report 88-2, 4 p. #3009 Erwin, J.W., Ponce, D.A., and Wagini, A., 1985, Bouguer gravity map of Nevada, McDermitt sheet: Nevada Bureau of Mines and Geology, Map 86, scale 1:250,000. #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. #2540 Michetti, A.M., and Wesnousky, S.G., 1993, Holocene surface faulting alo the west flank of the Santa Rosa Range (Nevada-Oregon) and the possible northe extension of the central Nevada seismic belt: Geological Society of America Abs with Programs, v. 25, no. 5, p. 120-121. #3524 Nakata, T., Weldon, R.J.I., Pezzopane, S., Rosenfeld, C., and Yeats, R.S., Preliminary aerial photo-interpretation of active faults in Oregon: Geological Soc of America Abstracts with Programs, v. 24, no. 5, p. 72. #4035 Narwold, C.F., 1999, Late Quaternary faulting along the Quinn River fault —A soils investigation, *in* Quaternary geology of the northern Quinn River and A Valleys, southeastern Oregon: Friends of the Pleistocene field trip guide, Septemb

24-26, 1999, Appendix 1, p. 1–18.

#3010 Narwold, C.F., 2001, Late Quaternary soils and faulting along the Quinn R fault zone, northern Nevada, southeastern Oregon: Arcata, California, Humboldt University, unpublished M.S. thesis, 76 p., 4, scale 1:48,000.

#3011 Narwold, C.F., and Pezzopane, S.K., 1997, Preliminary analysis of late Quaternary faulting along the Quinn River fault zone, northern Nevada-southeast Oregon: Geological Society of America Abstracts with Programs, v. 29, no. 6, p. 323.

#4039 Pezzopane, S., 1999, Regional tectonic setting and fault studies in Quinn F Valley and surrounding regions, Oregon and Nevada, *in* Quaternary geology of th northern Quinn River and Alvord Valleys, southeastern Oregon: Friends of the Pleistocene field trip guide, September 24-26, 1999, Appendix 6, p. 1-11.

#3544 Pezzopane, S.K., 1993, Active faults and earthquake ground motions in Oı 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.

#2866 Stewart, J.H., 1978, Basin-range structure in western North America—A r *in* Smith, R.B., and Eaton, G.P., eds., Cenozoic tectonics and regional geophysics the western cordillera: Geological Society of America Memoir 152, p. 1-31, scale 1:2,500,000.

#3012 Vikre, P.G., 1985, Geologic map of the Buckskin Mountain quadrangle, Nevada: Nevada Bureau of Mines and Geology , Map 88, scale 1:24,000.

#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.

#3586 Walker, G.W., and Repenning, C.A., 1966, Reconnaissance geologic map (west half of the Jordan Valley quadrangle Malheur County, Oregon: U.S. Geologi Survey Miscellaneous Geologic Investigations I-457, 1 sheet, scale 1:250,000.

#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.

#3002 Willden, R., 1964, Geology and mineral deposits of Humboldt County, Ne Nevada Bureau of Mines and Geology Bulletin 59, 154 p., scale 1:250,000.