Jump to Navigation

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.

Hoppin Peaks fault zone, Hoppin Peaks section (Class A) No. 1507b

Last Review Date: 2016-07-12

citation for this record: Adams, K., and Personius, S.F., compilers, 2002, Fault number 1507b, Hoppin Peaks fault zone, Hoppin Peaks section, 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 02:50 PM.

Synopsis	**General:** This down-to-the-east fault zone forms an abrupt topographic escarpment between the eastern margins of the Double H Mountains, Montana Mountains, Hoppin Peaks, and the Oregon Canyon Mountains, and the western margin of the Quinn River Valley. Quaternary fault traces have been mapped from Twelvemile Summit at the north end of the Quinn River Valley, south across the Oregon-Nevada border to about 10 km south of Moonshine Canyon. The footwall block comprised of the Montana Mountains, Double H Mountains, Hoppin Peaks, and the Oregon Canyon Mountains forms a major east-tilted fault block in the northern Basin and Range; the adjacent Quinn River Valley is a graben filled with thousands of meters of Tertiary-Quaternary fill. The Hoppin Peaks fault zone is divided into two sections herein, a northern Oregon Canyon Mountains section and a southern Hoppin Peaks section. As is common along other faults

	in the Quinn River Valley, both sections of the fault zone have piedmont and range-front fault scarps, but fault scarps are more continuous along the Hoppin Peaks section. No detailed fault studies have been conducted, but most of the fault zone is mapped as having youngest movement in the middle to late Quaternary. Short piedmont scarps at the northern ends of the Hoppin Peak and Oregon Canyon Mountains sections appear to have been active in the latest Pleistocene or Holocene, but the short lengths of these scarps suggest that they may be related to paleoearthquakes on the more-recently active Santa Rosa Range fault system [1508] located on the east side of the Quinn River Valley. **Sections:** This fault has 2 sections. Although detailed studies along the entire fault zone have not been completed, two sections herein are inferred based on geometry of the zone, a northern Oregon Canyon Mountains section and a southern Hoppin Peaks section. The two sections are separated by an echelon 4-km-wide left step in the range front near Washburn Creek, 7 km south of the Oregon-Nevada border. Range front and piedmont fault scarps are more consistently present along the Hoppin Peaks section.
Name comments	**General:** **Section:** This section is herein informally named after Hoppin Peaks, which form the footwall of this part of the fault zone. This section is the Hoppin Peaks fault zone of dePolo (1998 #2845). **Fault ID:** These structures are included in fault number 50 of Pezzopane (1993 #3544), fault number 63 of Geomatrix Consultants, Inc. (1995 #3593), and fault numbers MD1A and MD1B of dePolo (1998 #2845).
County(s) and State(s)	HUMBOLDT COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Fault locations are primarily based on 1:48,000-scale mapping of Narwold (2001 #3010) and unpublished 1:100,000-scale mapping of Michetti and Wesnousky (1993 #2540), both of which were compiled from the same set of 1:12,000-scale low-

	sun-angle aerial photographs and field checked. Additional faults were located from the 1:250,000-scale reconnaissance photogeologic mapping of Dohrenwend and Moring (1991 #284), and the 1:48,000-scale bedrock mapping of Greene (1972 #3007).
Geologic setting	This down-to-the-east fault zone forms abrupt eastern topographic escarpments between the Double H Mountains, Montana Mountains, Hoppin Peaks, and the Oregon Canyon Mountains, and the western margin of the northern Quinn River Valley. The footwall block forms a major east-tilted fault block in the northern Basin and Range (Stewart, 1978 #2866); the adjacent Quinn River Valley is a graben filled with 1,200 to 2,450 m of Tertiary-Quaternary fill (Erwin and others, 1985 #3009; Erwin, 1988 #3008).
Length (km)	This section is 55 km of a total fault length of 91 km.
Average strike	N15°E (for section) versus N4°E (for whole fault)
Sense of movement	Normal *Comments:* Structures in this zone are mapped as normal or high-angle faults by D.B. Slemmons (1966, unpublished McDermitt 1? X 2? sheet), Greene (1972 #3007), Dohrenwend and Moring (1991 #284), Michetti and Wesnousky (1993 #2540), Pezzopane (1993 #3544), dePolo (1998 #2845), and Narwold (2001 #3010).
Dip Direction	E
Paleoseismology studies	
Geomorphic expression	Faults in this zone are primarily expressed as east-facing scarps and faults that juxtapose Quaternary alluvium against bedrock, although a few west facing scarps also exist (Greene, 1972 #3007; Dohrenwend and Moring, 1991 #284; Narwold, 2001 #3010). Scarps along the range front are more continuous than scarps along the Oregon Canyon Mountains section. dePolo (1998 #2845) reports a maximum preferred basal fault facet height of 195 m along the Hoppin Peaks section.
Age of faulted surficial deposits	Faults in this zone displace Miocene volcanic rocks (Greene, 1972 #3007) and early to middle and/or late Pleistocene (Dohrenwend and Moring, 1991 #284) or middle to late Pleistocene (Narwold, 2001 #3010) alluvial-fan deposits.

Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* Timing of the most recent event is not well constrained on the Hoppin Peaks section. Most fault scarps in the section are on early or middle Pleistocene alluvium. At one location south of Salient Peak, a splay of the range front fault is buried by the highest (Sehoo) shoreline of Lake Lahonton (Narwold, 2001 #3010), so latest movement on this scarp must predate the 13 ka age (Adams and Wesnousky, 1999 #3982) of this feature. However, a small piedmont scarp mapped by Narwold (2001 #3010) at the northern end of the section appears to have been active in the latest Pleistocene or Holocene. The short length (7 km) of this young fault scarp and proximity to extensive latest Quaternary fault scarps on the eastern side of the Quinn River Valley suggest that the young scarp may be related to fault rupture on the more-recently active Santa Rosa Range fault system [1508].
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* dePolo (1998 #2845) assigned a reconnaissance vertical slip rate of 0.361 mm/yr to the Hoppin Peaks section, based on an empirical relationship between his preferred maximum basal facet height and vertical slip rate. The size of the facets (tens to hundreds of meters, as measured from topographic maps) indicates they are the result of many seismic cycles, and thus the derived slip rate reflects a long-term average. No detailed slip studies have been conducted on the Hoppin Peaks section, but mapping by Narwold (2001 #3010) indicates that the youngest movement on most of the section predates the latest Quaternary, and only a single small scarp offsets late Pleistocene or possibly younger surfaces. The map relations of Narwold (2001 #3010), and determination of a <0.1 mm/yr slip rate (Personius and others, 2002 #5651; 2002 #5652) on the nearby (and more-recently active) Santa Rosa Range fault system [1508] suggest lower rates of slip on the Hoppin Peaks section than those estimated by dePolo (1998 #2845).
Date and	2002

Compiler(s)	Kenneth Adams, Piedmont Geosciences, Inc. Stephen F. Personius, U.S. Geological Survey
References	#3982 Adams, K.D., and Wesnousky, S.G., 1999, The Lake Lahontan highstand—Age, surficial characteristics, soil development, and regional shoreline correlation: Geomorphology, v. 30, p. 357-392. #2845 dePolo, C.M., 1998, A reconnaissance technique for estimating the slip rate of 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 map of young faults in the McDermitt 1° by 2° quadrangle, Nevada, Oregon, and Idaho: U.S. Geological Survey Miscellaneous Field Studies Map MF-2177, 1 sheet, scale 1:250,000. #3008 Erwin, J.W., 1988, Discussion of the McDermitt gravity sheet, Map#86: Nevada 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 Oregon: Technical report to Oregon Department of Transportation, Salem, Oregon, under Contract 11688, January 1995, unpaginated, 5 pls., scale 1:1,250,000. #3007 Greene, R.C., 1972, Preliminary geologic map of the Jordan Meadows quadrangle, Nevada-Oregon: U.S. Geological Survey Miscellaneous Field Studies Map MF-341, scale 1:48,000. #2540 Michetti, A.M., and Wesnousky, S.G., 1993, Holocene surface faulting along the west flank of the Santa Rosa Range (Nevada-Oregon) and the possible northern extension of the central Nevada seismic belt: Geological Society of America Abstracts with Programs, v. 25, no. 5, p. 120-121. #3010 Narwold, C.F., 2001, Late Quaternary soils and faulting along the Quinn River fault zone, northern Nevada, southeastern Oregon: Arcata, California, Humboldt State University,

unpublished M.S. thesis, 76 p., 4, scale 1:48,000.

#5651 Personius, S.F., Anderson, R.E., Okumura, K., and Hancock, D.A., 2002, Preliminary results of a trench investigation of the Santa Rosa Range fault zone, Humboldt County, Nevada: Geological Society of America Abstracts with Programs, v. 34, no. 4, p. A-11.

#5652 Personius, S.F., Anderson, R.E., Okumura, K., Mahan, S.A., and Hancock, D.A., 2002, Preliminary paleoseismology of the Santa Rosa Range fault zone, Humboldt County, Nevada: Geological Society of America Abstracts with Programs, v. 34, no. 6, p. 27.

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

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