Jump to Navigation

Quaternary Fault and Fold Database of the United States

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Shoshone Range fault zone (Class A) No. 1148

Last Review Date: 2006-06-29

citation for this record: **Anderson, R.E., and Haller, K.M., compilers, 2006, Fault number 1148, Shoshone Range 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 02:18 PM.**

Synopsis	The Shoshone Range fault zone forms the western margin of the Shoshone Range, one of many southeast- to east-tilted ranges in north-central Nevada. This long fault zone extends across most of the Winnemucca sheet and southwest into the Millett sheet to about 3 km south of where the Reese River cuts south through the Shoshone Range. Its main central part is southeast of Battle Mountain, where the total throw is probably the greatest; this part separates the basin beneath Reese River Valley on the northwest from the Shoshone Range on the southeast. To the northeast, the fault zone bounds the Argenta Rim part of the Shoshone Range and the southeast past of the basin beneath Boulder Flat. From there, the fault zone trails off northeastward into Boulder Valley. The southern part of the fault is characterized by a more northerly strike (N. 20° E.) and less continuous scarps than the northern part, which strikes about N. 40° E. The northern part of the fault has a conspicuously S-shaped trace; whereas the southern part of

	the fault has a slightly irregular dogleg-shaped trace. The last surface-faulting event is probably Holocene. Thirteen profiles measured across a possible single-event scarps that are probably along the northern section yield an average offset of 1.4 m.
Name comments	Modified from dePolo (1998 #2845) who used the name Shoshone Range fault system for the long fault zone that extends across almost the entire north-south extent of the Winnemucca sheet (lat 40–41° N.). The fault zone starts in the northern part of Boulder Valley, and strikes southwest and south along the eastern margin of the Reese River Valley to about 3 km south of where the river cuts south through the Shoshone Range (just south of lat 40° N.). Wallace (1979 #203) referred to the scarps along south part of the fault zone as the Reese River Valley scarps, those along the Argenta Rim (south of Interstate Highway 80) as the Argenta Rim scarps, and those in Boulder Flat as the Boulder Flat scarps. **Fault ID:** Referred to as fault WI16 by dePolo (1998 #2845) and fault RSR by Pearthree and others (1989 #289) and Pearthree (1990 #148).
County(s) and State(s)	EUREKA COUNTY, NEVADA LANDER COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Fault traces taken principally from the 1:125,000-scale map of young fault scarps by Wallace (1979 #203) who mapped by the photogeology mostly on 1:60,000-scale aerial photos supported by limited field studies. The locations of a few fault traces at the southern end of this section are from the 1:250,000-scale map of Dohrenwend and others (1992 #283), which is based on photogeologic analysis of 1:58,000-nominal-scale, color-infrared photography, which was transferred directly to 1:100,000-scale topographic maps enlarged to the scale of the photographs. More recent mapping at 1:24,000 scale by Ramelli and House (2000 #5673) and Ramelli and others (2001 #5676) show in detail the numerous scarps on alluvium southeast of Battle Mountain, Nev.

Geologic setting	The Shoshone Range is one of a set of southeast- to east-tilted ranges in north-central Nevada. Its main central part has a precipitous fault-controlled, west-facing bedrock escarpment typical of those ranges. This geomorphic aspect may have resulted from long-term (>1–2 m.y.) accelerated displacement during the latter part of the past 10–14 m.y. (Wallace, 1978 #2648). The greatest throw on the fault zone is probably southeast of Battle Mountain, where the Reese River Valley and the Shoshone Range are the broadest. The total throw decreases in the southern part of the zone where coeval volcanic rock is exposed on both sides of the fault zone's trace (Stewart and Carlson, 1978 #3413). The northern part of the fault has a conspicuously S-shaped trace with an overall trend of about N. 40° E., and the southern part of the fault has a slightly irregular dogleg-shaped trace with an overall trend of about N. 20° E.
Length (km)	118 km.
Average strike	N34°E
Sense of movement	Normal *Comments:* Despite its irregular trace, a normal sense is inferred from its location and orientation in an extensional tectonic environment.
Dip Direction	W; N
Paleoseismology studies	Trenches have been excavated along the northern part of the Shoshone Range fault zone on a piedmont scarp at the mouth of Lewis Canyon. To the east and west, this same scarp shows clear evidence of multiple movements, with scarp heights ranging to as much as 6–8 m. This piedmont scarp is about 2 km northwest of the Shoshone Range, which shows discontinuous evidence of Quaternary movement along the subjacent range-front fault. Three trenches were excavated near Lewis Creek (Wesnousky and others, 2005 #7559). A long and relatively deep (3- to 4-m-deep) trench was excavated about 30 m southwest of the road to Mt. Lewis (20 km south-southeast of Battle Mountain) across a single-event piedmont scarp. Trench 1 (site 1148-1) crossed a 0.4-m-high scarp on the Holocene flood plain. The interpretation of the exposure is that a single coseismic surface rupture occurred since 6,867±119 cal yr BP (Wesnousky and others, 2005 #7559). The fault bifurcates north of Trench 1; Trench 2 (site 1148-2) and Trench 3 (site 1148-3) were excavated across the two subparallel

	fault scarps on the Q2 alluvial surface. Two coseimic surface ruptures are suggested by the exposed stratigraphy; the most recent event occurred close to 3,317±364 cal yr BP.
Geomorphic expression	The northern part of the fault is characterized by highly varied geomorphic expression, ranging from distributed mid-valley scarps in the Boulder and Reese River valleys to an escarpment lacking transverse drainages along Argenta Rim. The more typical expression is one of a faceted range-front escarpment of the Shoshone Range that faces the Reese River Valley. Pearthree (1989 #238) measured 13 profiles across scarps that are probably all along the northern part of the Shoshone Range fault zone. He reported an average offset of 1.4 m, but no other details of the scarp morphology are reported. The reported value probably approximates the mean height of a single-event scarp. Along the southern part of the fault, scarps are distributed throughout the piedmont east of Reese River between the Fish Creek Mountains and the Shoshone Range. Most of these scarps are discontinuous and face west, but some form narrow discontinuous grabens (Dohrenwend and Moring (1991 #282). Neither Wallace (1979) nor Dohrenwend and Moring (1991 #282) mapped young fault scarps on Quaternary deposits or erosion surfaces along the main break in slope at the western base of the Shoshone Range. Instead, Wallace (1979 #203) mapped that fault as a lineament along which no scarps are preserved and by Dohrenwend and Moring (1991 #282) and Dohrenwend and others (1992 #283) as a discontinuous major range-front fault characterized by fault juxtaposition of Quaternary alluvium against bedrock. dePolo (1998 #2845) reported a preferred maximum basal facet height of 183 m (158–207 m) for the Shoshone Range fault zone.
Age of faulted surficial deposits	On the basis of reconnaissance photogeologic mapping, Dohrenwend and Moring (1991 #282) estimated a broad range in age of Quaternary surficial deposits or erosion surfaces on which scarps of the Shoshone Range fault are formed. The range is from middle to early Pleistocene (0.13–1.6 Ma) to Holocene (10 ka). Scarps on deposits or erosion surfaces estimated to be Holocene are restricted to basin-fill deposits of the Reese River and Boulder Valleys. In that area, a few other faults are mapped as juxtaposing Quaternary deposits against bedrock (Dohrenwend and Moring, 1991 #282; Dohrenwend and others, 1992 #283). Mapping by Ramelli and House (2000 #5673) and Ramelli and others (2001 #5676) also show that the numerous scarps southeast of Battle Mountain, Nevada are on deposits as young as Holocene.

Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Holocene (Wesnousky and others, 2005 #7559). On a 1:125,000-scale map of young fault scarps, Wallace (1979 #203) shows the time of latest surface faulting along the northern part of the fault in Reese River and Boulder Valleys to be younger than 2 ka. Unpublished, but ongoing, paleoseismic studies at site 1148-1 support this estimate. Dohrenwend and Moring (1992 #282) show discontinuous scarps on Holocene age deposits along the northern 85 km of the fault, thus is the basis of the latest Quaternary age assignment.
Recurrence interval	*Comments:* Wesnousky and others (2005 #7559) report that the two coseismic surface ruptures were separated by many tens of thousands of years.
Slip-rate category	Less than 0.2 mm/yr *Comments:* dePolo (1998 #2845) assigned a vertical displacement rate of 0.335 mm/yr based on an empirical relationship between his preferred maximum basal facet height and vertical 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 rate reflects a long-term average. However, the late Quaternary characteristics of this fault (overall geomorphic expression, continuity of scarps, age of faulted deposits, etc.) suggest the slip rate during this period is of a lesser magnitude. Accordingly, the less than 0.2 mm/yr slip-rate category has been assigned to this fault.
Date and Compiler(s)	2006 R. Ernest Anderson, U.S. Geological Survey, Emeritus Kathleen M. Haller, U.S. Geological Survey
References	#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. #282 Dohrenwend, J.C., and Moring, B.C., 1991, Reconnaissance photogeologic map of young faults in the Winnemucca 1° by 2°

quadrangle, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-2175, 1 sheet, scale 1:250,000.

#283 Dohrenwend, J.C., Schell, B.A., and Moring, B.C., 1992, Reconnaissance photogeologic map of young faults in the Millett 1° by 2° quadrangle, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-2176, 1 sheet, scale 1:250,000.

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#238 Pearthree, P.A., Demsey, K.A., Bull, W.B., and Slaff, S., 1989, Detailed geomorphic studies of late Quaternary faulting in central Nevada: Technical report to U.S. Geological Survey, Earthquake Hazards Reduction Program, under Contract 14-0001-08-G1360, December 1989, 17 p.

#5673 Ramelli, A.R., and House, P.K., 2000, Geologic map of the Bateman Spring quadrangle, Lander County, Nevada: Nevada Bureau of Mines and Geology Open-File Report 2000-8, 1 sheet, scale 1:24,000.

#5676 Ramelli, A.R., House, P.K., Wrucke, C.T., and John, D.A., 2001, Geologic map of the Stony Point quadrangle, Lander County, Nevada: Nevada Bureau of Mines and Geology Map 131, 1 sheet, scale 1:24,000.

#3413 Stewart, J.H., and Carlson, J.E., 1978, Geologic map of Nevada: U.S. Geological Survey, Special Geologic Map, 1, scale 1:500,000.

#2648 Wallace, R.E., 1978, Geometry and rates of change of fault-generated range fronts, north-central Nevada: Journal of Research of the U.S. Geological Survey, v. 6, no. 5, p. 637-649.

#203 Wallace, R.E., 1979, Map of young fault scarps related to earthquakes in north-central Nevada: U.S. Geological Survey Open-File Report 79-1554, 2 sheet, scale 1:125,000.

#7559 Wesnousky, S.G., Barron, A.D., Briggs, R.W., Caskey, S.J., Kumar, Senthil, and Owen, L., 2005, Paleoseismic transect across the northern Great Basin: Journal of Geophysical Research, v.

	110, B05408, 25 p.