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.

Toquima Range fault (Class A) No. 1344

Last Review Date: 2011-08-09

citation for this record: **Sawyer, T.L., and Lidke, D.J., compilers, 2011, Fault number 1344, Toquima Range fault, 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 02:14 PM.**

Synopsis	This sinuous down-to-the-east fault bounds the eastern flank of the Toquima Range. The part of the fault along the flank of Mount Jefferson (highest point in the range) is north-northwest striking and defines a large embayment in the range front. The principle sources of data consist of geologic mapping, photogeologic mapping supplemented by field verification.
Name comments	Refers to the sinuous, but mostly north-northeast-striking fault zone that is relatively continuous along all but the northernmost part of the east flank of the Toquima Range. Includes the Toquima, Belmont, Silver Spring, Spanish Spring, and Dianas Punch Bowl faults of Schell (1981 #2844). dePolo (1998 #2845) included all of these faults in his Toquima Range fault system. Parts of this fault have also been mapped by McKee (1976 #4349), Kleinhampl and Ziony (1985 #2851), Shawe (1992 #2932), Dohrenwend and others (1992 #283; 1996 #2846). The

	fault zone extends from northern Ralston Valley at the south end of the Toquima Range, along the range front and through western Monitor Valley, to about State Route 82 east of Johning Potts Springs. **Fault ID:** Includes faults 73, 75, 76, 105, and 106 on Plates A2 and A7 in Schell (1981 #2844). Refers to faults T10A and T10B of dePolo (1998 #2845).
County(s) and State(s)	NYE COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Location based on 1:250,000-scale maps of Schell (1981 #2844), Dohrenwend and others (1992 #283; 1996 #2846). Mapping by Schell (1981 #2843; 1981 #2844) included field verification, but was based primarily on photogeologic analysis of 1:24,000-scale, color, aerial photography that was supplemented by analysis of some, 1:60,000-scale, black-and-white, aerial photography. Faults identified on the aerial photographs were transferred by inspection to 1:62,500-scale topographic maps that were photographically reduced to 1:250,000-scale for final compilation of the faults on 1:250,000-scale topographic maps. Mapping by Dohrenwend and others (1992 #283; 1996 #2846) was based on photogeologic analysis of 1:58,000-nominal-scale, color-infrared photography transferred directly to 1:100,000-scale topographic maps enlarged to the scale of the photographs. These maps were then reduced and compiled at 1:250,000-scale.
Geologic setting	This high-angle, down-to-the-east fault bounds nearly the entire east side of the north-northwest-trending, slightly westward-tilting Toquima Range. Some fault strands of the central part of the fault zone appear to connect to the east with the Western Monitor Range fault zone [1346], near the towns of Windmill and south of Belmont, suggesting that the fault zones may be related. McKee (1976 #4349) estimated that the late Cenozoic, vertical offset along bounding faults of the Toquima Range, such as the Toquima Range fault system, is greater than 600 m based on apparent offsets of Tertiary age tuffs.

Length (km)	78 km.
Average strike	N20°E
Sense of movement	Normal *Comments:* Not specifically reported. However, east facing scarps on piedmont-slope deposits adjacent to the range front, as well as the down-to-the-east, range-front character of much of the fault zone consistently indicates down-to-the-east fault offsets, which in this extensional regime probably reflects principally normal, dip-slip movement along easterly dipping faults.
Dip Direction	SE; NE
Paleoseismology studies	
Geomorphic expression	The fault juxtaposes Quaternary alluvium against bedrock, characterized by large basal fault facets, and late Pleistocene scarps and associated lineaments. Distributed zones of short scarps on late Pleistocene piedmont-slope surfaces are preserved near the northern end of the fault and within the embayment in the range front at Pasco Canyon (Schell, 1981 #2844; Dohrenwend and others, 1996 #2846). Schell (1981 #2844) reported moderately well defined (less than or equal to 17° slope angle) scarps as much as 10 m high on late Pleistocene alluvial fan deposits. dePolo (1998 #2845) reports a maximum preferred basal fault facet height of 134 m (110–158 m) along the northern part of the fault. Higher in the Toquima Range is an arcuate-shaped fault or faults that together with the range front zone make two wishbone patterns.
Age of faulted surficial deposits	Schell (1981 #2844) and Dohrenwend and others (1992 #283; 1996 #2846) mapped scarps on late Pleistocene and on early to middle Pleistocene deposits.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Although the timing of the most recent prehistoric faulting event is not well constrained, based on diffusion modeling of fault scarps Koehler and Wesnousky (2011 #7175) estimate the most recent coseismic surface deformation to be 55 and 60.5 ka, with evidence of younger 1.1-m offset at 16 ka to the

	north. Schell (1981 #2844) and Dohrenwend and others (1992 #283; 1996 #2846) agree on late Pleistocene based on photogeologic mapping and field reconnaissance of scarp morphology. The conservative age category is assigned here.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Koehler and Wesnousky (2011 #7175) estimate vertical-separation data for 20-k.y. and 60-k.y. timeframes that suggest low rates of vertical deformation that fall within the assigned slip-rate category. dePolo (1998 #2845) assigned a reconnaissance vertical slip rate of 0.248 mm/yr to the northern part of the fault based on an empirical relationship between his preferred maximum basal facet height. In addition, dePolo (1998 #2845) assigned a reconnaissance vertical slip rate of 0.010 mm/yr to the southern part of the fault based on the presence of scarps on alluvium and the absence of basal facets. 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. However, the late Quaternary characteristics of this fault and the reported 10-m-high scarp on late Quaternary deposits 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)	2011 Thomas L. Sawyer, Piedmont Geosciences, Inc. David J. Lidke, 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. #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. #2846 Dohrenwend, J.C., Schell, B.A., Menges, C.M., Moring, B.C., and McKittrick, M.A., 1996, Reconnaissance photogeologic map of young (Quaternary and late Tertiary) faults in Nevada, *in*

Singer, D.A., ed., Analysis of Nevada's metal-bearing mineral resources: Nevada Bureau of Mines and Geology Open-File Report 96-2, 1 pl., scale 1:1,000,000.

#2851 Kleinhampl, F.J., and Ziony, J.I., 1985, Geology of Northern Nye County, Nevada: Nevada Bureau of Mines and Geology Bulletin 99A, 172 p.

#7175 Koehler, R.D., and Wesnousky, S.G., 2011, Late Pleistocene regional extension rate derived from earthquake geology of late Quaternary faults across the Great Basin, Nevada, between 38.5 degrees N and 40 degrees N latitude: Geological Society of America Bulletin, v. 123, no. 3-4, p. 631–650, doi:10.1130/B30111.1.

#7773 Koehler, R.D., III, 2009, Late Pleistocene regional extension rate derived from earthquake geology of late Quaternary faults across Great Basin, Nevada between 38.5° and 40° N. latitude: Reno, University of Nevada, unpublished Ph.D. dissertation, 119 p.

#4349 McKee, E.H., 1976, Geology of the northern part of the Toquima Range, Lander, Eureka, and Nye Counties, Nevada: U.S. Geological Survey Professional Paper 931, 49 p., 2 pls., scale 1:62,500.

#2843 Schell, B.A., 1981, Faults and lineaments in the MX Sitting Region, Nevada and Utah, Volume I: Technical report to U.S. Department of [Defense] the Air Force, Norton Air Force Base, California, under Contract FO4704-80-C-0006, November 6, 1981, 77 p.

#2844 Schell, B.A., 1981, Faults and lineaments in the MX Siting Region, Nevada and Utah, Volume II: Technical report to U.S. Department of [Defense] the Air Force, Norton Air Force Base, California, under Contract FO4704-80-C-0006, November 6, 1981, 29 p., 11 pls., scale 1:250,000.

#2932 Shawe, D.R., 1992, Geologic map of the Belmont West 7 1/2-minute quadrangle, Nye County, Nevada: U.S. Geological Survey Open-File Report 92-0186, 10 p., scale 1:24,000.

Questions or comments?