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.

Mono Lake fault (Class A) No. 41

Last Review Date: 2002-08-15

Compiled in cooperation with the California Geological Survey

citation for this record: **Sawyer, T.L., and Bryant, W.A., compilers, 2002, Fault number 41, Mono Lake 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 03:09 PM.**

Synopsis	Holocene active, down-to-the-east normal fault that borders the western side of Mono Lake. One detailed study by McCalpin and Berry (1999 #5575) exposed deposits and stratigraphic relations that suggest two surface-faulting earthquakes during the Holocene. Clark and others (1984 #2876) calculated a late Pleistocene vertical slip rate of 2.5 mm/yr based on the amount of offset of late Tioga recessional moraine at Lundy Canyon.
Name comments	Mono Lake fault was first mapped, but not named by Russell (1889 #5576). The fault has been referred to as the Mono Lake fault (for example, by Clark and others, 1984 #2876; Bryant, 1984 #5573; McCalpin and Berry, 1999 #5575) and the Lee

	Vining fault (Bailey, 1989 #5577). The fault will be referred to as the Mono Lake fault in this compilation. **Fault ID:** Refers to number 133 (Mono Lake fault) of Jennings (1994 #2878) and fault number MA1 (Mono Lake fault) of dePolo (1998 #2845).
County(s) and State(s)	MONO COUNTY, CALIFORNIA
Physiographic province(s)	CASCADE-SIERRA MOUNTAINS
Reliability of location	Good Compiled at 1:48,000 scale. *Comments:* Location based on digital revisions to Jennings (1994 #2878). Original mapping (Bryant, 1984 #5573) is at 1:48,000.
Geologic setting	This high-angle, down-to-east, range-bounding normal fault along western border of Mono Lake basin extends from the Mono Craters caldera on the south to Conway Summit on the north. Gilbert and others (1968 #5574) inferred as much as 1,800 m of vertical displacement across the fault.
Length (km)	23 km.
Average strike	N34°W
Sense of movement	Normal *Comments:* Based on an observation by Bryant (1984 #5573) of a possible fault exposure in Paleozoic marble near Lundy Canyon.
Dip	55°–70° E. *Comments:* Based on an observation by Bryant (1984 #5573) of a possible fault exposure in Paleozoic marble near Lundy Canyon.
Paleoseismology studies	Site 41-1. Studies by McCalpin and Berry (1999 #5575) involved the excavation of three fault-normal trenches across the Mono Lake fault at the mouth of Lee Vining Canyon. They found evidence for two surface-faulting events that post-date the formation of latest Pleistocene fan-delta deposits.
Geomorphic	The Mono Lake fault (zone) is characterized by a steep, 900-m-

expression	high escarpment that has triangular facets and "wine-glass" shaped drainage canyons. Fault scarps are formed on Holocene alluvial fans and talus cones and generally are north of Mono Lake (Bryant, 1984 #5573).
Age of faulted surficial deposits	Holocene stream-terrace deposits, Holocene to late Pleistocene talus and alluvium; late Pleistocene (post-Tioga) wave-cut terrace deposits, Tioga recessional moraines and outwash deposits; Tahoe-stage moraines; early Pleistocene (Sherwin ?) glacial deposits. Paleozoic and Mesozoic roof pendant rocks (Dohrenwend, 1982 #2481; Clark and others, 1984 #2876; Bryant, 1984 #5573).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* The most recent paleoevent along the southern extent of the Mono Lake fault occurred about 1.6 ka (McCalpin and Berry, 1999 #5575).
Recurrence interval	*Comments:* McCalpin and Berry (1999 #5575) reported two surface-faulting earthquakes in Holocene time: the younger event occurred about 1.6 ka and was associated with 2–2.2 m of vertical displacement. The older event was estimated to be early Holocene and was characterized by about 1.6 m of vertical displacement.
Slip-rate category	Between 1.0 and 5.0 mm/yr *Comments:* Clark and others (1984 #2876) calculated a vertical slip rate of 2.5 mm/yr based on about 23 m offset of a Tioga recessional moraine (10–15 ka) in Lundy Canyon. Gilbert and others (1968 #5574) postulated that the 900-m-high escarpment along the fault developed after deposition of older glacial deposits (Sherwin ?; >0.76 Ma), suggesting a long-term rate of 1.2 mm/yr or less.
Date and Compiler(s)	2002 Thomas L. Sawyer, Piedmont Geosciences, Inc. William A. Bryant, California Geological Survey
References	#5577 Bailey, R.A., 1989, Geologic map of the Long Valley caldera, Mono-Inyo craters volcanic chain and vicinity, eastern California: U.S. Geological Survey Miscellaneous Investigations

Series Map I-1933, scale 1:62,500.

#5573 Bryant, W.A., 1984, Evidence of recent faulting along the Mono Lake fault zone, Mono County, California: California Division of Mines and Geology Open-File Report 84-55, scale 1:48,000.

#2876 Clark, M.M., Harms, K.H., Lienkaemper, J.J., Harwood, D.S., Lajoie, K.R., Matti, J.C., Perkins, J.A., Rymer, M.J., Sarna-Wojcicki, A.M., Sharp, R.V., Sims, J.D., Tinsley, J.C., III, and Ziony, J.I., 1984, Preliminary slip rate table and map of late Quaternary faults of California: U.S. Geological Survey Open-File Report 84-106, 12 p., 5 plates, scale 1:1,000,000.

#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.

#2481 Dohrenwend, J.C., 1982, Map showing late Cenozoic faults in the Walker Lake 1° by 2° quadrangle, Nevada-California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1382-D, 1 sheet, scale 1:250,000.

#5574 Gilbert, C.M., Christensen, M.N., Al-Rawi, Y., and Lajoie, K.R., 1968, Structural and volcanic history of the Mono basin, California-Nevada, *in* Studies in Volcanology—A memoir to Howell Williams: Geological Society of America Memoir 116, p. 275-329.

#2878 Jennings, C.W., 1994, Fault activity map of California and adjacent areas, with locations of recent volcanic eruptions: California Division of Mines and Geology Geologic Data Map 6, 92 p., 2 pls., scale 1:750,000.

#5575 McCalpin, J.P., and Berry, M.E., 1999, Holocene faulting on the Sierra Nevada frontal fault between Mono Lake and June Lake, eastern California: Geological Society of America Abstracts with Programs, v. 31, no. 7, p. 482.

#4860 Petersen, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic seismic hazard assessment for the State of California: California Department of

	Conservation, Division of Mines and Geology Open-File Report 96-08 (also U.S. Geological Open-File Report 96-706), 33 p. #5576 Russell, I.C., 1889, Quaternary history of Mono Valley, California, *in* Quaternary History of Mono Valley, California: U.S. Geological Survey Eighth Annual Report, p. 261-394.