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Quaternary Fault and Fold Database of the United States

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Owl Lake fault (Class A) No. 70

Last Review Date: 2003-06-18

citation for this record: **Bryant, W.A., compiler, 2003, Fault number 70, Owl 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 02:02 PM.**

Synopsis	The Owl Lake fault is a latest Pleistocene to Holocene active sinistral strike-slip fault in the southwestern Basin and Range geomorphic province. McGill and Sieh (1991 #6062) and McGill (1992 #6053) concluded that some sinistral slip is transferred from the Garlock fault zone [69]. McGill (1998 #6059) reports a preferred left-lateral slip rate of 2.5 mm/14C yr near the southwestern end of the Owl Lake fault. However this rate is poorly constrained and could be anywhere between 0.5 mm/14C yr and 7.8 mm/14C yr.
Name comments	The Owl Lake fault was first mapped and named by Muehlberger (1954 #6065).
County(s) and State(s)	SAN BERNARDINO COUNTY, CALIFORNIA
Physiographic province(s)	BASIN AND RANGE

Reliability of location	Good Compiled at 1:48,000 scale. *Comments:* Locations based on digital revisions to Jennings (1994 #2878) using original mapping by Muehlberger (1954 #6065) at 1:48,000; original mapping by Clark (1973 #483) at 1:24,000.
Geologic setting	The Owl Lake is a latest Pleistocene to Holocene active, east-northeast striking sinistral strike slip to normal-sinistral oblique slip fault located in the southwestern Basin and Range geomorphic province. The fault extends east-northeast from its intersection with the Garlock fault zone [69] near the southern Quail Mountains and bounds the northwestern side of the Owlshead Mountains where it is characterized by down-to-northwest normal to normal-oblique displacement (Muehlberger, 1954 #6065; Clark, 1973 #483). Total displacement has not been reported.
Length (km)	25 km.
Average strike	N56°E
Sense of movement	Left lateral *Comments:* The Owl Lake fault is a sinistral to normal-sinistral oblique slip fault along its southeastern traces, but about 12 km east-northeast of its intersection with the principal strands of the Garlock fault displacement is principally north-northwest-dipping normal (Clark, 1973 #483).
Dip Direction	NW *Comments:* Dip presumed near vertical along sinistral strike-slip strands and probably shallows to less than 80° along normal sinistral oblique strands.
Paleoseismology studies	70-1 by McGill (1998 #6079) studied a terrace riser that is offset about 80 m left-laterally and 2–28 m south-side-down across the Owl Lake fault, at a site near the southwestern end of the fault. Radiocarbon dates of about 30 ka on organic matter buried beneath desert varnish on boulders on the fan surface into which the terrace rise is incised suggest a preferred left-lateral slip rate of about 2.5 mm/yr, and a vertical slip rate of 0.06 to 0.9 mm/yr. The amount of left-lateral slip is poorly constrained and could be

	anywhere between 19 and 235 m, yielding minimum and maximum left-lateral slip rates of 0.5 mm/yr and 7.8 mm/yr, respectively. All rates are in uncalibrated radiocarbon years.
Geomorphic expression	The east-northeast-striking Owl Lake fault is delineated by geomorphic evidence of sinistral strike-slip displacement to about 12 km northeast from its intersection with the Garlock fault [69], such as shutter ridges, benches, sinisterly offset stream channels, linear valleys, and linear swales (Clark, 1973 #483). Farther northeast the fault is delineated by moderately to well-defined northwest facing scarps in alluvium indicative of normal to normal sinistral oblique slip (Clark, 1973 #483).
Age of faulted surficial deposits	Along the Owl Lake fault, a terrace riser incised into a 30 ka fan is offset, and younger deposits are offset as well (McGill, 1998 #6079).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Timing of most recent paleoevent in not well constrained. McGill (1998 #6079) mapped an offset terrace riser that is less than 30 ka. Clark (1973 #483) identified geomorphic features indicative of latest Pleistocene Holocene sinistral strike-slip displacement.
Recurrence interval	
Slip-rate category	Between 1.0 and 5.0 mm/yr *Comments:* McGill (1993 #6054; 1999 #6060) reported a latest Pleistocene slip rate of 1 to 3 mm/14Cyr for the Owl Lake fault, based on sinistral offset of 30 m to 80 m of a terrace riser. The age of the abandonment of this terrace is based on 14C dating of rock varnish of clasts exposed on the terrace surface indicates an age of 30 ka to 33 ka. Details of this study were published by McGill (1998 #6079), in which a preferred left-lateral slip rate of 2.5 mm/14Cyr is reported, along with a range of potential slip rates from 0.5 to 7.8 mm/14Cyr. The vertical slip rate of the Owl Lake fault is 0.06–0.9 mm/14Cyr. Slip rate assigned to the fault by Petersen and others (1996 #4860) for probabilistic seismic hazard assessment for the State of California was 2.0 mm/yr (with

	minimum and maximum assigned slip rates of 1.0 mm/yr and 3.0 mm/yr, respectively.
Date and Compiler(s)	2003 William A. Bryant, California Geological Survey
References	#483 Clark, M.M., 1973, Map showing recently active breaks along the Garlock and associated faults, California: U.S. Geological Survey Miscellaneous Geologic Investigations I-741, 3 sheets, scale 1:24,000. #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. #6054 McGill, S.F., 1993, Late Quaternary slip rate of the Owl Lake fault and maximum age of the latest event on the easternmost Garlock fault, S. California: Geological Society of America Abstracts with Programs, v. 25, no. 5, p. 118. #6079 McGill, S.F., 1998, Preliminary slip-rate estimate for the Owl Lake fault, California, *in* Calzia, J.P., and Reynolds, R.E., eds., Finding faults in the Mojave: San Bernardino County Museum Association Quarterly, v. 45, no. 1 and 2, p. 84-87. #6060 McGill, S.F., 1999, Slip-rate studies of the Garlock and Owl Lake faults: U.S. Geological Survey National Earthquake Hazards Reduction Program, Annual Summaries v. 40, Contract no. 1434-92-G-2210, 6 p., (electronic version on line at http://erp-web.er.usgs.gov/). #6062 McGill, S.F., and Sieh, K., 1991, Surficial offsets on the central and eastern Garlock Fault associated with prehistoric earthquakes: Journal of Geophysical Research, v. 96, p. 21,587-21,621. #6053 McGill, S.H.F., 1992, Paleoseismology and neotectonics of the central and eastern Garlock fault, California: Pasadena, California Institute of Technology, unpublished Ph.D. dissertation, 235 p. #6065 Muehlberger, W.R., 1954, Geology of the Quail Mountains, San Bernardino County: California Division of Mines Bulletin 170, Geology of Southern California Map Sheet 16, scale

	1:48,000. #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.