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.

Lake Mary fault zone (Class A) No. 971

Last Review Date: 1997-01-29

Compiled in cooperation with the Arizona Geological Survey

citation for this record: **Pearthree, P.A., compiler, 1997, Fault number 971, Lake Mary 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 03:11 PM.**

Synopsis	Substantial displacement across the northwest- and north-trending normal faults of the relatively long Lake Mary fault zone has formed a high, southwest-facing escarpment on Paleozoic bedrock and uppermost Miocene volcanic rocks. The fault zone is located near the Colorado Plateau margin, southeast of the Pliocene-Quaternary San Francisco volcanic field. The main fault zone bounds the northeast side of a narrow trough that contains upper and lower Lake Mary; there are several north-trending splays off of the main fault zone. Uppermost Miocene volcanic rocks are displaced about 130 m; upper Pliocene volcanic rocks are also faulted, but the amount of displacement has not been documented. Upper Quaternary hillslope colluvium exposed in a

	roadcut across the middle section of the fault zone is most likely faulted as well, but no detailed investigations have been conducted there.
Name comments	These faults were mapped and named the Anderson Mesa fault by Akers (1962 #2161), but later renamed the Lake Mary fault zone by Menges and Pearthree (1983 #2073) and Pearthree and others (1996 #2153). The general geology of the area was mapped by Ulrich and others (1984 #2157).
County(s) and State(s)	COCONINO COUNTY, ARIZONA
Physiographic province(s)	COLORADO PLATEAUS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Mapped at 1:100,000 scale, transferred to 1:250,000 map.
Geologic setting	The Lake Mary fault zone is the longest of several faults located southeast of the Pliocene-Quaternary San Francisco volcanic field, on the erosion surface cut onto Paleozoic rocks near the Colorado Plateau margin. The Lake Mary fault system displaces uppermost Miocene (5.9?0.3 Ma) volcanic rocks about 130 m, which is the largest amount of late Cenozoic displacement documented across any fault in and around the San Francisco volcanic field. Upper Pliocene volcanic rocks are also faulted, but the total displacement is not known. A roadcut exposure strongly suggests that upper Quaternary colluvial deposits also have been faulted.
Length (km)	25 km.
Average strike	N24°W
Sense of movement	Normal *Comments:* Predominantly normal movement inferred from topographic relations.
Dip	75° to 80° SW
Paleoseismology	

studies	
Geomorphic expression	A northwest- to north-trending escarpment formed on Paleozoic bedrock and uppermost Miocene basalt defines the east side of a fairly narrow, asymmetric graben. The trough bottom is covered by late Quaternary alluvium deposited in lakes or marshes, and locally, upper Pliocene basalt. Escarpment slopes are moderately steep suggesting Quaternary fault activity.
Age of faulted surficial deposits	Paleozoic, latest Miocene, late Pliocene, late Quaternary
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* This age estimate is based on probable faulting of upper to uppermost Quaternary hillslope colluvium as exposed in a roadcut on the Lake Marshall road.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* A low long-term slip rate is inferred based on about 130 m of displacement in 6 Ma. Although, this long-term rate may or may not be applicable to the Quaternary.
Date and Compiler(s)	1997 Philip A. Pearthree, Arizona Geological Survey
References	#2161 Akers, J.P., 1962, Relation of faulting to the occurrence of ground water in the Flagstaff area, Arizona, *in* Geological Survey Research 1962: U.S. Geological Survey Professional Paper 450, p. B97-B100. #2073 Menges, C.M., and Pearthree, P.A., 1983, Map of neotectonic (latest Pliocene-Quaternary) deformation in Arizona: Arizona Geological Survey Open-File Report 83-22, 48 p., scale 1:500,000. #2153 Pearthree, P.A., Vincent, K.R., Brazier, R., and Hendricks, D.M., 1996, Plio-Quaternary faulting and seismic hazard in the Flagstaff area, northern Arizona: Arizona Geological Survey

	Bulletin 200, 40 p., 2 pls. #2157 Ulrich, G.E., Billingsley, G.H., Hereford, R., Wolfe, E.W., Nealey, L.D., and Sutton, R.L., 1984, Maps showing geology, structure, and uranium deposits of the Flagstaff 1° by 2° quadrangle, Arizona: U.S. Geological Survey Miscellaneous Investigations Map I-1446, 2 sheets, scale 1:250,000.