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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.

McArthur fault zone (Class A) No. 8

Last Review Date: 1995-10-01

Compiled in cooperation with the California Geological Survey

citation for this record: **Sawyer, T.L., compiler, 1995, Fault number 8, McArthur 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 03:16 PM.**

Synopsis	This fault zone is poorly understood and no detailed studies have been completed at the time of this compilation. Principal sources of data are MacDonald (1966 #5109) and unpublished reconnaissance studies of Woodward-Clyde Consultants (1987 #5105), Wills (1990 #5107), and Sawyer and Page (1995 #5106).
Name comments	McArthur fault zone first mapped (partly) by Gay and Aune (1958 #4890) and named by Woodward-Clyde Consultants (1987 #5105); it includes the Butte Creek fault system of MacDonald (1966 #5109). **Fault ID:** Refers to numbers 28 (McArthur fault) and 30 (unnamed faults) of Jennings (1994 #2878) and NE02 of Working

	Group on Northern California Earthquake Potential (1996 #1216).
County(s) and State(s)	LASSEN COUNTY, CALIFORNIA SHASTA COUNTY, CALIFORNIA
Physiographic province(s)	CASCADE-SIERRA MOUNTAINS
Reliability of location	Good Compiled at 1:62,500 scale. *Comments:* Location based on digital revisions to Jennings (1994 #2878) using original mapping by Wills (1990 #5107) at 1:62,500 scale.
Geologic setting	High-angle, down-to-west, en echelon normal faults that extend along the western side of Butte Creek Rim.
Length (km)	59 km.
Average strike	N17°W
Sense of movement	Normal *Comments:* Primarily down-to-west normal component; dextral shear is suggested by the en echelon rupture pattern in the fault zone (Wills, 1990 #5107).
Dip Direction	W
Paleoseismology studies	
Geomorphic expression	The McArthur fault zone forms 250-m-high scarp on basalt (Wills, 1990 #5107) and scarps 3-4 m high on alluvial and lacustrine deposits (Woodward-Clyde Consultants, 1987 #5105). Scarps are broader, talus covered and incised by minor drainages along the central part of the fault zone (Wills, 1990 #5107). South of the Pit River, the footwall of the fault appears to have been gently folded into a 25-m-high scarp (monocline) on highly jointed basalt (Sawyer and Page, 1995 #5106). Two bevels on a 3- to 4-m-high scarp on alluvium and lacustrine deposits suggest displacement during two events of 1.5 to 2 m per event near the northern end of the fault (Wills, 1990 #5107).
Age of faulted surficial	Holocene to post glacial (<15 ka) alluvium, late Pleistocene basalt, Pleistocene alluvium and lakebeds, and early Pleistocene

deposits	basalt (Wills, 1990 #5107).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Wills (1990 #5107; 1991 #475) suggested Holocene fault activity based on steepening of drainages immediately upstream of the fault trace, the presence of a large closed depression along the trace, a tonal lineament, and possible scarps on Holocene alluvium, and an offset surface that is probably underlain by late Tioga (latest Pleistocene) to Holocene alluvium.
Recurrence interval	
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* The escarpment along the McArthur fault zone is less prominent and only half the height of that along the nearby Hat Creek fault zone [9] that has a slip rate of 1.0-1.3 mm/yr; therefore, the McArthur fault zone is presumed to have a somewhat lower slip rate.
Date and Compiler(s)	1995 Thomas L. Sawyer, Piedmont Geosciences, Inc.
References	#4890 Gay, T.E., and Aune, Q.A., 1958, Alturas Sheet: California Division of Mines and Geology Geologic Atlas of California, GAM001, scale 1:250,000. #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. #5109 MacDonald, G.A., 1966, Geology of the Cascade Range and Modoc Plateau, *in* Bailey, E.H., ed., Geology of northern California: California Department of Conservation, Division of Mines and Geology Bulletin 190, p. 65-96. #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. #5106 Sawyer, T., and Page, W.D., 1995, Field trip stops 1-3, 1-4, and 1-4A, *in* Page, W.D., ed., Quaternary Geology along the boundary between Modoc Plateau, southern Cascade Mountains, and northern Sierra Nevada: Friends of the Pleistocene, 1995 Pacific Cell, Field trip guidebook, p. 4-11. #5107 Wills, C.J., 1990, Hat Creek, McArthur and related faults, Shasta, Lassen, Modoc and Siskiyou Counties, California: California Division of Mines and Geology Fault Evaluation Report FER-209, 14 p. #475 Wills, C.J., 1991, Active faults north of Lassen Volcanic National Park, northern California: California Geology, v. 44, p. 51-58. #5105 Woodward-Clyde Consultants, 1987, Pit 1 Forebay Dam (97-110)—Evaluation of seismic geology, seismicity, and earthquake ground motion: Technical report to Pacific Gas and Electric Company, p. 2-7-2-10. #1216 Working Group on Northern California Earthquake Potential (WGNCEP), 1996, Database of potential sources for earthquakes larger than magnitude 6 in northern California: U.S. Geological Survey Open-File Report 96-705, 40 p.