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Quaternary Fault and Fold Database of the United States

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Dry Valley-Smoke Creek Ranch fault zone (Class A) No. 1602

Last Review Date: 1999-03-02

citation for this record: **Adams, K., and Sawyer, T.L., compilers, 1999, Fault number 1602, Dry Valley-Smoke Creek Ranch 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 02:29 PM.**

Synopsis	This nearly continuous, moderately long zone of predominately normal faults primarily bounds the steep east-facing escarpment of the unnamed west-tilted volcanic plateau west and south of Dry Valley, which generally appears to be a west-tilted half graben. The faults zone includes intra-basin faults that extend southward into Honey Lake Valley. These faults may be related to the Bonham Ranch fault zone [1601], which is subparallel and bounds the western side of the Smoke Creek Desert, to the east. North-striking faults in eastern Honey Lake Valley and within the mountain block composed of Tertiary volcanic rock west of the main fault zone are included because of similar orientation and proximity. The distributed zone of range-bounding and piedmont faults in southern Dry Valley has an apparent dextral (right-slip) component and these faults step left to join the main fault zone south of Parker Canyon. A second distributed zone is located

	between Willow Canyon and Red Rock Canyon. Faults in this latter group are primarily expressed as prominent east-facing escarpments that represent as much as 460 m of vertical displacement since the cessation of Miocene-Pliocene volcanism. In Smoke Creek Valley, a 60-m-high, northeast-facing scarp is preserved on upper Pliocene-Quaternary basalt. Sources of data include a detailed topical study of the fault zone involving detailed photogeologic mapping and scarp morphology studies, reconnaissance photogeologic mapping, and regional bedrock mapping. Trench investigations have not been completed.
Name comments	Refers to faults mapped by Bonham (1969 #2999), Slemmons (1974, unpublished Lovelock 1:250,000-scale map), Dodge (1980 #3021), Weick (1990 #3020), and Dohrenwend and others (1991 #285) that extend from eastern Honey Lake Valley north through Dry Valley and up the valley of Smoke Creek on the western side of the Smoke Creek Desert. Although, Weick (1990 #3020) informally named these faults the Dry Valley-Smoke Creek Ranch fault zone, dePolo (1998 #2845) referred to these faults as simply the Dry Valley fault zone; the original name is used herein. **Fault ID:** Refers to fault LL1 of dePolo (1998 #2845).
County(s) and State(s)	LASSEN COUNTY, CALIFORNIA WASHOE COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Fault locations primarily based on 1:24,000-scale photogeologic and field mapping of Weick (1990 #3020). Other locations from 1:250,000-scale reconnaissance photogeologic mapping of Dohrenwend and others (1991 #285) and 1:250,000-scale bedrock mapping of Bonham (1969 #2999). Mapping by Dohrenwend and others (1991 #285) based on photogeologic analysis of 1:58,000-nominal-scale color-infrared photography transferred directly to 1:100,000-scale topographic quadrangle maps enlarged to scale of the photographs.
Geologic setting	This nearly continuous, moderately long zone of predominately normal faults primarily bounds the steep east-facing escarpment of the unnamed west-tilted volcanic plateau west and south of Dry

	Valley, which generally appears to be a west-tilted half graben. This fault zone includes intra-basin faults that extend southward into Honey Lake Valley. These faults may be related to the Bonham Ranch fault zone [1601], which bounds the western side of the Smoke Creek Desert (Weick, 1990 #3020).
Length (km)	48 km.
Average strike	N7°W
Sense of movement	Normal *Comments:* Although the zone primarily consists of normal faults, Weick (1990 #3020) reported an apparent dextral component based on right-lateral offset of alluvial fans in southern Dry Valley.
Dip Direction	E
Paleoseismology studies	
Geomorphic expression	Faults in this group are primarily expressed as prominent east-facing escarpments that represent as much as 460 m of vertical displacement since the cessation of Miocene-Pliocene volcanism (Weick, 1990 #3020). In Smoke Creek Valley, a 60-m-high, northeast-facing scarp is developed on upper Pliocene-Quaternary basalt. dePolo (1998 #2845) reports a maximum preferred basal fault facet height of 177 m (165-189 m). In southern Dry Valley, 0.5 to 0.8 m high east-facing fault scarps are formed on lacustrine sediment (Weick, 1990 #3020).
Age of faulted surficial deposits	Weick (1990 #3020) reported faulted alluvial-fan deposits that range in age from Holocene to Pleistocene, faulted late Pleistocene lacustrine sediment, and faulted Tertiary bedrock. Dohrenwend and others (1991 #285) indicate scarps are on undifferentiated Pleistocene.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* On the basis of comparative scarp morphology, Weick (1990 #3020) reported that the most recent event probably occurred less than 2000 years ago and was probably concurrent with the most recent event (about 300 yrs ago) on the Bonham

	Ranch fault zone [1601]. Slemmons (1974, unpublished Lovelock 1:250,000-scale map) reported a latest Quaternary time and Dohrenwend and others (1991 #285) reported Pleistocene time for the most recent event on some of the faults based on reconnaissance photogeologic mapping. Age-category assignment is bases on Weick (1990 #3020).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Few lines of evidence exist on which to assign a slip-rate category to this fault. dePolo (1998 #2845) assigned a reconnaissance vertical slip rate of 0.323 mm/yr based on an empirical relationship between his preferred maximum basal facet height and vertical slip rate. 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 Weick (1990 #3020) suggests that the scarps on latest Quaternary deposits are small, which implies 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)	1999 Kenneth Adams, Piedmont Geosciences, Inc. Thomas L. Sawyer, Piedmont Geosciences, Inc.
References	#2999 Bonham, H.F., 1969, Geology and mineral deposits of Washoe and Storey Counties, Nevada: Nevada Bureau of Mines and Geology Bulletin 70, 140 p., 1 pl., scale 1:250,000. #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. #3021 Dodge, R.L., 1980, Evaluation of skylab photographs for mapping Quaternary geologic features, west-central Smoke Creek Desert, Nevada: Golden, Colorado School of Mines, unpublished M.S. thesis, 69 p. #285 Dohrenwend, J.C., McKittrick, M.A., and Moring, B.C., 1991, Reconnaissance photogeologic map of young faults in the Lovelock 1° by 2° quadrangle, Nevada and California: U.S.

	Geological Survey Miscellaneous Field Studies Map MF-2178, 1 sheet, scale 1:250,000. #3020 Weick, R.J., 1990, Structural, tectonic and Quaternary study of the eastern Madeline Plains, California and southwestern Smoke Creek Desert, Nevada: Reno, University of Nevada, unpublished M.S. thesis, 160 p.