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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.

Bonham Ranch fault zone (Class A) No. 1601

Last Review Date: 1998-09-10

citation for this record: **Adams, K., and Sawyer, T.L., compilers, 1998, Fault number 1601, Bonham 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 relatively long, predominately normal fault zone consists of numerous subparallel range-bounding and intra-basin and piedmont faults that bound the western side of the alluvial fill beneath the Smoke Creek Desert. Faults predominately dip to the east, but several narrow graben and a small horst are present along the zone. The easternmost intrabasin fault in the zone bounds the east side of unnamed low basalt hills in the Smoke Creek Desert. The intra-basin faults are expressed as both single-event and multiple-event, east-facing scarps on latest Pleistocene lacustrine deposits and Holocene subaerial and lacustrine deposits that collectively display evidence of two events in the past 12 ka. The single-event scarps reflect as much as 2.9 m of vertical displacement and have maximum scarp angles of 25°?, although most scarp slope angles are in the 10–15° maximum range. The range-bounding faults in this zone are expressed as abrupt topographic escarpments delineated by the juxtaposition of

	Quaternary sediment against Tertiary bedrock. Sources of data include a topical study of the fault zone involving detailed photogeologic mapping and scarp morphology studies, reconnaissance photogeologic mapping, and regional bedrock mapping.
Name comments	Refers to faults mapped by Bonham (1969 #2999), Slemmons (1974, unpublished Lovelock 1:250,000-scale map), Dodge (1980 #3021), Weick (1990 #3020), and Dohrenwend and others (1991 #285) that bound the western side of the Smoke Creek Desert from the southwestern edge of the desert north past the mouths of Smoke and Buffalo Creeks to Trail Canyon on the west flank of Burnt Mountain. Weick (1990 #3020) informally named these faults the Bonham Ranch fault zone; however, dePolo (1998 #2845) referred to some of these faults as the Western Smoke Creek Desert fault system; the original Bonham Ranch name is used herein. **Fault ID:** Refers to faults LL2A and LL2B of dePolo (1998 #2845).
County(s) and State(s)	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) is from 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 relatively long, predominately normal fault zone consists of numerous subparallel range-bounding and intra-basin and piedmont faults that bound the western side of the alluvial fill beneath the Smoke Creek Desert (Bonham, 1969 #2999; Weick, 1990 #3020; Dohrenwend and others, 1991 #285). Faults

	predominately dip to the east, but several narrow grabens and a small horst are present along the zone (Weick, 1990 #3020). The easternmost intrabasin fault in the zone bounds the eastern side of unnamed low basalt hills in the Smoke Creek Desert (Bonham, 1969 #2999; Weick, 1990 #3020).
Length (km)	54 km.
Average strike	N1°E
Sense of movement	Normal *Comments:* Faults have a normal component with secondary dextral slip (Bonham, 1969 #2999; Dodge, 1980 #3021; Weick, 1990 #3020) and Slemmons (1974, unpublished Lovelock 1:250,000-scale map). Dextral movement is defined by right-lateral offset of alluvial-fan deposits (Weick, 1990 #3020).
Dip	70–74° E. *Comments:* Near the mouth of Buffalo Creek, Weick (1990 #3020) reported faults dipping from 70–74° E. in deltaic deposits.
Paleoseismology studies	
Geomorphic expression	The intra-basin and piedmont faults are expressed as both single-event and multiple-event, east-facing scarps on latest Pleistocene lacustrine deposits and Holocene subaerial and lacustrine deposits that collectively display evidence of two events in the past 12 ka, with the most recent event occurring about 290±70 years B.P. (Weick, 1990 #3020). Single-event scarps represent as much as 2.9 m of vertical displacement and have maximum angles of 25°, although most scarps have maximum angles in the 10–15° range. The range-bounding faults in this zone are expressed as abrupt topographic escarpments delineated by the juxtaposition of Quaternary sediment against Tertiary bedrock (Weick, 1990 #3020; Dohrenwend and others, 1991 #285). dePolo (1998 #2845) reports a maximum preferred basal fault facet height of 183 m (171–207 m).
Age of faulted surficial deposits	Holocene; latest Pleistocene; Tertiary. Weick (1990 #3020) reported a fault offsetting both latest Pleistocene and Holocene deposits. At the southern and northern ends of the zone, faults displace Tertiary bedrock (Bonham, 1969 #2999; Weick, 1990

	#3020; Dohrenwend and others, 1991 #285).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Weick (1990 #3020) reported that the most recent paleoevent occurred about 300 years ago based on the radiocarbon age of graben-filling deposits. Slemmons (1974, unpublished Lovelock 1:250,000-scale map) also reported a latest Quaternary time for the most recent event.
Recurrence interval	*Comments:* Weick (1990 #3020) reported two events displace deposits estimated to have a maximum age of about 5 ka, with the most recent occurring at about 0.3 ka. These data yield a recurrence interval of a few thousand years.
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Weick (1990 #3020) estimated a maximum Holocene vertical slip rate of about 0.7 mm/yr based on 3.5 m of vertical separation of sediment estimated to be about 5 ka across a compound scarp displaying evidence for two events. However, the maximum age of the deposits is not convincingly demonstrated and they may be as old as 12 ka, thereby reducing the slip rate. A lower reconnaissance vertical slip rate (0.335 mm/yr) is assigned by dePolo (1998 #2845) 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. Based on the field evidence reported by Weick (1009 #3020), the 0.2–1.0 mm/yr slip-rate category has been assigned to this fault.
Date and Compiler(s)	1998 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.