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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.**

## Honey Lake fault zone (Class A) No. 22

**Last Review Date: 2017-10-13**

## Compiled in cooperation with the California Geological Survey

***citation for this record:*** **Adams, K., Sawyer, T.L., and Bryant, W.A., compilers, 2017, Fault number 22, Honey Lake 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 03:01 PM.**

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| **Synopsis** | These normal faults have been recognized for a long time (1885), but evidence for dextral strike-slip motion was first demonstrated in 1990. Dextral strike-slip strands of the Honey Lake fault zone are characterized by geomorphic evidence indicative of Holocene displacement. Geomorphic evidence of Quaternary displacement has not been documented along the Diamond Mountains range front, except at the southeastern end near Constantia, although well defined late Pleistocene shorelines parallel the range front and may obscure minor recent normal fault scarps. Although there has been detailed mapping of the faults, a study of offset late Holocene deposits exposed in a cutbank is the sole source of paleoseismic data. This distributed zone of predominately |

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| | northwest-striking dextral faults has (1) range-fronts that bound the southwestern sides of Dogskin Mountain and the Fort Sage Mountains, (2) intrabasin faults in Beddell Flat and Dry Valley, and (3) an intermontane fault that cuts through Seven Lakes Mountain and extends onto its northern piedmont. Because of similar strike and close proximity, faults at the southern end of the Honey Lake fault zone may be related to the northern end of the Southwestern Warm Springs Valley fault zone [1659]. In Nevada, range-front faults juxtapose Quaternary-Tertiary gravel and Quaternary alluvium against older bedrock. The intrabasin faults are expressed as lineaments and southwest- and north-facing scarps on Quaternary alluvium. The intermontane fault on Seven Lakes Mountain is expressed by a northwest-trending linear drainage that appears to be on strike with a northwest-striking fault on the northern piedmont. Reconnaissance photogeologic mapping and regional geologic mapping are the sources of data. Trench investigations and detailed studies of scarp morphology have not been conducted in the Nevada portion of the fault zone. |
| **Name comments** | The Honey Lake fault zone was first mapped by Russell (1885 #3549) in California and described by Diller (1908 #5173). Refers to faults mapped by Bonham (1969 #2999), Slemmons (1968, unpublished Reno map), Bell (1984 #105), Greene and others (1991 #3487), Nitchman and Ramelli (1991 #2551), and Garside (1993 #3600) on the southwest side of Dogskin Mountain and the Fort Sage Mountains, and in Honey Lake Valley and Bedell Flat; were it has been referred to as the Honey Lake fault zone (e.g., Wills and Borchardt, 1993 #3601; Jennings, 1994 #2878). Stewart (1988 #1654) referred to this as the Honey Lake fault.<br><br>**Fault ID:** Refers to numbers 60 (Honey Lake fault) and 63 (unnamed faults bordering Long Valley) of Jennings (1994 #2878), fault NE01 (Honey Lake fault) of Working Group on California Earthquake potential (1996 #1216), and fault S1A of dePolo (1998 #2845). |
| **County(s) and State(s)** | PLUMAS COUNTY, CALIFORNIA<br>WASHOE COUNTY, NEVADA<br>LASSEN COUNTY, CALIFORNIA |
| **Physiographic province(s)** | BASIN AND RANGE<br>CASCADE-SIERRA MOUNTAINS |
| **Reliability of location** | Good<br>Compiled at 1:100,000 scale. |

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| | *Comments:* Fault locations in California are based on digital revisions to Jennings (1994 #2878) using original mapping by Grose and others (1989 #5132), Grose and Porro (1989 #5279), and Wagner and Saucedo (1990 #5130) at 1:62,500, and Wills (1990 #5129) at 1:24,000. In Nevada, fault locations are primarily based on 1:250,000-scale maps of Bell (1984 #105) and Slemmons (1968, unpublished Reno 1:250,000-scale map). The mapping by Bell (1984 #105) is based on photogeologic analysis of 1:40,000-scale low sun-angle aerial photography, supplemented with 1:12,000-scale aerial photography of selected areas, several low-altitude aerial reconnaissance flights, and field reconnaissance of major structural and stratigraphic relations. Mapping by Slemmons (1968, unpublished Reno 1:250,000-scale sheet) is based on analysis of 1:60,000-scale AMS photography transferred to mylar overlaid onto a 1:250,000-scale topographic map using proportional dividers. Additional faults were transferred from 1:250,000-scale map of Bonham (1969 #2999). |
| **Geologic setting** | This fault zone extends from northeastern California into northwestern Nevada. In California, the fault zone is broad and has two principal (strain-partitioning ?) branches: (1) a range-bounding normal fault zone along the northeast front of the Diamond Mountains, and (2) a subparallel high-angle, dextral strike-slip fault zone 1 km to the east that crosses the floor of Honey Lake basin and northern Long Valley (Lydon and others, 1960 #5127; Wills, 1990 #5129; Grose and others, 1990 #5131). The total normal offset across the fault zone is at least 600 to 800 m as determined from the vertical separation of the Lovejoy Basalt (Wagner and others, 1989 #5174); more importantly, there may be as much as 10 km of dextral offset (Wagner and others, 1989 #5174).<br><br>In Nevada, the southeastern end of this zone becomes a distributed zone of predominately northwest-striking dextral faults that includes (1) range-fronts bounding the southwestern sides of Dogskin Mountain and the Fort Sage Mountains; (2) intra basin faults in Beddell Flat and Dry Valley; and (3) an intermontane fault cutting through Seven Lakes Mountain extending onto its northern piedmont (Slemmons, 1968, unpublished Reno 1:250,000-scale sheet, Bonham, 1969 #2999; Bell, 1984 #105). Because of similar strike and close proximity, faults at the southern end of this group may be related to the northern end of the Southwestern Warm Springs Valley fault zone |

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| | [1659]. |
| **Length (km)** | 98 km. |
| **Average strike** | N47°W |
| **Sense of movement** | Right lateral<br><br>*Comments:* Dextral movement is documented across Honey Lake basin and Long Valley, whereas normal movement is found along the front of the Diamond Mountains (Wills, 1990 #5129; Grose and others, 1990 #5131; Slemmons, 1968, unpublished Reno 1:250,000-scale sheet, Bonham, 1969 #2999; Nitchman and Ramelli, 1991 #2551). |
| **Dip** | 52° SW to vertical<br><br>*Comments:* Based on several fault planes that cut Holocene alluvial deposits exposed in a cutbank of Long Valley Creek [site 22-1] on the California part of the Honey Lake fault zone (Wills and Borchardt, 1993 #3601) |
| **Paleoseismology studies** | Site 22-1. Paleoseismic studies along the Honey Lake fault zone by Wills (1990 #5129) and Wills and Borchardt (1993 #3601) involved detailed logging and dating of offset deposits in a cutbank exposure along Long Valley Creek. Interpretations of the exposure reveal: (1) a 4-m-wide fault zone with six principal strands, all of which offset Holocene deposits; (2) all of the soils, including the surface soil, are displaced by one or more strands of the fault; and (3) at least four major ground-rupturing earthquakes have occurred in the past 6 ka. |
| **Geomorphic expression** | Dextral strike-slip strands of the Honey Lake fault zone are delineated by scarps on Holocene alluvial fans, dextrally offset stream channels, and closed depressions (Wills, 1990 #5129). Bedrock escarpments and faceted spurs along the front of Diamond Mountains characterize the normal components of the fault zone. The majority of the range-front normal fault is concealed by latest Pleistocene shoreline deposits (Wills, 1990 #5129; Wagner and Saucedo, 1990 #5130). The southeastern end of the normal fault near Constantia is delineated by scarps on latest Pleistocene to Holocene alluvium and sharp faceted spurs on bedrock (Wills, 1990 #5129). |

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| | In Nevada, the Honey Lake fault zone is comprised of range-front faults that juxtapose Quaternary-Tertiary gravel and Quaternary alluvium against older bedrock and are expressed as abrupt range-front escarpments (Bonham, 1969 #2999; Bell, 1984 #105). The intrabasin faults are expressed as lineaments and southwest- and north-facing scarps on Quaternary alluvium (Slemmons, 1968, unpublished Reno 1:250,000-scale map, Bonham, 1969 #2999; Bell, 1984 #105). The intermontane fault on Seven Lakes Mountain is expressed by a northwest-trending linear drainage that appears to be on strike with a northwest-striking fault on the northern piedmont (Bonham, 1969 #2999). |
| **Age of faulted surficial deposits** | Holocene (?) stream-terrace deposits and high-stand (?) shorelines of Lake Lahontan (approximately 12.5 ka) are offset along the front of the Diamond Mountains. The "modern" soil (200–400 yrs old ?) is offset at site 22-1, and scarps are formed on all but latest Holocene alluvium across Honey Lake basin and Long Valley (Wills, 1990 #5129). Bonham (1969 #2999) reported offset of Quaternary alluvium, Quaternary-Tertiary gravel, and Tertiary volcanic rocks in western Nevada. |
| **Historic earthquake** | |
| **Most recent prehistoric deformation** | latest Quaternary (<15 ka)<br><br>*Comments:* The timing of the most recent paleoevent in the California portion of the fault zone is based on offset the "modern" soil", which probably occurred within the past few hundred years (Wills, 1990 #5129; 1993 #3601). This timing estimate is based on detailed studies of the Honey Lake fault exposed in a cutbank along Long Valley Creek (site 22-1) in Honey Lake Valley. Detailed studies have not been conducted in Nevada, but Dohrenwend and others (1996 #2846) reported an undifferentiated Pleistocene time for the most recent event. |
| **Recurrence interval** | 1.5 k.y. (<7 ka)<br><br>*Comments:* Wills and Borchardt (1993 #3601) reported a recurrence interval of about 1.5 k.y., based on an interpretation of four events over the past 6 k.y., whereas Wills (1990 #5129) interpreted a minimum of four surface-faulting events in about the past 7 k.y. based on deposits and soils exposed in a cutbank of Long Valley Creek (site 22-1). |

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| **Slip-rate category** | Between 1.0 and 5.0 mm/yr<br><br>*Comments:* Wills (1990 #5129) estimated the rate of deformation of 1.1–2.6 mm/yr based on 16±2 m of right-lateral offset of a 7.0- to 12.5-ka fluvial channel, whereas Wills and Borchardt (1993 #3601) reported a preferred horizontal Holocene deformation rate of 1.1–2.6 mm/yr based on the displacement of a post-Lahontan stream channel margin. Although these rates were for locations on the northern part of the fault zone, they may be representative for the entire fault zone. |
| **Date and Compiler(s)** | 2017<br>Kenneth Adams, Piedmont Geosciences, Inc.<br>Thomas L. Sawyer, Piedmont Geosciences, Inc.<br>William A. Bryant, California Geological Survey |
| **References** | #105 Bell, J.W., 1984, Quaternary fault map of Nevada—Reno sheet: Nevada Bureau of Mines and Geology Map 79, 1 sheet, scale 1:250,000.<br><br>#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.<br><br>#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.<br><br>#5173 Diller, J.S., 1908, Geology of the Taylorsville region, California: U.S. Geological Survey Bulletin 353, 128 p.<br><br>#2846 Dohrenwend, J.C., Schell, B.A., Menges, C.M., Moring, B.C., and McKittrick, M.A., 1996, Reconnaissance photogeologic map of young (Quaternary and late Tertiary) faults in Nevada, *in* Singer, D.A., ed., Analysis of Nevada's metal-bearing mineral resources: Nevada Bureau of Mines and Geology Open-File Report 96-2, 1 pl., scale 1:1,000,000.<br><br>#3600 Garside, L.J., 1993, Geologic map of the Bedell Flat quadrangle, Nevada: Nevada Bureau of Mines and Geology, Field Studies Map 3, 1 sheet, scale 1:250,000.<br><br>#8520 Gold, R.D., Briggs, R.W., Crone,A.J., and DuRoss, C.B., 2017, Refining fault slip rates using multiple displaced terrace |

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Questions or comments?