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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.

Thousand Springs Valley fault zone (Class A) No. 1584

Last Review Date: 2016-10-06

citation for this record: **Sawyer, T.L., Oswald, J.A., and Haller, K.M., compilers, 2016, Fault number 1584, Thousand Springs Valley 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 02:36 PM.**

Synopsis	This long, right-stepping zone of normal faults includes range-front faults bounding the east side Gollaher Mountain and Knoll Mountain and the west side of Rock Creek valley and Thousand Springs Valley, intermontane faults south of Gollaher Mountain and within northeastern part of Knoll Mountain, and piedmont faults in western Thousand Springs Valley. The source of information is reconnaissance photogeologic mapping of fault related features and scarp studies at one location near the southern end are the sources of data.
Name comments	Refers to faults mapped by Slemmons (1964, unpublished Wells 1:250,000-scale quadrangle), Coats (1987 #2861), and Dohrenwend and others (1991 #290). Named the Thousand Springs Valley fault zone by dePolo (1998 #2845). This zone

	extends along the west side of upper Milligan Creek valley, Rock Creek valley, and Thousand Springs Valley from 5 km northeast of Gollaher Mountain southward to Deadman Creek, east of the Windermere Hills. **Fault ID:** Refers to fault WE11 of dePolo (1998 #2845).
County(s) and State(s)	ELKO COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE COLUMBIA PLATEAU
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Location based on 1:250,000-scale geologic map of Coats (1987 #2861), and 1:250,000-scale maps of Slemmons (1964, unpublished Wells 1:250,000-scale quadrangle) and Dohrenwend and others (1991 #290). Dohrenwend and others (1991 #290) mapped by 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. The Quaternary fault map of Slemmons (1964, unpublished Wells 1:250,000-scale quadrangle) is from analysis of 1:60,000-scale AMS photography transferred to mylar overlay on a 1:250,000-scale topographic map using proportional dividers.
Geologic setting	This long, right-stepping zone of normal faults includes range-front faults bounding the east side Gollaher Mountain and Knoll Mountain and the west side of Rock Creek valley and Thousand Springs Valley, intermontane faults south of Gollaher Mountain and within northeastern part of Knoll Mountain, and piedmont faults in western Thousand Springs Valley.
Length (km)	76 km.
Average strike	N8°E
Sense of movement	Normal *Comments:* Coats (1987 #2861), and inferred from topography.
Dip Direction	E
Paleoseismology	

studies	
Geomorphic expression	Most of the fault is expressed by a linear fault that juxtaposes Quaternary alluvium against bedrock along the abrupt and well-defined east fronts of Gollaher Mountain and Knoll Mountain and forms discontinuous scarps and/or lineaments on upper piedmont-slope surfaces (Dohrenwend and others, 1991 #290). Ramelli and dePolo (1993 #2855; 2011 #7558) reported a 2-m-high, single-event scarp on a Holocene to latest Pleistocene piedmont-slope surface and a scarp on a early to middle Quaternary surface that represents 17 m vertical displacement near the south end of Knoll Mountain. dePolo (1998 #2845) reports a maximum preferred basal fault facet height of 98 m (73–122 m).
Age of faulted surficial deposits	possible Holocene to latest Pleistocene; late Pleistocene (?); early to middle Quaternary; Quaternary. Faults displace alluvium interpreted from photogeologic mapping to be late Pleistocene and Quaternary in age (Dohrenwend others, 1991 #290). Ramelli and dePolo (1993 #2855) reported scarps on Holocene to latest Pleistocene and on early to middle Quaternary piedmont-slope surfaces in Thousand Springs Valley near south end of Knoll Mountain.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Although timing of the most recent event is not well constrained; Dohrenwend and others (1991 #290, 1996 #2846), Coats (1987 #2861) and dePolo (1998 #2845) suggested a late Quaternary time based on reconnaissance studies. However based on limited geomorphic evidence, Holocene or latest Pleistocene faulting is suggested at one location by Ramelli and dePolo (1993 #2855; 2011 #7558). The assigned age category represents the most inclusive interpretation based on various information.
Recurrence interval	 *Comments:* Ramelli and dePolo (2011 #7558) report there is evidence of multiple mid- to late-Quaternary surface ruptures, but in their assessment of faulting across the region they conclude that for a given fault individual earthquakes are typically separated by periods of tens of thousands to hundreds of thousands of years.

Slip-rate category	Less than 0.2 mm/yr *Comments:* No detailed data exists to determine slip rates for this fault. dePolo (1998 #2845) assigned a reconnaissance vertical slip rate of 0.199 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. The late Quaternary characteristics of this fault (overall geomorphic expression, continuity of scarps, age of faulted deposits, etc.) suggest the slip rate during this period is low. Accordingly, the less than 0.2 mm/yr slip-rate category has been assigned to this fault.
Date and Compiler(s)	2016 Thomas L. Sawyer, Piedmont Geosciences, Inc. John A. Oswald, Piedmont Geosciences, Inc. Kathleen M. Haller, U.S. Geological Survey
References	#2861 Coats, R.R., 1987, Geology of Elko County, Nevada: Nevada Bureau of Mines and Geology Bulletin 101, 112 p., 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. #290 Dohrenwend, J.C., McKittrick, M.A., and Moring, B.C., 1991, Reconnaissance photogeologic map of young faults in the Wells 1° by 2° quadrangle, Nevada, Utah, and Idaho: U.S. Geological Survey Miscellaneous Field Studies Map MF-2184, 1 sheet, scale 1:250,000. #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. #2855 Ramelli, A.R., and dePolo, C.M., 1993, Examples of Holocene and latest Pleistocene faulting in northern and eastern Nevada: Geological Society of America Abstracts with Programs,

	v. 25, no. 5, p. 136. #7558 Ramelli, A.R., and dePolo, C.M., 2011, Quaternary faults in the 2008 Wells earthquake area: Nevada Bureau of Mines and Geology Special Publication 36, p. 79–88.