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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.

Dolly Varden Mountains fault zone (Class A) No. 1712

Last Review Date: 2001-07-17

citation for this record: **Anderson, R.E., compiler, 2001, Fault number 1712, Dolly Varden Mountains 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 02:26 PM.**

Synopsis	The Dolly Varden fault zone is located in a large area in the southeastern part of the Elko 1?x2? quadrangle that is devoid of major Quaternary range-front faults. Other groups of distributed faults in this area include the Goshute fault zone [1713], unnamed fault zone in Antelope Range [1720], unnamed fault zone in Ferber Hills [1721], and Boone Spring Hills fault zone [1724]. The Dolly Varden Mountains fault zone includes a north-northeast-striking fault at the western base of the Dolly Varden Mountains and several northwest-striking faults that extend south from the Dolly Varden Mountains into the Currie Hills. The fault zone also includes a short fault along the eastern flank of the Dolly Varden Mountains. Most of the northwest-striking faults in the zone are probably small-displacement, down-to-the-southwest normal faults, and some may have traces in Tertiary volcanic rocks. Well-defined topographic escarpments or sharp

	piedmont/hillslope breaks are generally lacking along the Quaternary faults in the Dolly Varden Mountains and Currie Hills. Only two short (< 2 km) fault traces are marked by scarps on Quaternary surficial deposits or erosion surfaces, and one of those is formed on surficial deposits or erosion surfaces estimated to be late Pleistocene on the basis of photogeologic study. No detailed studies are reported, and recurrence times are not known.
Name comments	Adapted from dePolo (1998 #2845) and dePolo and Anderson (2000 #4471) who gave the name Dolly Varden Mountains fault to a single north-northeast-striking fault that extends along the western base of the Dolly Varden Mountains from Mizpah Point southward to Willow Creek. Here, numerous additional Quaternary faults, mostly northwest-striking, are combined, largely for convenience, with the Dolly Varden Mountains fault zone. The fault zone extends south from Mizpah Point into the Currie Hills. **Fault ID:** Referred to as fault EK13 by dePolo (1998 #2845).
County(s) and State(s)	ELKO COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Fault traces taken from the 1:250,000 map of Dohrenwend and others (1991 #286). That map was produced by analysis of 1:58,000-nominal-scale color-infrared photography transferred directly to 1:100,000-scale topographic quadrangle maps enlarged to the scale of the photographs.
Geologic setting	The southeastern part of the Elko 1? x 2? quadrangle contains a large (approximately 1750 square kilometer) area that lacks major range-bounding Quaternary faults (Dohrenwend and others, 1991 #286). Quaternary faults in that area are relatively short (<15 km, mostly <5 km), diversely oriented (mostly north-striking) block-bounding structures. The area includes all or parts of several ranges, mountains, and hills including the northernmost Schell Creek Range, Antelope Range, Dolly Varden Mountains, southern Goshute Mountains, Kinsley Mountains, Currie Hills, Boone Spring Hills, and Ferber Hills. Most of these highlands are poorly

	defined physiographically and structurally, so the geologic setting of the Quaternary faults is not obvious, and placing them into groups that may have seismogenic significance is quite subjective. Other fault groups in this area include [1713], [1720], [1721], and [1724]. On the basis of photogeologic and field study, Barnhard (1985 #428) recognized no Quaternary scarps in this area whereas Dohrenwend and others (1991 #286) on the basis of photogeologic study, mapped 20 to 30 faults (the number depending on how the faults are connected). dePolo (1998 #2845) connected some faults across large gaps, but did not consider most of these faults in his statewide study of Quaternary faults, possibly suggesting that most of the Quaternary faults in the area are of little significance. Tertiary volcanic rocks are widely exposed in the Dolly Varden Mountains and adjacent parts of the Boone Spring Hills and Antelope Range, but little is known of the Quaternary geology. The fault extending south-southwest from Mizpah Point appears to bound the Dolly Varden Mountains and basin beneath Goshute Valley. Most of the northwest-striking faults in the Dolly Varden Mountains fault zone are probably small-displacement, down-to-the-southwest normal faults, and some may have traces in Tertiary volcanic rocks (Stewart and Carlson, 1978 #3413).
Length (km)	27 km.
Average strike	N25°W
Sense of movement	Normal *Comments:* Inferred from location in an extensional tectonic province.
Dip Direction	W; SW *Comments:* A short (< 4 km) fault on the east flank of the Dolly Varden Mountains is probably down to the east.
Paleoseismology studies	
Geomorphic expression	Well-defined topographic escarpments or sharp piedmont/hillslope breaks are generally lacking along the Quaternary faults in the Dolly Varden Mountains and Currie Hills. Dohrenwend and others (1991 #286) mapped only two short (< 2 km) fault traces marked by scarps on Quaternary surficial deposits

	or erosion surfaces. dePolo (1998 #2845) reported a preferred maximum basal facet height of 110 m (85-134 m) for the north-northeast striking fault that extends south from Mizpah Point.
Age of faulted surficial deposits	Tertiary and undifferentiated Quaternary deposits are offset on the basis of photogeologic study (Dohrenwend and others, 1991 #286). They also showed a short (<2 km) scarp between Millick and Currie Canyons, which was estimated to be formed on late Pleistocene surficial deposits or erosion surfaces.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Although Dohrenwend and others (1991 #286) mapped one short scarp as formed on deposits or erosion surfaces of questionable late Pleistocene (10-130 ka) age, the timing of most recent displacement on most of the faults is not known or has a broader age range.
Recurrence interval	
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 0.214 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 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 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)	2001 R. Ernest Anderson, U.S. Geological Survey, Emeritus
References	#428 Barnhard, T.P., 1985, Map of fault scarps formed in unconsolidated sediments, Elko 1° x 2° quadrangle, Nevada and Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-1791, 1 sheet, 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. #4471 dePolo, C.M., and Anderson, J.G., 2000, Estimating the slip rates of normal faults in the Great Basin, USA: Basin Research, v. 12, p. 227-240. #286 Dohrenwend, J.C., Schell, B.A., and Moring, B.C., 1991, Reconnaissance photogeologic map of young faults in the Elko 1° by 2° quadrangle, Nevada and Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-2179, 1 sheet, scale 1:250,000. #3413 Stewart, J.H., and Carlson, J.E., 1978, Geologic map of Nevada: U.S. Geological Survey, Special Geologic Map, 1, scale 1:500,000.