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.](#)

Buffalo Valley fault zone (Class A) No. 1140

Last Review Date: 2000-07-18

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Synopsis	The Buffalo Valley fault zone consists of two contrasting structural elements: (1) a major north-striking range-front fault at the eastern base of the Tobin Range and (2) a group of northeast-striking piedmont faults distributed throughout the northwestern part of Buffalo Valley. The total throw on the range-front fault probably decreases toward its north and south ends, where upper Paleozoic rocks are exposed across it; near its center, it apparently separates the uplifted Tobin Range block from the structural basin beneath Buffalo Valley. The eastern flank of the Tobin Range is a relatively straight precipitous escarpment transected by numerous canyons that head near the range crest. The fault trace is at the base of the escarpment and apparently juxtaposes Quaternary alluvium against bedrock, but it lacks scarps on Quaternary surficial deposits or erosion surfaces. The scarps and lineaments in Buffalo Valley face east and southeast, are roughly parallel to topographic contours, are small on Quaternary surficial deposits or erosion surfaces, and may be as young as Holocene. No morphometric studies or detailed mapping has been done, and no recurrence times are reported.
Name comments	Name taken from dePolo (1998 #2845) who apparently adapted it from the name Buffalo Valley scarps used by Wallace (1979 #203). The main range-bounding fault extends from Summit Spring at the north end of the Tobin Range south to Jersey Summit, which is between the Tobin Range and the Fish Creek Mountains. The intra basin faults in Buffalo Valley extend from about the Summit Spring Road southwest to near Buffalo Springs. **Fault ID:** Referred to as fault WI8 by dePolo (1998 #2845).
County(s) and State(s)	PERSHING COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* The range-front fault is compiled from the 1:250,000-scale map by Dohrenwend and Moring (1991 #282), which 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 scale of the photographs. The mid-valley faults were compiled from Wallace (1979 #203) who mapped them at 1:250,000 scale mainly from photogeologic and field study using 1:60,000-scale aerial photos.
Geologic setting	The Buffalo Valley fault zone consists of two contrasting structural elements: (1) a major north-striking range-front fault at the eastern base of the Tobin Range and (2) a group of northeast-striking piedmont faults distributed throughout the northwestern part of Buffalo Valley. The total throw on the range-front fault probably decreases toward its north and south ends, where upper Paleozoic rock is exposed across it (Stewart and Carlson, 1978 #3413); near its center, it apparently separates the uplifted Tobin Range block from the structural basin beneath Buffalo Valley. The 125,000-scale map of young fault scarps by Wallace (1979 #203) shows discontinuous short scarps along the eastern margin of the Tobin Range. Ferguson and others (1951 #4355) 1: 25,000-scale geologic map shows a dashed fault marking the bedrock/alluvium contact for only about 8 km along the north part. Dohrenwend and Moring (1991 #282) shows a prominent fault contact along almost the entire range front. Thus, although the eastern margin of the Tobin Range is faulted, its Quaternary history seems uncertain. The structural relation between the range front and piedmont faults is not known. Ferguson and others (1951 #4355) do not map the piedmont faults in Buffalo Valley. Those faults may provide a structural tie between the Buffalo Mountain fault zone on the eastern side of the Tobin Range and the western Battle Mountain fault [1142] to the northeast.
Length (km)	38 km.
Average strike	N22°E
Sense of movement	Normal *Comments:* Inferred from location in extensional tectonic province.
Dip Direction	E
Paleoseismology studies	
Geomorphic expression	The eastern flank of the Tobin Range is a relatively straight, precipitous escarpment transected by numerous canyons that head near the range crest. The fault trace is at the base of the escarpment and apparently juxtaposes Quaternary alluvium against bedrock, but generally lacks recognized scarps on Quaternary surficial deposits or erosion surfaces (Wallace, 1979 #203; Dohrenwend and Moring, 1991 #282). dePolo (1998 #2845) reported a preferred maximum basal facet height of 244 m (219–268 m) along the range front. The piedmont scarps and lineaments in Buffalo Valley face east or southeast, are approximately parallel to topographic contours, and are apparently small on undifferentiated Quaternary surficial deposits or erosion surfaces. According to Pearthree (1990 #148), scarps on the lower piedmont cut shoreline features related to the last high stand of Lake Lahontan (ca. 13 ka, Adams, 1997 #3003).
Age of faulted surficial deposits	Early Pleistocene to Holocene. Photogeologic reconnaissance mapping by Dohrenwend and Moring (1991 #282) indicates that the scarps in Buffalo Valley are formed on a wide range of surfaces or deposits ranging in age from early Pleistocene to Holocene. Wallace (1979 #203) suggested an age of more than 12 k.y. for the scarps in the upper piedmont. On the basis of scarp profiles, Pearthree (1990 #148) suggested an age of about 10–22 ka, although poor scarp preservation makes the estimate very uncertain. On the basis of a soil development, he suggested a post-Pleistocene (Holocene) age for the upper piedmont scarps, possibly contemporaneous with formation of scarps low on the piedmont. According to Pearthree (1990 #148) scarps on the lower piedmont modify 13 ka Lake Lahontan shoreline features (Adams, 1997 #3003). No age is estimated for the faulted Quaternary deposits juxtaposed against bedrock at the Tobin Range front.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Time is based on an estimate from photogeologic reconnaissance by Dohrenwend and Moring (1991 #282) that shows one lineament and one short (about 2 km) piedmont scarp in Buffalo Valley are formed on deposits or surfaces of Holocene age. This is consistent with estimates by Wallace (1979 #203) that some of the scarps are older than 12 ka and some are younger. According to Pearthree (1990 #148), scarps on the lower piedmont modify Lake Lahontan shoreline features, suggesting a post-13 ka time for faulting (Adams, 1997 #3003). The time of latest faulting on the more continuous eastern range-front fault of the Tobin Range is known only to be Quaternary, but may be much younger if they have the same history as the piedmont scarps.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Little detailed data exists to determine slip rates for this fault. dePolo (1998 #2845) assigned a reconnaissance vertical displacement rate of 0.488 mm/yr for the main range front fault based on an empirical relationship between his preferred maximum basal facet height and vertical displacement 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, general lack of scarps along the frontal fault, age of unfaulted deposits, etc.) suggest the slip rate during this period is of a lesser magnitude. Pearthree (1990 #148) indicates the isolated scarps on alluvium are generally low (1 m high) and are predominantly single-event scarps. The apparent absence of multiple event scarps suggests that the time between events could be quite long. Thus, this fault is assigned to the less than 0.2 mm/yr slip-rate category due to conclusive evidence of recurrent late Pleistocene faulting.
Date and Compiler(s)	2000 R. Ernest Anderson, U.S. Geological Survey, Emeritus
References	#3003 Adams, K.D., 1997, Late Quaternary pluvial history, isostatic rebound, and active faulting in the Lake Lahontan basin, Nevada and California: Reno, University of Nevada, unpublished Ph.D. dissertation, 169 p. #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. #282 Dohrenwend, J.C., and Moring, B.C., 1991, Reconnaissance photogeologic map of young faults in the Winnemucca 1° by 2° quadrangle, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-2175, 1 sheet, scale 1:250,000. #4355 Ferguson, H.G., Muller, S.W., and Roberts, R.J., 1951, Geology of the Mount Moses quadrangle, Nevada: U.S. Geological Survey Geologic quadrangle Map GQ-0012, 1 sheet, scale 1:125,000. #148 Pearthree, P.A., 1990, Geomorphic analysis of young faulting and fault behavior in central Nevada: Tucson, University of Arizona, unpublished Ph.D. dissertation, 212 p. #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. #203 Wallace, R.E., 1979, Map of young fault scarps related to earthquakes in north-central Nevada: U.S. Geological Survey Open-File Report 79-1554, 2 sheet, scale 1:125,000.