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Quaternary Fault and Fold Database of the United States

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Hoback fault (Class B) No. 772

Last Review Date: 1998-04-01

citation for this record: **Pierce, K.L., compiler, 1998, Fault number 772, Hoback fault, 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 02:02 PM.**

Synopsis	The Hoback fault was active in Miocene time, particularly during deposition of the middle unit of the Camp Davis Formation. The southern part of the fault (not included herein) has sediment of the upper part of the Miocene Camp Davis Formation deposited across it and thus has no evidence for Quaternary movement. However, the northern part of the fault may have been reactivated in the Quaternary. A few scarps are found along the fault north of Game Creek and about 1-2 km farther northwest along the fault, but for the most part the fault has poor Quaternary expression. Talus breccia that was deposited with a west dip is interpreted as dipping into the fault. This possibly reactivated portion of the Hoback fault is southeast of the projection of the strike of the Teton fault [768], which has lost evidence of movement well north of Jackson. Only one short part of the largely concealed Hoback fault has a scarp on Quaternary surficial materials. Thus, we consider the Hoback fault to be a Class B structure because of the general lack of Quaternary expression and possible landslide origin for the small area of known scarps.

Name comments	This fault extends from the narrow valley of Flat Creek (about 2 km southwest of Jackson, Wyoming) south and east to the vicinity of Little Horse Creek. The Hoback normal fault was named by Nelson and Church (1943, p. 163 #4462), but is herein shortened to Hoback fault.
County(s) and State(s)	TETON COUNTY, WYOMING
Physiographic province(s)	MIDDLE ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* The mostly concealed trace of the fault, as shown here, is from 1:24,000-scale quadrangle mapping by Shroeder (1974 #2303), Love and Albee (1977 #2306), and Love, (1978 #2302). The trace of the fault was generalized and recompiled at 1:250,000 scale on a topographic base map.
Geologic setting	The Hoback fault is a basin-and-range fault that was activated in the Miocene, particularly during deposition of the middle unit of the Camp Davis Formation. The southern part of the fault has the upper part of the Miocene Camp Davis Formation deposited across it (Schroeder, 1974 #2303), and thus has no evidence for Quaternary movement in this area. As such, it is not included on the compiled map nor discussed herein. However, the northern part of the fault may have been reactivated in the Quaternary. This possibly reactivated portion is southeast of where the Teton fault [768] dies out on the western side of the valley. This interpretation is consistent with the pattern of fault activity outlined by Pierce and Morgan (1992 #2297).
Length (km)	18 km.
Average strike	N40°W
Sense of movement	Normal *Comments:* Shown as normal fault on geologic maps by Shroeder (1974 #2303), Love and Albee (1977 #2306), and Love (1978 #2302).
Dip Direction	SW

	Comments: Shown with high-angle dip on cross sections by Love and Albee (1977 #2306) and Love (1978 #2302), but no values are listed.
Paleoseismology studies	
Geomorphic expression	Scarps are found along about 0.8 km of the fault at Game Creek (Love and Montagne, 1956 #2305). There, Love and Montagne (1956 #2305, p. 173-4) reported that "Loess and silt that overlie reworked Pleistocene glacial debris (in sec. 26, R. 40 N., R. 116 W.) have been displaced as much as 50 feet (sic 14 m), southwest block downdropped along the fault, hence movement apparently continued until Recent time." The scarps may be tectonic or may be due to slumping of benches that are about 180 m above the Snake River and underlain by weak Mesozoic shales and unconsolidated Cenozoic deposits. Love (1977 #2306) noted that "Talus breccia of Paleozoic limestone fragments that accumulated along the rising fault scarp and that had a steep initial dip westward was rotated enough to make it dip eastward into the fault" (Love and Albee, 1972 #2304; Love and Love, 1978 #2302). Pierce measured slope angles of 27 degrees on scarps about 10 m high.
Age of faulted surficial deposits	The scarps are on deposits of the Munger glaciation, which is correlated with the 140 ka Bull Lake glaciation of West Yellowstone.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* The scarps, which are as much as 10 m high and may therefore be product of multiple faulting events, are preserved on Bull Lake glacial terrain that formed about 140 ka. Thus, it seems geologically reasonable to assign a late Quaternary (<130 ka) time to their formation. However, the compiler considers the Hoback fault to be a suspect (Class B) structure because of the general lack of Quaternary expression, and because there is only a small area of scarps for which a landslide origin might be possible.
Recurrence	

interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* If the reported scarps are fault related, this structure probably falls in the low slip-rate category based on Pierce's estimate of 5 m of offset on a landscape (deposits) estimated to be 140 ka. This assessment varies markedly with that presented by Wong and others (2000 #4484) who suggested fault slip rates of 0.2-6.0 mm/yr based on 15 m of offset of loess deposits (Love and Montagne, 1956 #2305) and associated glacial deposits (12-40 ka, Pinedale). However, the late Quaternary characteristics of this fault (overall poor geomorphic expression, poor continuity of scarps, age of faulted deposits, etc.) suggest that the slip rate during this period is of a lesser magnitude than the 0.4 mm/yr preferred value of Wong and others (2000 #4484). Accordingly, the <0.2 mm/yr slip-rate category has been assigned to this fault.
Date and Compiler(s)	1998 Kenneth L. Pierce, U.S. Geological Survey, Emeritus
References	#2306 Love, J.D., 1977, Summary of upper Cretaceous and Cenozoic stratigraphy, and of tectonic and glacial events in Jackson Hole, northwestern Wyoming, *in* Heisey, E.L., Lawson, D.E., Norwood, E.R., Wach, P.H., and Hale, L.A., eds., Rocky Mountain Thrust Belt; geology and resources: Wyoming Geological Association, Twenty-ninth Annual Field Conference, p. 585-593. #2304 Love, J.D., and Albee, H.F., 1972, Geologic map of the Jackson quadrangle, Teton County, Wyoming: U.S. Geological Survey Miscellaneous Geologic Investigations I-769-A. #2302 Love, J.D., and Love, C.M., 1978, Geologic map of the Cache Creek quadrangle, Teton County, Wyoming: U.S. Geological Survey Open-File Report 78-480, scale 1:24,000. #2305 Love, J.D., and Montagne, J.M., 1956, Pleistocene and recent tilting of Jackson Hole, Teton County, Wyoming: Wyoming Geological Association Guidebook, Eleventh Annual Field Conference, 169-178 p. #4462 Nelson, V.E., and Church, V., 1943, Critical structures of the Gros Ventre and northern Hoback Ranges, Wyoming: Journal of Geology, v. 51, p. 143-166.

	#2297 Pierce, K.L., and Morgan, L.A., 1992, The track of the Yellowstone hotspot—Volcanism, faulting, and uplift, *in* Link, P.K., Kuntz, M.A., and Platt, L.B., eds., Regional geology of eastern Idaho and western Wyoming: Geological Society of America Memoir 171, p. 1-53. #2303 Schroeder, M.L., 1974, Geologic map of the Camp Davis quadrangle, Teton county, Wyoming: U.S. Geological Survey Geologic quadrangle Map GQ-1160, scale 1:24,000. #4484 Wong, I., Olig, S., and Dober, M., 2000, Preliminary probabilistic seismic hazard analyses—Island Park, Grassy Lake, Jackson Lake, Palisades, and Ririe Dams: U.S. Department of the Interior, Bureau of Reclamation Technical Memorandum D8330-2000-17.