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Quaternary Fault and Fold Database of the United States

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Hogsback fault, northern section (Class A) No. 732a

Last Review Date: 1994-06-22

citation for this record: **McCalpin, J.P., Black, B.D., DuRoss, C.B., and Hecker, S., compilers, 1994, Fault number 732a, Hogsback fault, northern section, 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 02:03 PM.**

Synopsis	**General:** The Hogsback fault is comprised of middle to late Pleistocene (?) age fault scarps near the North Flank and Darby-Hogsback thrust faults in the Uinta Mountains in northeastern Utah and southwestern Wyoming. It is generally poorly expressed by discontinuous scarps and alignment of drainages. One trench was excavated near the southern end of the scarps, but the timing of the most recent movement as well as its Quaternary history is not well constrained. **Sections:** This fault has 2 sections. Sections are based on inferred segmentation of the fault from reconnaissance investigations by West (1989 #824). He mentioned that evidence of faulting is less distinct to the south of Chapman Butte, but he also suggested that

	it is in part due to the presence of glacial deposits and glacial topography in the south.
Name comments	**General:** West (1989 #824; 1992 #826) used the name Darby-Hogsback fault to refer to the parts of similarly named thrust faults that exhibit normal reactivation. Isolated scarps and fault-related features were named after local geographic features. From north to south they are Muddy Creek lineament, Meeks Cabin/Thunderbolt Mountains scarps, and Elizabeth Ridge scarps. This structure was also referred to as the Hogsback fault in a later publication (West, 1993 #825). The Hogsback name is used in this compilation owing to prior use of the confusing and multiple Darby-Hogsback term by West, author of the most pertinent research. The fault extends from about 6 km north of Interstate 80 south in southwestern Wyoming to the North Fork Mill Creek, south of Elizabeth Mountain in northeastern Utah. **Section:** No name was suggested by West (1989 #824) for the northern part of the fault, but it is considered herein as the northern section of the Hogsback fault The section extends from about 6 km north of Interstate 80 south to southern end of Chapman Butte, southern end of section approximately located and not shown by West (1989 #824). **Fault ID:** Includes Hecker's (1993 #642) fault number 12-14 (Elizabeth Ridge scarps).
County(s) and State(s)	UINTA COUNTY, WYOMING
Physiographic province(s)	MIDDLE ROCKY MOUNTAINS WYOMING BASIN
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Fault traces transferred from 1:100,000-scale map of West (1989 #824).
Geologic setting	North-striking fault is generally parallel to and east of Muddy Creek and its tributaries in Wyoming. Down-to-west normal reactivation of the Laramide-age Darby-Hogsback thrust, a major east-directed low-angle thrust fault of the Overthrust Belt, is thought to have occurred during the Quaternary. The northeast- to east-trending scarps at the south end of the fault roughly parallel the Tertiary-age North Flank fault of the Uinta Mountains.

	Normal faulting may have initiated 250–600 ka with possible maximum vertical displacement of 200 m based on apparent separation of Quaternary surfaces (West, 1989 #824); West indicates that earlier studies indicate similar amounts of separation of the Wasatch Formation (Eocene). However, most of the geomorphic features are lineaments and escarpments that are paralleled by streams, so much of the measured relief could be erosional rather than tectonic.
Length (km)	This section is 23 km of a total fault length of 53 km.
Average strike	N17°E (for section) versus N7°E (for whole fault)
Sense of movement	Normal *Comments:* (West, 1989 #824)
Dip	45°-80° *Comments:* Dip of fault is schematically shown by West (1989 #824; 1992 #826; 1993 #825) as 80? W in upper 1 km, flattening to 45? W at 2 km, and subhorizontal at 4 km.
Paleoseismology studies	
Geomorphic expression	Fault is expresses as linear drainage alignments, lineaments, and subdued west-facing scarps on Pleistocene terrace and pediment surfaces. The amount of east-directed tilt of terrace surfaces increases with increasing age of the surfaces suggesting recurrent movement.
Age of faulted surficial deposits	Fault offsets the Bigelow Bench surface (West, 1989 #824), which has been variously described as being 150-600 ka (late middle Pleistocene) to 300-600 ka (middle Pleistocene).
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* Reconnaissance of this part of the fault zone indicates up to 200 m of down-to-the-west normal slip of the Bigelow Bench, a surface that is inferred to be 150-600 k.y. old (West, 1989 #824) or older. No data are presented to indicate the timing of the most recent event but West believes that surface rupture of

	this fault occurred before rupture of the Bear River fault zone [730], which is thought to be late Holocene. West (1989 #824) further suggests that the most recent event may be older than late Pleistocene or early Holocene because the geomorphic features seem to be poorly expressed. A conservative estimate of middle and late Quaternary time (<750 ka) is given here.
Recurrence interval	*Comments:* West (1989 #824) suggested that the late Quaternary recurrence interval might be approximated by that of the nearby Bear River fault zone [730] because of analogous tectonic setting. Thereby, he would suggest a recurrence interval of a few thousand years. Several other faults in the region [728 and 729] also are reported to have similar short recurrence intervals during the Holocene. These likely represent temporal clustering that is not characteristic of the fault's longer term activity.
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Poorly-constrained estimates range from 0.33-1.5 mm/yr (West, 1989 #824) for the entire fault. The highest estimate (1.5 mm/yr) is based on inferring a rate similar to that of the Bear River fault zone [730]. A lower rate of 0.33-1.33 mm/yr is obtained based on 200-m offset of 150-600 ka surface (Bigelow Bench). A later publication suggested that the age of Bigelow Bench surface is 300-600 k.y., which would suggest a slip rate of <1 mm/yr. Thus, the 0.2-1 mm/yr slip-rate category is assigned here due to the recent suggestion that the surface is older then 150 k.y., and because the bulk of the cited rates are <1 mm/yr.
Date and Compiler(s)	1994 James P. McCalpin, GEO-HAZ Consulting, Inc. Bill D. Black, Utah Geological Survey Christopher B. DuRoss, Utah Geological Survey Suzanne Hecker, U.S. Geological Survey
References	#824 West, M.W., 1989, Neotectonics of the Darby-Hogsback and Absaroka thrust pls., Uinta County, Wyoming and Summit County, Utah with applications to earthquake hazard assessment: Golden, Colorado School of Mines, unpublished Ph.D. dissertation, 450 p., 17 pls. #826 West, M.W., 1992, An integrated model for seismogenesis in the Intermountain seismic belt: Bulletin of the Seismological Society of America, v. 82, p. 1350-1372.

	#825 West, M.W., 1993, Extensional reactivation of thrust faults accompanied by coseismic surface rupture, southwestern Wyoming and north-central Utah: Geological Society of America Bulletin, v. 105, p. 1137-1150.