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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.

Bull Mountain western border fault (Class A) No. 690

Last Review Date: 1993-04-30

Compiled in cooperation with the Montana Bureau of Mines and Geology

citation for this record: **Machette, M.N., compiler, 1993, Fault number 690, Bull Mountain western border 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	Poorly studied, down-to-the-west, normal fault that is largely inferred by the young morphologic appearance of the western margin of Bull Mountain. The fault is suspected as having young movement, but this assertion is not well supported.
Name comments	Although this fault was recognized by Pardee (1950 #46), it was first named the "Bull Mountain western border fault" by Johns and others (1982 #259). The fault extends along the west side of Bull Mountain from a point about 10 km south of Boulder, Montana, to about 5 km north of the Jefferson River.

	Fault ID: Refers to fault 21 (Bull Mountain western border fault) of Johns and others (1982 #259) and fault 72 (unnamed fault, east side of Little Whitetail Valley) of Witkind (1975 #317).
County(s) and State(s)	JEFFERSON COUNTY, MONTANA
Physiographic province(s)	NORTHERN ROCKY MOUNTAINS
Reliability of location	Poor Compiled at 1:250,000 scale. *Comments:* Trace is from 1:500,000-scale map of Witkind (1975 #317), transferred to 1:250,000-scale base.
Geologic setting	Range-bounding, down-to-the-west, normal fault that is mapped along western margin of Bull Mountain. No other compilations (Witkind, 1975 #317; Johns and others, 1982 #259) or studies of active faulting (Stickney and Bartholomew, 1987 #85) have reported fault scarps on unconsolidated material in this area.
Length (km)	29 km.
Average strike	N9°W
Sense of movement	Normal *Comments:* Witkind (1975 #317) and Johns and others (1982 #259).
Dip Direction	W *Comments:* Nearly vertical (?) according to Johns and others (1982 #259).
Paleoseismology studies	
Geomorphic expression	No scarps noted, although Pardee (1950 #46) implied young fault control of the range front, which is steep, straight, and rises abruptly. Johns and others (1982 #259) inferred deposition on the dissected piedmont of Bull Mountain south of Black Butte owing to young (late? Pleistocene) movement of the fault.
Age of faulted	

Age of faulted surficial deposits	Pardee (1950 #46) mentioned that Tertiary beds dip east toward Bull Mountain, suggesting young (late Cenozoic) movement.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Although Johns and others (1982 #259) listed the fault's latest movement as late Pleistocene, their argument is based on anomalous stream gradients. Inasmuch as no scarps have been recognized on unconsolidated material, we use a more conservative estimate herein. Additionally, Stickney and Bartholomew (1987 #242) did not include this structure on their map. Pierce and Morgan (1992 #539) indicate that this fault was active during the Tertiary but do not preclude Quaternary movement. Bartholomew and Stickney examined several sites along the fault and found no evidence suggesting late Quaternary faulting (M.J. Bartholomew, written commun. 1997). Because details are lacking, the fault is included in this compilation. Due to the lack of agreement in the timing of the most recent movement, a Quaternary age is assigned here.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Inferred low slip rate based on absence of scarps along the structure.
Date and Compiler(s)	1993 Michael N. Machette, U.S. Geological Survey, Retired
References	#259 Johns, W.M., Straw, W.T., Bergantino, R.N., Dresser, H.W., Hendrix, T.E., McClernan, H.G., Palmquist, J.C., and Schmidt, C.J., 1982, Neotectonic features of southern Montana east of 112°30' west longitude: Montana Bureau of Mines and Geology Open-File Report 91, 79 p., 2 sheets. #46 Pardee, J.T., 1950, Late Cenozoic block faulting in western Montana: Geological Society of America Bulletin, v. 61, p. 359-406. #539 Pierce, K.L., and Morgan, L.A., 1992, The track of the Yellowstone hot spot—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 179, p. 1-53, 1 pl. #242 Stickney, M.C., and Bartholomew, M.J., 1987, Preliminary map of late Quaternary faults in western Montana: Montana Bureau of Mines and Geology Open-File Report 186, 1 pl., scale 1:500,000. #85 Stickney, M.C., and Bartholomew, M.J., 1987, Seismicity and late Quaternary faulting of the northern Basin and Range province, Montana and Idaho: Bulletin of the Seismological Society of America, v. 77, p. 1602-1625. #317 Witkind, I.J., 1975, Preliminary map showing known and suspected active faults in western Montana: U.S. Geological Survey Open-File Report 75-285, 36 p. pamphlet, 1 sheet, scale 1:500,000.