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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.

Georgia Gulch fault (Class A) No. 667

Last Review Date: 2011-01-18

Compiled in cooperation with the Montana Bureau of Mines and Geology

citation for this record: **Haller, K.M., compiler, 2011, Fault number 667, Georgia Gulch 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 02:04 PM.**

Synopsis	Much of the fault has only been studied during preliminary reconnaissance. In general, little specific evidence is published regarding the nature, timing, or extent of displacement. Published maps reveal significant differences even in the location of the fault. Two trenches have been excavated on the most recently active part of the fault.
Name comments	Source of the name is from Stickney and Bartholomew (1987 #85; 1987 #242). The Georgia Gulch fault is inferred in this compilation to include the piedmont scarps shown by Ruppel and others (1993 #646) and, thus, extends from 3 km south of Dry Boulder Creek southward to 1 km north of Wisconsin Creek. The northern 6.5 km of echelon faults, which are in Tertiary sediments

	(M.J. Bartholomew, written commun. 1997) have not been included in previous discussions (Stickney and Bartholomew, 1987 #85; Bartholomew and others, 1990 #243) or shown on other compilations (Johns and others, 1982 #259; Stickney and Bartholomew, 1987 #242; written commun. 1992 #556). The northern 10 km of this fault is west of the southern part of the Tobacco Root fault [649], and the southern part of the fault coincides with the southern part of the Tobacco Root fault. **Fault ID:** Refers to number 7 (Georgia Gulch fault) of Stickney and Bartholomew (1987 #85), Georgia Gulch fault of Stickney and Bartholomew (1987 #242), and Georgia Gulch fault and North Georgia Gulch fault of Stickney and Bartholomew (written commun. 1992 #556).
County(s) and State(s)	MADISON COUNTY, MONTANA
Physiographic province(s)	NORTHERN ROCKY MOUNTAINS
Reliability of location	Poor Compiled at 1:100,000 scale. *Comments:* Source of the trace is the 1:250,000-scale geologic map of Ruppel and others (1993 #646), further constrained by satellite imagery and topography at scale of 1:100,000. Northern scarps shown by Ruppel and others (1993 #646) are not included as Vuke and others (2004 #7062) indicate that scarps are on Tertiary- but not Quaternary-age deposits. Reference satellite imagery is ESRI_Imagery_World_2D with a minimum viewing distance of 1 km (1000 m). Location of trenched scarp is from Bartholomew and others (1990 #243).
Geologic setting	High-angle, down-to-the-west, normal fault near the southwestern side of the Tobacco Root Mountains. There is no known data on the amount of total stratigraphic throw.
Length (km)	14 km.
Average strike	N12°W
Sense of movement	Normal *Comments:* (Witkind, 1975 #317; Johns and others, 1982 #259)

Dip Direction	W
Paleoseismology studies	Trench 667-1, located approximately 2 km south of Goodrich Gulch on valleyward strand of fault, was excavated in 1986 (Bartholomew and Stickney, 1987 #9). The trench crossed a 0.5-m-high scarp on the youngest faulted alluvial fan deposit; however, displacement of an inferred upper Quaternary (Bull Lake) mudflow deposit is 1 m (Bartholomew and others, 1990 #243), which may reflect multiple movements. Post-glacial (Pinedale) displacement is thought to be 0.5 m. Another trench, located a few hundred meters south of trench 667-1, was excavated in 1990 by Bartholomew and Stickney, but no published information is available at this time.
Geomorphic expression	Scarps on alluvium are present at least locally. Holocene deposits have no scarps; approximately 1-m-high scarps are on uppermost Pleistocene (Pinedale ?) deposits, and 4-m-high scarps are on upper Quaternary (Bull Lake ?) deposits (Stickney and Bartholomew, 1987 #85).
Age of faulted surficial deposits	Faulted deposits include Quaternary alluvial-fan deposits and Tertiary sediments based on Bartholomew and others (1990 #243) generalized map of Jefferson basin. They show the fault at the bedrock-alluvial contact along the southern part of the section; to the north, it displaces Quaternary alluvium. The Tertiary sediments shown by Bartholomew and others (1990 #243) should be offset based on the location of scarps defining the northern end of the section from Ruppel and others (1993 #646). Ruppel and others (1993 #646) show only Quaternary alluvium along this section of the fault; however, M.J. Bartholomew (written commun. 1997) believes that the deposits are Tertiary.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Relations in trench 667-1 suggest that the most recent event postdates deposition related to the most recent glacial cycle (Bartholomew and others, 1990 #243), but Holocene deposits near the trench site are not faulted. The same age is assigned to the rest of the piedmont scarps, even though there is no supporting data. Stickney and Bartholomew (1987 #85; 1987 #242; written commun., 1992 #556) indicate that the timing of the most recent event is late Pleistocene for the range-bounding part

	of this fault.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* The inferred low slip rate is based on the small amount of documented slip in the past 130 k.y. However, the available data are for a single strand of the fault and do not represent the cumulative slip across the numerous nearby splays.
Date and Compiler(s)	2011 Kathleen M. Haller, U.S. Geological Survey
References	#9 Bartholomew, M.J., and Stickney, M.C., 1987, Late Quaternary faulting in southwestern Montana: Geological Society of America Abstracts with Programs, v. 19, p. 258-259. #243 Bartholomew, M.J., Stickney, M.C., and Wilde, E.M., 1990, Late Quaternary faults and seismicity in the Jefferson basin, *in* Hall, R.D., ed., Quaternary geology of the western Madison Range, Madison Valley, Tobacco Root range, and Jefferson valley: Rocky Mountain Cell, Friends of the Pleistocene, August 15-19, 1990, Guidebook, p. 238-244. #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. #646 Ruppel, E.T., O'Neill, J.M., and Lopez, D.A., 1993, Geologic map of the Dillon 1° x 2° quadrangle, Idaho and Montana: U.S. Geological Survey Miscellaneous Investigations Map I-1803-H, 1 sheet, scale 1;250,000. #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. #556 Stickney, M.C., and Bartholomew, M.J., 1992 written commun., Preliminary map of late Quaternary faults in western Montana (digital data): Montana Bureau of Mines and Geology (digital version of MBMG Open-File Report 186), 1 pl., scale 1:500,000. #7062 Vuke, S.M., Coppinger, W.W., Cox, B.E., 2004, Geologic map of Cenozoic deposits in the Upper Jefferson Valley, southwestern Montana, Montana Bureau of Mines and Geology: Open-File Report 505, 35 p., 1 sheet(s), 1:50,000. #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.