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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.

Wolf Creek graben (Class A) No. 661

Last Review Date: 1994-04-11

Compiled in cooperation with the Montana Bureau of Mines and Geology

citation for this record: **Haller, K.M., compiler, 1994, Fault number 661, Wolf Creek graben, 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	Little is known about these short subparallel fault scarps. Most of the data cited here is from Stickney and Bartholomew (1987 #85; 1987 #242).
Name comments	Source of name is Stickney and Bartholomew (1987 #85; 1987 #242). Johns and others (1982 #259) refer to each strand with an individual fault name. Stickney and Bartholomew (written commun. 1992 #556) call these faults the Madison graben. Weinheimer (1979 #696; 1982 #656) probably first documented the name "Wolf Creek Hot Spring fault". All of the faults are discussed collectively because the known information indicates that they do not behave independently during large magnitude earthquakes.

	Fault ID: Possibly refers to part of number 51 (Wolf Creek Hot Springs fault), number 55 (Wolf Creek fault A), and number 56 (Wolf Creek fault B) of Johns and others (1982 #259); number 12 (Wolf Creek graben) of Stickney and Bartholomew (1987 #85); Wolf Creek graben of Stickney and Bartholomew (1987 #242); and Madison graben 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	Good Compiled at 1:250,000 scale. *Comments:* Source of trace is digital data of Stickney and Bartholomew (written commun. 1992 #556) compiled at scale of 1:250,000.
Geologic setting	Fault, as shown, consists of three subparallel intrabasin scarps forming a graben on the east side of the Madison River. The eastern two scarps are down to the west and the western scarp is down to the east.
Length (km)	4 km.
Average strike	N19°W
Sense of movement	Normal *Comments:* (Johns and others, 1982 #259)
Dip Direction	W; E
Paleoseismology studies	
Geomorphic expression	Weinheimer (1979 #696) documents the morphology of the scarps on a fault that he calls the Wolf Creek Hot Springs fault, but it is uncertain if the structure he describes is shown in this compilation. The fault, as he shows it, should be east of those shown here and is down to the range front at least along part of its length (this sense of movement is opposite to the easternmost fault shown here). He describes the scarps as being 1- to 1.5-m-

	high, east-facing scarps along the southern 2 km and about 2-m-high, west facing scarps between 3-5 km north of Wolf Creek, with presumably a 1 km gap between.
Age of faulted surficial deposits	
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Timing of most recent event is from Stickney and Bartholomew (1987 #85; 1987 #242; written commun. 1992 #556). Johns and others (1982 #259) indicate Holocene faulting (Weinheimer, 1982 #656) on fault number 51, Wolf Creek Hot Springs fault, which might, in part, be the east-facing scarp shown here. Scarps on fault number 55, Wolf Creek fault A, of Johns and others (1982 #259) are restricted to the Cameron surface (Schneider, 1985 #319). The other fault is shown as Quaternary by Johns and others (1961 #766).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Low slip rate is indicated by presence of scarps generally less than 2 m high on upper Quaternary deposits (Johns and others, 1982 #259).
Date and Compiler(s)	1994 Kathleen M. Haller, U.S. Geological Survey
References	#766 Johns, W.M., 1961, Geology and ore deposits of the southern Tidal Wave mining district Madison County, Montana: Montana Bureau of Mines and Geology Bulletin 24, 53 p., 1 pl. #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. #319 Schneider, N.P., 1985, Morphology of the Madison Range

fault scarp, southwest Montana—Implications for fault history and segmentation: Oxford, Ohio, Miami University, unpublished M.S. thesis, 131 p.

#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.

#696 Weinheimer, G.J., 1979, The geology and geothermal potential of the upper Madison Valley between Wolf Creek and the Missouri Flats, Madison County, Montana: Bozeman, Montana State University, unpublished M.S. thesis, 108 p., 1 pl.

#656 Weinheimer, G.J., 1982, Madison Valley thermal springs, *in* The upper Centennial Valley, Beaverhead and Madison Counties, Montana: Montana Bureau of Mines and Geology Memoir 50, p. 20-26.