Jump to Navigation

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.

Spokane Hills fault, range-bounding section (Class A) No. 679a

Last Review Date: 1993-04-23

Compiled in cooperation with the Montana Bureau of Mines and Geology

citation for this record: **Machette, M.N., compiler, 1993, Fault number 679a, Spokane Hills fault, range-bounding 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 02:04 PM.**

Synopsis	**General:** The range-bounding normal faults [679a] form a prominent escarpment on Tertiary bedrock along the eastern margin of Helena Valley and locally show evidence of late Quaternary movement. The piedmont scarp [679b] shows clear evidence of late Quaternary movement. Johns and others (1982 #259) indicate that a splay of the Helena Valley fault extends about 6 km southward along Spokane Creek and is a structural control for the creek. This splay is not included here because it lacks evidence of Quaternary movement.

	Sections: This fault has 2 sections. Informally named sections defined here include the main range-bounding faults [679a] and a short piedmont scarp [679b].
Name comments	**General:** The first use of this name appears to have been by Schmidt (1986 #533). The faults were included as the southwestern part of the Helena Valley (St. Marys) fault by Witkind (1975 #317) and Johns and others (1982 #259). The structure consists of two range-bounding splays and a piedmont scarp that together extend from about 1 km northwest of Hauser Lake where Spokane Creek enters southward to a point about 1 km north of U.S. Highway 287. **Section:** This informally named section is the main range-bounding trace of the fault and consists of two scarps that form a right-stepping echelon pattern. The northern scarp extends from a bedrock knob about 1 km west of Spokane Creek at its entry into Hauser Lake, southeastward about 6 km into the Spokane Hills. The northern end of the southern scarp is about 2.5 km to the south and extends south-southeastward along the base of the main part of the Spokane Hills for a distance of about 5 km. **Fault ID:** Refers to parts of fault 50, St. Mary's fault, of Witkind (1975 #317), fault 121, Helena Valley fault, of Johns and others (1982 #259), fault 24, Spokane Hills fault, of Stickney (1987 #251), and Stickney and Bartholomew (1987 #85; 1987 #242; written commun. 1992 #556).
County(s) and State(s)	BROADWATER COUNTY, MONTANA LEWIS AND CLARK COUNTY, MONTANA
Physiographic province(s)	NORTHERN ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Based on 1:50,000-scale map of Stickney (1987 #251).
Geologic setting	This zone of subparallel, generally down-to-the-southwest, range-bounding and piedmont normal faults form the western margin of the Spokane Hills along the eastern side of Helena Valley. The main fault [679a] has two echelon parts that place pre-Tertiary bedrock on the east against Tertiary sedimentary rocks and Quaternary sediment on the west. A subsidiary fault, on the

	piedmont, cuts Tertiary and perhaps Quaternary sediment.
Length (km)	This section is 14 km of a total fault length of 14 km.
Average strike	N41°W (for section) versus N39°W (for whole fault)
Sense of movement	Normal
Dip Direction	SW
Paleoseismology studies	
Geomorphic expression	Forms prominent escarpment along the western edge of the Spokane Hills. No fault scarps on unconsolidated material have been reported.
Age of faulted surficial deposits	Stickney (1987 #251) showed the fault cutting Pleistocene loess and Tertiary deposits, both of which are in juxaposition with pre-Tertiary bedrock in the footwall along most of this section. The fault cuts middle Pleistocene piedmont gravel at one locality (Stickney, 1987 #251).
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Stickney (1987 #251) reports this section of the fault as having early Quaternary or late Tertiary movement, although middle Pleistocene piedmont gravel appears to be offset at one locality.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Low slip rate inferred from absence of Quaternary scarps.
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. #533 Schmidt, R.G., 1986, Geology, earthquake hazards, and land use in the Helena area, Montana—A review: U.S. Geological Survey Professional Paper 1316, 64 p., 3 pls., scale 1:48,000 and 1:25,000. #251 Stickney, M.C., 1987, Quaternary geologic map of the Helena valley, Montana: Montana Bureau of Mines and Geology Geologic Map 46, 1 pl., scale 1:50,000. #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. #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.