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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.

Swan fault (Class A) No. 700

Last Review Date: 2006-05-08

Compiled in cooperation with the Montana Bureau of Mines and Geology

citation for this record: **Haller, K.M., compiler, 2006, Fault number 700, Swan 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	Little known about this long range-front fault that bounds the west side of the Swan Range. Detailed studies have not been conducted to date. No scarps have been reported along this fault, but most of the deposits near the location of the inferred fault are probably post-glacial in age and, thus, may post-date the most recent faulting event.
Name comments	xxxAn early reference to this fault is Clapp (1932 #997), who believed that movement was characterized by thrust or reverse slip on an east-dipping fault. Fault extends from midway along southwestern flank of Teakettle Mountain southward to Cottonwood Creek.

	Fault ID: Refers to number 93 (Swan fault) of Witkind (1975 #317).
County(s) and State(s)	FLATHEAD COUNTY, MONTANA LAKE COUNTY, MONTANA MISSOULA COUNTY, MONTANA POWELL COUNTY, MONTANA
Physiographic province(s)	NORTHERN ROCKY MOUNTAINS
Reliability of location	Poor Compiled at 1:250,000 scale. *Comments:* Location based on inferred trace from 1:250,000-scale map of Mudge and others (1982 #964), approximately 1:312,000-scale map of Ostenaa and others (1990 #540), and 1:500,000-scale map of Witkind (1975 #317). Earlier mapping (Johns and others, 1963 #1026) does not extend fault as far north as shown here.
Geologic setting	Possible listric, down-to-the-west, normal fault between the western side of the Swan Range and Kalispell, Swan, and Clearwater Valleys. Near the central part of the fault, geophysical data indicate that the valley fill is about 2 km thick near Condon, Montana, and stratigraphic offset is more than 3.5 km (Mudge and others, 1982 #964; Crosby, 1984 #316). In Kalispell Valley, gravity data suggests the valley fill is about 1.5 km thick (Konizeski and McMurtrey, 1968 #965). Southern end of fault may be truncated by or merges with St Marys fault (Ostenaa and others, 1990 #540).
Length (km)	154 km.
Average strike	N23°W
Sense of movement	Normal *Comments:* Johns and others (1964 #1051)
Dip Direction	SW
Paleoseismology studies	
Geomorphic expression	Range front is abrupt, linear, steep, and characterized by prominent faceted spurs. Especially prominent fault scarps near

	Lion Creek were reported by Crosby (1984 #316), but more recent work suggests scarps on alluvium are not present at this location (Ostenaa and others, 1990 #540). No other documentation of scarps on alluvium is known. The origin of the abrupt range front was attributed to glacial erosion by early reconnaissance studies in this area (Davis, 1920 #962). Anderson and LaForge (2001 #6895) defined two and possibly three sections based on the distribution of Tertiary basins in the hanging-wall block adjacent to the fault. The fault is not similarly divided here due to lack of data to suggest differences in slip rate or event timing along the fault.
Age of faulted surficial deposits	
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* No detailed studies have been published to document the displacement history of this fault. The Swan fault is known not to displace uppermost Pleistocene and Holocene surficial deposits at several locations; however, the occurrence of surface-faulting earthquakes prior to about 13 ka cannot be precluded due to the absence of alluvium of that age at the surface (Ostenaa and others, 1990 #540; Anderson and LaForge, 2001 #6895). The Swan fault has characteristics similar to those of late Quaternary faults elsewhere in the region (Sullivan and LaForge, 1988 #541). Thus, we use a conservative estimate of age.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Lowest slip-rate category assigned based on the absence of scarps on post-glacial deposits. Anderson and Laforge (2001 #6895) state that the absence of surface rupture in the past 13 k.y. suggests that the slip rate is less than that of the Mission fault [699b]. Based on that line of evidence and the length of each respective section, they assign a preferred slip rate of 0.3 mm/yr to both segments.

Date and Compiler(s)	2006 Kathleen M. Haller, U.S. Geological Survey
References	#6895 Anderson, L.W., and LaForge, R., 2001, Seismotectonic study for Hungry Horse Dam, Hungry Horse Project, and Gibson Dam, Sun River Project, Montana: U.S. Bureau of Reclamation Seismotectonic Report 2001-5, 68 p. #997 Clapp, C.H., 1932, Geology of a portion of the Rocky Mountains of northwestern Montana: Montana Bureau of Mines and Geology Memoir 4, 30 p., 1 pl., scale 1:500,000. #316 Crosby, G.W., 1984, Structural-geophysical interpretation of Swan Valley, Montana, *in* McBane, J.D., and Garrison, P.B., eds., Northwest Montana and adjacent Canada: Montana Geological Society, 1984 Field Conference and Symposium, p. 245-251. #962 Davis, W.M., 1920, Features of glacial origin in Montana and Idaho: Annals of the Association of American Geographers, v. 10, p. 75-148. #1051 Johns, W.M., 1964, Progress report on geologic investigations in the Kootenai-Flathead area, northwest Montana —6. Southeastern Flathead County and northern Lake County: Montana Bureau of Mines and Geology Bulletin 42, 66 p., 3 pls. #1026 Johns, W.M., Smith, A.G., Barnes, W.C., Gilmour, E.H., and Page, W.D., 1963, Progress report on geologic investigations in the Kootenai-Flathead area, northwest Montana: Montana Bureau of Mines and Geology Bulletin 36, 68 p., 4 pls., scale 1:75,000. #965 Konizeski, R.L., and McMurtrey, R.G., 1968, Geology and ground water resources of the Kalispell Valley, northwestern Montana: Montana Bureau of Mines and Geology Bulletin 68, 42 p., 5 pls. #964 Mudge, M.R., Earhart, R.L., Whipple, J.W., and Harrison, J.E., 1982, Geologic and structure map of the Choteau 1° x 2° quadrangle, western Montana: U.S. Geological Survey Miscellaneous Investigations Map I-1300, 2 sheets, scale 1:250,000. #540 Ostenaa, D., Manley, W., Gilbert, J., LaForge, R., Wood, C.,

	and Weisenberg, C.W., 1990, Flathead Reservation regional seismotectonic study—An evaluation for dam safety: U.S. Bureau of Reclamation Seismotectonic Report 90-8, 161 p., 7 pls. #541 Sullivan, J.T., and LaForge, R.C., 1988, Seismic sources and maximum credible earthquakes for Willow Creek Dam, Sun River Project, Montana: U.S. Bureau of Reclamation Seismotectonic Report 88-12, 15 p., 2 pls. #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.