

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](#).

Big Flat fault (Class A) No. 631

Last Review Date: 2010-11-09

Compiled in cooperation with the Idaho Geological Survey

citation for this record: Personius, S.F., and Neier, R.S., compilers, 2010, Fault number 631, Big Flat 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 03:02 PM.

Synopsis

The Big Flat fault is a north-striking, east-dipping normal fault that forms the western margin of Big Flat (valley), and the eastern margin of Willow Ridge, a prominent west-tilted fault block. The fault is part of the western Idaho fault belt. The nearby west-dipping Jakes Creek fault [630] probably is subsidiary to and lies in the hanging wall of the Big Flat fault. The Big Flat fault is marked by a prominent 180- to 300-m-high escarpment in Miocene Columbia River Basalts most of its length, but unfortunately the fault trace is obscured in most places by extensive landslide deposits. No paleoseismic investigations have been described, but information from a trench investigation on nearby Jakes Creek fault (site 630-1) has been used to infer latest

	Pleistocene or early Holocene movement on the Big Flat fault.
Name comments	<p>The Big Flat fault was originally mapped and named after nearby Big Flat (valley) by Anderson (1934 #595). The Big Flat fault was also briefly described by Capps (1941 #5895). The fault was renamed the Big Willow Creek fault zone by Fitzgerald (1982 #5886), but the original name appears to be in present usage (Gilbert and others, 1983 #5887; Knudsen and others, 1996 #5889) so that name is retained herein.</p> <p>Fault ID: This fault is fault number 221 in the fault compilation of Witkind (1975 #320).</p>
County(s) and State(s)	GEM COUNTY, IDAHO WASHINGTON COUNTY, IDAHO
Physiographic province(s)	COLUMBIA PLATEAU
Reliability of location	<p>Good Compiled at 1:100,000 scale.</p> <p><i>Comments:</i> Fault locations are from 1:250,000-scale mapping of Gilbert and others (1983 #5887) and Knudsen and others (1996 #5889) further constrained by satellite imagery and topography at scale of 1:100,000. Reference satellite imagery is ESRI_Imagery_World_2D with a minimum viewing distance of 1 km (1000 m).</p>
Geologic setting	The Big Flat fault is a north-striking, east-dipping normal fault that forms the western margin of Big Flat (valley), and the eastern margin of Willow Ridge, a prominent west-tilted fault block. The fault is part of the western Idaho fault belt of Hamilton (1963 #6040), a system of north-striking normal faults formed along the western margin of the Idaho batholith. The Big Flat fault displaces Miocene Columbia River Basalts along most of its length (Newcomb, 1970 #3761; Fitzgerald, 1982 #5886; Gilbert and others, 1983 #5887). The nearby west-dipping Jakes Creek fault [630] probably is subsidiary to and lies in the hanging wall of the Big Flat fault.
Length (km)	30 km.
Average strike	N6°W
Sense of	Normal

movement	<i>Comments:</i> The Big Flat fault is mapped as a normal fault by Newcomb (1970 #3761), Fitzgerald (1982 #5886), Gilbert and others (1983 #5887), and Knudsen and others (1996 #5889).
Dip Direction	E <i>Comments:</i> No actual dip measurements have been published, but Knudsen and others (1996 #5889) modeled the Big Flat fault as a 60° dipping normal fault in their analysis of paleo-earthquake magnitudes.
Paleoseismology studies	
Geomorphic expression	The Big Flat fault is marked by a steep, 180- to 300-m-high east-facing escarpment in Columbia River Basalt rocks along the western margin of Big Flat (valley) (Gilbert and others, 1983 #5887; Knudsen and others, 1996 #5889). The valley margin is marked by a series of moderately conspicuous topographic and vegetation linears, but unfortunately the base of the range front is marked by extensive landslide deposits that almost entirely cover the fault trace, obscuring evidence of Quaternary displacement (Gilbert and others, 1983 #5887).
Age of faulted surficial deposits	The Big Flat fault offsets Miocene Columbia River Basalts, but landslides obscure evidence of fault scarps in Quaternary deposits (Gilbert and others, 1983 #5887).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) <i>Comments:</i> Gilbert and others (1983 #5887) and Knudsen and others (1996 #5889) assumed that the nearby (and probably subsidiary) Jakes Creek fault [630] has a similar history of Quaternary fault displacements, so they used data from the Jakes Creek fault trench (site 630-1) to infer latest Pleistocene or early Holocene displacement on the Big Flat fault. We use their age assignment here. However, Breckenridge and others (2003 #5878) show the fault as a lesser late Quaternary (<130 ka) structure.
Recurrence	

interval	
Slip-rate category	<p>Less than 0.2 mm/yr</p> <p><i>Comments:</i> Slip rates have not been described, but Gilbert and others (1983 #5887) estimated total vertical offsets of 300-600 m in Miocene Columbia River Basalt rocks along the Big Flat fault. These displacement values yield low rates of long-term slip.</p>
Date and Compiler(s)	<p>2010</p> <p>Stephen F. Personius, U.S. Geological Survey</p> <p>Ricky S. Neier, University of Idaho</p>
References	<p>#595 Anderson, A.L., 1934, A preliminary report on recent block faulting in Idaho: Northwest Science, v. 8, p. 17-28.</p> <p>#5878 Breckenridge, R.M., Lewis, R.S., Adema, G.W., and Weisz, D.W., 2003, Miocene and younger faults in Idaho: Idaho Geological Survey Map 8, 1 sheet, scale 1:1,000,000.</p> <p>#5895 Capps, S.R., 1941, Faulting in western Idaho and its relation to the high placer deposits: Idaho Bureau of Mines and Geology Pamphlet 56, 20 p., 1 pl., scale 1:500,000.</p> <p>#5886 Fitzgerald, J.E., 1982, Geology and basalt stratigraphy of the Weiser Embayment, west-central Idaho, <i>in</i> Bonnicksen, B., and Breckenridge, R.M., eds., Cenozoic geology of Idaho: Idaho Bureau of Mines and Geology Bulletin 26, p. 103-128.</p> <p>#5887 Gilbert, J.D., Piety, L., and LaForge, R., 1983, Seismotectonic study for Black Canyon Dam, Boise project, Idaho: U.S. Bureau of Reclamation Seismotectonic Report 83-7, 73 p., 8 pl.</p> <p>#6040 Hamilton, W., 1963, Metamorphism in the Riggins region, western Idaho: U.S. Geological Survey Professional Paper 436, 95 p.</p> <p>#5889 Knudsen, K.L., Wong, I., Sawyer, T.L., Bott, J., Silva, W., and Lettis, W.R., 1996, Seismotectonic evaluation, Cascade Dam, Boise project, west-central Idaho: Final Report prepared for U.S. Department of the Interior, Bureau of Reclamation, 198 p., 3 pls.</p> <p>#3761 Newcomb, R.C., 1970, Tectonic structure of the main part of the basalt of the Columbia River Group Washington, Oregon, and Idaho: U.S. Geological Survey Miscellaneous Geologic</p>

Investigations I-587, 1 sheet, scale 1:500,000.

#320 Witkind, I.J., 1975, Preliminary map showing known and suspected active faults in Idaho: U.S. Geological Survey Open-File Report 75-278, 71 p. pamphlet, 1 sheet, scale 1:500,000.

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