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.

Rush Peak fault zone (Class A) No. 633

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 633, Rush Peak fault zone, 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 Rush Peak fault zone forms the unusual east-west trending southern margin of the Cuddy Mountains in western Idaho. The fault zone displaces Miocene Columbia River Basalt against Mesozoic intrusive and metamorphic rocks primarily in a down-to-the-south sense of displacement, but some studies indicate an unknown amount of left-lateral displacement. The fault zones displaces alluvial deposits of probable last-glacial-maximum age, so latest movement appears to have occurred in the latest Quaternary.
Name comments	The fault zone defines the southern margin of the Cuddy Mountains, and was originally named after Rush Peak by King

	(1971 #5892). The fault was renamed the Cuddy Mountain fault by Fitzgerald (1982 #5886) and the Rush Creek fault by Geomatrix Consultants, Inc. (1989 #1310), but recent reports (Zollweg and Wood, 1993 #780; Mann and Meyer, 1993 #3535; Personius, 1998 #3508) use the original name so "Rush Peak fault zone" is retained herein. The description herein also includes the Goodrich Creek fault of Zollweg and Wood (1993 #780), which is also referred to (erroneously?) in their text as the Johnson Creek fault. **Fault ID:** This fault zone is fault number 261 in the fault compilation of Witkind (1975 #320).
County(s) and State(s)	ADAMS COUNTY, IDAHO WASHINGTON COUNTY, IDAHO
Physiographic province(s)	COLUMBIA PLATEAU
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Fault locations are from 1:125,000-scale mapping of Personius (1998 #3508) and Smith and Wood (2001 #7119). Fault location 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).
Geologic setting	The Rush Peak fault zone forms the unusual east-west trending southern margin of the Cuddy Mountains in western Idaho. The fault zone displaces Miocene Columbia River Basalt against Mesozoic intrusive and metamorphic rocks primarily in a down-to-the-south sense of displacement (Fitzgerald, 1982 #5886). Mann and Meyer (1993 #3535) include the Rush Peak fault zone in a regional scale right-lateral shear zone, the Olympic-Wallowa lineament, but Zollweg and Wood (1993 #780) and Personius (1998 #3508) found no unequivocal evidence of pervasive left-lateral displacement.
Length (km)	27 km.
Average strike	N75°W
Sense of movement	Normal

	Comments: The sense of movement on the Rush Peak fault zone is a matter of controversy. Geologic map of the region show the structure as a normal fault (Newcomb, 1970 #3761; Fitzgerald, 1982 #5886). Mann and Meyer (1993 #3535) discuss map patterns they interpret as evidence of substantial left-lateral displacement on the Rush Peak fault. However, although Zollweg and Wood (1993 #780) agreed an oblique sense of displacement was possible, they described evidence of both left-lateral and right-lateral apparent displacement along the fault zone. Smith (1999 #4041) and Smith and others (1999 #5891; 2001 #5890) described evidence of sinistral displacement in both Mesozoic bedrock and late Quaternary deposits. Personius (1998 #3508) found no consistent sense of lateral displacement of stream drainages, and noted that the sinuous trace of the Rush Peak fault does not exhibit the near-vertical dip pattern characteristic of typical strike-slip faults. He concluded that the geomorphic expression of the Rush Peak fault is consistent with primarily normal, down-to-the-south displacement.
Dip Direction	S *Comments:* No actual dip measurements have been published, but Knudsen and others (1996 #5889) modeled the Rush Peak fault zone as a 60? south-dipping normal fault in their analysis of paleo-earthquake magnitudes.
Paleoseismology studies	
Geomorphic expression	The Rush Peak fault zone forms a steep, east-trending range front along the southern flank of the Cuddy Mountains. Apparent lateral separations with both left-lateral and right-lateral senses of displacement have been described along the mountain front (Zollweg and Wood, 1993 #780; Mann and Meyer, 1993 #3535). Faults with 4-7 m of vertical displacement in Quaternary deposits have been described near the eastern end of the fault zone at Rush Creek (Zollweg and Wood, 1993 #780; Personius, 1998 #3508); these scarps also may have right-lateral displacements of as much as 7 m (Zollweg and Wood, 1993 #780; Smith, 1999 #4041; Smith and others, 1999 #5891; Smith and others, 2001 #5890), although Personius (1998 #3508) found no consistent sense of lateral displacement of stream drainages along the fault zone. The fault zone has a complex trace pattern. The central 9-km-long section of the fault is marked by a single ENE-trending fault, with

	an intermittently present 100-m-wide graben and fault scarps on Quaternary deposits (Zollweg and Wood, 1993 #780; Personius, 1998 #3508), but the fault appears to splinter into Y-shaped branches at both its eastern and western ends. At the eastern end of the central section, scarps are present on late Pleistocene alluvium just east of Cow Creek, where the fault abruptly turns to the southeast and dies out about 300 m from the creek (Zollweg and Wood, 1993 #780; Personius, 1998 #3508). Zollweg and Wood (1993 #780) and Personius (1998 #3508) describe evidence that suggests the active trace of the Rush Peak fault probably branches southward and eastward as the Goodrich Creek fault. The Goodrich Creek fault continues eastward as a prominent break in slope almost to the Weiser River, just north of Goodrich. Transfer of late Quaternary activity to the Goodrich Creek fault is also supported by the subdued geomorphology of the range front of the Cuddy Mountains between Cow Creek and Goodrich Creek. The westward extent of Quaternary activity on the Rush Peak fault is also problematic, because the fault also splays into Y-shaped branches at its western end (Personius, 1998 #3508). Between Camp Creek and Little Pine Creek, the Rush Peak fault forms several short northwest- and west-northwest-trending splays, and west of Little Pine Creek, the most recent fault activity appears to be confined to the roughly east-west-trending southern arm of the "Y". The northwest-trending splay that defines the southern flank of the Cuddy Mountains has less evidence of recent activity than the southern arm, and appears to have been abandoned.
Age of faulted surficial deposits	The Rush Peak fault zone offsets Miocene Columbia River Basalts along most of its length (Newcomb, 1970 #3761; Fitzgerald, 1982 #5886). At Rush Creek, scarps in late Quaternary fluvial deposits have been described in several reports (Zollweg and Wood, 1993 #780; Personius, 1998 #3508; Smith, 1999 #4041; Smith and others, 1999 #5891; Smith and others, 2001 #5890). Personius (1998 #3508) used soil development and the height above the modern flood plain to correlate offset alluvial deposits at Rush Creek with last-glacial-maximum Pilgrim Cove deposits in nearby Long Valley; weathering rinds developed on basalt clasts in offset deposits are consistent with this age estimate (Smith, 1999 #4041; Smith and others, 1999 #5891).
Historic earthquake	
Most recent	latest Quaternary (<15 ka)

prehistoric deformation	*Comments:* Most of the fault zone is mapped as a major or lesser late Quaternary (<130 ka) structure by Breckenridge and others (2003 #5878), but scarp profiles, soil development, clast weathering rinds, and longitudinal stream profiles have been used to estimate a late Quaternary (<20-40 ka) age of faulting at the Rush Creek site (Personius, 1998 #3508; Smith, 1999 #4041; Smith and others, 1999 #5891).
Recurrence interval	*Comments:* Zollweg and Wood (1993 #780) used a long-term (post-Miocene) slip rate of 0.04 mm/yr and an estimated surface rupture of 1 m to calculate a possible average recurrence interval of 25,000 years on the Rush Peak fault zone.
Slip-rate category	Less than 0.2 mm/yr *Comments:* Zollweg and Wood (1993 #780) used offsets of 530-730 m of Miocene Columbia River basalts to determine an average minimum vertical slip rate of 0.04 mm/yr.
Date and Compiler(s)	2010 Stephen F. Personius, U.S. Geological Survey Ricky S. Neier, University of Idaho
References	#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. #5886 Fitzgerald, J.E., 1982, Geology and basalt stratigraphy of the Weiser Embayment, west-central Idaho, *in* Bonnichsen, B., and Breckenridge, R.M., eds., Cenozoic geology of Idaho: Idaho Bureau of Mines and Geology Bulletin 26, p. 103-128. #1310 Geomatrix Consultants, Inc., 1989, Final report seismotectonic evaluation for Mann Creek Dam site and Mason Dam site: Technical report to U.S. Department of Interior, Bureau of Reclamation, Denver, Colorado, under Contract 6-CS-81-07310, October 1989, 118 p., 2 pls. #5892 King, J.R., 1971, The geology of the southeastern Cuddy Mountains district, western Idaho: Corvallis, Oregon State University, unpublished M.S. thesis, 78 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.

#3535 Mann, G.M., and Meyer, C.E., 1993, Late Cenozoic structure and correlations to seismicity along the Olympic-Wallowa Lineament, northwest United States: Geological Society of America Bulletin, v. 105, p. 853–871.

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

#3508 Personius, S.F., 1998, Surficial geology and neotectonics of selected areas of western Idaho and northeastern Oregon: U.S. Geological Survey Open-File Report 98-771, 25 p.

#4041 Smith, S.C., 1999, The Rush Peak fault zone, Cuddy Mountains, western Idaho—Evidence for sinistral-oblique Late-Quaternary movement and analysis of longitudinal stream profiles crossing an active range front, *in* Quaternary geology of the northern Quinn River and Alvord Valleys, southeastern Oregon: Friends of the Pleistocene field trip guide, September 24-26, 1999, Appendix 8, p. 1-4.

#7009 Smith, S.C., and Wood, S.H., 2001, Geologic map of Advent Gulch and Rush Peak 7.5 minute (1:24,000) quadrangles, Idaho: Boise, Idaho, Boise State University, 1 sheet, scale 1:24,000.

#5891 Smith, S.C., Northrup, C.J., and Wood, S., 1999, The Rush Peak fault zone, Cuddy Mountains, western Idaho—Evidence for sinistral-oblique late Quaternary movement: Geological Society of America Abstracts with Programs, v. 31, no. 7, p. 48.

#5890 Smith, S.C., Northrup, C.J., and Wood, S.H., 2001, The Rush Peak shear zone, Cuddy Mountains, western Idaho—Evidence for multiple episodes of reactivation: Geological Society of America Abstracts with Programs, v. 33, no. 5, p. 9.

#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.

	#780 Zollweg, J.E., and Wood, S.H., 1993, Faulting relationships, seismicity, design earthquakes, and peak ground accelerations at hydroelectric facilities in Hells Canyon of the Snake River, Idaho-Oregon: Report prepared for Idaho Power Company, 158 p., 3 pls.