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.

Pine Valley graben fault system, Brownlee section (Class A) No. 809a

Last Review Date: 2016-04-06

citation for this record: **Personius, S.F., compiler, 2002, Fault number 809a, Pine Valley graben fault system, Brownlee 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 01:59 PM.**

Synopsis	**General:** The Pine Valley graben fault system forms a complex northwest-trending graben that confines Pine Valley. The graben is formed in Miocene Columbia River basalts, and is floored by Quaternary alluvial sediments. Numerous northwest-trending faults are present throughout the region; some workers attribute graben formation to a pull apart basin related to displacement along a regional scale right-lateral strike-slip fault system, but others see little evidence for late Cenozoic strike-slip faulting in this area. **Sections:** This fault has 2 sections. The Pine Valley graben fault system is divided into two sections herein. The Brownlee section consists of the Brownlee fault, and defines the northern margin of the graben. The Halfway-Posey Valley section consists of the Halfway-Deer Creek and Posey Valley faults and defines the

	southern margin of the graben.
Name comments	**General:** **Section:** This section consists of the Brownlee fault of Mann (1989 #3542); parts of this fault have been mapped by Swanson and others (1981 #3496), Mann (1989 #3542), Mann and Meyer (1993 #3535), and Zollweg and Wood (1993 #780). **Fault ID:** These structures are part of fault number 16 of Pezzopane (1993 #3544) and fault numbers 70 and 71 of Geomatrix Consultants, Inc. (1995 #3593).
County(s) and State(s)	BAKER COUNTY, OREGON 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 1:100,000-scale mapping of Weldon and others (2002 #5648), based on 1:500,000-scale mapping of Pezzopane (1993 #3544).
Geologic setting	The Pine Valley graben fault system forms a complex northwest-trending graben that confines Pine Valley. The graben is formed in Miocene Columbia River basalts, and is floored by Quaternary alluvial sediments (Brooks and others, 1976 #3573; Swanson and others, 1981 #3496; Walker and MacLeod, 1991 #3646). Numerous northwest-trending faults are present throughout the region; some workers attribute graben formation to a pull apart basin related to displacement along a regional scale right-lateral strike-slip fault system (Mann, 1989 #3542; Mann and Meyer, 1993 #3535), but others see little evidence for late Cenozoic strike-slip faulting in this area (Simpson and others, 1993 #3596; Knudsen and others, 1996 #3529).
Length (km)	This section is 17 km of a total fault length of 38 km.
Average strike	N45°W (for section) versus N44°W (for whole fault)
Sense of movement	Normal, Right lateral *Comments:* Faults in this section are mapped as normal or high-

	angle faults (Swanson and others, 1981 #3496; Walker and MacLeod, 1991 #3646; Pezzopane, 1993 #3544; Simpson and others, 1993 #3596). Some workers attribute formation of the Pine Valley graben to a pull apart basin related to displacement along a regional scale right-lateral strike-slip fault system (Mann, 1989 #3542; Mann and Meyer, 1993 #3535), but others see little evidence for late Cenozoic strike-slip faulting in this area (Simpson and others, 1993 #3596; Knudsen and others, 1996 #3529).
Dip	55° SW *Comments:* Mann (1989 #3542) and Zollweg and Wood (1993 #780) map a fault attitude of 55° near the southern end of the Brownlee fault in western Idaho; Simpson and others (1993 #3596) and Geomatrix Consultants, Inc. (1995 #3593) modeled the Brownlee fault as a 70° dipping normal or normal-oblique fault in their analyses of paleo-earthquake magnitudes.
Paleoseismology studies	
Geomorphic expression	Zollweg and Wood (1993 #780) and Simpson and others (1993 #3596) describes faults in the Brownlee section as discrete, 4–6 km long fault strands, rather than the continuous fault trace shown in Mann (1989 #3542) and Mann and Meyer (1993 #3535). Faults in the section offset rocks of the Miocene Columbia River Basalt Group, in an area generally lacking Quaternary deposits. Most of the trace has poor geomorphic expression, and no evidence of fault scarps on Quaternary deposits has been described (Zollweg and Wood, 1993 #780; Simpson and others, 1993 #3596; Geomatrix Consultants Inc., 1995 #3593). The best geomorphic expression of late Cenozoic faulting is found between Black Canyon and Pine Creek Canyon near the northern end of the fault, where a 2.5-km-long faceted mountain front is formed in Miocene basalt (Zollweg and Wood, 1993 #780).
Age of faulted surficial deposits	Faults in the Brownlee section offset Miocene Columbia River basalts, but no offsets in Quaternary surficial deposits have been described (Zollweg and Wood, 1993 #780; Simpson and others, 1993 #3596; Geomatrix Consultants Inc., 1995 #3593).
Historic earthquake	

Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Simpson and others (1993 #3596) did not find evidence of Quaternary displacement on the Brownlee section. Pezzopane (1993 #3544), Geomatrix Consultants, Inc. (1995 #3593), and Weldon and others (2002 #5648) infer probable Quaternary (<1.6–1.8 Ma) displacement on this part of the Pine Valley graben fault system.
Recurrence interval	10–100 k.y. *Comments:* The average recurrence time estimate on most active faults in the southern Hells Canyon region is based on low rates of Quaternary slip (Zollweg and Wood, 1993 #780).
Slip-rate category	Less than 0.2 mm/yr *Comments:* Displacement across the fault zone in Miocene Columbia River basalts is about 170 m northwest of Brownlee Dam (Zollweg and Wood, 1993 #780); Geomatrix Consultants, Inc. (1995 #3593) use the offset data to estimate slip rates of 0.005–0.05 mm/yr for the Brownlee section.
Date and Compiler(s)	2002 Stephen F. Personius, U.S. Geological Survey
References	#3573 Brooks, H.C., McIntyre, J.R., and Walker, G.W., 1976, Geology of the Oregon part of the Baker 1 by 2 quadrangle: State of Oregon, Department of Geology and Mineral Industries Geological Map Series GMS-7, 25 p. pamphlet, 1 sheet, scale 1:250,000. #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. #3593 Geomatrix Consultants, Inc., 1995, Seismic design mapping, State of Oregon: Technical report to Oregon Department of Transportation, Salem, Oregon, under Contract 11688, January 1995, unpaginated, 5 pls., scale 1:1,250,000. #3529 Knudsen, K.L., Simpson, G.D., Sawyer, T.L., Wong, I.G., Bott, J.D., and Lettis, W.R., 1996, Late Quaternary faulting and

seismotectonics of east-central Oregon and west-central Idaho: Geological Society of America Abstracts with Programs, v. 28, no. 5, p. 82.

#3542 Mann, G.M., 1989, Seismicity and late Cenozoic faulting in the Brownlee Dam Area—Oregon and Idaho: U.S. Geological Survey Open-File Report 89-429, 46 p., 4 pls., scale 1:24,000.

#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.

#3544 Pezzopane, S.K., 1993, Active faults and earthquake ground motions in Oregon: Eugene, Oregon, University of Oregon, unpublished Ph.D. dissertation, 208 p.

#3596 Simpson, G.D., Hemphill-Haley, M.A., Wong, I.G., Bott, J.D.J., Silva, W.J., and Lettis, W.R., 1993, Seismotectonic evaluation, Burnt River Project Unity Dam, Baker Project Thief Valley Dam, northeastern Oregon: Final Report prepared for U.S. Department of the Interior, Bureau of Reclamation, 167 p., 2 pls.

#3496 Swanson, D.A., Anderson, J.L., Camp, V.E., Hooper, P.R., Taubeneck, W.H., and Wright, T.L., 1981, Reconnaissance geologic map of the Columbia River Basalt Group, northern Oregon and western Idaho: U.S. Geological Survey Open-File Report 81-797, 35 p., 5 pls., scale 1:250,000.

#3646 Walker, G.W., and MacLeod, N.S., 1991, Geologic map of Oregon: U.S. Geological Survey, Special Geologic Map, 2 sheets, scale 1:500,000.

#5648 Weldon, R.J., Fletcher, D.K., Weldon, E.M., Scharer, K.M., and McCrory, P.A., 2002, An update of Quaternary faults of central and eastern Oregon: U.S. Geological Survey Open-File Report 02-301 (CD-ROM), 26 sheets, scale 1:100,000.

#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.

Questions or comments?