

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](#).

Donner und Blitzen fault (Class A) No. 821

Last Review Date: 2016-03-25

citation for this record: Personius, S.F., compiler, 2002, Fault number 821, Donner und Blitzen 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 01:59 PM.

Synopsis	The Donner und Blitzen fault is marked by a prominent, 300- to 400-m-high escarpment that separates the western margin of Blitzen Valley from the east flank of Jackass Mountain in the Basin and Range of southeastern Oregon. A fault splay that extends to the southwest from the latitude of Frenchglen may be part of this fault. The fault offsets Miocene volcanic and tuffaceous sedimentary rocks 300 m to more than 450 m, but no fault scarps on Quaternary deposits have been described along the trace.
Name comments	This fault was first mapped and named by Piper and others (1939 #3488), presumably after the nearby Donner und Blitzen River. Subsequent maps of the area have left the fault unnamed or associated it with Jackass Mountain or Blitzen Valley (Walker and Repenning, 1965 #3559; Sherrod and Johnson, 1994 #3563; Johnson, 1996 #3494). The original name is retained herein.
County(s) and State(s)	HARNEY COUNTY, OREGON
Physiographic	

Physiographic province(s)	BASIN AND RANGE
Reliability of location	<p>Good Compiled at 1:100,000 scale.</p> <p><i>Comments:</i> Location of fault from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/Map5 downloaded 06/02/2016) attributed to 1:24,000-scale mapping of Sherrod and Johnson (1994 #), 1:100,000-scale mapping of Evans and Geisler (2001 #), and 1:250,000 mapping of Walker and Repenning (1965 #) supplemented with 1:100,000-scale mapping of Weldon and others (2002 #5648).</p>
Geologic setting	This north-trending, normal fault forms the eastern margin of Jackass Mountain and the western margin of Donner und Blitzen (now Blitzen) Valley, in the Basin and Range of southeastern Oregon. The area is underlain by Miocene volcanic and tuffaceous sedimentary rocks (Walker and Repenning, 1965 #3559; Walker and MacLeod, 1991 #3646; Sherrod and Johnson, 1994 #3563; Johnson, 1996 #3494).
Length (km)	26 km.
Average strike	N18°E
Sense of movement	<p>Normal</p> <p><i>Comments:</i> This fault is mapped as a normal or high-angle fault zone by Piper and others (1939 #3488), Walker and Repenning (1965 #3559), Hawkins and others (1965 #2946), Walker and MacLeod (1991 #3646), Pezzopane (1993 #3544), Sherrod and Johnson (1994 #3563), and Johnson (1996 #3494). Both Piper and others (1939 #) and Sherrod and Johnson (1994 #3563) note the presence of significant monoclin folding of the overlying bedrock along the trace of the fault. At its northern end, the fault may merge with northwest-trending faults associated with the right-lateral Brothers fault zone (Greene and others, 1972 #3560; Brown and others, 1980 #3560; Walker and MacLeod, 1991 #3646).</p>
Dip Direction	E; SE
Paleoseismology studies	
Geomorphic expression	The Donner und Blitzen fault is marked by a prominent 300- to 400-m-high range front escarpment that separates the western margin of Blitzen Valley from the east flank of Jackass Mountain (Piper and others, 1939 #3488; Sherrod and Johnson, 1994 #3563; Johnson, 1996 #3494). Piper and others (1939 #3488) note the peculiar z-shaped crenulations in the trace of the escarpment, and attribute them to interactions between northwest-trending faults (associated with the Brothers fault zone) and the north-trending Donner und Blitzen range front fault. A fault splay that extends to

	<p>southwest from the latitude of Frenchglen (Piper and others, 1939 #3488; Walker Repenning, 1965 #3559; Walker and MacLeod, 1991 #3646; Sherrod and Johnson, 1994 #3563) may be part of this fault zone; Madin and others (1996 #3479) map splay as active in the Quaternary. No fault scarps on Quaternary deposits have been described along the fault trace (Sherrod and Johnson, 1994 #3563; Johnson, 1996 #3494).</p>
Age of faulted surficial deposits	<p>The Donner und Blitzen fault forms a prominent range-front escarpment, but no fault scarps on Quaternary deposits have been described along its trace; bedrock fault exposures are poor, but the fault is assumed to post-date all the Miocene rock units along its trace (Sherrod and Johnson, 1994 #3563; Johnson, 1996 #3494). In places the fault is mapped as juxtaposing Miocene bedrock against Quaternary alluvium (Walker and Repenning, 1965 #3559; Walker and MacLeod, 1991 #3646).</p>
Historic earthquake	
Most recent prehistoric deformation	<p>undifferentiated Quaternary (<1.6 Ma)</p> <p><i>Comments:</i> Pezzopane (1993 #3544) used airphoto analysis to infer Quaternary displacement. Subsequent compilations (Geomatrix Consultants Inc., 1995 #3593; Madin and Mabey, 1996 #3575; Weldon and others, 2002 #5648) also show the Donner und Blitzen fault as active in the Quaternary (<1.6–1.8 Ma).</p>
Recurrence interval	
Slip-rate category	<p>Less than 0.2 mm/yr</p> <p><i>Comments:</i> No published slip rates are available for the Donner und Blitzen fault. However, Piper and others (1939 #3488) and Sherrod and Johnson (1994 #3563) show 300 m to more than 450 m of structural relief across the fault. The youngest well bedrock offset by the fault, the Devine Canyon Tuff, has been dated at about 9.5 Ma (Sherrod and Johnson, 1994 #3563). Such slip data indicate low long-term rates of extension.</p>
Date and Compiler(s)	<p>2002 Stephen F. Personius, U.S. Geological Survey</p>
References	<p>#3572 Brown, D.E., Black, G.L., Mclean, G.D., and Petros, J.R., 1980, Preliminary geology and geothermal resource potential of the Powell Buttes Area, Oregon: State of Oregon, Department of Geology and Mineral Industries Open-File Report O-80-8 p., 1 pl., scale 1:62,500.</p> <p>#7801 Evans, J.G., and Geisler, T.M., 2001, Geologic field-trip guide to Steens Mountain Loop Road, Harney County, Oregon: U.S. Geological Survey Bulletin 15 p., 1 pl., 1:100,000 scale.</p>

#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.

#3560 Greene, R.C., Walker, G.W., and Corcoran, R.E., 1972, Geologic map of the Burns quadrangle, Oregon: U.S. Geological Survey Miscellaneous Geologic Investigations I-680, 2 sheet, scale 1:250,000.

#2946 Hawkins, F.F., LaForge, R.C., Templeton, M., and Gilbert, J.D., 1988, Seismotectonic study for Arthur R. Bowman and Ochoco Dams, Crooked River Project, Oregon: U.S. Bureau of Reclamation Seismotectonic Report 88-10, 57 p. pls.

#3494 Johnson, J.A., 1996, Geologic map of the Page Springs quadrangle, Harney County, southeastern Oregon: U.S. Geological Survey Open-File Report 96-675, sheet, scale 1:24,000.

#3575 Madin, I.P., and Mabey, M.A., 1996, Earthquake hazard maps for Oregon: of Oregon, Department of Geology and Mineral Industries Geological Map Series GMS-100, 1 sheet.

#3479 Madin, I.P., Ferns, M.F., Langridge, R., Jellinek, A.M., and Priebe, K., 1995, Final report to Bonneville Power Administration U.S. Department of Energy Portland General Electric Company—Geothermal resources of southeast Oregon: State of Oregon, Department of Geology and Mineral Industries Open-File Report OFR-04, 41 p., 6 pls.

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

#3488 Piper, A.M., Robinson, T.W., and Park, C.F., Jr., 1939, Geology and groundwater resources of the Harney Basin, Oregon: U.S. Geological Survey Water-Supply Paper 841, 189 p., 2 pls.

#3563 Sherrod, D.R., and Johnson, J.A., 1994, Geologic map of the Irish Lake quadrangle, Harney County, south-central Oregon: U.S. Geological Survey Miscellaneous Field Studies Map MF-2256, 1 sheet, scale 1:24,000.

#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.

#3559 Walker, G.W., and Repenning, C.A., 1965, Reconnaissance geologic map of the Adel quadrangle, Lake, Harney, and Malheur Counties, Oregon: U.S. Geological

Survey Miscellaneous Geologic Investigations I-446, 1 sheet, scale 1:250,000.

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

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