

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](#).

Owyhee Mountains fault system (Class A) No. 636

Last Review Date: 2003-06-13

Compiled in cooperation with the Idaho Geological Survey

citation for this record: Personius, S.F., and Lewis, R.S., compilers, 2003, Fault number 636, Owyhee Mountains fault system, 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 03:03 PM.

Synopsis

This complex of faults forms the northwest-trending border between the Tertiary volcanic rocks of the Owyhee Mountains and the Snake River Plain in southwestern Idaho. Most of the faults mapped in this zone offset volcanic rocks of probable late Tertiary age, but many of these rock units are poorly dated and thus may include some Quaternary units. A few faults offset Quaternary surficial deposits in the area between Shoofly Creek and Little Jacks Creek; these deposits are undated, but are probably late Quaternary in age. Scarp profiling, trenching, and detailed soils analysis of faults and deposits in the Shoofly/Little

	Jacks Creek area suggest latest Quaternary displacements on some of these faults.
Name comments	This complex fault zone or fault system forms the northwest-trending border between the Owyhee Mountains and the Snake River Plain in southwestern Idaho. Original use of the name is unknown, but it has been in use at least since publication of Gilbert and LaForge (1990 #5900). The system includes the Halfway Gulch, Water Tank, and Parker Ranch faults, which have been described in detail by Beukelman (1997 #4809).
County(s) and State(s)	TWIN FALLS COUNTY, IDAHO OWYHEE COUNTY, IDAHO
Physiographic province(s)	COLUMBIA PLATEAU
Reliability of location	Good Compiled at 1:125,000 scale. <i>Comments:</i> Fault locations are from 1:125,000-scale mapping of Ekren and others (1981 #5907) and Malde and others (1963 #5914), and 1:50,000-scale mapping of Kauffman and Bonnicksen (1990 #5912) and Jenks and Bonnicksen (1990 #5997); traces of the Halfway Gulch, Water Tank, and Parker Ranch faults are from mapping on a 1:24,000-scale base by Beukelman (1997 #4809).
Geologic setting	This complex group of faults forms the northwest-trending border between the Tertiary volcanic rocks of the Owyhee Mountains and the Snake River Plain in southwestern Idaho (Malde and others, 1963 #5914; Witkind, 1975 #320; Ekren and others, 1981 #5907; Ekren and others, 1984 #6039).
Length (km)	206 km.
Average strike	N50°W
Sense of movement	Normal <i>Comments:</i> Faults in the Owyhee Mountains fault zone are mapped as normal faults by Malde and others (1963 #5914), Witkind (1975 #320), Ekren and others (1981 #5907; 1984 #6039), Kauffman and Bonnicksen (1990 #5912), Jenks and Bonnicksen (1990 #5997), and Beukelman (1997 #4809).

<p>Dip</p>	<p>65-70° NE</p> <p><i>Comments:</i> Dip measurements include 65-70° dips in Tertiary bedrock near Little Jacks Creek by Ekren and others (1981 #5907) and Beukelman (1997 #4809), and a 70° dip measured in the Water Tank fault trench by Beukelman (1997 #4809).</p>
<p>Paleoseismology studies</p>	<p>A trench investigation was conducted along the Water Tank fault by Beukelman (1997 #4809).</p> <p>Site 636-1. A trench across a 2- to 6-m-high fault scarp on the Water Tank fault in Quaternary fan deposits was excavated and logged by Beukelman (1997 #4809). The trench exposed a 70° E-dipping fault zone in fan alluvium and scarp-derived colluvial deposits. Evidence for multiple faulting events was interpreted from the trench exposure, although the timing of these events is unconstrained by conventional dating methods. Grain-size analysis and soil carbonate contents were used to delineate discrete packages of colluvial sediment that were interpreted to represent individual surface-faulting events of 50-100 cm vertical displacement. Sedimentologic and structural relations led Beukelman (1997 #4809) to infer five or six events, and he used accumulation of pedogenic carbonate to estimate the ages of and calculate recurrence intervals for the last five events. Beukelman (1997 #4809) used pedogenic data to infer that all five events occurred since 26±8 ka, and an age of the youngest event of about 3 ka.</p>
<p>Geomorphic expression</p>	<p>Faults in the Owyhee Mountains fault zone form the northwest-trending, northeast-facing margin between the Owyhee Mountains and the Snake River Plain (Malde and others, 1963 #5914; Ekren and others, 1981 #5907). In the region between Shoofly Creek and Little Jacks Creek, fault scarps with surface offsets of 2-12 m are present in Quaternary alluvial-fan deposits (Beukelman, 1997 #4809).</p>
<p>Age of faulted surficial deposits</p>	<p>Most of the faults mapped in this zone offset volcanic rocks of probable late Tertiary age, but many of these rock units are poorly dated and thus may include some Quaternary units (Malde and others, 1963 #5914; Ekren and others, 1981 #5907; Ekren and others, 1984 #6039; Kauffman and Bonnicksen, 1990 #5912; Jenks and Bonnicksen, 1990 #5997). A few faults offset Quaternary surficial deposits in the area between Shoofly Creek</p>

	and Little Jacks Creek; these deposits are undated, but are probably late Quaternary in age (Beukelman, 1997 #4809).
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) <i>Comments:</i> Most of the faults mapped in this zone offset volcanic rocks of probable late Tertiary age, but many of these rock units are poorly dated and thus may include some Quaternary units (Malde and others, 1963 #5914; Ekren and others, 1981 #5907; Ekren and others, 1984 #6039; Kauffman and Bonnicksen, 1990 #5912; Jenks and Bonnicksen, 1990 #5997). A few faults offset Quaternary surficial deposits in the area between Shoofly Creek and Little Jacks Creek; these deposits are poorly dated, but are probably late Quaternary in age (Beukelman, 1997 #4809). Most of the fault zone is mapped as lesser Quaternary (<1.6 Ma) by Breckenridge and others (2003 #5878), with the exception of the Halfway Gulch and Water Tank faults, which they mapped as lesser Holocene. Given the poor constraints on the age of offset deposits, most of the fault zone is herein assigned a Quaternary age with the exception of the Halfway Gulch, Parker Ranch, and Water Tank faults, which are assigned a latest Quaternary age based on scarp profile and trench data of Beukelman (1997 #4809).
Recurrence interval	3-9 k.y.; 5.2 k.y. average of last five events <i>Comments:</i> Recurrence data from Water Tank fault trench, based on ages estimated from soil development (Beukelman, 1997 #4809).
Slip-rate category	Less than 0.2 mm/yr <i>Comments:</i> Beukelman (1997 #4809) used estimated offsets and ages based on soil development to infer slip rates of 0.14-0.15 mm/yr for the last 26±8 ka on the Water Tank fault, and also used offset of a 2.5 Ma ash to calculate slip rates of 0.007-0.13 mm/yr on the Parker Ranch fault. Beukelman (1997 #4809) also determined slip rates of 0.5-2.9 mm/yr on the Halfway fault, but erroneously used the estimated age of the youngest event and not the age of the offset landform in his calculations, and thus these rates are not reasonable slip-rate estimates. Detailed long-term estimates of slip rate across the fault zone have not been made,

but estimates of 1.8-2.2 km of offset across the range front near Owyhee Mountain of 11-16.6 Ma volcanic rocks (Clemens, 1992 #5996) indicate low rates of long-term slip.

**Date and
Compiler(s)**

2003
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References

- #4809 Beukelman, G.S., 1997, Evidence of active faulting in the Halfway Gulch-Little Jacks Creek area of the western Snake River Plain, Idaho: Boise, Idaho, Boise State University, unpublished M.S. thesis, 170 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.
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- #5907 Ekren, E.B., McIntyre, D.H., Bennett, E.H., and Malde, H.E., 1981, Geologic map of Owyhee County, Idaho, west of longitude 116° W.: U.S. Geological Survey Miscellaneous Investigations Map I-1256, 2 sheets, scale 1:125,000.
- #5900 Gilbert, J.D., and LaForge, R.C., 1988, Seismotectonic study for Anderson Ranch Dam, Boise project, Idaho: U.S. Bureau of Reclamation Seismotectonic Report 88-4, 37 p., 1 pl.
- #5997 Jenks, M.D., and Bonnicksen, B., 1990, Geologic map of the Bruneau River wilderness study area, Owyhee County, Idaho: U.S. Geological Survey Miscellaneous Field Studies Map MF-2128, 1 sheet, scale 1:50,000.
- #5912 Kauffman, D.F., and Bonnicksen, B., 1990, Geologic map of the Little Jacks Creek, Big Jacks Creek, and Duncan Creek wilderness study areas, Owyhee County, Idaho: U.S. Geological Survey Miscellaneous Field Studies Map MF-2142, 1 sheet, scale

1:50,000.

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#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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