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# 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.**

## West Baker Valley fault (Class A) No. 804

**Last Review Date: 2016-03-21**

***citation for this record:*** **Personius, S.F., and Haller, K.M., compilers, 2002, Fault number 804, West Baker Valley 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.**

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| **Synopsis** | The West Baker Valley fault is a major zone of northwest-trending, down-to-the-northeast normal faults that form the western margin of Baker Valley in northeast Oregon. Rocks exposed in the uplifted Elkhorn Ridge consist of an allochthonous terrane of Mesozoic and Paleozoic igneous and metamorphic rocks. The valley m fault trace is marked in places by linear range fronts, faceted spurs, benches, spri tonal and vegetation lineaments, and fault scarps on late Quaternary alluvial-fan deposits. No detailed Quaternary stratigraphic studies have been performed along West Baker Valley fault, but the fault is buried by probable middle to late Holoce deposits, so the most-recent surface-faulting event probably occurred in the late Quaternary. Larger scarps on older Quaternary deposits indicate probable recurre Quaternary displacement. |
| **Name comments** | The West Baker Valley fault borders the western margin of Baker Valley in northeastern Oregon. The fault zone has been give various names, such as Baker Baker Valley fault, and the Baker zone or fault zone (Geomatrix Consultants Inc. #1310; Pezzopane and Weldon, 1993 #149; Pezzopane, 1993 #3544). Herein we |

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| | the name "West Baker Valley fault" of Simpson and others (1993 #3596) to distin this major range-bounding structure from other faults in the Baker Valley. Parts o fault have been mapped by Gilluly (1937 #3489), Newcomb (1970 #3761), Brool others (1976 #3573), and Brooks and McIntyre (1977 #3751).<br><br>**Fault ID:** This structure is fault number 15 of Pezzopane (1993 #3544) and fault number 67 of Geomatrix Consultants, Inc. (1995 #3593). |
| **County(s) and State(s)** | BAKER COUNTY, OREGON |
| **Physiographic province(s)** | COLUMBIA PLATEAU |
| **Reliability of location** | Good<br>Compiled at 1:250,000 scale.<br><br>*Comments:* Location of fault from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS downloaded 06/02/2016) attributed to 1:250,000-scale mapping by Brooks and ot (1976 #3573) supplemented with 1:250,000-scale mapping of Simpson and other (1993 #3596) and 1:100,000-scale mapping of Weldon and others (2002 #5648). |
| **Geologic setting** | The West Baker Valley fault is a major zone of northwest-trending, mostly down-the-northeast normal faults resulting in topographic relief of 400–1300 m at the western margin of Baker Valley in northeastern Oregon. Rocks exposed in the up Elkhorn Ridge consist of an allochthonous terrane of Mesozoic and Paleozoic ign and metamorphic rocks (Brooks and others, 1976 #3573; Ferns and others, 1987 #3753; Walker and MacLeod, 1991 #3646; Ferns and others, 2001 #5135). |
| **Length (km)** | 33 km. |
| **Average strike** | N54°W |
| **Sense of movement** | Normal<br><br>*Comments:* Simpson and others (1993 #3596) and Geomatrix Consultants, Inc. (1 #3593) modeled the West Baker Valley fault as a 70° dipping normal fault in thei analyses of paleo-earthquake magnitudes. |
| **Dip** | 40° NE<br><br>*Comments:* Lindgren (1901 #4172) (also reproduced in Gilluly, 1937 #3489), measured a dip of 40° on the main trace of the West Baker Valley fault exposed i 30-m-deep placer mine at the mouth of Salmon Creek Canyon; Simpson and othe (1993 #3596) and Geomatrix Consultants, Inc. (1995 #3593) modeled the West B |

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| | Valley fault as a 70° dipping normal fault in their analyses of paleo-earthquake magnitudes. |
| **Paleoseismology studies** | |
| **Geomorphic expression** | The West Baker Valley fault forms a large, steep range front along the western ma of Baker Valley. The fault trace is marked in places by linear range fronts, faceted spurs, benches, springs, tonal and vegetation lineaments, and fault scarps in older alluvial-fan deposits (Geomatrix Consultants Inc., 1989 #1310; Simpson and othe 1993 #3596). Simpson and others (1993 #3596) divided the West Baker Valley in two segments, the Washington Gulch and Hunt Mountain segments, based on app differences in geomorphic expression. However, they interpret late Quaternary movement on both segments and did not conduct detailed paleoseismic investigat so herein these segments are discussed together. We also include several short fau mapped at the southern end of the Baker Valley (Brooks and others, 1976 #3573; Walker and MacLeod, 1991 #3646), although the most-recent faulting along these structures is older than elsewhere along the West Baker Valley fault (Geomatrix Consultants Inc., 1989 #1310; Simpson and others, 1993 #3596; Weldon and othe 2002 #5648). |
| **Age of faulted surficial deposits** | No detailed Quaternary stratigraphic studies have been performed along the West Baker Valley fault. Brooks and others (1976 #3573) and Walker and MacLeod (19 #3646) map Quaternary terrace and fan gravels faulted against Quaternary alluviu along one strand of the West Baker Valley fault. Geomatrix Consultants, Inc. (198 #1310) describe scarps of probable fault origin in late Pleistocene to Holocene va fill deposits. Simpson and others (1993 #3596) describe fault scarps in late Quate fan deposits, but found no offset in probable middle to late Holocene fan deposits Simpson and others (1993 #3596) also observed larger scarps in older Quaternary deposits, indicating recurrent late Quaternary displacement. |
| **Historic earthquake** | |
| **Most recent prehistoric deformation** | late Quaternary (<130 ka)<br><br>*Comments:* Simpson and others (1993 #3596) describe fault scarps in late Quater fan deposits, but found no offset in probable middle to late Holocene fan deposits contrast, Geomatrix Consultants, Inc. (1989 #1310) described scarps of probable origin on late Pleistocene to Holocene valley-fill deposits. Such relations suggest most-recent surface-faulting event occurred in the late Quaternary. Several short f at the south end of Baker Valley are thought to have been active in the Quaternary (Weldon and others, 2002 #5648). |
| **Recurrence** | |

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| **interval** | |
| **Slip-rate category** | Less than 0.2 mm/yr<br><br>*Comments:* Geomatrix Consultants, Inc. (1995 #3593) used estimated rates of 0.0 0.05 mm/yr in their analysis of earthquake hazards associated with the West Bake Valley fault. |
| **Date and Compiler(s)** | 2002<br>Stephen F. Personius, U.S. Geological Survey<br>Kathleen M. Haller, U.S. Geological Survey |
| **References** | #3751 Brooks, H.C., McIntyre, J.R., and Eisele, K.A., 1977, Preliminary geologi of the Baker quadrangle, Oregon: State of Oregon, Department of Geology and Mineral Industries Open-File Report 77-6, 1 sheet, scale 1:24,000.<br><br>#3573 Brooks, H.C., McIntyre, J.R., and Walker, G.W., 1976, Geology of the Ore 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.<br><br>#3753 Ferns, M.L., Brooks, H.C., Avery, D.G., and Blome, C.D., 1987, Geology mineral resources map of the Elkhorn Peak quadrangle, Baker County, Oregon: S of Oregon, Department of Geology and Mineral Industries GMS-41, 2 sheets, sca 1:24,000.<br><br>#5135 Ferns, M.L., Madin, I.P., and Taubeneck, W.H., 2001, Reconnaissance geo map of the La Grande 30' x 60' quadrangle, Baker, Grant, Umatilla, and Union Counties, Oregon: State of Oregon, Department of Geology and Mineral Industri Reconnaissance Map Series RMS-1, 1 pl., scale 1:100,000.<br><br>#1310 Geomatrix Consultants, Inc., 1989, Final report seismotectonic evaluation Mann Creek Dam site and Mason Dam site: Technical report to U.S. Department Interior, Bureau of Reclamation, Denver, Colorado, under Contract 6-CS-81-073 October 1989, 118 p., 2 pls.<br><br>#3593 Geomatrix Consultants, Inc., 1995, Seismic design mapping, State of Oreg Technical report to Oregon Department of Transportation, Salem, Oregon, under Contract 11688, January 1995, unpaginated, 5 pls., scale 1:1,250,000.<br><br>#3489 Gilluly, J., 1937, Geology and mineral resources of the Baker quadrangle, Oregon: U.S. Geological Survey Bulletin 879, 116 p.<br><br>#4172 Lindgren, W., 1901, The gold belt of the Blue Mountains of Oregon—Part U.S. Geological Survey Annual Report, vol. 22, 551-776 p., 1 pl. |

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| | #3761 Newcomb, R.C., 1970, Tectonic structure of the main part of the basalt of Columbia River Group Washington, Oregon, and Idaho: U.S. Geological Survey Miscellaneous Geologic Investigations I-587, 1 sheet, scale 1:500,000.<br><br>#3544 Pezzopane, S.K., 1993, Active faults and earthquake ground motions in Or Eugene, Oregon, University of Oregon, unpublished Ph.D. dissertation, 208 p.<br><br>#149 Pezzopane, S.K., and Weldon, R.J., II, 1993, Tectonic role of active faulting central Oregon: Tectonics, v. 12, p. 1140-1169.<br><br>#3596 Simpson, G.D., Hemphill-Haley, M.A., Wong, I.G., Bott, J.D.J., Silva, W.J Lettis, W.R., 1993, Seismotectonic evaluation, Burnt River Project Unity Dam, B Project Thief Valley Dam, northeastern Oregon: Final Report prepared for U.S. Department of the Interior, Bureau of Reclamation, 167 p., 2 pls.<br><br>#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.<br><br>#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. Geolog Survey Open-File Report 02-301 (CD-ROM), 26 sheets, scale 1:100,000. |