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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.**

## East Bank fault (Class A) No. 876

**Last Review Date: 2002-05-28**

***citation for this record:*** **Personius, S.F., compiler, 2002, Fault number 876, East Bank 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 03:14 PM.**

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| **Synopsis** | The northwest-striking East Bank fault lies in the Portland basin, which may be a lateral pull-apart basin in the forearc of the Cascadia subduction zone; the fault li few km east of and is parallel to the Portland Hills fault [877], which forms the southwestern margin of the basin. The East Bank fault has been mapped as a high angle normal fault with a down-to-the-southwest displacement direction, but dow the-northeast reverse displacement with a right-lateral strike-slip component is consistent with tectonic setting, mapped geologic relations, aeromagnetic data, ar microseismicity in the area. No fault scarps on surficial Quaternary deposits have described along the fault trace, and the fault is mapped as buried by latest Pleisto Missoula flood deposits, but recently acquired shallow seismic-reflection suggest probable down-to-the-northeast offset of unconformities, paleochannels, and sedi associated with flood deposits at several locations across the East Bank fault. |
| **Name comments** | The East Bank fault was first mapped by Madin (1990 #4067) and Beeson and otl (1991 #4048) and informally named after the east bank of the Willamette River b Blakely and others (1995 #4021). The fault may be part of the Portland Hills-Clackamas River structural zone of Beeson and others (1985 #4022; 1989 #4023) |

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| | is included in the Portland Hills fault zone of Blakely and others (1995 #4021). |
| **County(s) and State(s)** | MULTNOMAH COUNTY, OREGON<br>CLACKAMAS COUNTY, OREGON |
| **Physiographic province(s)** | PACIFIC BORDER |
| **Reliability of location** | Good<br>Compiled at 1:24,000 and 1:50,000 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 Madin (2004 #7779) and Madin and others (2008 #7781). |
| **Geologic setting** | The northwest-striking East Bank fault lies in the Portland basin, which may be a lateral pull-apart basin in the forearc of the Cascadia subduction zone (Beeson an others, 1985 #4022; Beeson and others, 1989 #4023; Yelin and Patton, 1991 #402 Blakely and others, 1995 #4021; Blakely and others, 2000 #4333), or a piggybacl synclinal basin formed between antiformal uplifts of the Portland fold belt (Unrul others, 1994 #3597; Unruh and others, 1994 #4007). The East Bank fault lies a fe east of and is parallel to the Portland Hills fault [877], which forms the southwest margin of the Portland basin. |
| **Length (km)** | 29 km. |
| **Average strike** | N46°W |
| **Sense of movement** | Reverse, Right lateral<br><br>*Comments:* The East Bank fault is mapped as a high-angle normal fault with a do to-the-southwest displacement direction (Madin, 1990 #4067; Beeson and others, #4048). Blakely and others (1995 #4021) used aeromagnetic data to infer a northe dipping reverse geometry for the fault. However, shallow seismic reflection data indicate down-to-the-northeast displacements that are inconsistent with a northea dipping reverse fault (Pratt and others, 2001 #5136). The East Bank fault is mode a 70° northeast-dipping reverse to vertical fault in the earthquake hazards analysi Wong and others (1999 #4073; 2000 #5137). Reverse displacement with a right-l strike-slip component is consistent with the tectonic setting, mapped geologic rela and microseismicity in the area (Beeson and others, 1989 #4023; Yelin and Patton 1991 #4020; Blakely and others, 1995 #4021; Blakely and others, 2000 #4333). |
| **Dip Direction** | NE<br><br>*Comments:* Blakely and others (1995 #4021) use aeromagnetic data to infer a |

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| | northeast-dipping reverse geometry for the fault, and Wong and others (1999 #40 2000 #5137) modeled the East Bank fault as a 70° northeast-dipping reverse to ve fault in their earthquake hazards analysis of the Portland metropolitan area. Dip direction from Blakely and others (1995 #4021) and Wong and others (1999 #407 2000 #5137); shallow seismic reflection data indicate down-to-the-northeast displacement (Pratt and others, 2001 #5136). |
| **Paleoseismology studies** | |
| **Geomorphic expression** | Little geomorphic evidence of this fault exists, because the Portland basin was extensively scoured and buried by debris from the latest Pleistocene Missoula flo Shallow seismic-reflection data suggest that the East Bank fault may lie south of trace inferred by Madin (1990 #4067) and Beeson and others (1991 #4048), and r influence the location of a paleochannel of the Columbia River near its confluenc the Willamette River (Pratt and others, 2001 #5136). No other geomorphic evider this fault has been described. |
| **Age of faulted surficial deposits** | The East Bank fault offsets Miocene Columbia River Basalt Group volcanic rock Miocene to Pliocene sedimentary rocks of the Troutdale Formation (Madin, 1990 #4067; Beeson and others, 1991 #4048). No fault scarps on surficial Quaternary deposits have been described along the fault trace, and the fault is shown as burie latest Pleistocene flood deposits (Madin, 1990 #4067; Beeson and others, 1991 #4 However, recently acquired shallow seismic-reflection data across the East Bank at several locations suggests probable offset of unconformities, paleochannels, an sediments associated with the 15.3–12.7 ka Missoula floods (Pratt and others, 200 #5136). |
| **Historic earthquake** | |
| **Most recent prehistoric deformation** | middle and late Quaternary (<750 ka)<br><br>*Comments:* Madin (1990 #4067) and Beeson and others (1991 #4048) show the E Bank fault as buried by Missoula flood deposits; however, shallow seismic-reflec data suggest probable offset of unconformities, and paleochannels, and sediments formed during the 15.3–12.7 ka Missoula floods (Pratt and others, 2001 #5136). T assigned age category is from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS downloaded 06/02/2016). |
| **Recurrence interval** | |
| **Slip-rate** | Less than 0.2 mm/yr |

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| **category** | *Comments:* Cross sections from Beeson and others (1991 #4048) suggest 60–120 down-to-the-west vertical displacement of Miocene Columbia River Basalt Grou volcanic rocks, and 60–90 m of vertical displacement of Miocene-Pliocene Trout Formation rocks across the East Bank fault; no estimates of strike-slip displacem have been published, but such vertical displacements indicate low rates of long-te slip. Pratt and others (2001 #5136) used shallow seismic-reflection data to infer 2 of vertical offset in 15.3–12.7 ka Missoula flood related sediments across several strands of the East Bank fault. Wong and others (1999 #4073; 2000 #5137) used estimated slip rates of 0.05–0.4 mm/yr in their analyses of the earthquake hazards associated with the East Bank fault, but did not document the basis for these estir Given the lack of significant geomorphic expression along the fault, the lower rat herein considered more likely. |
| **Date and Compiler(s)** | 2002<br>Stephen F. Personius, U.S. Geological Survey |
| **References** | #4022 Beeson, M.H., Fecht, K.R., Reidel, S.P., and Tolan, T.L., 1985, Regional correlations within the Frenchman Springs member of the Columbia River Basalt Group—New insights into the middle Miocene tectonics of northwestern Oregon Oregon Geology, v. 47, no. 8, p. 87-96.<br><br>#4023 Beeson, M.H., Tolan, T.L., and Anderson, J.L., 1989, The Columbia River Basalt Group in western Oregon-Geologic structures and other factors that contro flow emplacement patterns, *in* Reidel, S.P., and Hooper, P.R., eds., Volcanism and tectonism in the Columbia River Flood-Basalt Province: Geological Society of America Special Paper 239, p. 223-246.<br><br>#4048 Beeson, M.H., Tolan, T.L., and Madin, I.P., 1991, Geologic map of the Por quadrangle, Multnomah and Washington Counties, Oregon, and Clark County, Washington: State of Oregon Geological Map Series GMS-75, 1 sheet, scale 1:24<br><br>#4333 Blakely, R.J., Wells, R.E., Tolan, T.L., Beeson, M.H., Trehu, A.M., and Lil L.M., 2000, New aeromagnetic data reveal large strike-slip (?) faults in the northe Willamette Valley, Oregon: Geological Society of America Bulletin, v. 112, p. 12 1233.<br><br>#4021 Blakely, R.J., Wells, R.E., Yelin, T.S., Madin, I.P., and Beeson, M.H., 199 Tectonic setting of the Portland-Vancouver area, Oregon and Washington—Const from low-altitude aeromagnetic data: Geological Society of America Bulletin, v. no. 9, p. 1051-1062.<br><br>#4067 Madin, I.P., 1990, Earthquake-hazard geology maps of the Portland metropolitan area, Oregon—Text and map explanation: State of Oregon, Departm of Geology and Mineral Industries Open-File Report 0-90-2, 21 p., 8 pls., scale |

1:24,000.

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#5136 Pratt, T.L., Odum, J., Stephenson, W., Williams, R., Dadisman, S., Holmes and Haug, B., 2001, Late Pleistocene and Holocene tectonics of the Portland Basi Oregon and Washington, from high-resolution seismic profiling: Bulletin of the Seismological Society of America, v. 91, no. 4, p. 637-650.

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#5137 Wong, I., Silva, W., Bott, J., Wright, D., Thomas, P., Gregor, N., Li, S., Ma M., Sojourner, A., and Wang, Y., 2000, Earthquake scenario and probabilistic gro shaking maps for the Portland, Oregon, metropolitan area: State of Oregon, Department of Geology and Mineral Industries Interpretive Map Series IMS-16, pamphlet, scale 1:62,500.

#4020 Yelin, T.S., and Patton, H.J., 1991, Seismotectonics of the Portland, Orego region: Bulletin of the Seismological Society of America, v. 81, no. 1, p. 109-130