Jump to Navigation

Quaternary Fault and Fold Database of the United States

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Gales Creek fault zone (Class A) No. 718

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Synopsis	The northwest-striking Gales Creek fault zone forms the boundary between the C Coast Range and the Willamette Valley in northwestern Oregon. At its southern e the fault zone forms the southwestern margin of the Tualatin basin. The fault zon been active at least since the Miocene, when it controlled the emplacement of Mi Columbia River Basalt Group lava flows. These faults are shown on numerous m the area, mostly based on juxtaposition of Miocene Columbia River Basalt Group rocks against Eocene volcanic rocks. No unequivocal evidence of deformation of Quaternary deposits has been described, but a thick sequence of silty sediment deposited by the Missoula floods covers much of the southern part of the fault tra
Name comments	The Gales Creek fault zone is named after its location in the valley of Gales Cree west of Forest Grove in northwestern Oregon (Warren and others, 1945 #4076; H and Newcomb, 1965 #4063; Schlicker and others, 1967 #4068; Unruh and others #3597; Wells and others, 1994 #3988; Yeats and others, 1996 #4291), and is inclu in the Gales Creek-Mount Angel structural zone of Beeson and others (1985 #40 1989 #4023). Herein we include nearby faults mapped in the Carpenter Creek an

	Scoggins Creek valleys (Carpenter Creek and Scoggins faults of Unruh and other 1994 #3597) in this description of the Gales Creek fault zone. **Fault ID:** This is fault number 31 of Geomatrix Consultants, Inc. (1995 #3593).
County(s) and State(s)	CLATSOP COUNTY, OREGON TILLAMOOK COUNTY, OREGON YAMHILL COUNTY, OREGON WASHINGTON COUNTY, OREGON
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:100,000 and 1:250,000 scale. *Comments:* Location of fault from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS downloaded 06/02/2016) primarily attributed to 1:250,000-scale mapping of Wel others (1983 #3583) and 1:100,000-scale mapping of Niem and Niem (1985 #787 Additional fault traces are from 1:62,500-scale mapping of Wells and others (199 #3988), and 1:100,000-scale mapping of Popowski (1996 #4677) 1:100,000-scale compilation of Yeats and others (1996 #4291).
Geologic setting	The northwest-striking Gales Creek fault zone forms the boundary between the C Coast Range and the Willamette Valley in northwestern Oregon. At its southern e the fault zone forms the southwestern margin of the Tualatin basin (Popowski, 19 #4677; Wilson, 1997 #5065; Wilson, 1998 #5058). The fault zone has been active least since the Miocene, when it controlled the emplacement of Miocene Columb River Basalt Group lava flows (Beeson and others, 1985 #4022; 1989 #4023). Th faults are shown on numerous maps of the area, mostly based on juxtaposition of Miocene Columbia River Basalt Group rocks against Eocene volcanic rocks (Wa and others, 1945 #4076; Hart and Newcomb, 1965 #4063; Schlicker and others, 1 #4068; Unruh and others, 1994 #3597; Wells and others, 1994 #3988; Yeats and 1996 #4291; Blakely and others, 2000 #4333). A steep gravity gradient (McPhee others, 2014 #7371) up to 110 mGal extends along the fault for more than 50 km, sharp magnetic boundaries suggest 10–15 km dextral offset of magnetic Eocene basement (Wells, 2009 #). The fault may connect to the Mount Angle fault (Bees and others, 1985 #4022; Blakely and others, 2000 #4333).
Length (km)	73 km.
Average strike	N41°W
Sense of movement	Right lateral, Reverse

	Comments: Both dextral strike-slip and vertical separation are apparent along the Creek fault zone. If the fault is part of a larger Gales Creek-Mount Angel structur zone (Beeson and others, 1985 #4022; 1989 #4023), then by analogy the vertical separation may have a reverse sense of displacement (Geomatrix Consultants Inc 1995 #3593).
Dip Direction	Unknown *Comments:* Geologic mapping suggests that the Gales Creek fault is a northwest-trending, steeply west dipping fault that has accommodated dextral slip (Wells, 20 #7706).
Paleoseismology studies	
Geomorphic expression	No fault scarps on Quaternary deposits have been described anywhere along the f zone (Geomatrix Consultants Inc., 1995 #3593). However, a thick sequence of sil sediment deposited by the Missoula floods covers much of the southern part of th fault trace, and older stream terraces at 100–120 m elevation along Gales Creek a largely confined to the upthrown side of the fault zone (R.E. Wells, pers. commur 2001).
Age of faulted surficial deposits	The fault zone is mapped in Eocene through Miocene bedrock, but no unequivoca evidence of displacement in Quaternary deposits has been described (Warren and others, 1945 #4076; Hart and Newcomb, 1965 #4063; Schlicker and others, 1967 #4068; Unruh and others, 1994 #3597; Wells and others, 1994 #3988; Geomatrix Consultants Inc., 1995 #3593; Yeats and others, 1996 #4291; Blakely and others, #4333).
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Unruh and others (1994 #3597) used airphoto, aerial, and field reconnaissance to determine that latest movement on these faults predates the late Pleistocene; they mapped the faults as Tertiary and concluded that they are not ac Geomatrix Consultants (1995 #3593) inferred possibly activity in the Quaternary based on alignment with and possible connection to the Mount Angel fault [873]. Madin and Mabey (1996 #3575) compiled this fault zone as active in the middle a late Quaternary (<780 ka) or Quaternary (<1.6 Ma). Given the equivocal evidenc Quaternary displacement, the Gales Creek fault zone is herein classified as Quate (<1.6 Ma) until further studies are conducted.
Recurrence	

interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* No detailed slip rate data have been published. Recent geologic mapp suggests a couple of kilometers of vertical separation and as much as 12 km of de separation of Paleogene bedrock; these offsets yield vertical and horizontal rates and 0.3 mm/yr, respectively (R.E. Wells, pers. commun., 2001). Wong and others (1999 #4073; 2000 #5137) assigned rates of 0.1–0.4 mm/yr to the Gales Creek fa their analysis of earthquake hazards in the Portland area. Given the lack of evider displacement in Quaternary deposits, lower rates of slip are assumed.
Date and Compiler(s)	2017 Stephen F. Personius, U.S. Geological Survey Kathleen M. Haller, U.S. Geological Survey
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