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Quaternary Fault and Fold Database of the United States

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Chemult graben fault system, western section (Class A) No. 839a

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Synopsis	**General:** This north- and northeast-trending normal fault system forms the Chem graben in central Oregon, at the intersection of the northwestern Basin and Range the Cascade Range. The fault system is marked by prominent escarpments (Walk Rim) on upper Miocene to lower Pliocene volcanic rocks; much of the southern p the graben is covered with pyroclastic deposits of Holocene Mount Mazama. Fau the western section form small scarps on middle Pleistocene alluvial deposits alo Little Deschutes River, and perhaps on latest Pleistocene(?) glacial moraines that buried by Mazama pyroclastic debris south of Little Walker Mountain. No scarps Quaternary deposits have been described along faults in the Walker Rim section, forms the eastern margin of the graben. **Sections:** This fault has 2 sections. Following Geomatrix Consultants, Inc. (1995 #3593), the Chemult graben fault system is divided into a western section that co of the mostly east-down faults that bound the western margin of the graben, and t Walker Rim section that consists of the mostly west-down faults that bound the e

	margin of the graben. The primary structures in the latter section are associated w the Walker Rim fault zone.
Name comments	**General:** The Chemult graben fault system is composed of faults that bound the Chemult graben in central Oregon. Numerous authors use the names Chemult gra or fault zone and Walker Rim fault or fault zone for these structures (Higgins, 19 #3764; Sherrod and Pickthorn, 1989 #3599; Goles and Lambert, 1990 #3763; MacLeod and Sherrod, 1992 #3566, 1988; Pezzopane, 1993 #3544); Geomatrix Consultants, Inc. (1995 #3593) used the name Chemult Graben-Walker Rim fault Herein we informally include the primarily east-down faults that bound the weste margin of the graben in a western section, and the primarily west-down faults tha bound the eastern margin of the graben in the Walker Rim section. **Section:** This part of the fault system is part of the Chemult fault zone of Goles a Lambert (1990 #3763), and was informally named the Chemult graben (western margin) by Geomatrix Consultants, Inc. (1995 #3593). **Fault ID:** This group of structures consists of fault numbers 28 and 29 of Pezzop (1993 #3544) and fault numbers 51a and 51b of Geomatrix Consultants, Inc. (19 #3593). This section is fault number 51a of Geomatrix Consultants, Inc. (1995 #3
County(s) and State(s)	KLAMATH COUNTY, OREGON
Physiographic province(s)	COLUMBIA PLATEAU CASCADE-SIERRA MOUNTAINS
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) attributed to 1:250,000-scale mapping of MacLeod and Sherrod (1992 #3566), and Weldon and others (2002 #5648).
Geologic setting	This north and northeast trending, normal fault system forms the Chemult graben central Oregon, at the intersection of the northwestern Basin and Range and the Cascade Range. The fault is marked by prominent escarpments (Walker Rim) on Miocene to lower Pliocene volcanic rocks; much of the southern part of the grabe covered with pyroclastic deposits of Holocene Mount Mazama (Sherrod and Smi 1989 #3498; Walker and MacLeod, 1991 #3646; MacLeod and Sherrod, 1992 #3 Sherrod and Smith, 2000 #5165).
Length (km)	This section is 51 km of a total fault length of 97 km.
Average strike	N14°E (for section) versus N7°E (for whole fault)

Sense of movement	Normal *Comments:* Faults in this section are mapped as normal or high-angle faults by W and MacLeod (1991 #3646), MacLeod and Sherrod (1992 #3566), Pezzopane (19 #3544), Bacon and others (1997 #3516), and Sherrod and Smith (2000 #5165).
Dip Direction	E; W *Comments:* No structural data on the dip of these faults have been published, but Sherrod and Pickthorn (1989 #3599) estimated dips of 60° on the Chemult grabe faults, and Geomatrix Consultants, Inc. (1995 #3593) used an estimated dip of 70 their modeling of earthquake potential of the Chemult graben fault system.
Paleoseismology studies	
Geomorphic expression	Faults in the western section form small scarps on middle Pleistocene alluvial dep along the Little Deschutes River north of Little Walker Mountain (MacLeod and Sherrod, 1992 #3566). South of Little Walker Mountain, faults in this section for escarpments on upper Miocene to Pleistocene volcanic rocks, but are covered wit pyroclastic deposits from the eruption of Holocene Mount Mazama (Walker and MacLeod, 1991 #3646; MacLeod and Sherrod, 1992 #3566; Sherrod and Smith, 2 #5165). However, S.K. Pezzopane (personal commun., 1993, in Geomatrix Consultants Inc., 1995 #3593) describes 5- to 6-m-high fault scarps on latest Pleistocene (?) glacial moraines that are buried by Mazama pyroclastic debris, presumably along faults in the western section. Weldon and others (2002 #5648) lineaments across Quaternary deposits based on interpretation of 1:100,000-scale DEMs of the area.
Age of faulted surficial deposits	Faults in the western section offset lava flows as young as 0.88±0.03 Ma (MacLe and Sherrod, 1992 #3566). No radiometric ages have been obtained on faulted Quaternary sediments along the western section. However, Walker and MacLeod #3646), MacLeod and Sherrod (1992 #3566), and Sherrod and Smith (2000 #516 mapped faults in middle Pleistocene (>150 ka) alluvial deposits along the Little Deschutes River, and S.K. Pezzopane (personal commun., 1993, in Geomatrix Consultants Inc., 1995 #3593) describes fault scarps on latest Pleistocene (?) glac moraines that are buried by Mazama pyroclastic debris along faults in the western section. Ake and others (2001 #5035) used airphoto analysis to question the interpretation of Pezzopane.
Historic earthquake	
Most recent prehistoric	late Quaternary (<130 ka)

deformation	*Comments:* Pezzopane (1993 #3544) and subsequent compilations (Geomatrix Consultants Inc., 1995 #3593; Madin and Mabey, 1996 #3575) classified these fa middle and late (<700–780 ka) Quaternary. Weldon and others (2002 #5648) map of these faults as active in the middle and late Quaternary (<780 ka), and others a active in the late Quaternary (<120 ka). The most recent event must predate 6,84 radiocarbon yr BP. (Bacon, 1983 #3787), because all faults south of Little Walker Mountain are buried by pyroclastic debris from the climactic eruption of Mount Mazama (MacLeod and Sherrod, 1992 #3566).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Geomatrix Consultants, Inc. (1995 #3593) used age and estimates of 6 m in approximately 15 ka deposits (S.K. Pezzopane, personal commun., 1993, i Geomatrix Consultants Inc., 1995 #3593) to calculate a maximum vertical displacement rate of 0.4 mm/yr; the slip rates used in their analysis of earthquake hazards along the western section were 0.01–0.3 mm/yr. Pezzopane (1993 #3544) inferred an average displacement rate of about 0.5–1 mm/yr across the Chemult graben, although this slip must be accommodated on many faults. Ake and others (2001 #5035) used the subdued geomorphic development to conclude that rates o deformation across the fault zone are probably <0.1 mm/yr.
Date and Compiler(s)	2016 Stephen F. Personius, U.S. Geological Survey
References	#5035 Ake, J., LaForge, R., and Hawkins, F., 2001, Probabilistic seismic hazard analysis for Wickiup Dam—Deschutes project, central Oregon: U.S. Bureau of Reclamation Seismotectonic Report 2000-04, 71 p. #3787 Bacon, C.R., 1983, Eruptive history of Mount Mazama and Crater Lake Caldera, Cascade Range, USA: Journal of Volcanology and Geothermal Research 18, p. 57–115. #3516 Bacon, C.R., Mastin, L.G., Scott, K.M., and Nathenson, M., 1997, Volcano earthquake hazards in the Crater Lake region, Oregon: U.S. Geological Survey O File Report 97-487, 30 p., 1 pl., scale 1:100,000. #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. #3763 Goles, G., and Lambert, R.S.J., 1990, A strontium isotopic study of Newbe volcano, central Oregon—Structural and thermal implications: Journal of Volcano

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#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.

#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.