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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.

Mount Mazama ring faults (Class B) No. 1807

Last Review Date: 2002-12-10

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Synopsis	These faults form the rim of the Crater Lake caldera, which formed about 7.7 ka in Mount Mazama, a large Quaternary stratovolcano in the Cascade Range of south-central Oregon. Mount Mazama is comprised of andesite to rhyodacite rocks, which range in age from about 400 ka to the middle Holocene. The caldera may be localized at the intersection of the Klamath graben with the Cascades volcanic province. The mode of formation of these faults is poorly known, but they probably occurred as collapse in as little as a few days following the climactic eruption 7.7 ka. These faults are classified as Class B herein because they are volcanic features associated with caldera collapse, rather than tectonic faulting.
Name comments	This group of faults forms the caldera rim of Mount Mazama, the volcano in which the Crater Lake caldera is formed in south-central Oregon (Bacon and Nathenson, 1996 #3541; Bacon and

	others, 1997 #3516).
County(s) and State(s)	KLAMATH COUNTY, OREGON
Physiographic province(s)	CASCADE-SIERRA MOUNTAINS
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Fault traces are from 1:100,000-scale mapping of Weldon and others, (2002 #5648).
Geologic setting	These faults form the rim of the Crater Lake caldera, which formed about 7.7 ka in Mount Mazama, a large Quaternary stratovolcano in the Cascade Range of south-central Oregon. Mount Mazama is comprised of andesite to rhyodacite rocks which range in age from about 400 ka to the middle Holocene. The caldera may be localized at the intersection of the Klamath graben with the Cascades volcanic province (Bacon, 1983 #3787; Bacon and Nathenson, 1996 #3541; Bacon and others, 1997 #3516).
Length (km)	9 km.
Average strike	N86°W
Sense of movement	Normal *Comments:* These faults are mapped as normal (ring) faults by Sherrod and Smith (2000 #5165) and Weldon and others, (2002 #5648).
Dip Direction	Unknown *Comments:* These faults rim the caldera walls in a circular pattern, and thus dip in all directions.
Paleoseismology studies	
Geomorphic expression	No details of the geomorphic expression of these faults has been published. The steep rim of Crater Lake is at least 370 m high, and the lake reaches depths of more than 500 m. None of the published geologic maps of the area (Smith and others, 1982

	#3493; Sherrod and Smith, 1989 #3498; Walker and MacLeod, 1991 #3646; Bacon and others, 1997 #3516), with the exception of Sherrod and Smith (2000 #5165), show the ring fractures mapped by Weldon and others, (2002 #5648). Bacon (1983 #3787) postulated a collapse ring about 5 km in diameter, and a postulated ring fracture zone of similar dimension has been mapped in the subsurface of Crater Lake, based on the locations of a ring of explosion craters on the caldera floor (Nelson and others, 1988 #5039; Bacon and Nathenson, 1996 #3541). These postulated fracture zones are about 1 km inboard of the mapped trace of Weldon and others, (2002 #5648), which coincides with the steep topographic rim of the caldera.
Age of faulted surficial deposits	The rim faults are formed in middle Holocene to middle Pleistocene volcanic rocks of Mount Mazama (Bacon, 1983 #3787; Bacon and Nathenson, 1996 #3541; Bacon and others, 1997 #3516; Sherrod and Smith, 2000 #5165).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* The rim faults are formed in middle Holocene to middle Pleistocene volcanic rocks of Mount Mazama; the youngest extensive eruption occurred about 7.7 ka (Bacon, 1983 #3787; Bacon and Nathenson, 1996 #3541; Bacon and others, 1997 #3516). Weldon and others (2002 #5648) mapped these faults as active in the latest (<20 ka) Quaternary.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Escarpments hundreds of meters high in Quaternary volcanic rocks imply high rates of slip, but these features are associated with caldera collapse. Their mode of formation is poorly known, but probably occurred as collapse in as little as a few days following the climactic eruption 7.7 ka (Bacon and Nathenson, 1996 #3541).
Date and Compiler(s)	2002 Stephen F. Personius, U.S. Geological Survey
References	#3787 Bacon, C.R., 1983, Eruptive history of Mount Mazama and

Crater Lake Caldera, Cascade Range, USA: Journal of Volcanology and Geothermal Research, v. 18, p. 57–115.

#3541 Bacon, C.R., and Nathenson, M., 1996, Geothermal resources in the Crater Lake Area, Oregon: U.S. Geological Survey Open-File Report 96-663, 34 p.

#3516 Bacon, C.R., Mastin, L.G., Scott, K.M., and Nathenson, M., 1997, Volcano and earthquake hazards in the Crater Lake region, Oregon: U.S. Geological Survey Open-File Report 97-487, 30 p., 1 pl., scale 1:100,000.

#5039 Nelson, C.H., Carlson, P.R., and Bacon, C.R., 1988, The Mount Mazama climactic eruption (approximately 6900 yr B.P.) and resulting convulsive sedimentation on the Crater Lake caldera floor, continent, and ocean basin, *in* Clifton, H.E., ed., Sedimentologic consequences of convulsive geologic events: Geological Society of America Special Paper 229, p. 37–57.

#3498 Sherrod, D.R., and Smith, J.G., 1989, Preliminary map of upper Eocene to Holocene volcanic and related rocks of the Cascade Range, Oregon: U.S. Geological Survey Open-File Report 89-14, 20 p., 1 pl., scale 1:500,000.

#5165 Sherrod, D.R., and Smith, J.G., 2000, Geologic map of upper Eocene to Holocene volcanic and related rocks of the Cascade Range, Oregon: U.S. Geological Survey Geologic Investigations Map I-2569, 2 sheets, scale 1:500,000.

#3493 Smith, J.G., Page, N.J., Johnson, M.G., Moring, B.C., and Gary, F., 1982, Preliminary geologic map of the Medford 1x2 quadrangle, Oregon and California: U.S. Geological Survey Open-File Report 82-955, 1 sheet, scale 1:250,000.

#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, P.A., 2002, An update of Quaternary faults of central and eastern Oregon: U.S. Geological Survey Open-File Report 02-301 (CD-ROM), 26 sheets, scale 1:100,000.

Questions or comments?