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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.

Cedar Mountain fault system, Cedar Mountain section (Class A) No. 2b

Last Review Date: 2000-04-06

Compiled in cooperation with the California Geological Survey

citation for this record: **Bryant, W.A., compiler, 2000, Fault number 2b, Cedar Mountain fault system, Cedar Mountain section, 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 02:23 PM.**

Synopsis	**General:** Complex, 44-km-long fault system consisting of north-striking normal faults that offset latest Pleistocene and Holocene volcanic rocks, glacial, and alluvial deposits (Williams, 1949 #4894; Wood, 1960 #4896; Bryant, 1990 #4889). The Cedar Mountain fault system is comprised of the Cedar Mountain, Mahogany Mountain, Mt. Hebron, Meiss Lake, and Ikes Mountain faults. Detailed reconnaissance level mapping by Wood (1960 #4896) and Bryant (1990 #4889) is at 1:62,500 scale. There are no detailed studies for any of these faults. Bryant (1990 #4889) estimated a late Pleistocene slip rate of 0.2 mm/yr for a

	strand of the East Cedar Mountain fault, based on offset late Tioga equivalent outwash deposits. Historic surface fault rupture was associated with the 08/01/1978 Stephens Pass earthquake (Bennett and others, 1979 #3326). **Sections:** This fault has 4 sections. It is proposed in this fault compilation that the Cedar Mountain, Mahogany Mountain, Mt. Hebron fault zones, and Ikes Mountain and Stephens Pass faults be collectively referred to as the Cedar Mountain fault system. Individual sections include the Mahogany Mountain section [2a], Cedar Mountain section [2b], Ikes Mtn.-Mt. Hebron section [2c], and the Stephens Pass section [2d].
Name comments	**General:** Cedar Mountain fault system is a complex group of generally north- to north-northwest-striking normal faults along the boundary between the Cascade Ranges and the Modoc Plateau. First mapped, but not named, by Williams (1949 #4894) and Wood (1960 #4896). Bryant (1990 #4889) first proposed the names Cedar Mountain fault zone, West Cedar Mountain fault, East Cedar Mountain fault, Meiss Lake fault, Mahogany Mountain fault zone, and Mt. Hebron fault zone for structures within this fault system. The Stephens Pass fault was unmapped prior to the ML 4.6 Stephens Pass earthquake of 08/01/1978. This fault system should not be confused with the faults [1324] that were activated in western Nevada during the 12/21/1932 Cedar Mountain earthquake. **Section:** The Cedar Mountain section extends from northern Butte Valley south to Stephens Pass. The Cedar Mountain section is comprised of the West Cedar Mountain fault, East Cedar Mountain fault, Meiss Lake fault, and several unnamed faults between the East Cedar Mountain fault and Mahogany Mountain fault zone. These faults were mapped by Wood (1960 #4896) and Bryant (1990 #4889) and first named by Bryant (1990 #4889). Bryant (1990 #4889) first mapped and named the Meiss Lake fault. **Fault ID:** Refers to Jennings (1994 #2878) fault numbers 1 (Mahogany Mountain fault zone), 2 (Ikes Mountain fault and unnamed faults in Butte Valley), 2A (Meiss Lake fault), 3 (Mt. Hebron fault zone), and 4 (Cedar Mountain fault zone), 11 (Cedar Mountain fault zone, southern part), and 22 (Stephens Pass fault), and fault number NE04 (Cedar Mtn. fault) of Working Group on Northern California Earthquake Potential (1996 #1216).
County(s) and	

County(s) and State(s)	SISKIYOU COUNTY, CALIFORNIA
Physiographic province(s)	CASCADE-SIERRA MOUNTAINS
Reliability of location	Good Compiled at 1:62,5000 scale. *Comments:* Based on digital revisions to Jennings (1994 #2878) using original mapping by Wood (1960 #4896) and Bryant (1990 #4889) at 1:62,500 scale.
Geologic setting	Complex system of generally north-striking normal faults that extends from the Oregon border south to the Stephens Pass area in northeastern California. The northern end of the Cedar Mountain fault system may extend into Oregon as the Sky Lakes fault zone [844]. The southern extent of the fault system is poorly understood and not mapped in detail. The fault zone is the result of east-west extension and is located along the boundary between the Cascade Ranges and the Modoc Plateau. The fault zone bounds Butte Valley, a structurally controlled closed drainage basin. Cumulative vertical displacement is not known, but scarps on late Tertiary bedrock suggest a minimum cumulative Quaternary vertical displacement of 500 m along the Mahogany Mountain fault. Scarp heights on Cedar Mountain, a Pliocene-Pleistocene volcanic cone, suggest a minimum cumulative Pleistocene displacement of 60 m.
Length (km)	This section is 52 km of a total fault length of 69 km.
Average strike	N16°W (for section) versus N16°W (for whole fault)
Sense of movement	Normal *Comments:* Based on mapping by Wood (1960 #4896) and Bryant (1990 #4889). Fault is delineated by well-defined geomorphic evidence of normal faulting (Bryant, 1990 #4889).
Dip	50°-70° E *Comments:* Dip unknown, presumed 50?-70? E. Direction based on Wood (1960 #4896), Bryant (1990 #4889).
Paleoseismology	

studies	
Geomorphic expression	Both the West and East Cedar Mountain faults are delineated by well-defined geomorphic features indicative of latest Pleistocene and Holocene normal faulting such as well-defined scarps in bedrock, scarps with scarp slope angles of 20? on alluvium, closed depressions, ponded alluvium, vertically offset drainages, and unfilled fissures near the crest of scarps on volcanic bedrock (Bryant, 1990 #4889; Wills and Bryant, 1991 #4895).
Age of faulted surficial deposits	Fault strands of the Cedar Mountain section offset the Butte Valley basalt, a late Pleistocene volcanic unit. Wood (1960 #4896) reported that the Butte Valley basalt is interbedded with lacustrine deposits in Butte Valley. Bryant (1990 #4889) reported that faulted glacial outwash deposits in the Antelope Sink area are probably equivalent to late Tioga (11-13 ka) outwash deposits of the eastern Sierra Nevada (Smith, 1979 #4892), based on soil profile development. The Meiss Lake fault offsets lake shorelines that Bryant (1990 #4889) estimated to be Holocene, based on soil profile development.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* These faults are delineated by well defined geomorphic features indicative of latest Pleistocene and Holocene movement (Bryant, 1990 #4889; Wills and Bryant, 1991 #4895).
Recurrence interval	
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Bryant (1990 #4889) estimated a slip rate of 0.2 mm/yr for a strand of the East Cedar Mountain fault, based on a 2 2-m-high scarp on late Tioga outwash deposits. It is assumed that the entire Cedar Mountain fault is characterized by a late Pleistocene slip rate of about 0.5-1.0 mm/yr, based on similar geomorphic expression.
Date and Compiler(s)	2000 William A. Bryant, California Geological Survey
References	#3326 Bennett, J.H., Sherburne, R.W., Cramer, C.H., Chesterman, C.W., and Chapman, R.H., 1979, Stephens Pass earthquakes,

Mount Shasta-August 1978: California Geology, v. 32, p. 27-34.

#4889 Bryant, W.A., 1990, Stephens Pass fault and faults in the Butte Valley area, Siskiyou County: California Division of Mines and Geology Fault Evaluation Report FER-210.

#2878 Jennings, C.W., 1994, Fault activity map of California and adjacent areas, with locations of recent volcanic eruptions: California Division of Mines and Geology Geologic Data Map 6, 92 p., 2 pls., scale 1:750,000.

#4860 Petersen, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic seismic hazard assessment for the State of California: California Department of Conservation, Division of Mines and Geology Open-File Report 96-08 (also U.S. Geological Open-File Report 96-706), 33 p.

#4892 Smith, G.I., 1979, Subsurface stratigraphy and geochemistry of late Quaternary evaporites, Searles Lake, California: U.S. Geological Survey Professional Paper 1043, 103 p.

#4894 Williams, H., 1949, Geology of the Macdoel quadrangle: California Division of Mines and Geology Bulletin 151, 60 p., scale 1:125,000.

#4895 Wills, C.J., and Bryant, W.A., 1991, Development and degradation of normal fault scarps in the Modoc Plateau, northeastern California: Geological Society of America Abstracts with Programs, v. 23, no. 5, p. A433.

#4896 Wood, P.R., 1960, Geology and ground-water features of the Butte Valley region, Siskiyou County, California: U.S. Geological Survey Water-Supply Paper 1491, 150 p.

#1216 Working Group on Northern California Earthquake Potential (WGNCEP), 1996, Database of potential sources for earthquakes larger than magnitude 6 in northern California: U.S. Geological Survey Open-File Report 96-705, 40 p.