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Quaternary Fault and Fold Database of the United States

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Cedar Mountain fault system, Ikes Mtn.-Mt. Hebron section (Class A) No. 2c

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 2c, Cedar Mountain fault system, Ikes Mtn.-Mt. Hebron 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:** Stephens Pass section principally is delineated by surface fault rupture associated with 08/01/1978 Stephens Pass earthquake (Bennett and others, 1979 #3326). Section extends from about 9.5 km south of Tennant to about 1 km south of the 1978 rupture. Stephens Pass fault was first named by Bennett and others (1979 #3326). **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 State(s)	SISKIYOU COUNTY, CALIFORNIA
Physiographic	

Physiographic province(s)	CASCADE-SIERRA MOUNTAINS
Reliability of location	Good Compiled at 1:62,500 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 43 km of a total fault length of 69 km.
Average strike	N15°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).
Dip	50°-70° E *Comments:* Dip unknown, presumed 50?-70? E. Direction based on Wood (1960 #4896), Bryant (1990 #4889).
Paleoseismology studies	
Geomorphic expression	Faults are delineated by prominent east-facing escarpments on Pliocene-Pleistocene bedrock (Bryant, 1990 #4889). The Ikes Mountain fault lacks youthful geomorphic expression indicative

	of Holocene offset and is concealed by Holocene alluvial fans. The Mt. Hebron fault zone locally is delineated by degraded east-facing scarps on Pleistocene fluvial-glacial deposits (Bryant, 1990 #4889).
Age of faulted surficial deposits	Faults offset High Cascades series volcanic rocks of Pliocene-Pleistocene age. The westernmost trace of the Mt. Hebron fault zone offsets Pleistocene fluvio-glacial deposits (1960 #4896).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Bryant (1990 #4889) reported that Ikes Mountain and Mt. Hebron fault zone lacked geomorphic evidence of Holocene displacement. Traces of the Mt. Hebron fault zone offset Pleistocene alluvium, but scarps are degraded and lack evidence of Holocene offset.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Bryant (1990 #4889) reported a late Pleistocene slip rate of 0.2 mm/yr for a strand of the East Cedar Mountain fault. Based on differences in geomorphic expression of the Ikes Mountain fault and Mt. Hebron fault zone, a Quaternary slip rate of <0.2 mm/yr is assumed
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. #4894 Williams, H., 1949, Geology of the Macdoel quadrangle: California Division of Mines and Geology Bulletin 151, 60 p., scale 1:125,000. #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.