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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.

Bear Lake (west side) fault (Class B) No. 2531

Last Review Date: 2004-05-01

Compiled in cooperation with the Utah Geological Survey

citation for this record: **Black, B.D., DuRoss, C.B., McDonald, G.N., and Hecker, S., compilers, 2004, Fault number 2531, Bear Lake (west side) fault, 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 02:53 PM.**

Synopsis	Poorly understood north-trending east-dipping normal fault bounding the southwest side of the Bear Lake graben. The fault may be a southern extension of the Holocene western Bear Lake fault [622] in Idaho.
Name comments	**Fault ID:** Refers to fault number 11-5 in Hecker (1993 #642).
County(s) and State(s)	RICH COUNTY, UTAH
Physiographic	

Physiographic province(s)	MIDDLE ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:42,240 scale. *Comments:* Location of fault traces from Kaliser (1972 #4413). Also mapped by Skeen (1975 #4428), Anderson and Miller (1979 #4494), and McCalpin (1990 #4419, 2003 #6750).
Geologic setting	North-trending east-dipping normal fault that bounds the southwest side of the Bear Lake graben. The fault may be a southern extension of the Holocene western Bear Lake fault [622] further north in Idaho.
Length (km)	5 km.
Average strike	N3°W
Sense of movement	Normal
Dip	E
Paleoseismology studies	McCalpin (1990 #4419, 2003 #6750) excavated two trenches across the central section of the western Bear Lake fault in Idaho, east of the town of Bloomington, about 18 km north of the Utah-Idaho border. The trenches, about 1 km apart, crossed 2- and 6-m-high fault scarps (site 2351-1). The southern trench revealed deformation associated with both fault rupture and monoclinal folding. Stratigraphic evidence indicated a single surface-faulting event, with a poorly constrained minimum age of 1.9 ka and a better constrained maximum age of 6.7-7.4 ka based on radiocarbon dating of bulk soil, organic mud, and peat collected from both the trench exposure and a 1.8-m-deep auger hole. The northern trench exposed only monoclinal folding with no coseismic event horizons, and could not be logged due to rapid ground-water flow and caving problems.
Geomorphic expression	The mapped fault is on-trend with the central section of the western Bear Lake fault in Idaho, which has evidence for two faulting events since 13 ka (McCalpin, 1990 #4419, 2003 #6750). However, seismic reflection profiles on the western side of the lake (Skeen, 1975 #4428) do not show any subsurface faults on-trend with the Holocene fault in Idaho. One possibility is that the western side of the Bear Lake graben in Utah is a hinge zone,

	composed of east- and west-dipping, north-south-oriented normal fault swarms, rather than a discrete zone of faulting (McCalpin, 1990 #4419, 2003 #6750). An increasing eastward tilt of lake-bottom reflectors toward the south end of Bear Lake supports this hypothesis (McCalpin, 1990 #4419). Thus, we consider that structure to be Class B owing to questions about its origin.
Age of faulted surficial deposits	Quaternary (?); fault displaces Holocene deposits in Idaho, but displaced Holocene units are not evident in Utah.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Based on association with nearby Quaternary deformation. Although the fault in Idaho has evidence for a Holocene event (younger than 6.7-7.4 ka; McCalpin, 2003 #6750), no such evidence exists for the fault in Utah.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr
Date and Compiler(s)	2004 Bill D. Black, Utah Geological Survey Christopher B. DuRoss, Utah Geological Survey Greg N. McDonald, Utah Geological Survey Suzanne Hecker, U.S. Geological Survey
References	#4494 Anderson, L.W., and Miller, D.G., 1979, Quaternary fault map of Utah: Long Beach, California, Fugro, Inc, 35 p. pamphlet, scale 1:500,000. #642 Hecker, S., 1993, Quaternary tectonics of Utah with emphasis on earthquake-hazard characterization: Utah Geological Survey Bulletin 127, 157 p., 6 pls., scale 1:500,000. #4413 Kaliser, B.N., 1972, Environmental geology of Bear Lake area, Rich County, Utah: Utah Geological and Mineral Survey Bulletin 96, 32 p., 2 pls., scale 1:31,680. #4419 McCalpin, J., 1990, Latest Quaternary faulting in the

	northern Wasatch to Teton corridor (NWTC): Technical report to U.S. Geological Survey, under Contract 14-08-001-G1396, October 1990, 42 p. #6750 McCalpin, J.P., 2003, Neotectonics of the Bear Lake Valley, Utah and Idaho; A preliminary assessment: Utah Geological Survey Miscellaneous Publication 03-4, 43 p., http://ugspub.nr.utah.gov/publications/misc_pubs/MP-03-4.pdf. #4428 Skeen, R.C., 1975, A reflection seismic study of the subsurface structure and sediments of Bear Lake, Utah-Idaho: Salt Lake City, University of Utah, senior thesis, 25 p., 1 pl.