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Quaternary Fault and Fold Database of the United States

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Lone Pine fault, unnamed southern section (Class A) No. 604b

Last Review Date: 2010-10-27

Compiled in cooperation with the Idaho Geological Survey

citation for this record: **Haller, K.M., and Wheeler, R.L., compilers, 2010, Fault number 604b, Lone Pine fault, unnamed southern 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 03:02 PM.**

Synopsis	**General:** Details of this fault are poorly known. No recent work has been completed at time of this compilation except for reconnaissance work on this section [604b], which ruptured during 1983 Borah Peak earthquake. **Sections:** This fault has 2 sections. Sections are defined as the southeastern section of the fault [604b] that ruptured during 1983 Borah Peak earthquake, and the remainder of fault [604a].
Name comments	**General:** An early reference to the Lone Pine fault is Baldwin (1951 #427), wherein he describes the fault as extending from the

	Salmon River south to Willow Creek hills. **Fault ID:** Refers to number 194 ("unnamed fault") in Witkind (1975 #320).
County(s) and State(s)	CUSTER COUNTY, IDAHO
Physiographic province(s)	NORTHERN ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Location is based on the 1:24,000-scale map of Crone and others (1987 #19), further constrained by satellite imagery and topography at scale of 1:100,000. Reference satellite imagery is ESRI_Imagery_World_2D with a minimum viewing distance of 1 km (1,000 m).
Geologic setting	This part of east-central Idaho and southwest Montana is made of Precambrian and Paleozoic rocks that were shortened by folding and faulting and was thrust northeastward during the late Mesozoic. Mid- to late Cenozoic extension broke the thrust complex into northwest-trending basins and ranges and continues today. The Lone Pine fault is a high-angle, down-to-the-northeast, range-front, normal fault that separates Antelope Flat and Round Valley to the northeast from Lone Pine Peak on the southwest. At its southeastern end, the northeast-dipping Lone Pine fault joins the longer, southwest-dipping Lost River fault [601]. The two normal faults bound an intervening graben. Analysis of the 1984 Devil Canyon earthquake mainshock (ML 5.8) and its aftershocks indicated that the Lone Pine and Lost River faults are conjugate structures (Jackson, 1994 #833; Payne and others, 2004 #7015), but the seismological results by themselves could not determine which fault is the master fault and which is the antithetic fault. However, the much greater length and topographic relief of the Lost River fault suggest that it is the master fault. This suggestion is supported by the occurrence of the 1983 Borah Peak earthquake (MS 7.3) and its aftershocks on the Lost River fault (Crone and others, 1987 #19). The Borah Peak mainshock occurred at a depth of 16 km (Doser and Smith, 1985 #276), well below the 10- to 11-km depth where the Devil Canyon aftershocks indicate that the two faults meet (Jackson, 1994 #833; Payne and others, 2004 #7015). Thus, the Lost River fault extends 5-6 km deeper than its junction with the Lone Pine fault.

Length (km)	This section is 7 km of a total fault length of 26 km.
Average strike	N88°W (for section) versus N50°W (for whole fault)
Sense of movement	Normal *Comments:* (Crone and others, 1987 #19)
Dip Direction	N
Paleoseismology studies	
Geomorphic expression	Discontinuous cracks and small scarps (no more than 20 cm high) caused by 1983 Borah Peak earthquake; however, the scarps are thought to be a secondary surface rupture (Crone and others, 1987 #19). The small scarps are superimposed on prehistorical scarps. These cracks are on distinct older scarps that characterize the southern part of the fault at least as far north as Spar Canyon.
Age of faulted surficial deposits	
Historic earthquake	Borah Peak earthquake 1983
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Reconnaissance indicates prehistorical scarps are preserved on the southern section. Thus, late Quaternary movement is inferred.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* The small scarps are suggestive of a low slip rate.
Date and Compiler(s)	2010 Kathleen M. Haller, U.S. Geological Survey Russell L. Wheeler, U.S. Geological Survey, Emeritus
References	#427 Baldwin, E.M., 1951, Faulting in the Lost River Range area of Idaho: American Journal of Science, v. 249, p. 884-902. #19 Crone, A.J., Machette, M.N., Bonilla, M.G., Lienkaemper,

	J.J., Pierce, K.L., Scott, W.E., and Bucknam, R.C., 1987, Surface faulting accompanying the Borah Peak earthquake and segmentation of the Lost River fault, central Idaho: Bulletin of the Seismological Society of America, v. 77, p. 739-770. #276 Doser, D.I., and Smith, R.B., 1985, Source parameters of the 28 October 1983 Borah Peak, Idaho, earthquake from body wave analysis: Bulletin of the Seismological Society of America, v. 75, p. 1041-1051. #833 Jackson, S.M., 1994, Seismic evidence of conjugate normal faulting—The 1984 Devil Canyon earthquake sequence near Challis, Idaho: Boise, Idaho, Boise State University, unpublished M.S. thesis, 156 p. #7015 Payne, S.J., Zollweg, J.E., and Rodgers, D.W., 2004, Stress triggering of conjugate normal faulting—Late aftershocks of the 1983 Ms 7.3 Borah Peak, Idaho, earthquake: Bulletin of the Seismological Society of America, v. 94, no. 3, p. 828-844. #320 Witkind, I.J., 1975, Preliminary map showing known and suspected active faults in Idaho: U.S. Geological Survey Open-File Report 75-278, 71 p. pamphlet, 1 sheet, scale 1:500,000.