

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](#).

Mirror Plateau faults, older section (Class A) No. 749b

Last Review Date: 1998-03-27

citation for this record: Pierce, K.L., compiler, 1998, Fault number 749b, Mirror Plateau faults, older 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 01:59 PM.

Synopsis

General: This group of Quaternary faults form of anastomosing band on and near the Mirror Plateau (fig. 3 and Plate 1, Love, 1961 #3801). The plateau is underlain by Eocene volcanic rocks, partly covered with 0.63-Ma Lava Creek Tuff (U.S. Geological Survey, 1972 #639). The faults are parallel to and 7-11 km outboard of the structural margin of the 0.63-Ma Yellowstone caldera (Christiansen, 2001 #1784), which is the leading edge of the Yellowstone hotspot (Pierce and Morgan, 1992 #539). The faults have strong geomorphic expression and commonly appear to have dammed or offset stream drainages (Love, 1961 #3801). In the Mirror Plateau area, younger faults [749a] that we classify as <15 ka (post-glacial) have generally been mapped as solid across Pinedale till, whereas older faults [749b] classified as <750 have generally been mapped as dashed across Pinedale till. The Pinedale till on U.S. Geological Survey maps (1972 #639)

	<p>includes Pinedale "rubble veneer" mapped at 1:62,500 scale (Pierce, 1974 #2217; Pierce, 1974 #2238), and which is so thin that nearly all the escarpments are on bedrock rather than on glacial deposits.</p> <p>Sections: This fault has 2 sections. Faults on Mirror Plateau with evidence of <15 ka movement are collectively described as the younger section [749a] and those with evidence of <750 ka movement are collectively described as the older section [749b].</p>
<p>Name comments</p>	<p>General: Referred to as the Mirror Plateau faults by Love (p. 1751, 1961 #3801). These faults are mostly on the Mirror Plateau and extend to the southeast.</p> <p>Section: This informally named section includes older faults on Mirror Plateau that locally offset 0.63-Ma Lava Creek Tuff, but which do not show evidence of post glacial (<15 ka) movement. These faults are on the Mirror Plateau, and extend 7 km to the southeast.</p>
<p>County(s) and State(s)</p>	<p>PARK COUNTY, WYOMING</p>
<p>Physiographic province(s)</p>	<p>MIDDLE ROCKY MOUNTAINS</p>
<p>Reliability of location</p>	<p>Good Compiled at 1:125,000 scale.</p> <p><i>Comments:</i> Originally studied by Love (1961 #3801). First mapped by USGS at 1:62,000 scale as bedrock geology quadrangles by Prostka and others (1975 #2259; 1975 #2260; 1975 #3802) and surficial geology quadrangles by Pierce (1974 #2217; 1974 #2238) and Richmond and Waldrop (1972 #2261). Later recompiled at 1:125,000 scale on Yellowstone Park Maps (U.S. Geological Survey, 1972 #639; U.S. Geological Survey, 1972 #1057). Fault traces recompiled at 1:125,000-scale on map with topographic base.</p>
<p>Geologic setting</p>	<p>These faults are parallel to and 7-11 km outboard of the northeast of the margin the 0.63-Ma Yellowstone caldera (Christiansen, 2001 #1784), which is on the leading edge of the Yellowstone hotspot (Pierce and Morgan, 1992 #539). They form of an anastomosing band on and near the Mirror Plateau (fig. 3 and Plate 1, Love, 1961 #3801), where the bedrock is Eocene volcanic rock partly covered with 0.63 Ma Lava Creek Tuff (U.S.</p>

	Geological Survey, 1972 #639). P-wave and gravity studies suggest hydrothermal or partially molten material is at depth beneath this area (Smith and Braile, 1993 #2271).
Length (km)	This section is 23 km of a total fault length of 23 km.
Average strike	N43°W (for section) versus N39°W (for whole fault)
Sense of movement	Normal
Dip Direction	NE; SW
Paleoseismology studies	
Geomorphic expression	Scarps recognizable on aerial photographs, but generally less sharply defined than those for faults in the younger section [749a]. Scarps mostly or entirely on bedrock.
Age of faulted surficial deposits	Lava Creek Tuff (0.63 Ma) commonly offset along parts of faults.
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) <i>Comments:</i> Commonly along fault length, the 0.63 Ma Lava Creek Tuff is offset. Younger deposits may be offset, especially where closely associated with the Younger Mirror Plateau faults section [749a]. The compiler considers that an age of 130 ka is probable for most of these faults, but conservatively places these faults in the middle and late Quaternary (<750 ka) category.
Recurrence interval	<i>Comments:</i> Limits on recurrence are <600 ka to possibly <100 ka. The 0.63 Ma Lava Creek Tuff is commonly offset along the length of the fault. Younger deposits may be offset, thus a recurrence interval of 100 k.y. or less seems likely.
Slip-rate category	Less than 0.2 mm/yr <i>Comments:</i> Net vertical offset of perhaps 5 m has occurred on individual faults in the group in the past 100,000 yrs, which would suggest a long-term slip rate of only 0.05 mm/yr, thus, the

	low slip-rate category inferred by compiler.
Date and Compiler(s)	1998 Kenneth L. Pierce, U.S. Geological Survey, Emeritus
References	<p>#1784 Christiansen, R.L., 2001, The Quaternary and Pliocene Yellowstone Plateau volcanic field of Wyoming, Idaho, and Montana: U.S. Geological Survey Professional Paper 729-G, 145 p., 3 pls., scale 1:125,000.</p> <p>#3801 Love, J.D., 1961, Reconnaissance study of Quaternary faults in and south of Yellowstone National Park, Wyoming: Geological Society of America Bulletin, v. 72, p. 1749-1764.</p> <p>#2217 Pierce, K.L., 1974, Surficial geologic map of the Abiathar Peak and parts of adjacent quadrangles, Yellowstone National Park, Wyoming and Montana: U.S. Geological Survey Miscellaneous Geologic Investigations I-646, scale 1:62,500.</p> <p>#2238 Pierce, K.L., 1974, Surficial geologic map of the Tower Junction quadrangle and part of the Mount Wallace quadrangle, Yellowstone National Park, Wyoming and Montana: U.S. Geological Survey Miscellaneous Geologic Investigations I-647, scale 1:62,500.</p> <p>#539 Pierce, K.L., and Morgan, L.A., 1992, The track of the Yellowstone hot spot—Volcanism, faulting, and uplift, <i>in</i> Link, P.K., Kuntz, M.A., and Platt, L.B., eds., Regional geology of eastern Idaho and western Wyoming: Geological Society of America Memoir 179, p. 1-53, 1 pl.</p> <p>#2260 Prostka, H.J., Blank, H.R., Jr., Christiansen, R.L., and Ruppel, E.T., 1975, Geologic map of the Tower Junction quadrangle, Yellowstone National Park, Wyoming and Montana: U.S. Geological Survey Geologic quadrangle Map GQ-1247, scale 1:62,500.</p> <p>#3802 Prostka, H.J., Ruppel, E.T., and Christiansen, R.L., 1975, Geologic map of the Abiathar Peak quadrangle, Yellowstone National Park, Wyoming: U.S. Geological Survey Geologic quadrangle Map GQ-1244, 1 sheet, scale 1:62,500.</p> <p>#2259 Prostka, H.J., Smedes, H.W., and Christiansen, R.L., 1975, Geologic map of the Pelican Cone quadrangle, Yellowstone National Park and vicinity, Wyoming: U.S. Geological Survey</p>

Geologic quadrangle Map GQ-1243.

#2261 Richmond, G.M., and Waldrop, H.A., 1972, Surficial geologic map of the Pelican Cone quadrangle, Yellowstone National Park and adjoining area, Wyoming: U.S. Geological Survey Miscellaneous Geologic Investigations I-638, scale 1:62,500.

#2271 Smith, R.B., and Braile, L.W., 1993, Topographic signature, space-time evolution, and physical properties of the Yellowstone-Snake River plain volcanic system—the Yellowstone hotspot, *in* Snoke, A.W., Steidtmann, J.R., and Roberts, S.M., eds., *Geology of Wyoming: Geological Survey of Wyoming, Memoir No. 5*, p. 694-754.

#1057 U.S. Geological Survey, 1972, Surficial geologic map of Yellowstone National Park: U.S. Geological Survey Miscellaneous Geologic Investigations I-710, 1 sheet, scale 1:125,000.

#639 U.S. Geological Survey, 1972, Geologic map of Yellowstone National Park: U.S. Geological Survey Miscellaneous Geologic Investigations I-711, 1 sheet, scale 1:125,000.

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