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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.

Snake River caldera faults (Class A) No. 765

Last Review Date: 1998-04-01

citation for this record: **Pierce, K.L., compiler, 1998, Fault number 765, Snake River caldera faults, 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 02:02 PM.**

Synopsis	Includes about a dozen generally younger north- to northeast-trending faults near the south entrance to Yellowstone National Park. The faults are just outside the 0.63-Ma caldera boundary, and inside the 2.1-Ma caldera of the Yellowstone volcanic field. They are described collectively here because they all offset the 0.63-Ma Lava Creek tuff and the 0.93- to 0.97-Ma Lewis Canyon rhyolite flow. Conversely, older faults that could be included within this group are described separately "faults in boundary region of Yellowstone and Grand Teton National Parks" [764].
Name comments	Referred to as faults of the Snake River caldera segment by Christiansen (2001 #1784). Renamed Snake River caldera faults herein to avoid usage of the term "segment". This group of faults include the Beulah-Hering Lakes fault, the Polecat Creek faults, the Falls River fault, and the Lake of the Woods fault of Ostenaa and others (1993 #2290). These faults are inside the Snake River

	caldera, which is the eruptive source of the 2.1-Ma Huckleberry Ridge Tuff.
County(s) and State(s)	TETON COUNTY, WYOMING
Physiographic province(s)	MIDDLE ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:125,000 scale. *Comments:* Traces mapped at 1:125,000 scale by R.L. Christiansen (2001 #1784); those faults entirely within the national park were previously shown at 1:125,000 scale by the U.S. Geological Survey (1972 #639). Those faults in western part of area mapped at 1:62,500 by Christiansen and others, 1978, #2282). Fault traces recompiled at 1:125,000-scale on map with topographic base. The Beulah-Hering Lakes fault, the Polecat Creek faults, the Falls River fault, and the Lake of the Woods fault are shown by Ostenaa and others (figs. 6 and 7, 1993 #2290).
Geologic setting	These intracaldera faults are just south of the 0.63-Ma Lava Creek (youngest) Yellowstone caldera, but inside a reentrant of the older 2.1-Ma Snake River caldera of the Yellowstone volcano field.
Length (km)	14 km.
Average strike	N4°E
Sense of movement	Normal
Dip Direction	E *Comments:* All faults dip easterly except westernmost fault, which dips northwest.
Paleoseismology studies	
Geomorphic expression	Expressed as bedrock scarps on the Lava Creek tuff and Lewis Canyon Rhyolite. Hering Lake and nearby lakes are bordered by fault scarps that are as much as 90 m high on bedrock (Ostenaa and others, 1993 #2290).

Age of faulted surficial deposits	The faulted Lava Creek Tuff is 0.63 Ma and the Lewis Canyon rhyolite is 0.93-0.97 Ma (Obradovich, 1992 #2268). However, the faults near Hering Lake do not offset the 70-ka Pitchstone Plateau rhyolite flow. No offset was observed in surficial deposits by Richmond (1973 #2283, #2284).
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* The faults are less than 630 ka. Near Hering Lake, the faults are buried by the 70-ka Pitchstone Plateau rhyolite flow (U.S. Geological Survey, 1972, #639).
Recurrence interval	*Comments:* The faults near Hering Lake do not offset the 70-ka Pitchstone Plateau rhyolite flow, indicating a minimum (incomplete) value for recurrence.
Slip-rate category	Less than 0.2 mm/yr *Comments:* The best-expressed scarp south of Hering Lake has a height of about 90 m and is on a rhyolite flow that formed about 95 ka, thus indicating a low long-term slip rate. Most of the scarps in the group have lower topographic height and, thus, probably lower slip rates. Wong and others (2000 #4484) suggested fault slip rates for a number of separately named faults in the group. These include 0.07 mm/yr for the Beulah-Hering Lakes faults based on 60 m of offset on Lewis Canyon rhyolite (930?10 ka); 0.08 mm/yr for the Polecat Creek faults based on 61 m of offset on these same deposits; 0.02 mm/yr for the Falls River based on a lack of recognition of 1-m-high scarps on 70-150 ka deposits; and 0.001 mm/yr for the Lake of the Woods fault based on a lack of recognition of 1-m-high scarps on the Lewis Canyon rhyolite. The above mentioned geologic slip rates, along with the late Quaternary characteristics of this fault (overall geomorphic expression, continuity of scarps, age of faulted deposits, etc.) suggest the slip rate during this period has been <0.2 mm/yr.
Date and Compiler(s)	1998 Kenneth L. Pierce, U.S. Geological Survey, Emeritus
References	#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.

#2282 Christiansen, R.L., Blank, H.R., Jr., Love, J.D., and Reed, J.C., Jr., 1978, Geologic map of the Grassy Lake Reservoir quadrangle, Yellowstone National Park and vicinity, Wyoming: U.S. Geological Survey Geologic quadrangle Map GQ-1459.

#2268 Obradovich, J.D., 1992, Geochronology of the late Cenozoic volcanism of Yellowstone National Park and adjoining areas, Wyoming and Idaho: U.S. Geological Survey Open-File Report 92-408, 45 p.

#2290 Ostenaa, D.A., Wood, C., and Gilber, J.D., 1993, Seismotectonic study for Grassy Lake Dam-Minidoka Project, Wyoming: U.S. Bureau of Reclamation Seismotectonic Report 93-3, 68 p., scale 1:24,000.

#2283 Richmond, G.M., 1973, Surficial geologic map of the Huckleberry Mountain quadrangle, Yellowstone National Park and adjoining area, Wyoming: U.S. Geological Survey Miscellaneous Geologic Investigations I-639, scale 1:62,500.

#2284 Richmond, G.M., 1973, Surficial geologic map of the Warm River Butte quadrangle, Yellowstone National Park and adjoining area, Wyoming: U.S. Geological Survey Miscellaneous Geologic Investigations I-645, scale 1:62,500.

#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.

#4484 Wong, I., Olig, S., and Dober, M., 2000, Preliminary probabilistic seismic hazard analyses—Island Park, Grassy Lake, Jackson Lake, Palisades, and Ririe Dams: U.S. Department of the Interior, Bureau of Reclamation Technical Memorandum D8330-2000-17.

Questions or comments?