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Quaternary Fault and Fold Database of the United States

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Stagner Creek fault (Class A) No. 773

Last Review Date: 1999-05-12

citation for this record: **Machette, M.N., compiler, 1999, Fault number 773, Stagner Creek 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 02:02 PM.**

Synopsis	Although no detailed investigations have been made of this fault, reconnaissance studies indicate there has been latest Quaternary movement on the medial 27-km-long portion of the fault. The Stagner Creek fault is a north-northwest-striking fault that forms the southern margin of the Owl Creek uplift. Evidence for surficial deformation along the fault is distributed over a zone as wide as 3 km wide, south of the range front. Although the surficial geology and scarp morphology along the fault have been investigated, no paleoseismic investigations (i.e., trenching) have been performed. Detailed mapping and morphometric studies of scarps along the fault indicate a long period of recurrent movement during the Quaternary. The apparent slip rate is low (<0.2 mm/yr) and recurrence intervals between faulting events may be 8-22 k.y.
Name	The fault was mapped and named by Geomatrix Consultants

comments	(1988 #2973) for its proximity to Stagner Creek, a small stream that drains the south face of Stagner Mountain, which is about 50 km north of Riverton, Wyoming, and west of Boysen Reservior. The fault is along the southern margin of the Owl Creek and Bridger Mountains, on the northeastern margin of the Wind River valley. The fault probably extends from Mexican Pass (on the west) to Tough Creek (on the east) as shown by Geomatrix Consultants (1988 #2973). **Fault ID:** Referred to as normal fault 10 (Stagner Creek) on figure 2-1 of Geomatrix Consultants (1988 #2973).
County(s) and State(s)	FREMONT COUNTY, WYOMING
Physiographic province(s)	MIDDLE ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Trace of fault scarps and lineaments shown on detailed map (ca. 1:100,000 scale; figure 3-1) of Geomatrix Consultants (1988 #2973). Also shown in generalized form at 1:250,000 scale on plate 2 in Geomatrix Consultants (1988 #2973), and at 1:1,000,000 scale by Case and others (Case and others, 1997 #3449). Only the late Quaternary (medial) portion of the fault is shown; Quaternary displacement is not known for the distal portions of the underlying bedrock fault. Traces of fault scarps (and some lineaments) transferred from 1:100,000-scale map (fig. 3-1) in Geomatrix Consultants (1988 #2973) and fitted to 1:250,000-scale topographic base map.
Geologic setting	This generally north-northwest-striking fault forms the southern margin of the Owl Creek uplift, which includes the Owl Creek and Bridger Mountains. The bedrock fault probably extends about 38 km, from Mexican Pass on the west to Tough Creek on the east (Geomatrix Consultants, 1988 #2973), although evidence of Quaternary displacement is only seen on the central 27 km of the fault. The Owl Creek uplift, north of the fault, is primarily an asymmetric anticline bordered on the south by the South Owl Creek Mountains thrust (Laramide). The Stagner Creek fault is generally coincident with an unnamed bedrock fault mapped by Tourtelot and Thompson (1948 #3447). Surficial deformation along the fault is distributed over a zone as wide as 3 km west of

	Boysen Reservoir, and as a single scarp near Birdseye Creek, east of Boysen Reservoir.
Length (km)	27 km.
Average strike	N77°W
Sense of movement	Normal *Comments:* Predominantly normal, down to the south movement as shown by the aspect of Quaternary fault scarps.
Dip Direction	S *Comments:* Although no subsurface information exists, the linear trace suggests the fault has a high-angle dip.
Paleoseismology studies	
Geomorphic expression	A zone of nearly continuous small fault scarps, springs, and lineations are present 0.5 to 4.5 km south of the mountain front, with the majority of scarps being 2-3 km to the south of the mountain front. According to mapping of Geomatrix Consultants (1988 #2973), all but one of the dozen or so scarps face south and down-slope on the piedmont of the Owl Creek Mountains. Geomatrix Consultants (1988 #2973) studied most of the scarps, but only did detailed investigations of the surficial geology and scarp morphology at two locations: 1) Jewel Creek, near the east end of the fairly continuous ruptures 4 km west of Boysen Reservoir; and 2) Birdseye Creek, along an isolated scarp that marks the eastern end of the surficial rupture about 3 km east of Boysen Reservoir. At Jewell Creek, Geomatrix Consultants' (fig. 3-7 in 1988 #2973) mapping shows scarps having as much as 2.3 m of cumulative net vertical displacement (NVD) on the oldest surficial deposit (Q1) and scarps with 0.5 m NVD on the youngest deformed surface (Q4). Intermediate amounts of displacement on units Q2 and Q3 yield convincing evidence for a long period of recurrent faulting at this study site. At Birdseye Creek, Geomatrix Consultants' (fig. 3-4 in 1988 #2973) mapping shows scarps having as much as 2.2-2.3 m NVD on the two older surficial deposits (Q1, Q2) and scarps with 0.6 m

	NVD on the youngest deformed surface (Q4). These results are comparable to those at Jewell Creek, and substantiate their conclusion of a long period of recurrent movement along the fault. Scarp morphology studies at both sites reveal gentle scarp slopes (4.6?-7?) for the 1 m or higher scarps, and their analyses suggest latest Quaternary for their formation.
Age of faulted surficial deposits	Five ages of surficial deposits were mapped in two study areas. These deposits range from Q1 of early(?) late Pleistocene (60-130 ka) age to Q5, which is considered to be of Holocene age (<10 ka). The faults cut units Q4 through Q1, with increasing (albeit small) amounts of cumulative displacement. Geomatrix Consultants (1988 #2973) compared soil properties from these deposits with dated glacial and outwash deposits to estimate numerical ages for deposits Q2-Q5. Although these soil ages have large inherent errors, they provide a reasonable basis for estimating times of surface stabilization and placing limits on the times of faulting. Their estimates were as follows: unit Q2, 30-60 ka; unit Q3, 15-40 ka, and unit Q4, 8-20 ka. Unit Q5, which is no where disturbed by the Stagner Creek fault, was considered to be 1-7 ka (Holocene).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* The most recent movement was estimated to be younger than 8-20 ka (latest Pleistocene or early Holocene) on the basis of soil development on faulted unit Q2, and 4-12 ka on the basis of scarp morphology.
Recurrence interval	*Comments:* Geomatrix Consultants (1988, Table 3-1 #2973) summary of displacements and age estimates from the Birdseye and Jewell Creek study areas was used to determine possible recurrence intervals for the fault. Inasmuch as 0.5-m-high scarps were found on the youngest (Q4) faulted surfaces, this value was used to calculate average recurrence intervals of about 8-20 k.y. (4-5 events for 2.2-2.3 m of offset on unit Q2 since 30-60 ka).
Slip-rate category	Less than 0.2 mm/yr *Comments:* Geomatrix Consultants' (1988 #2973) summary of

	displacements and age estimates from the Birdseye Creek study area (Table 3-1) yielded a variety of data that could be used to calculate slip rates. The net slip rates (using a 60? fault dip) ranged from 0.03 to 0.08 mm/yr, whereas the vertical (component only) slip rates were slightly less at 0.02-0.07 mm/yr. The long and short term rates showed no particular trend, and thus a value of 0.05?0.03 mm/yr probably describes the probable late Quaternary slip rate for the Stagner Creek fault. These values were used to place the fault in the low slip-rate category of <0.2 mm/yr.
Date and Compiler(s)	1999 Michael N. Machette, U.S. Geological Survey, Retired
References	#3449 Case, J.C., Larsen, L.L., Boyd, C.S., and Cannia, J.C., 1997, Earthquake epicenters and suspected active faults with surficial expression in Wyoming: Geological Survey of Wyoming Preliminary Hazards Report 97-1, 1 sheet, scale 1:1,000,000. #2973 Geomatrix Consultants, Inc., 1988, Northwestern Wind River Basin seismotectonic evaluation: Technical report to U.S. Department of Interior, Bureau of Reclamation, Denver, under Contract 6-CS-81-07310, 116 p., 3 pls. #3447 Tourtelot, H.A., and Thompson, R.M., 1948, Geology of the Boysen area, central Wyoming: U.S. Geological Survey Oil and Gas Investigations Preliminary Map 91, 2 sheets.