Jump to Navigation

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.

North Granite Mountains fault system, western section (Class B) No. 777

Last Review Date: 1999-05-19

citation for this record: **Machette, M.N., compiler, 1999, Fault number 777, North Granite Mountains fault system, western 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 02:02 PM.**

Synopsis	This 95-110 km long east-west trending, south-dipping fault system is located along the north margin of the Granite Mountains within the Wyoming basin province of central Wyoming. Two episodes of movement have been documented. The first was near the end of the Eocene when the Granite Mountains were uplifted at least 3 km, and the second was during the Pliocene to Quaternary? when the fault was reactivated in the opposite sense (down-to-the-south), resulting in subsidence of the previously uplifted Precambrian-cored Sweetwater Arch (Granite Mountains). There has been a thorough reconnaissance of the fault and a detailed paleoseismic investigation at one location along its western half (section). These studies revealed no evidence for late Quaternary deformation on the western section of the fault, but could not preclude Quaternary deformation on the basis of discontinuous lineaments, springs, alignment of

	vegetation, and fault scarps. Thus, we include the western section as a Class B (suspected Quaternary) feature. Conversely, there is no evidence for Quaternary deformation along the eastern half (section) of the fault, and thus it is not discussed in this compilation. It is instead described as a Class C structure, which are unnumbered.
Name comments	On the basis of Geomatrix Consultants' (1988 #2980) mapping, this informally named section is taken as being the western part of the North Granite Mountains fault between West Muskrat Basin (sec. 6, T. 31 N., R. 91 W., about 2 km west of the Dry Lakes), east to the East Fork of Sage Hen Creek (sec. 36, T. 32 N., R. 89 W.). **Fault ID:** Referred to as normal fault 3 on figure 2-1 of Geomatrix Consultants (1988 #2973) and fault 242 of Witkind (1975 #819).
County(s) and State(s)	FREMONT COUNTY, WYOMING NATRONA COUNTY, WYOMING
Physiographic province(s)	WYOMING BASIN
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Trace based on western part of mapped fault system as shown at about 1:140,000 scale in fig. 4-1 by (Geomatrix Consultants, 1988 #2980). This is a generalization from that shown by Love and others (1979 #3470) and Love and Christiansen (1985 #2287). Geomatrix Consultants (1988 #2980) also showed the fault and older structures at 1:250,000 scale (plate 2) with a topographic-base. The fault is shown in generalized fashion at 1:500,000 scale by Witkind (1975 #819) and Geomatrix Consultants (1988 #2980), and at 1:1,000,000 scale by Case and others (Case and others, 1997 #3449). Trace of fault transferred from 1:140,000-scale map to 1;250,000 scale topographic base map.
Geologic setting	The North Granite Mountains fault trends east-west along the northern flank of the Granite Mountains. The fault system forms the southern margin of the Sweetwater Arch, a west-northwest-trending asymmetic Laramide-age anticline consisting of a steeply dipping southwestern limb and a gently dipping

	northeastern limb (Love, (1970 #3445). The central to western portion of the arch is comprised of Precambrian granite, which protrudes as knobs above Miocene to Pliocene sediment. The southern limb is comprised of the South Granite Mountains. After being buried by Eocene conglomerate, the arch started to subside via structural downwarping along the Split Mountain syncline and by normal displacement along the outward-bounding North and South Granite Mountain fault systems. Subsidence continued into the Pliocene, but Quaternary movement has only been documented on three sections of the South Granite Mountains fault system [779]. The system's east-west orientation and normal sense of movement are consistent with the north-south extensional stress regime proposed for the Wyoming foreland by Zoback and Zoback (1980 #176).
Length (km)	28 km.
Average strike	
Sense of movement	Normal *Comments:* Down to the south in Pliocene to Quaternary time; in Eocene, movement was in opposite sense (down-to-the-north) (Love, 1970 #3445). However, some scarps near the Dry Lakes have north-facing scarps, which may imply down-to-the-north movement.
Dip Direction	S *Comments:* According to Love (Love, 1970 #3445), the dip appears nearly vertical.
Paleoseismology studies	Site 777-1: The Dry Lakes locality. Two excavations, an exploratory trench and a soil pit, were made to examine subsurface materials at The Dry Lakes locality (Geomatrix Consultants, 1988 #2980, fig. 4-1). This site contains two closed depressions that are located near the western end of the North Granite Mountains fault. The depressions appear to be eolian deflation basins, but they are associated with nearby east-west trending lineaments south of the main fault. A low north-facing scarp to the east of the largest of the Dry Lakes has been enhanced by fluvial erosion. Geomatrix Consultants (1988 #2980, fig. 4-3) excavated a 52-m-long exploratory trench across this scarp to investigate the possibility that it is related to faulting.

	Stratigraphic units exposed in the trench indicate that there has been no displacement of these units. However, joints exposed in indurated pebble gravel (Miocene? and Oligocene? conglomerate), both in the trench and in adjacent outcrops, are the likely cause of the east-west trending lineaments in the vicinity of The Dry Lakes. On the basis of the trenching and soil age estimates, Geomatrix Consultants (1988 #2980) concluded that there has been no late Pleistocene or Holocene displacement across lineaments associated with the western section of the North Granite Mountains fault.
Geomorphic expression	There is no evidence for deformation of late Quaternary alluvial-fan or terrace deposits along this fault section. However, Geomatrix Consultants (1988 #2980) found many discontinuous lineaments with low scarps, breaks in slope, springs and vegetation lines. They investigated these features in the field and found them to be associated with bedrock faulting. Thus, although no evidence was found for late Quaternary displacement, we suspect that there could be (older) Quaternary displacement along this section of the fault.
Age of faulted surficial deposits	No evidence for late Quaternary deformation (Geomatrix Consultants, 1988 #2980), but Quaternary faulting may be present as evidenced by fault-related lineaments along most of the fault section.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* No evidence for late Quaternary (<130 ka) movement on this section of the fault, but we suspect that there may be Quaternary faulting as evidenced by fault-related lineaments along most of the fault section.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Low slip-rate category is inferred by compiler on basis of a lack of late Quaternary faulting of alluvial-fan or terrace deposits along the section.
Date and	1999

Compiler(s)	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. #2980 Geomatrix Consultants, Inc., 1988, Wyoming Basin geomorphic province seismotectonic evaluation: Technical report to U.S. Department of Interior, Bureau of Reclamation, Denver, under Contract 6-CS-81-07310, 167 p., 2 pls. #3445 Love, J.D., 1970, Cenozoic geology of the Granite Mountain area, central Wyoming: U.S. Geological Survey Professional Paper 495-C, 154 p., 10 pls. #2287 Love, J.D., and Christiansen, A.C., 1985, Geologic map of Wyoming: State Geologic Map, 3 sheets, scale 1:500,000. #819 Witkind, I.J., 1975, Preliminary map showing known and suspected active faults in Wyoming: U.S. Geological Survey Open-File Report 75-279, 35 p. pamphlet, 1 sheet, scale 1:500,000. #176 Zoback, M.L., and Zoback, M., 1980, State of stress in the conterminous United States: Journal of Geophysical Research, v. 85, no. B11, p. 6113-6156.

Questions or comments?

Facebook Twitter Google Email
Hazards
Design Ground MotionsSeismic Hazard Maps & Site-Specific DataFaultsScenarios
EarthquakesHazardsDataEducationMonitoringResearch
Search... Search
HomeAbout UsContactsLegal