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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.

Eagle Bay fault, middle section (Class A) No. 757b

Last Review Date: 2011-02-23

citation for this record: **Pierce, K.L., and Haller, K.M., compilers, 2011, Fault number 757b, Eagle Bay fault, middle 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:** The Eagle Bay fault strikes north across the margin of the 0.63-Ma Yellowstone caldera. Although the fault in Yellowstone Lake has been imaged by seismic-reflection profiles collected concurrently with multibeam bathymetric data, it is only nominally mentioned in recent publications (Finn and Morgan, 2002 #7054; Johnson and others, 2003 #7050; Morgan and others, 2003 #7053, 2007 #7051; Pierce and others, 2007 #7052). **Sections:** This fault has 3 sections. The middle section of the Eagle Bay fault [757b] offsets Holocene lake sediment adjacent to and in the Eagle Bay-Flat Mountain Arm area of Yellowstone Lake. Studies concluded that there was only one post-glacial event that offsets lake sediments on this section of the fault. The main fault scarp is as much as 9 m high, but when adjusted for the vertical offset from multiple antithetic scarps, the resulting net

	stratigraphic offset is less than one-half this amount. Near the northern section of the fault, seismic profiles show that post-glacial lake sediment is vertically offset, although the location and trace of the fault are not yet well controlled. The northern section of this fault probably connects to the Lake Hotel fault [755]. Vertical displacement on the southern section of the fault has formed a bedrock scarp on the 0.63-Ma Lava Creek Tuff.
Name comments	**General:** Named the Eagle Bay fault by Locke and others (1992 #308). It was previously known as the Yellowstone Lake fault of Witkind (1975 #819). **Section:** This informally named section has observed post-glacial offset, whereas southern section seems older. **Fault ID:** Refers to fault 238 of Witkind (1975 #819).
County(s) and State(s)	TETON COUNTY, WYOMING
Physiographic province(s)	MIDDLE ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Location of the underwater sections beneath Eagle Bay and the Flat Mountain arm are constrained by 450 km of high-resolution seismic-reflection profiles that were collected concurrently with multibeam bathymetric data (Pierce and others, 2007 #7052, fig. 2).
Geologic setting	This is one of several north-trending, range-front faults in the area between the 0.63-Ma Yellowstone caldera and the Teton fault to the south [768]. However, it is the only fault that cuts across the caldera's structural boundary. This fault is near a swarm of small earthquakes that occurred in 1989 (fig. 1, Peyton and Smith, 1990 #2270).
Length (km)	This section is 6 km of a total fault length of 31 km.
Average strike	N7°E (for section) versus N3°E,N5°E (for whole fault)
Sense of movement	Normal *Comments:* Presence of 50- to 400-m-wide graben suggests predominately normal slip.

Dip Direction	E
Paleoseismology studies	
Geomorphic expression	Well-expressed fault scarp is as much as 9 m high mostly on gravelly and sandy lakeshore deposits with a graben on the east side. Locke and others (1992 #308) suggested a late Holocene age based on scarp's morphology, which is less degraded than the Drum Mountains, Utah, (early Holocene) and Lake Bonneville shoreline (latest Pleistocene) scarps.
Age of faulted surficial deposits	Holocene and latest Pleistocene (Pinedale) sand and gravel lakeshore deposits are offset along this section. Richmond (1974 #2276) mapped the fault as offsetting emergent Holocene lake deposits. Locke and others (1992 #308) mapped the fault trace, profiled the fault scarp, and determined the time of faulting in relation to the shorelines of Yellowstone Lake.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Locke (1992 #308) sampled charcoal from a hand-dug pit in scarp colluvium (?) that yielded a 14C age of 4,540 ? 40 yr BP, which is considered to be a minimum time for the scarp-forming event. Locke and Meyer (1994 #2275) concluded that the fault offsets the S5 shoreline (ca. 4.5 ka in Locke, 1992 #308), whereas the S4 shoreline (ca. 3 ka in Locke, 1992 #308) is eroded into the fault scarp.
Recurrence interval	 *Comments:* One event occurred about 5 ka, and no earlier events have occurred since 12 ka (Locke and others, 1992 #308).
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Locke and others (p. 515, 1992 #308) concluded more than 5 m of vertical offset occurred in one event about 5,000 yr ago. They also concluded that this was the only post-glacial (past 12 k.y.) event. These data suggest a slip rate in the range of the assigned category. Referring to the same data, Wong and others (2000 #4484) modeled fault slip rates of 0.4 mm/yr (60% weight) and 1.4 mm/yr (40% weight) for the entire fault in a regional

	probabilistic seismic-hazard assessment.
Date and Compiler(s)	2011 Kenneth L. Pierce, U.S. Geological Survey, Emeritus Kathleen M. Haller, U.S. Geological Survey
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