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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.

Safford fault zone, northern section (Class A) No. 936a

Last Review Date: 1996-01-02

Compiled in cooperation with the Arizona Geological Survey

citation for this record: **Pearthree, P.A., compiler, 1996, Fault number 936a, Safford fault zone, northern 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 03:12 PM.**

Synopsis	**General:** Discontinuous faults scarps trend north to northwest along the eastern front of the Pinaleno Mountains. Reconnaissance geologic mapping, soils studies, and analyses of scarp morphology indicate that several Quaternary faulting events have occurred along the Safford fault zone. The northern and southern sections of the fault zone each are about 15 km long; they are separated by an approximately 2-km-long gap that has no preserved scarps. There is evidence for recurrent, but infrequent Quaternary faulting event on each section. The youngest faulting event on both sections probably occurred during the latest

	Pleistocene, but timing data are not sufficiently precise to indicate whether this was one large event or two smaller events. **Sections:** This fault has 2 sections.
Name comments	**General:** Fault scarps were noted by Swan (1976 #2127) and J.C. Witcher (oral report); mapped by Menges and Pearthree (1983 #2073); remapped and analyzed by Machette and others (1986 #1033). **Section:** This name applies to the northern part of the Safford fault zone. These faults are at or near the eastern front of the Pinaleno Mountains, from the mouth of Gillespie Canyon to the northeast corner of the mountain range at Deadman Ridge.
County(s) and State(s)	GRAHAM COUNTY, ARIZONA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Mapped at 1:250,000 scale by Machette et al (1986 #1033), based on 1:48,000-scale mapping by Pearthree and Calvo (unpublished data, 1981).
Geologic setting	Fault scarps parallel the north to northwest trend of the east side of the Pinaleno Mountains. Scarps are very close to the rugged, linear mountain front along the northern section of the fault. The sharpness of the mountain front suggests a fairly active normal fault, but it is probably due at in part to the resistant gneissic rocks of the mountains. Fault scarps are near the western margin of a middle and late Cenozoic sedimentary basin that is up to 3000 m deep. Faults associated with the scarps may merge downward into a major, moderate to low-angle, northeast-dipping detachment fault (Kruger, 1991 #2126). Late Pleistocene, middle Pleistocene, and early middle Pleistocene surfaces are displaced by progressively greater amounts, indicating recurrent movement. Total middle Quaternary and younger displacement is 5 to 10 m.
Length (km)	This section is 15 km of a total fault length of 31 km.
Average strike	N19°W (for section) versus N33°W (for whole fault)
Sense of	Normal

movement	*Comments:* Interpreted from topography and seismic reflection lines (Kruger, 1991 #2126).
Dip	About 50° in the shallow subsurface, possibly decreasing to about 20° below 2-3 km. *Comments:* Interpreted from seismic reflection lines (Kruger, 1991 #2126).
Paleoseismology studies	
Geomorphic expression	Low to moderately high scarps formed on Pleistocene relict alluvial-fan surfaces. Late Pleistocene fans are offset 1-2 m, whereas middle Pleistocene fans are offset 2-7 m. Morphologic analyses of fault scarps suggest a latest Pleistocene age of youngest rupture along the northern part of the fault.
Age of faulted surficial deposits	Early to middle Pleistocene, middle Pleistocene, and late Pleistocene . Deposit ages are estimated using geomorphic surface characteristics and their topographic position in the landscape, and soil development.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Analysis of fault scarp morphology suggests a latest Pleistocene age of youngest faulting. Deposits with an estimated age as young as late Pleistocene (based on soil development) are faulted, suggesting that the youngest faulting event occurred since the latest Pleistocene.
Recurrence interval	*Comments:* Recurrence intervals are unknown but could be about 100 k.y. Late Pleistocene, middle Pleistocene, and early middle Pleistocene surfaces are displaced by progressively greater amounts, indicating recurrent movement. Total middle Quaternary and younger displacement is 5 to 10 m, implying that recurrence intervals between large surface ruptures are quite long.
Slip-rate	Less than 0.2 mm/yr

category	*Comments:* A low slip rate is inferred based on less than 10 m of vertical displacement in the middle and late Quaternary (the past 500 to 750 k.y.).
Date and Compiler(s)	1996 Philip A. Pearthree, Arizona Geological Survey
References	#2126 Kruger, J.M., 1991, Seismic crustal structure beneath the Safford basin and Pinaleno Mountains—Implications for Cenozoic extension and metamorphic core complex uplift in SE Arizona: Tucson, University of Arizona, unpublished Ph.D. dissertation, 158 p. #1033 Machette, M.N., Personius, S.F., Menges, C.M., and Pearthree, P.A., 1986, Map showing Quaternary and Pliocene faults in the Silver City 1° x 2° quadrangle and the Douglas 1° x 2° quadrangle, southeastern Arizona and southwestern New Mexico: U.S. Geological Survey Miscellaneous Field Studies Map MF-1465-C, 12 p. pamphlet, 1 sheet, scale 1:250,000. #2073 Menges, C.M., and Pearthree, P.A., 1983, Map of neotectonic (latest Pliocene-Quaternary) deformation in Arizona: Arizona Geological Survey Open-File Report 83-22, 48 p., scale 1:500,000. #2127 Swan, M.M., 1976, The Stockton Pass fault: An element of the Texas lineament: University of Arizona, Dept. of Geosciences, unpublished M.S. thesis, 119 p.