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.

Big Chino fault (Class A) No. 951

Last Review Date: 1998-02-17

Compiled in cooperation with the Arizona Geological Survey

citation for this record: **Pearthree, P.A., compiler, 1998, Fault number 951, Big Chino 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 03:14 PM.**

Synopsis	The Big Chino fault is located along the northeastern margin of Big Chino Valley, a northwest-trending basin that is essentially at the boundary between the Basin and Range and the Colorado Plateaus Provinces. Locally, the fault offsets middle to late Quaternary alluvium by as much as 20–25 m; younger alluvial deposits are offset about 7–8 m. Lower to middle Holocene alluvium is not faulted even though morphologic analyses of fault scarps suggest an early Holocene time of youngest rupture. The fault has been fairly active in the late Quaternary, and the youngest rupture probably occurred 10–15 ka.
Name comments	Partially mapped and named the "Big Chino fault or monocline" by Kreiger (1965 #2148; 1967 #2149). The fault was later studied

	and named the Big Chino fault by Soule (1978 #2150); additional studies have been conducted by Pearthree and others (1983 #2083) and Euge and others (1992 #2095).
County(s) and State(s)	YAVAPAI COUNTY, ARIZONA
Physiographic province(s)	BASIN AND RANGE COLORADO PLATEAUS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Trace based on interpretation of large-scale aerial photos by Chris Menges; trace transferred to 1:250,000-scale topographic base map.
Geologic setting	The Big Chino fault is located along the northeastern margin of Big Chino Valley, a northwest-trending basin at the boundary between the Basin and Range and the Colorado Plateaus Provinces. Displaced bedrock is exposed at the northwestern end of the fault, but middle to late Quaternary alluvium is displaced along most of the fault.
Length (km)	46 km.
Average strike	N44°W
Sense of movement	Normal *Comments:* The general sense of movement is inferred from topography, regional relations, and fault exposures. Some right-lateral oblique slip was suggested by Euge and others (1992 #2095).
Dip	60° to 70° SW *Comments:* Based on fault-plane exposures in alluvium exposed in fault trenches (Euge and others, 1992 #2095).
Paleoseismology studies	Site 951-1. Three trenches were excavated across the central part of the fault zone at a locality known as Sheep Camp (Euge and others, 1992 #2095). Two trenches were excavated in the mid-slope and the toe slope of a large scarp formed on a middle Pleistocene alluvial fan. They revealed multiple colluvial wedges interpreted as being from individual faulting events. A soil profile

	developed above the youngest colluvial wedge was considered to be of early Holocene age, implying that the youngest fault rupture is slightly pre-Holocene (i.e., latest Pleistocene). A third trench excavated across a fault scarp formed on upper Pleistocene alluvium estimated age 80 to 100 ka has about 8 m of surface displacement. Two or three colluvial wedges were interpreted from the stratigraphy, implying 2–3 faulting events that each had 2–4 m of displacement during approximately the past 100 k.y.
Geomorphic expression	Along most of its length, faulting is expressed as fairly continuous medium-high to high alluvial scarps located about 0.5 to 1 km downslope from the main topographic escarpment associated with Black Mesa. The position of the Quaternary fault scarps in the landscape has been interpreted as evidence for a long period of tectonic quiescence, during which the main escarpment was eroded back from the fault, prior to fault reactivation during the middle and late Quaternary (Pearthree and others, 1983 #2083; Euge and others, 1992 #2095). Thirty-nine topographic scarp profiles have been surveyed across the fault (Pearthree and others, 1983 #2083). Scarp heights vary from a few meters to about 30 m, increasing with the age of the deformed surface. The largest scarps are obviously the result of recurrent fault movement; they typically have steep slope elements with maximum slopes of between 25° and 30°. Virtually all of the surveyed scarps have maximum slope angles greater than 10°. Morphologic fault-scarp analyses suggest an early Holocene age of youngest rupture. Much smaller, antithetic, northeast-facing scarps exist along much of the base of the main scarp.
Age of faulted surficial deposits	Middle Pleistocene, late Pleistocene
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Age estimates for faulted and unfaulted deposits exposed in fault trenches imply that the youngest faulting event is pre-Holocene, but may have occurred during the latest Pleistocene (10–15 ka). Analysis of fault-scarp morphology suggests an early Holocene time for the youngest faulting event.

Recurrence interval	*Comments:* Although not explicitly stated, recurrence intervals could be on the order of 25–50 k.y. for the past 80–100 k.y. based on 2 or 3 faulting events in the past 80 to 100 k.y. (Euge and others, 1992 #2095).
Slip-rate category	Less than 0.2 mm/yr *Comments:* A low slip rate is inferred based on about 25 m of vertical displacement of middle Pleistocene alluvium (estimated age 200–400 ka Euge and others, 1992 #2095). In addition, upper Pleistocene alluvium (estimated age 80–100 ka Euge and others, 1992 #2095) is displaced about 8 m.
Date and Compiler(s)	1998 Philip A. Pearthree, Arizona Geological Survey
References	#2095 Euge, K.M., Schell, B.A., and Lam, I.P., 1992, Development of seismic acceleration maps for Arizona: Arizona Department of Transportation Report AZ92-344, 327 p., 5 sheets, scale 1:1,000,000. #2148 Krieger, M.H., 1965, Geology of the Prescott and Paulden quadrangles, Arizona: U.S. Geological Survey Professional Paper 467, 127 p., 5 sheets. #2149 Krieger, M.H., 1967, Reconnaissance geologic map of the Picacho Butte quadrangle, Yavapai and Coconino Counties, Arizona: U.S. Geological Survey Miscellaneous Investigations Map I-0500, 1 sheet, scale 1:62,500. #2083 Pearthree, P.A., Menges, C.M., and Mayer, L., 1983, Distribution, recurrence, and possible tectonic implications of late Quaternary faulting in Arizona: Arizona Geological Survey Open-File Report 83-20, 51 p. #2150 Soule, C.H., 1978, Tectonic geomorphology of the Big Chino fault, Yavapai County, Arizona: Tucson, University of Arizona, unpublished M.S. thesis, 114 p.