

# 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](#).

## Sevier/Toroweap fault zone, southern Toroweap section (Class A) No. 997d

Last Review Date: 1997-04-03

## Compiled in cooperation with the Arizona Geological Survey

*citation for this record:* Black, B.D., and Hecker, S., compilers, 1997, Fault number 997d, Sevier/Toroweap fault zone, southern Toroweap 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 03:11 PM.

### Synopsis

**General:** The Sevier/Toroweap fault zone is a long, north- to northeast-trending structure near the western margin of the Colorado Plateaus that has had substantial Cenozoic normal displacement. It extends from south of the Grand Canyon to north of Panguitch, Utah. The fault has generated a west-facing bedrock escarpment along the east side of Toroweap and Prospect Valleys, Ariz., and Long Valley, Utah. Detailed studies indicate that about 50 km of the fault, centered approximately on the Colorado River, ruptured during the middle to late Holocene. There is clear evidence for recurrent late Quaternary displacement events on this

section of the fault. The high, relatively linear fault escarpment continues about 10 km south of the young rupture, suggesting that the southern section of the fault zone has also been quite active during the Quaternary. The northern section of the fault zone on the Kanab Plateau has probably been less active during the Quaternary because there is minimal topographic relief across the fault, but there may have been late Quaternary displacement on this section as well.

**Sections:** This fault has 4 sections. The sections are defined based on changes in geomorphic expression and recent rupture history of the fault along strike. The northernmost section is entirely in Utah. The next one to the south spans the State line and the southern two sections are entirely in Arizona. The northern two sections are probably late Quaternary, the central section is Holocene, and the southern section appears to be significantly older.

**Name comments**

**General:** This fault is traditionally known as the Sevier fault in Utah and the Toroweap fault in Arizona. The Sevier fault in Utah as depicted by Hecker (1993 #642) consisted of two parts separated by a 50-km-long gap in surface faulting. Based on this gap and differences in displacement style and age of most recent movement, the northern part of the fault appears to be a different fault and is discussed separately as the Sevier fault [2355]. Thus, the southern part of Hecker's Sevier fault and the Toroweap fault are regarded here as the same fault.

**Section:** This name applies to the section of the Toroweap fault in Prospect Valley south of the southern end of Holocene rupture. This section corresponds with "segment C" of Jackson (1990 #2181) and includes the Prospect Point graben, which diverges south southeastward from the main fault zone at the northern end of this section. The southern end of this section bends to the east and merges with the Aubrey fault zone [995].

**County(s) and State(s)**

COCONINO COUNTY, ARIZONA

**Physiographic province(s)**

COLORADO PLATEAUS

**Reliability of location**

Good  
Compiled at 1:250,000 scale.

*Comments:* Mapped at 1:48,000 scale, transferred to 1:250,000-

	scale topographic base map for digitization.
<b>Geologic setting</b>	The Sevier/Toroweap fault zone is located near the western margin of the Colorado Plateaus Province. Displacement on the fault generally increases from south to north. At the southern end, displacement is generally low and similar to that of the northern part of the Aubrey fault zone [995], with which it merges. As much as 300 m of Cenozoic normal displacement has occurred across the fault zone near the Grand Canyon. Total normal displacement decreases to less than 100 m on the Kanab Plateau north of Toroweap Valley, but then dramatically increases to nearly 500 m north of the Utah-Arizona stateline. On the basis of three-point solutions and projections to the fault, Anderson and Christenson (1989 #828) estimated 475 m of throw at the Coral Pink Sand dunes, north of the Utah-Arizona stateline. Seismic-reflection data (E. Lundin, written commun. to R.E. Anderson) indicate about 900 m of throw on the basement at Red Canyon east of Panguitch, Utah.
<b>Length (km)</b>	This section is 19 km of a total fault length of 250 km.
<b>Average strike</b>	N11°E (for section) versus N15°E (for whole fault)
<b>Sense of movement</b>	Normal  <i>Comments:</i> Based on regional relations and normal displacement of Paleozoic bedrock across the fault zone.
<b>Dip Direction</b>	NW; NE; SW
<b>Paleoseismology studies</b>	
<b>Geomorphic expression</b>	Faulting is expressed as a high, moderately steep, linear, west- to southwest-facing escarpment formed on Paleozoic bedrock in southern Prospect Valley. No alluvial fault scarps have been mapped along the base of the bedrock escarpment in this section.
<b>Age of faulted surficial deposits</b>	Paleozoic
<b>Historic earthquake</b>	
<b>Most recent</b>	middle and late Quaternary (<750 ka)

<b>prehistoric deformation</b>	<i>Comments:</i> No definitive displacement of Quaternary deposits has been documented, but the strong geomorphic expression of the fault escarpment implies substantial middle and late Quaternary fault activity.
<b>Recurrence interval</b>	
<b>Slip-rate category</b>	Less than 0.2 mm/yr  <i>Comments:</i> A low slip-rate category is assigned based rates of similar faults in the region.
<b>Date and Compiler(s)</b>	1997 Bill D. Black, Utah Geological Survey Suzanne Hecker, U.S. Geological Survey
<b>References</b>	#828 Anderson, R.E., and Christenson, G.E., 1989, Quaternary faults, folds, and selected volcanic features in the Cedar City 1° x 2° quadrangle, Utah: Utah Geological and Mineral Survey Miscellaneous Publication 89-6, 29 p., 1 pl., scale 1:250,000.  #642 Hecker, S., 1993, Quaternary tectonics of Utah with emphasis on earthquake-hazard characterization: Utah Geological Survey Bulletin 127, 157 p., 6 pls., scale 1:500,000.  #2181 Jackson, G.W., 1990, Tectonic geomorphology of the Toroweap fault western Grand Canyon, Arizona—Implications for transgression of faulting on the Colorado Plateau: Arizona Geological Survey Open-File Report 90-4, 67 p., 2 pls., scale 1:24,000.

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