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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.

Ryan Creek fault zone (Class A) No. 2263

Last Review Date: 1997-06-11

Compiled in cooperation with the Utah Geological Survey and the Colorado Geological Survey

citation for this record: **Widmann, B.L., compiler, 1997, Fault number 2263, Ryan Creek fault zone, 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 03:01 PM.**

Synopsis	The Ryan Creek fault zone is on the southwest margin of the Uncompahgre Uplift near the Colorado/Utah border. The fault has roughly similar extent in the two states. Evidence for Quaternary movement on this fault zone was cited in Witkind (1976 #2792) as a personal communication from Fred Cater. Based on the timing of abandonment of Unaweep Canyon, Cater (1966 #2671) indicated uplift of the Uncompahgre Plateau began in the mid-Pliocene and continued into the Pleistocene, resulting in as much as 640 m of differential uplift. Despite the lack of evidence of faulted Quaternary deposits along the Ryan Creek fault zone, it

	has been classified as a Quaternary fault (Howard and others, 1978 #312; Kirkham and Rogers, 1981 #792; Colman, 1985 #1953), and no references have been published that refute this age assignment.
Name comments	The Ryan Creek fault zone trends east-west along the southwest margin of the Uncompahgre Uplift. More than half of the fault length is in Utah. The fault extends east into Colorado from the flank of the Haystack Peaks parallel to Ryan Gulch (its namesake), then bends southeast toward Unaweep Canyon. Individual faults in the zone form the southern margin of the Sand Flat graben in Utah and the northeast margin of the Ute Creek graben in Colorado. This fault is part of Hecker's (1993 #642) Uncompahgre fault zone. **Fault ID:** Fault 76 in Kirkham and Rogers (1981 #792); fault 349 in Witkind (1976 #2792); fault number Q13 of Widman and others (1998 #3441); and part of fault number 18-3 in Hecker (1993 #642).
County(s) and State(s)	GRAND COUNTY, UTAH MESA COUNTY, COLORADO
Physiographic province(s)	COLORADO PLATEAUS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* The fault was mapped by Williams (1964 #2789) at 1:250,000 and mapped or discussed by Cater (1970 #2671), Heyman (1983 #2697), and Ely and others (1986 #2687).
Geologic setting	The Ryan Creek fault zone lies on the southwest margin of the Uncompahgre Uplift and northeast margin of the Ute Creek Graben along the Utah/Colorado border. The Uncompahgre Uplift is a northwest-trending, east-tilted fault block. This fault is high-angle normal and down to the south and southwest. Individual faults in the fault zone form the southern margin of the Sand Flat graben in Utah and the northeast margin of the Ute Creek graben in Colorado. The fault lies in a tectonically weakened area above the ancestral Uncompahgre fault zone (Stone, 1977 #2749) and may merge at depth with a major uplift-bounding reverse fault (Ely and others, 1986 #2687).

Length (km)	39 km.
Average strike	N63°W
Sense of movement	Normal *Comments:* Heyman (1983 #2697) mapped part of this fault as down to the southwest on a southwest-dipping fault plane. Kirkham and Rogers (1981 #792) also listed this fault as normal. Ely and others (1986 #2687) suggested it merges with a major uplift-bounding reverse fault at depth.
Dip	75° SW *Comments:* Although Heyman (1983 #2697) measured a dip of 75? SW for part of the Ryan Creek fault zone in the vicinity of T22S, R26E in Utah, sense of offset is variable along the fault zone, so dip is likewise probably variable.
Paleoseismology studies	
Geomorphic expression	Geomorphic indicators of youthful faulting have not been reported.
Age of faulted surficial deposits	Bedrock as young as Late Cretaceous is faulted at the western end of the Sand Flat graben in Utah. In Colorado, the Cretaceous Dakota Sandstone and Burro Canyon Formation are the youngest deposits offset by the fault. The fault lies entirely within Precambrian and lower Mesozoic bedrock and Quaternary deposits are absent along the trace of the fault (Williams, 1964 #2789).
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Despite a lack of evidence for offset in Quaternary deposits, faults associated with the Uncompahgre Uplift are often considered to have experienced Quaternary movement. Evidence for Quaternary movement on this fault zone was cited in Witkind (1976 #2792) based on personal communication with Fred Cater. Based on the timing of abandonment of Unaweep Canyon, Cater (1966 #2671) indicated uplift of the Uncompahgre Plateau began in the mid-Pliocene and continued into the Pleistocene, resulting

	in as much as 640 m of differential uplift. There is no other published evidence that Quaternary deposits are offset by this structure. Despite the lack of evidence for Quaternary movement, this fault has been classified as a Quaternary fault (e.g. Howard and others, 1978 #312; Kirkham and Rogers, 1981 #792; Colman, 1985 #1953), and no references have been published that refute this age assignment.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Based on calculations of an overall uplift rate of 0.4 mm/yr since 1.8 Ma for the Uncompahgre Uplift (Perry, 1989 #2731; Perry and Annis, 1990 #4458), a geologic slip rate of less than 0.2 mm/yr is estimated for this fault (Widmann and others, 1998 #3441).
Date and Compiler(s)	1997 Beth L. Widmann, Colorado Geological Survey
References	#2671 Cater, F.W., Jr., 1966, Age of the Uncompahgre Uplift and Unaweep Canyon, west-central Colorado: U.S. Geological Survey Professional Paper 550-C, 86-92 p. #1953 Colman, S.M., 1985, Map showing tectonic features of late Cenozoic origin in Colorado: U.S. Geological Survey Miscellaneous Geologic Investigations I-1566, 1 sheet, scale 1:1,000,000. #2687 Ely, R.W., Wong, I.G., and Chang, P., 1986, Neotectonics of the Uncompahgre Uplift, eastern Utah and western Colorado, *in* Rogers, W.P., and Kirkham, R.M., eds., Contributions to Colorado tectonics and seismicity—A 1986 update: Colorado Geological Survey Special Publication 28, p. 75-92. #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. #2697 Heyman, O.G., 1983, Distribution and structural geometry of faults and folds along the northwestern Uncompahgre Uplift, western Colorado and eastern Utah, *in* Averett, W., ed., Northern Paradox Basin—Uncompahgre Uplift: Grand Junction Geological

Society, p. 45-57.

#312 Howard, K.A., Aaron, J.M., Brabb, E.E., Brock, M.R., Gower, H.D., Hunt, S.J., Milton, D.J., Muehlberger, W.R., Nakata, J.K., Plafker, G., Prowell, D.C., Wallace, R.E., and Witkind, I.J., 1978, Preliminary map of young faults in the United States as a guide to possible fault activity: U.S. Geological Survey Miscellaneous Field Studies Map MF-916, 2 sheets, scale 1:5,000,000.

#792 Kirkham, R.M., and Rogers, W.P., 1981, Earthquake potential in Colorado: Colorado Geological Survey Bulletin 43, 171 p., 3 pls.

#4458 Perry, T.W., and Annis, D.R., 1990, Pleistocene history of the Gunnison River in Unaweep Canyon, Colorado, and implications for Colorado Plateau uplift: Geological Society of America Abstracts with Programs, v. 22, no. 3, p. 75.

#2731 Perry, T.W.V., 1989, Tectonic inference and computer simulation in stream longitudinal profile evolution, Unaweep Canyon and vicinity, Colorado and Utah: Geological Society of America Abstracts with Programs, v. 21, no. 6, p. 269.

#2749 Stone, D.S., 1977, Tectonic history of the Uncompahgre Uplift, *in* Veal, H.K., ed., Exploration Frontiers of the central and southern Rockies: Rocky Mountain Association of Geologists, 1977 Field Conference Guidebook, p. 23-30.

#3441 Widmann, B.L., Kirkham, R.M., and Rogers, W.P., 1998, Preliminary Quaternary fault and fold map and database of Colorado: Colorado Geological Survey Open-File Report 98-8, 331 p., 1 pl., scale 1:500,000.

#2789 Williams, P.L., 1964, Geology, structure, and uranium deposits of the Moab quadrangle, Colorado and Utah: U.S. Geological Survey Miscellaneous Geologic Investigations I-360.

#2792 Witkind, I.J., 1976, Preliminary map showing known and suspected active faults in Colorado: U.S. Geological Survey Open-File Report 76-154.

Questions or comments?