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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.

East Robledo fault (Class A) No. 2063

Last Review Date: 2015-12-21

Compiled in cooperation with the New Mexico Bureau of Geology & Mineral Resources

citation for this record: **Machette, M.N., and Jochems, A.P., compilers, 2015, Fault number 2063, East Robledo 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 02:22 PM.**

Synopsis	This major Quaternary fault bounds the uplifted Robledo Mountains and forms intrabasin scarps on the upper and lower La Mesa (geomorphic) surfaces west of Las Cruces. No detailed studies have been made of the fault or its scarp morphology.
Name comments	This fault was first mapped by Kottlowski (1960 #1010), but he did not name it. Ruhe (1962 #1637) applied the name Robledo to the fault, which was subsequently used by De Hon (1965 #1018) and Hawley and Kottlowski (1969 #1009). However, the name was later changed to the East Robledo fault (Clemons and others, 1975 #1011) to differentiate it from the West Robledo fault [2064]. The surface trace of the East Robledo fault extends from

	the north edge of Robledo Mountain (about 3 km southwest of Fort Selden), south along the mountain front to about 10 km west of Las Cruces, New Mexico. From here, the fault extends south-southwest across high-level geomorphic surfaces; its mapped surface trace ends about 3 km southwest of Afton (siding) according to Seager and others (1987 #627).
County(s) and State(s)	DOÑA ANA COUNTY, NEW MEXICO
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Kottlowski (1960 #1010) appears to have been the first to show the fault on a Quaternary geologic map, and Ruhe (1967 #1008) mapped the northern part at 1:62,500 scale during a regional study of Quaternary geology. Seager and others (2008 #7298) mapped the fault at 1:24,000 from the Robledo Mountains to about 4 km south of Las Cruces International Airport, and a generalized trace of the entire fault is shown on the 1:125,000-scale map of Seager and others (1987 #627). The location of the fault was digitized at 1:24,000 scale using photogrammetry to accurately map its trace from these maps.
Geologic setting	This major range-bounding fault forms the eastern side of the Robledo Mountain block and places Quaternary sediment against bedrock. The Robledo Mountain block is a horst that bounds the western edge of the Rio Grande valley north and west of Las Cruces. Southward propagation of the East Robledo and West Robledo [2064] faults during the early Quaternary isolated fluvial sediment of the Camp Rice Formation on the southern margin of the Robledo Mountains from active deposition by the ancestral Rio Grande in the Mesilla Basin to the east (Mack and others, 1994 #7299). South of the Robledo Mountains along its southern half, the fault is entirely within sediment of the Camp Rice Formation and younger surficial deposits.
Length (km)	47 km.
Average strike	N8°E
Sense of movement	Normal

Dip Direction	E *Comments:* The fault is shown as a high-angle structure on cross sections of Seager and others (1987 #627; 2008 #7298). However, no specific dip values are shown on these maps.
Paleoseismology studies	
Geomorphic expression	The fault bounds the uplifted Robledo Mountain block and places Paleozoic and Tertiary rock in the hanging (west) wall against Quaternary sediment on the footwall. In some places, the fault is entirely within sediment of the Camp Rice Formation, but south of Picacho Mountain the fault forms a southward-widening zone of intrabasin scarps on the upper and lower La Mesa (geomorphic) surfaces west of Las Cruces. The fault separates the upper (western block) and lower (eastern block) La Mesa surfaces, and although both are formed by aggrading deposits of Camp Rice Formation, the upper surface is probably a local, tectonically uplifted surface that is not regionally significant as a stratigraphic datum. The fault offsets Camp Rice Formation sediment about 90 m on the east side of Robledo Mountain (Clemons and others, 1975 #1011) and the La Mesa surfaces as much as 61 m along Interstate Highway 10, but the amount of surficial throw decreases to the south (Ruhe, 1967 #1008). For example, the scarp is about 40 m high at Norwood Ranch, 23 m high at Perry Ranch, and is hardly discernible at Brook Tank (Ruhe, 1962 #1637). No detailed studies have been made of the fault or its scarp morphology.
Age of faulted surficial deposits	A variety of Quaternary units are offset as shown on the maps of Ruhe (1967 #1008) and Seager and others (1987 #627; 2008 #7298). Quaternary units that are faulted include the upper part of the Camp Rice Formation, early to middle (?) Pleistocene, the upper and lower La Mesa surfaces (constructional surfaces of the Camp Rice Formation), and a sequence of older (middle Pleistocene) alluvial-fan and river-terrace deposits (Qvo) that are equivalent to the Tortugas alluvium (250±50 ka) (Hawley and Kottlowski, 1969 #1009). Geomorphic equivalents of the lower La Mesa surface are believed to have stabilized about 700–900 ka (Mack and others, 1993 #1020), whereas the upper La Mesa is older, but probably still Quaternary. The Tortugas and La Mesa surfaces are offset from 6 and 61 m, respectively. In addition, there are indications of slight warping and faulting of the Picacho

	surface (possibly late middle to late Pleistocene, 100±30 ka, Hawley and Kottlowski, 1969 #1009).
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* Scarps formed on the La Mesa surfaces suggest displacement since stabilization of the lower surface 700–900 ka (Mack and others, 1993 #1020). However, the fault may have late Pleistocene displacement as well, as indicated by deformation of deposits as young as about 250–100 ka (Hawley and Kottlowski, 1969 #1009).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Low slip-rate category assigned based on 6-m-high scarps on the Tortugas surface (250±50 ka) and 60-m-high scarps on the lower La Mesa surface (700–900 ka).
Date and Compiler(s)	2015 Michael N. Machette, U.S. Geological Survey, Retired Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources
References	#1011 Clemons, R.E., Hawley, J.W., Hoffer, J.M., and Seager, W.R., 1975, Second day, road log from Las Cruces to the Sierra de las Uvas and Aden volcanic area, and return, *in* Seager, W.R., Clemons, R.E., and Callender, J.F., eds., Guidebook of the Las Cruces country: New Mexico Geological Society, 26th Field Conference, November 13-15, 1975, Guidebook, p. 17-34. #1018 De Hon, R.A., 1965, Maare of La Mesa, *in* Fitzsimmons, J.P., and Lochman-Balk, C., eds., Guidebook of southwestern New Mexico II: New Mexico Geological Society, 16th Field Conference, October 15-17, 1965, Guidebook, p. 204-209. #1009 Hawley, J.W., and Kottlowski, F.E., 1969, Quaternary geology of the south-central New Mexico border region, *in* Kottlowski, F.E., and LeMone, D.V., eds., Border stratigraphy symposium: New Mexico Bureau of Mines and Mineral Resources Circular 104, p. 89-115.

	#1010 Kottlowski, F.E., 1960, Reconnaissance geologic map of Las Cruces thirty-minute quadrangle: New Mexico Bureau of Mines and Mineral Resources Geologic Map 14, 1 sheet, scale 1:126,720. #7299 Mack, G.H., James, W.C., and Salyards, S.L., 1994, Late Pliocene and early Pleistocene sedimentation as influenced by intrabasinal faulting, southern Rio Grande rift: Geological Society of America Special Paper 291, p. 257–264. #1020 Mack, G.H., Salyards, S.L., and James, W.C., 1993, Magnetostratigraphy of the Plio-Pleistocene Camp Rice and Palomas formations in the Rio Grande rift of southern New Mexico: American Journal of Science, v. 293, p. 49–77. #1637 Ruhe, R.V., 1962, Age of the Rio Grande valley in southern New Mexico: Journal of Geology, v. 70, p. 151-167. #1008 Ruhe, R.V., 1967, Geomorphic surfaces and surficial deposits in southern New Mexico: [New Mexico] Bureau of Mines and Mineral Resources Memoir 18, 66 p., 2 pls., scale 1:62,500. #627 Seager, W.R., Hawley, J.W., Kottlowski, F.E., and Kelley, S.A., 1987, Geology of east half of Las Cruces and northeast El Paso 1° x 2° sheets, New Mexico: New Mexico Bureau of Mines and Mineral Resources Geologic Map 57, 3 sheets, scale 1:125,000. #7298 Seager, W.R., Kottlowski, F.E., and Hawley, J.W., 2008, Geologic map of the Robledo Mountains and vicinity, Doña Ana County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Report 509, 2 sheets, scale 1:24,000.