

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](#).

Sand Hill fault zone (Class A) No. 2039

Last Review Date: 2016-06-28

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

citation for this record: Personius, S.F., and Jochems, A.P., compilers, 2016, Fault number 2039, Sand Hill 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 02:23 PM.

Synopsis	The down-to-the-east Sand Hill fault zone extends from about 9 km south of the Sandoval-Bernalillo County line, northward along the Ceja del Rio Puerco to the vicinity of Cañada de las Milpas. Very little is known about the Quaternary history of the Sand Hill fault zone other than that it cuts probable early Pleistocene sand and gravel of the upper Santa Fe Group and is buried by younger surficial deposits. This fault zone is one of several north-trending faults that form the active western boundary of the Rio Grande rift in the northern part of the Albuquerque-Belen basin.
Name	The Sand Hill fault zone was first named, mapped, and described

comments

by Bryan and McCann (1937 #1288), has subsequently been mapped in various degrees of detail by Wright (1946 #1427), Kelley and others (1976 #1380, fig. 19), and Kelley (1954 #1222; 1977 #1106), and has more recently been mapped in detail in the Arroyo de las Calabacillas (previously Sky Village SE), Benavidez Ranch, Cerro Conejo (previously Sky Village NE), and The Volcanoes 7.5-minute quadrangles (Cather and others, 1997 #1763; Koning and others, 1998 #7375; Thompson and others, 2009 #7460; Koning and Jochems, 2014 #7507). As originally mapped by Bryan and McCann (1937 #1288), the Sand Hill fault zone extended about 10 km along the western edge of the Llano de Albuquerque. Bryan and McCann (1937 #1288) and Wright (1946 #1427) mapped the southern end of the Sand Hill fault zone 3–5 km south of the Bernalillo-Sandoval County line; Bryan and McCann (1937 #1288) state that the fault is covered by Pleistocene and younger alluvium southward. Kelley (1977 #1106, p. 48) used stratigraphic arguments to extend the Sand Hill fault zone a minimum of 12 km further south. Similarly at the north end, Kelley and others (1976 #1380, fig. 19) and Kelley (1977 #1106, p. 48) extended the Sand Hill fault zone along a northeast-trending splay across the Llano de Albuquerque. Kelley (1977 #1106, p. 48) also suggests that some of the down-to-the-east displacement associated with the Sand Hill fault zone is taken up by the Garcia and Tenorio faults, which extend northward another 23 km along the western edge of the Llano. Mapping in the Arroyo de las Calabacillas 7.5-minute quadrangle (Cather and others, 1997 #1763) shows that the Sand Hill fault zone does not trend northeastward across the Llano de Albuquerque, but rather continues northward along the Ceja del Rio Puerco to the vicinity of Cañada de las Milpas in the Cerro Conejo quadrangle (Koning and others, 1998 #7375). Wright (1946 #1427) included in the Sand Hill fault zone a northwest-trending (N20°W) down-to-the-east fault that is 1–2 km east of the Sand Hill fault zone. However, the trend of this fault, Wright's detailed description of a thick sequence of tectonically-derived sediment on the downthrown block, and mapping in the Arroyo de las Calabacillas 7.5-minute quadrangle (Cather and others, 1997 #1763) all indicate that this eastern fault strand is distinct from the Sand Hill fault zone and thus is mapped as a separate structure (Calabacillas section of the Jemez-San Ysidro fault [2029c]) in this compilation.

County(s) and State(s)

BERNALILLO COUNTY, NEW MEXICO
SANDOVAL COUNTY, NEW MEXICO

Physiographic province(s)	COLORADO PLATEAUS BASIN AND RANGE
Reliability of location	Good Compiled at 1:24,000 scale. <i>Comments:</i> Fault traces are from 1:24,000-scale maps by Cather and others (1997 #1763), Koning and others (1998 #7375), Thompson and others (2009 #7460), and Koning and Jochems (2014 #7507), as well as unpublished air-photo mapping by A.P. Jochems.
Geologic setting	The Sand Hill fault zone is one of several north-trending faults that form the active western boundary of the Rio Grande rift in the northern part of the Albuquerque-Belen basin.
Length (km)	36 km.
Average strike	N6°E
Sense of movement	Normal
Dip	54°–82° E. <i>Comments:</i> Fault dips are from surface exposures (Wright, 1946 #1427, plate 8; Cather and others, 1997 #1763; Thompson and others, 2009 #7460; Koning and Jochems, 2014 #7507).
Paleoseismology studies	
Geomorphic expression	The fault is well expressed as linear breaks in slope in the eroded Santa Fe Group badlands below the western edge of the Llano de Albuquerque. Bryan and McCann (1937 #1288) noted that their northernmost strand has been injected by a sand dike that is more erosion resistant than the surrounding rocks; Wright (1946 #1427) stated that all strands of the Sand Hill fault are marked by sand dikes. In places, preferential cementation related to groundwater flow has formed prominent wall- or finger-like features in the fault zone (Mozley and Goodwin, 1995 #7508). No fault scarps on surficial deposits have been described, suggesting a lack of recency to the faulting.
Age of faulted surficial	The trace of the Sand Hill fault zone as originally mapped by Bryan and McCann (1937 #1288) lies entirely within the Upper

deposits	Buff Member of the Santa Fe Formation, which is roughly correlative with the Ceja Formation of the Upper Santa Fe Group (Kelley, 1977 #1106; Hawley and others, 1991 #1302; Connell, 2008 #7506). In places the upper part of these deposits is early Pleistocene in age. No faulting of younger surficial deposits has been described.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) <i>Comments:</i> The only deposits documented as offset by the Sand Hill fault zone are early Pleistocene to Pliocene in age.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr <i>Comments:</i> No detailed studies of fault offset or age of offset deposits are available; slip rate estimate is based on lack of fault scarps and low rates of slip on other faults in this part of the Rio Grande rift.
Date and Compiler(s)	2016 Stephen F. Personius, U.S. Geological Survey Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources
References	#1288 Bryan, K., and McCann, F.T., 1937, The Ceja del Rio Puerco— A border feature of the Basin and Range province in New Mexico, Part I, Stratigraphy and structure: Journal of Geology, v. 45, p. 801-828. #1763 Cather, S.M., Connell, S.D., Heynekamp, M.R., and Goodwin, L.B., 1997, Geology of the Arroyo de las Calabacillas [Sky Village SE] 7.5-minute quadrangle, Sandoval County, New Mexico: New Mexico Bureau of Mines and Mineral Resources Open-File Geologic Map 9, 8 p. pamphlet, 1 sheet, scale 1:24,000. #7506 Connell, S.D., 2008, Refinements to the stratigraphic nomenclature of the Santa Fe Group, northwestern Albuquerque Basin, New Mexico: New Mexico Geology, v. 30, p. 14–35. #1302 Hawley, J.W., Love, D.W., Betancourt, J.L., Turner, R.M.,

and Tharnstrom, S., 1991, Quaternary and Neogene landscape evolution—A transect across the Colorado Plateau and Basin and Range provinces in west-central and central New Mexico, *in* Julian, B., and Zidek, J., eds., Field guide to geologic excursions in New Mexico and adjacent areas of Texas and Colorado: New Mexico Bureau of Mines and Mineral Resources Bulletin 137, p. 105-148.

#1222 Kelley, V.C., 1954, Tectonic map of a part of the upper Rio Grande area, New Mexico: U.S. Geological Survey Oil and Gas Investigations Map OM-157, 1 sheet, scale 1:190,080.

#1106 Kelley, V.C., 1977, Geology of Albuquerque basin, New Mexico: New Mexico Bureau of Mines and Mineral Resources Memoir 33, 60 p., 2 pls.

#1380 Kelley, V.C., Woodward, L.A., Kudo, A.M., and Callender, J.F., 1976, Guidebook to Albuquerque basin of the Rio Grande rift, New Mexico: New Mexico Bureau of Mines and Mineral Resources Circular 153, 31 p.

#7507 Koning, D.J., and Jochems, A.P., 2014, Geologic map of the Benavidez Ranch 7.5-minute quadrangle, Bernalillo and Sandoval Counties, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 234, scale 1:24,000.

#7375 Koning, D.J., Pederson, J., Pazzaglia, F.J., and Cather, S.M., 1998, Geology of the Cerro Conejo (Sky Village NE) 7.5-minute quadrangle, Sandoval County, New Mexico: New Mexico Bureau of Mines and Mineral Resources Open-file Geologic Map 45, scale 1:24,000.

#1400 Machette, M.N., 1978, Geologic map of the San Acacia quadrangle, Socorro County, New Mexico: U.S. Geological Survey Geologic quadrangle Map GQ-1415, 1 sheet, scale 1:24,000.

#7508 Mozley, P.S., and Goodwin, L.B., 1995, Patterns of cementation along a Cenozoic normal fault: A record of paleoflow orientations: *Geology*, v. 23, p. 539-542.

#7460 Thompson, R.A., Shroba, R.R., Menges, C., Schmidt, D.L., Personius, S.F., and Brandt, T.R., 2009, Geologic map of the

Volcanoes quadrangle, Bernalillo and Sandoval Counties, New Mexico: U.S. Geological Survey Scientific Investigations Map SIM-3083, scale 1:24,000.

#1427 Wright, H.E., Jr., 1946, Tertiary and Quaternary geology of the lower Rio Puerco area, New Mexico: Geological Society of America Bulletin, v. 57, p. 383-456.

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