

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](#).

West Lobo Valley fault zone, Sierra Vieja section (Class A) No. 918d

Last Review Date: 1993-01-25

Compiled in cooperation with the Texas Bureau of Economic Geology

citation for this record: Collins, E., compiler, 1993, Fault number 918d, West Lobo Valley fault zone, Sierra Vieja 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 03:13 PM.

Synopsis

General: This long fault zone consists of a distinct series of continuous and discontinuous range-front scarps. The zone has been mapped by many, including Twiss (1959 #861), Belcher and others (1977 #875), Muehlberger and others (1978 #854), Henry and others (1985 #866), Machette and Personius (unpublished field notes made available to Collins), and Collins and Raney (1993 #852). Reconnaissance studies of scarp morphology and mapping of faulted Quaternary deposits are the sources for fault data. No trench investigations have been conducted.

	<p>Sections: This fault has 4 sections. Collins and Raney (1993 #852; 1994 #853) interpreted four fault sections on the basis of the fault's geometry, map pattern, and reconnaissance studies of offset data for the fault strands that compose the zone.</p>
<p>Name comments</p>	<p>General: Named by Collins and Raney (1993 #852) for fault's position along the west margin of Lobo Valley. Sections discussed herein include: Fay [918a], Neal [918b], Mayfield [918c], and Sierra Vieja [918d]. The entire fault zone has also been called the Mayfield fault by Muehlberger and others (1978 #854; 1985 #911) after its proximity to Mayfield Ranch however the West Lobo Valley name is more descriptive. Northern end of fault zone is about 10 km south of Van Horn; the zone extends south-southeastward along the eastern base of the Van Horn Mountains and Sierra Vieja to a point about 18 km southwest of Valentine.</p> <p>Section: Named the Sierra Vieja fault by Collins and Raney (1993 #852) for an echelon series of fault strands along the eastern base of the Sierra Vieja. The section's north boundary with the Mayfield section [918c] is marked by a series of low bedrock hills that lie basinward of the Sierra Vieja, about 20 km northwest of Valentine. The Sierra Vieja section extends southward to an area about 15 km southwest of Valentine and includes one basinward strand.</p>
<p>County(s) and State(s)</p>	<p>JEFF DAVIS COUNTY, TEXAS PRESIDIO COUNTY, TEXAS</p>
<p>Physiographic province(s)</p>	<p>BASIN AND RANGE</p>
<p>Reliability of location</p>	<p>Good Compiled at 1:250,000 scale.</p> <p><i>Comments:</i> Location based on 1:250,000-scale map compiled from field mapping using 1:24,000-scale aerial photographs and topographic maps (Collins and Raney, 1993 #852). This fault has also been mapped by Twiss (1959 #861), Belcher and others (1977 #875), Muehlberger and others (1978 #854), Henry and others (1985 #866), and Machette and Personius (unpublished notes made available to Collins).</p>
<p>Geologic setting</p>	<p>Down-to-the-east range bounding fault zone that separates the Van Horn Mountains and Sierra Vieja (on the west) from Lobo Valley (basin). Collins and Raney (1993 #852; 1994 #853) determined that the throw is greater than 11 m on middle</p>

	Pleistocene deposits along the southernmost section (Sierra Vieja [918d]) of the fault zone.
Length (km)	This section is 22 km of a total fault length of 60 km.
Average strike	N12°W (for section) versus N19°W (for whole fault)
Sense of movement	Normal <i>Comments:</i> Not studied in detail; sense of movement inferred from topography.
Dip Direction	E
Paleoseismology studies	
Geomorphic expression	Multiple en echelon fault strands are expressed by single and compound (multiple-event) scarps. E.W. Collins and J.A. Raney measured scarp heights of 2–14.5 m. Some compound scarps are as much as 14.5 m high and have young appearing elements that are between 2 and 3.5 m high and as steep as 20°. The less steep parts of the compound scarps have scarp-slope angles that are between 6° and 11°. Muehlberger and others (1978 #854) also measured compound scarps over 7 m high and M.N. Machette and S.F. Personius (unpublished notes made available to Collins) reported scarps as high as 6 m and scarp-slope angles of as much as 23°. These morphometric analyses suggest multiple faulting events during the late Quaternary.
Age of faulted surficial deposits	Quaternary. Approximate age of youngest known faulted deposits was estimated from calcic soil development (Collins and Raney, 1993 #852). Upper Pleistocene to Holocene (?) deposits are offset 3.5 m vertically. Some young (Holocene) terraces are unfaulted although more work is needed to determine if older Holocene deposits are offset.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) <i>Comments:</i> Vertical offset of possible middle Pleistocene deposits is as great as 8–11 m and deposits of possible upper Pleistocene–Holocene (?) age are offset as much as 3.5 m. The latest surface rupture may have produced about 1–2 m of vertical displacement if the steeper element of compound scarps was caused by a single

	<p>rupture (Collins and Raney, 1993 #852). It is likely that at least two surface ruptures have displaced upper Pleistocene deposits; the youngest event may offset early (?) Holocene deposits.</p>
<p>Recurrence interval</p>	<p>35–70 k.y. (<500 ka)</p> <p><i>Comments:</i> Collins and Raney (1993 #852) estimated that the average recurrence interval for large surface ruptures since middle Pleistocene may be as great as 35–70 k.y. Their recurrence interval is based on (a) their estimate of the number of large-displacement (1- to 2-m) surface ruptures since middle Pleistocene time, (b) the assumption that faulted middle Pleistocene deposits are approximately 250–500 ka and (c) approximately 8–11 m of measured throw for middle Pleistocene deposits.</p>
<p>Slip-rate category</p>	<p>Less than 0.2 mm/yr</p> <p><i>Comments:</i> Average vertical-displacement rate since middle Pleistocene is approximately less than 0.2 mm/yr based on 8–11 m of throw on middle Pleistocene deposits (Collins and Raney, 1993 #852).</p>
<p>Date and Compiler(s)</p>	<p>1993 E.W. Collins, Bureau of Economic Geology, The University of Texas at Austin</p>
<p>References</p>	<p>#875 Belcher, R.C., Goetz, L.K., and Muehlberger, W.R., 1977, Map B—Fault scarps within Quaternary units in West Texas, <i>in</i> Goetz, L.K., ed., Quaternary faulting in Salt Basin graben, West Texas: The University of Texas at Austin, unpublished M.S. thesis, 1 pl., scale 1:500,000.</p> <p>#852 Collins, E.W., and Raney, J.A., 1993, Late Cenozoic faults of the region surrounding the Eagle Flat study area, northwestern trans-Pecos Texas: Technical report to Texas Low-Level Radioactive Waste Disposal Authority, under Contract IAC(92-93)-0910, 74 p.</p> <p>#853 Collins, E.W., and Raney, J.A., 1994, Impact of late Cenozoic extension on Laramide overthrust belt and Diablo Platform margins, northwestern trans-Pecos Texas, <i>in</i> Ahlen, J., Peterson, J., and Bowsher, A.L., eds., Geologic activities in the 90s: New Mexico Bureau of Mines and Mineral Resources Bulletin 150, p. 71-81.</p>

#866 Henry, C.D., Gluck, J.K., and Bockoven, N.T., 1985, Tectonic map of the Basin and Range province of Texas and adjacent Mexico: The University of Texas at Austin, [Texas] Bureau of Economic Geology Miscellaneous Map 36, 1 sheet, scale 1:500,000.

#854 Muehlberger, W.R., Belcher, R.C., and Goetz, L.K., 1978, Quaternary faulting in trans-Pecos Texas: *Geology*, v. 6, p. 337-340.

#911 Muehlberger, W.R., Beleher, R.C., and Goetz, L.K., 1985, Quaternary faulting in Trans-Pecos Texas, *in* Dickerson, P.W., and Muehlberger, W.R., eds., *Structure and tectonics of Trans-Pecos Texas*: West Texas Geological Society Publication 85-81, p. 21.

#861 Twiss, P.C., 1959, *Geology of Van Horn Mountains Texas*: The University of Texas at Austin, [Texas] Bureau of Economic Geology Geologic quadrangle Map 23, 1 sheet, scale 1:48,000.

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