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Elsinore fault zone, Temecula section (Class A) No. 126d

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Synopsis	**General:** A major dextral strike-slip fault zone that is part of the San Andreas fault system. Research studies have been done to assess faulting on most of the sections, and have documented Holocene activity for the length of the fault zone with a slip rate around 4–5 mm/yr. Multiple events have only been dated on the Whittier fault and Glen Ivy North fault strand, so interaction between faults and adjacent sections is not well-known. Multiple strands within several sections mean that the studies are not always fully representative of the whole section. Numerous consulting reports (not summarized herein) that have addressed location and recency of faulting are on file with the State of California, California Geological Survey, as part of the records of their Alquist-Priolo Earthquake Fault Zoning Program. **Sections:** This fault has 7 sections. Sections are selected

	following the segmentation from Working Group on California Earthquake Probabilities (1995 #4945) from north to south: Whittier section [126a], Chino section [126b], Glen Ivy section [126c], Temecula section [126d], Julian section [126e], Coyote Mountain section [126f], with addition of Laguna Salada section [126g] as used by Petersen and others (1996 #4860) and Chino fault (paired with the Whittier fault by Rockwell and others, 1992 #6431).Anderson and others (1989 #6372) also identified same segments, with addition of Chupamiertos and Sierra Mayor segments in Baja California (not included in this summary); Wesnousky (1986 #5305) defined four segments, combining the Whittier, Chino and Glen Ivy into his segment A, Temecula into segment B, Julian into segment C, and the Coyote Mountain and Laguna Salada sections into segment D.
Name comments	**General:** **Section:** Includes Wildomar fault (#460), Willard fault (#467) and Wolf Valley fault (#469) of Jennings (1994 #2878) and Murrieta Creek fault of (and named by) Bergmann and Rockwell (1989 #6404). Wildomar and Willard first used by Engel (1933 #6409; 1959 #6410). Wolf Valley fault was named by Kennedy (1977 #6419). Northern end of Temecula section is comprised of the Willard and Wildomar faults along south side of Lake Elsinore. Southern end of section is where the fault zone changes strike along the southern side of Agua Tibia Mountain, northeast of Pala Mountain. **Fault ID:** Refers to numbers 431 (Chino fault), 444 (Whittier fault), 446 (Fresno, Tin Mine and Main Street faults), 460 (Wildomar fault), 461 (Glen Ivy North fault), 462 (Glen Ivy South fault), 467 (Willard fault), 469 (Wolf Valley fault), 470 (unnamed faults flanking Agua Tibia Mountain), 482 (Earthquake Valley), 483 & 496 (Elsinore fault), and 511 (Laguna Salada fault) of Jennings (1994 #2878); and numbers 10 (Chino fault), 12 (Whittier fault), 13 (Main Street fault), 14 (Fresno-Eagle fault), 15 (Tin Mine fault), 16 (Glen Ivy North fault), 17 (Glen Ivy South fault), 18 (Wildomar fault), 19 (Willard fault), 20 (Wolf Valley fault) of Ziony and Yerkes (1985 #5931).
County(s) and State(s)	SAN DIEGO COUNTY, CALIFORNIA RIVERSIDE COUNTY, CALIFORNIA
Physiographic province(s)	PACIFIC BORDER LOWER CALIFORNIAN

Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Location of fault traces modified from Kennedy (1977 #6419), Weber (1977 #6448) and Alquist-Priolo Earthquake Fault Zone maps by California Division of Mines and Geology (1:24,000 - Elsinore, Murrieta, Pala, Pechanga, Temecula and Wildomar quadrangles).
Geologic setting	The Elsinore fault zone is a major dextral shear system, parallel to the southern San Andreas fault [1], that accommodates about 5 mm/yr of the Pacific-North American Plate boundary slip. The northern elements of the fault zone, the Chino and Whittier faults, bound the Puente Hills, an uplifted block of Tertiary sediments. The Glen Ivy section forms the northeast boundary of the Santa Ana Mountains, and, together with the Temecula section, forms the Elsinore trough. To the southeast the fault zone (Temecula, Julian, and Coyote Mountain sections) cuts diagonally across various Peninsular Range batholithic and pre-batholithic metamorphic terrain until it reaches the southwestern margin of the Salton Trough as the Laguna Salada fault. Total strike-slip is reported to be as much as 40 km but is more likely only 10–15 km, and total vertical separation is about 200 m (Hull and Nicholson, 1992 #6416).
Length (km)	This section is 62 km of a total fault length of 306 km.
Average strike	N48°W (for section) versus N51°W (for whole fault)
Sense of movement	Right lateral *Comments:* Greater than 10:1 horizontal to vertical slip (Hull and Nicholson, 1992 #6416; Bergmann and Rockwell, 1993 #6406). Focal mechanisms indicate dextral reverse motion in the Willard fault, in contrast to surface (trench) observations of normal component (Hull and Nicholson, 1992 #6416). Normal component of slip reported on Wildomar; reverse component on Willard, and principally normal on Murrieta Creek.
Dip Direction	SW; NE *Comments:* Surface dips from mapping by Kennedy (1977 #6419); near-vertical to steep NE dip is indicated by seismicity to about 13 km depth (Hull and Nicholson, 1992 #6416; Magistrale

	and Rockwell, 1996 #1230).
Paleoseismology studies	Site 126-2, south of Lake Elsinore: a single trench exposed one of two inferred strands of the Wildomar fault. Sedimentary sections across fault do not match, and faulting extends to about 1 m from the surface. Observed deformation is interpreted to have resulted from two, and possibly three, earthquakes (Lamar and Swanson, 1981 #6420). Site 126-5, Agua Tibia Mountain: trenching at two sites with 14C age control provided data on earthquake history (Vaughan and Rockwell, 1986 #6443; Thorup, 1997 #6438; Vaughan and others, 1999 #6446). Site 126-6, Murrieta Creek: trench studies provided data on sense of movement, slip rate and recurrence on this secondary fault within the Elsinore fault zone (Bergmann and Rockwell, 1989 #6404). Site 126-9, Murrieta: trench study exposed offset stream channels, providing slip rate (Rockwell, written communication, 1998). Site 126-11, Temecula: trench study exposed offset channel, providing data on slip rate (Bergmann and Rockwell, 1993 #6406; Rockwell, written communication, 1998).
Geomorphic expression	Fault zone forms southwestern boundary of Elsinore trough at nothern end; horst, scarps, sag ponds (Wildomar); linear mountain front, faceted spurs, low scarps in alluvium (Willard); offset streams, beheaded drainages, shutter ridges, graben observed at Agua Tibia Mountain.
Age of faulted surficial deposits	Holocene alluvium and fan deposits; late Pleistocene Pauba Formation (Wildomar, Murrieta Creek and Wolf Valley faults); late Pleistocene Pauba Formation (Willard fault) (Kennedy, 1977 #6419).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Vaughan and others (1999 #6446)(1999) estimate last event at southern end of section between 1655 and 1810 A.D.; latest event at northern part of fault section post-dates clayey

	horizon with 14C dates obtained from humic acids (4,330±400 yr BP) and carbon residue (4,120±260 yr BP) (Lamar and Swanson, 1981 #6420).
Recurrence interval	450–750 yr *Comments:* Vaughan and Rockwell (1986 #6443) and Vaughan and others(1996 #6444) estimate 1500 year maximum average recurrence; the elapse time since the most recent event is more than 180 yr. Based on Vaughan and others (1999 #6446) a poorly constrained recurrence interval of 240 (+260, -111) yr is indicated. Working Group on California Earthquake Probabilities (1995 #4945)calculate a recurrence interval of 250–600 yr.
Slip-rate category	Between 1.0 and 5.0 mm/yr *Comments:* 4.2 mm/yr (+0.5/-.09) for Wildomar fault (Bergmann and Rockwell, 1993 #6406; Bergmann and others, 1993 #6407) is a partial rate; Vaughan and Rockwell (1986 #6443) give a maximum range of 1.5–7 mm/yr and a best estimate of 5 mm/yr at the southern end of this section, at Agua Tibia Mountain; Murrieta Creek fault has about 1.25 mm/yr dip-slip rate (Bergmann and Rockwell, 1989 #6404). Slip rate assigned to this part of the fault by Petersen and others (1996 #4860) for probabilistic seismic hazard assessment for the State of California was 5.0 mm/yr (with minimum and maximum assigned slip rates of 3.0 mm/yr and 7.0 mm/yr, respectively.
Date and Compiler(s)	1998 Jerome A. Treiman, California Geological Survey
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