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Quaternary Fault and Fold Database of the United States

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West Napa fault, Browns Valley section (Class A) No. 36a

Last Review Date: 2000-06-07

Compiled in cooperation with the California Geological Survey

citation for this record: **Bryant, W.A., compiler, 2000, Fault number 36a, West Napa fault, Browns Valley 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 03:10 PM.**

Synopsis	**General:** Late Pleistocene and Holocene active dextral strike-slip fault generally located along the western side of Napa Valley. Detailed reconnaissance-level mapping exits for most of fault, based on geologic and geomorphic data from Weaver (1949 #5317), Fox and others (1973 #5253), Helley and Herd (1977 #509), Pampeyan (1979 #1245), and Bryant (1982 #5313). Galehouse (1991 #5314) reported possible evidence of creep along the West Napa fault zone following the 1989 Ms 7.1 Loma Prieta earthquake, but the result of 18.5 years of monitoring the fault zone for creep has shown a lack of detectable displacement

	(Galehouse, 1999 #5500). The West Napa fault is divided into two sections in this compilation. Holocene slip rate and recurrence interval data have not been determined for this fault. Several site-specific studies in compliance with Alquist-Priolo Act (Hart and Bryant, 1997 #4856) have documented location and approximate age of most recent faulting, but detailed paleoseismic investigations have not been done. **Sections:** This fault has 2 sections. There is insufficient data to delineate seismogenic segments and there has been no previous attempts at defining sections. However, for this compilation the West Napa fault zone is divided into two sections. The northern section, named here the Browns Valley section, is delineated by a zone of north-northwest-striking late Pleistocene faults that generally lack geomorphic evidence of Holocene displacement (Bryant, 1982 #5313). The southern section, named here the Napa County Airport section, is delineated by northwest-striking dextral slip faults that exhibit geomorphic evidence of Holocene displacement (Helley and Herd, 1977 #509; Bryant, 1982 #5313).
Name comments	**General:** Strands of the West Napa fault zone were first mapped by Weaver (1949 #5317) in the hills west of the City of Napa. Weaver (1949 #5317) named these faults the Browns Valley and Mill Valley faults. The West Napa fault was more completely mapped by Fox and others (1973 #5253). Helley and Herd (1977 #509) first named the northwest to north northwest-striking zone of predominantly dextral slip faults the West Napa fault zone. Pampeyan (1979 #1245) referred to this fault zone as the Napa fault. The most common usage in recent literature is West Napa fault. **Section:** Name for northern section is proposed in this compilation. Section extends from Yountville south southeast to the vicinity of the Napa River and Home Hill. Browns Valley section is delineated by an approximately 600-m-wide zone of north northwest-striking, dextral and dextral normal faults. **Fault ID:** Refers to number 152 (West Napa fault) of Jennings (1994 #2878), and number L05 (West Napa fault) of Working Group on Northern California Earthquake Potential (1996 #1216).
County(s) and State(s)	NAPA COUNTY, CALIFORNIA
Physiographic province(s)	PACIFIC BORDER

Reliability of location	Good Compiled at 1:62,500 scale. *Comments:* Locations based on digital revisions to Jennings (1994 #2878) using original mapping by Fox and others (1973 #5253) at 1:62,500 scale and mapping by Herd (cited in Bryant, 1982 #5313; written commun.,1982) and Bryant (1982 #5313) at 1:24,000 scale.
Geologic setting	The Napa Valley fault is a dextral strike-slip fault that forms a part of the larger San Andreas fault system. Fault is generally located along the western side of Napa Valley and extends from Yountville southeast to the vicinity of Napa Junction. Fox (1983 #5252) suggested that the West Napa fault may continue further to the northwest in the bedrock hills to near Saint Helena, rather than striking more northerly into the alluvium of Napa Valley. However, fault recency has not been documented along this northwestern part of the trace other than it offsets Pliocene-Pleistocene Sonoma Volcanics against rocks of the Cretaceous Great Valley Sequence (Fox, 1983 #5252). Cumulative dextral displacement is unknown. Helley and Herd (1977 #509) reported that at least 24 m of down-to-east vertical (normal dip-slip) has occurred along a strand just north of Browns Valley. Fox (1983 #5252) reported that the down-to-east vertical component may be greater that 79 m, based on the thickness of alluvium logged in a water well just east of the fault in western Napa Valley.
Length (km)	This section is 33 km of a total fault length of 43 km.
Average strike	N18°W (for section) versus N20°W (for whole fault)
Sense of movement	Right lateral, Normal, Reverse *Comments:* Sense of displacement is not well documented. Geomorphic expression of fault and north-northwest orientation suggests predominantly dextral strike-slip with a component of down-to-east normal dip-slip offset (Bryant, 1982 #5313; Fox, 1983 #5252). Helley and Herd (1977 #509) reported that fault is probably characterized by dextral strike-slip with a down-to-east normal dip slip component. Locally, there is subsurface evidence of east-dipping reverse displacement (Bryant, 1982 #5313).
Dip	75° E. to 90°

	Comments: Fault dips documented in outcrops and trench excavations vary from vertical to about 75? E., although one trench exposure along east side of Browns Valley showed 31? NE. dip (Bryant, 1982 #5313). Dextral normal offset is delineated by east-facing scarps on alluvium and presumed easterly dip. Trench exposures along east side of Browns Valley show eastern dips along reverse faults (Bryant, 1982 #5313).
Paleoseismology studies	
Geomorphic expression	The Browns Valley section of the West Napa fault is delineated by moderately defined to locally poorly defined geomorphic evidence of dextral-normal displacement, including dissected east-facing scarps in late Pleistocene alluvium, linear drainages, saddles, and dextrally deflected drainages (Bryant, 1982 #5313).
Age of faulted surficial deposits	A late Pleistocene terrace mapped by Sowers and others (1998 #5316) is offset in Yountville (Fox and others, 1973 #5253; Bryant, 1982 #5313). A dissected scarp delineates the Browns Valley section just north of Browns Valley. Sowers and others (1998 #5316) estimated the age of this surface to be late Pleistocene, based on the degree of soil profile development and surface morphology.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Timing of the most recent paleoevent is not known. Traces of the Browns Valley section offset late Pleistocene terrace and alluvial-fan deposits. Pampeyan (1979 #1245) and Bortugno (1982 #5291) reported that the Browns Valley section was characterized by Holocene displacement based on mapping by Fox and others (1973 #5253) and Helley and Herd (1977 #509). Bryant (1982 #5313) did not verify Holocene displacement and concluded that fault scarps suggestive of Holocene offset are dissected, are developed on late Pleistocene surfaces, and that geomorphic evidence of systematic Holocene displacement did not characterize traces of the Browns Valley section. Minor, distributive Holocene offset was not ruled out (Bryant, 1982 #5313).
Recurrence	

interval	
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* The geomorphic expression of the Browns Valley section is indicative of late Pleistocene slip rate on the order of about 0.5 mm/yr, but probably less than 1 mm/yr.
Date and Compiler(s)	2000 William A. Bryant, California Geological Survey
References	#5291 Bortugno, E.J., 1982, Map showing recency of faulting, Santa Rosa quadrangle, *in* Wagner, D.L., and Bortugno, E.J., eds., Geologic map of the Santa Rosa quadrangle, California: California Division of Mines and Geology Regional Geologic Map No. 2A, Sheet 5, scale 1:250,000. #5313 Bryant, W.A., 1982, West Napa fault zone and Soda Creek (East Napa) fault, Napa County: California Division of Mines and Geology Fault Evaluation Report FER-129, microfiche copy in Division of Mines and Geology Open-File Report 90-10, 18 p., scale 1:24,000. #5252 Fox, K.F., Jr., 1983, Tectonic setting of late Miocene, Pliocene, and Pleistocene rocks in part of the Coast Ranges north of San Francisco, California: U.S. Geological Survey Professional Paper 1239, 33 p., 1 pl. #5253 Fox, K.F., Sims, J.D., Bartow, J.A., and Helley, E.J., 1973, Preliminary geologic map of eastern Sonoma County and western Napa County, California: San Francisco Bay Region Environment and Resources Planning Study: U.S. Geological Survey Miscellaneous Field Studies Map MF-483 (Basic Data Contribution 56), scale 1:62,500. #5314 Galehouse, J.S., 1991, Creep rates on Bay Area faults during the past decade [abs.], *in* Living on the edge—Joint meeting of the Seismological Society of America and the Geological Society of America Cordilleran Section, 86th Annual Meeting: Seismological Research Letters, v. 62, p. 12. #4856 Hart, E.W., and Bryant, W.A., 1997, Fault-rupture hazard zones in California: California Division of Mines and Geology Special Report 42, 38 p. #509 Helley, E.J., and Herd, D.G., 1977, Map showing faults with

	Quaternary displacement, northeastern San Francisco Bay region, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-881, 1 sheet, scale 1:125,000. #2878 Jennings, C.W., 1994, Fault activity map of California and adjacent areas, with locations of recent volcanic eruptions: California Division of Mines and Geology Geologic Data Map 6, 92 p., 2 pls., scale 1:750,000. #1245 Pampeyan, E.H., 1979, Preliminary map showing recency of faulting in coastal north-central California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1070, 13 p. pamphlet, 3 sheets. #4860 Petersen, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic seismic hazard assessment for the State of California: California Department of Conservation, Division of Mines and Geology Open-File Report 96-08 (also U.S. Geological Open-File Report 96-706), 33 p. #5316 Sowers, J.M., Noller, J.S., and Lettis, W.R., 1998, Quaternary geology and liquefaction susceptibility, Napa, California, 1:100,000—A digital database: U.S. Geological Survey Open-File Report 98-460: U.S. Geological Survey Open-File Report 98-460. #5317 Weaver, C.E., 1949, Geology and mineral deposits of an area north of San Francisco Bay, California: California Division of Mines Bulletin 149, p. 135. #1216 Working Group on Northern California Earthquake Potential (WGNCEP), 1996, Database of potential sources for earthquakes larger than magnitude 6 in northern California: U.S. Geological Survey Open-File Report 96-705, 40 p.