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Monterey Bay- Tularcitos fault zone, Seaside-Monterey section (Class A) No. 62b

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citation for this record: **Bryant, W.A., compiler, 2001, Fault number 62b, Monterey Bay- Tularcitos fault zone, Seaside-Monterey 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 03:03 PM.**

Synopsis	**General:** Monterey Bay-Tularcitos fault zone is a complex, generally northwest-striking zone up to 15 km wide of dextral, dextral-reverse, and thrust faults (Greene and others, 1973 #1323; Dibblee, 1974 #4829; Clark and others, 1974 #6136; Rosenberg, 1993 #6158; Rosenberg and Clark, 1994 #6144). Detailed reconnaissance level mapping is by Greene and others (1973 #1323), Dibblee (1974 #4829), Clark and others (1974 #6136), McCulloch and Greene (1990 #5406), Rosenberg (1993 #6158), Rosenberg and Clark (1994 #6144), and Clark and others (1997 #6137). Rosenberg and Clark (1994 #6144) documented evidence of Holocene displacement along the Hatton Canyon, Sylvan Thrust, and Tularcitos faults. McCulloch and Greene (1990 #5406) mapped Holocene alluvium as offset along offshore traces of the of the Monterey Bay fault zone. Monterey Bay-Tularcitos fault zone lacks detailed studies and evidence of late Pleistocene

	and Holocene slip rates is poorly constrained. Dextral slip rates are not known. Rosenberg and Clark (1994 #6144) reported vertical slip rates that ranged from 0.02 mm/yr for the Navy fault (late Pleistocene vertical rate), to 0.4 mm/yr for the Sylvan Thrust fault (Holocene vertical rate). Post-Middle Miocene dextral slip rate of 0.3-1.5 mm/yr can be inferred for Tularcitos fault zone based on postulated dextral displacement by Graham (1976 #6155). However, timing of total dextral displacement is poorly constrained. **Sections:** This fault has 3 sections.
Name comments	**General:** **Section:** Section name is proposed in this compilation. Seaside-Monterey section includes the Navy, Berwick Canyon, Hatton Canyon, and Sylvan faults comprising a zone as much as 5 km wide. Section extends from the postulated on-shore extension of the Monterey Bay fault zone at the southern side of Monterey Bay southeast to about 1 km north of Snivleys Ridge where the Navy, Berwick Canyon, and Hatton Canyon faults branch from the Tularcitos fault. **Fault ID:** Refers to numbers 229 (Monterey Bay fault zone), 232 (Navy fault), and 236 (Tularcitos fault) of Jennings (1994 #2878) and number LO4 (Monterey Bay-Tularcitos fault zone) of Working Group on Northern California Earthquake Potential (1996 #1216).
County(s) and State(s)	MONTEREY COUNTY, CALIFORNIA
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Locations based on digital revisions to Jennings (1994 #2878)) using original mapping by Dibblee (1974 #4829) at 1:62,500; original mapping by Clark and others (1974 #6136), Bryant (1985 #6135), Rosenberg (1993 #6158), Rosenberg and Clark (1994 #6144), and Clark and others (1997 #6137) at 1:24,000.
Geologic setting	Generally northwest-striking zone of discontinuous faults located

	in the complexly deformed Salinian block bounded by the San Andreas [1] fault zone to the northeast and the San Gregorio [60] fault zone to the southwest. Monterey Bay-Tularcitos fault zone extends for about 84 km from about 6 km southwest of Santa Cruz, near the San Gregorio [60] fault, across Monterey Bay southeast to the Monterey Peninsula to near the crest of the Sierra de Salinas. Cumulative dextral and vertical displacement are not known. Graham (1976 #6155) postulated between 3.2 km and 16 km of dextral strike-slip displacement may have occurred along the Tularcitos fault zone, based on apparent dextral separation of distinctive beds in the Miocene Monterey Formation. Fiedler (1944 #6140) reported 380 m of post-Miocene up-to-north vertical displacement along the Tularcitos fault zone.
Length (km)	This section is 25 km of a total fault length of 84 km.
Average strike	N48°W (for section) versus N44°W (for whole fault)
Sense of movement	Right lateral *Comments:* Navy fault is primarily dextral strike-slip fault, based on geomorphic expression (Rosenberg, 1994 #6144) and first-motion studies (Cockerham and others, 1990 #6152). Berwick Canyon fault is considered to be a dextral reverse fault. Younse (1980 #6162) considered the Berwick Canyon fault to be predominantly normal (down-to-north), but his cross-section C-C' suggests thickness changes of Tertiary sedimentary rocks across the fault which would indicate a strike-slip component. Both Hatton Canyon and Sylvan Thrust faults are predominantly up-to-north reverse faults. Road-cut exposure of Sylvan Thrust indicates fault is thrust fault (Rosenberg and Clark, 1994 #6144).
Dip Direction	S; SW *Comments:* Navy, Berwick Canyon, and Hatton Canyon faults identified as steeply dipping. Exposures of Sylvan Thrust show fault planes dipping 38? to 47? SW (Rosenberg and Clark, 1994 #6144).
Paleoseismology studies	
Geomorphic expression	Navy fault is delineated by geomorphic features indicating late Pleistocene and possible Holocene dextral strike-slip displacement such as aligned linear drainages, aligned benches

	and saddles, springs, and southwest-facing bedrock scarps (Clark and others, 1974 #6136; Rosenberg and Clark, 1994 #6144). Well-defined scarps, closed depressions, and dextrally offset drainages were not observed by Bryant (1985 #6135). Berwick Canyon fault delineated by aligned linear drainages and poorly defined benches and saddles (Rosenberg and Clark, 1994 #6144).
Age of faulted surficial deposits	Fault strands in this section offset Mesozoic crystalline basement rocks, Tertiary sedimentary rocks, Quaternary to late Pleistocene marine and fluvial terrace deposits, and, locally, Holocene colluvium (Clark and others, 1974 #6136; Dupre, 1990 #6153; Vaughn and others, 1991 #6147; Rosenberg and Clark, 1994 #6144).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Timing of the most recent paleoevent is not well constrained. Traces of the Sylvan Thrust fault offset colluvium that has 14C age of 4,890?90 yr B.P. and traces of the Hatton Canyon fault offset colluvium that has 14C age of 2,080?40 yr B.P. (Rosenberg and Clark, 1994 #6144). Most recent displacement on Navy fault has not been established, but Clark and others (1974 #6136) considered fault as possibly active, based on geomorphic expression and association with offshore faults that offset seafloor (McCulloch and Greene, 1990 #5406). Rosenberg and Clark (1994 #6144) mapped folded late Pleistocene terrace deposits adjacent to the Navy fault which suggest post-late Pleistocene displacement.
Recurrence interval	
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* There are no data for total slip along the Seaside-Monterey section. Rosenberg and Clark (1994 #6144) reported late Quaternary and Holocene vertical slip-rates for the faults of the Seaside-Monterey section. Late Quaternary vertical slip rate for Navy fault is 0.02 mm/yr, based on 10 m vertical offset of 600 ka fluvial terrace (Wright and others, 1990 #6161). Rosenberg (1993 #6158) reported a Quaternary vertical slip-rate of 0.03 mm/yr for the Hatton Canyon fault, based on 30 m vertical offset

	of 1.1 Ma fluvial terrace. Rosenberg and Clark (1994 #6144) calculated a Holocene vertical slip-rate of 0.07-0.14 mm/yr for the Hatton Canyon fault, based on 0.15-0.3 m vertical offset of 2.08 ka colluvium (14C age). Late Pleistocene vertical slip-rate of 0.04-0.05 mm/yr for Sylvan Thrust reported by Rosenberg and Clark (1994 #6144), based on 15-20 m vertical offset of 415 ka coastal terrace. Holocene vertical slip-rate of 0.2-0.4 mm/yr was calculated for the Sylvan Thrust fault by Rosenberg and Clark (1994 #6144), based on 1-2 m vertical offset of 4.89 ka colluvium (14C age). Poorly constrained slip rate assigned to the entire fault by Petersen and others (1996 #4860) for probabilistic seismic hazard assessment for the State of California was 0.5 mm/yr (with minimum and maximum assigned slip rates of 0.1 mm/yr and 0.9 mm/yr, respectively.
Date and Compiler(s)	2001 William A. Bryant, California Geological Survey
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