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Quaternary Fault and Fold Database of the United States

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Coronado Bank fault zone, Coronado Bank section (Class A) No. 131b

Last Review Date: 2017-03-06

citation for this record: **Ryan, H.F., and Bryant, W.A., compilers, 2017, Fault number 131b, Coronado Bank fault zone, Coronado Bank 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 02:15 PM.**

Synopsis	**General:** The Coronado Bank fault zone is comprised of numerous discontinuous, subparallel, right and left stepping youthful fault strands that are probably controlled by pre-existing faults (Greene and others, 1979; Kennedy and others, 1979; Legg and Kennedy, 1979; Kennedy and others, 1980; Greene and Kennedy, 1986; Legg and others, 1991; Clarke and others, 1987 8043; Ryan and others 2009). Based on a change in strike and style of deformation, the Coronado Bank fault zone is divided into two sections at La Jolla fan valley. The southern Coronado Bank section trends more northerly and exhibits evidence for transtension along strike. It lies within and slightly to the east of Loma Sea Valley, between Coronado Bank and the continental slope and is generally comprised of one to two major strands with numerous branch and secondary features (Kennedy and others, 1980; Greene and Kennedy, 1986; Clarke and others, 1987; Ryan

	and others 2009). In places, the fault zone splays into multiple strands that form horst and graben structures that offset Holocene sediment (Greene and Kennedy, 1986). Astiz and Shears (2000) resolve microseismicity near the Coronado Bank fault zone east of the Loma Sea Valley; it is unclear whether this seismicity is related directly to the Coronado Bank fault zone or unnamed faults farther east. North of the La Jolla fan valley, the Coronado Bank fault zone has a very different character. The Coronado Bank-Palos Verdes section [131b] of the fault zone has a more westerly orientation with evidence for transpression along strike. The fault zone extends for 18 km north of La Jolla fan valley as a positive flower structure with the outer fault strands dipping into the fault zone exhibiting a reverse sense of motion. Farther north, the fault zone is buried beneath sediments, but again shows bathymetric expression south and east of Crespi Knoll. Although data are sparse, we cannot extend the northern section of the fault zone along strike northwest of Crespi Knoll with any confidence. Thus it is unclear whether the fault zone is continuous with the Palos Verdes fault zone [128] to the north. An additional active fault strand is present north and east of Crespi Knoll, the Carlsbad Ridge fault. This is a much simpler feature that is comprised of a single high-angle strand that deforms Holocene-age sediment and shows progressive offset of reflectors with depth (Normark and others, 2009). **Sections:** This fault has 2 sections. In this compilation, the Coronado Bank fault zone is divided into two sections based on both a change in strike of the fault zone from about N. 30° W. for the Coronado Bank section [131a] to about N. 45° W. for the Coronado Bank-Palos Verdes section [131b] and a change in the style of deformation from transtensional in the south to transpressional in the north. La Jolla fan valley is located at the transition between the two sections
Name comments	**General:** Emery and others (1952) first suggested that a fault is present along Loma Sea Valley adjacent to Coronado Bank. In the area adjacent to and east of Coronado Bank, Moore (1969) also mapped a fault, however, no fault name was given. Kennedy and others (1979), Legg and Kennedy (1979), and Greene and others (1979 6470) use the term Coronado Bank fault zone for the fault zone east of Coronado Bank along Loma Sea Valley, and its continuation to the northwest where it is proposed to join with the Palos Verdes fault zone [128]. **Section:** The Coronado Bank section extends from south of the

	international border with Mexico north to the La Jolla fan valley. The fault is composed of 1–2 main strands with numerous subsidiary faults. In general, the westernmost fault strands dip to the northeast from 60–75° and the eastern strands dip to the southwest at similar values forming a negative flower structure. Near the border with Mexico, the fault zone is not as well defined on seismic reflection profiles, owing in part to shallow water depths. Farther north the fault zone is clearly resolved on both high-resolution and deep penetration reflection profiles. West of Point Loma, a prominent graben is present along the fault zone, with some of the fault strands associated with the graben clearly offsetting the seafloor. North of Mission Bay, the fault zone splays into numerous strands that form horst and graben structures. These strands terminate near La Jolla fan valley. **Fault ID:** Refers to Jennings (1994) numbers 484 and 489.
County(s) and State(s)	SAN DIEGO COUNTY, CALIFORNIA
Physiographic province(s)	LOWER CALIFORNIAN
Reliability of location	Good Compiled at 1:250,000 and 1:750,000 scale. *Comments:* Location of fault from Qt_flt_ver_3-0_Final_WGS84_polyline.shp (Bryant, W.A., written communication to K.Haller, August 15, 2017) attributed to 1:250,000-scale mapping of Clarke and others (1987 #8043) and unspecified scale map of Ryan and others (2009 #8244). The fault zone was mapped using seismic reflection data including deep penetration industry multichannel seismic reflection profiles with a nominal trackline spacing of about 3 km that are available for the offshore region from the Mexican border to La Jolla fan valley (USGS, 2005; Ryan and others 2009). These data were supplemented by both high resolution multichannel reflection profiles with a trackline spacing of about 4 km that have a vertical resolution of 2–4 m (Normark and others, 1999) and high resolution boomer profiles that have a vertical resolution of less than 1 m and were used to document recency of faulting (Gutmacher and others, 2000).
Geologic setting	The Coronado Bank fault zone is one of several northwest-trending strike-slip fault zones that occur between San Clemente

	Island and the main land in the inner California Continental Borderland. The fault zone may be continuous with the Agua Blanca fault zone, (which goes offshore near Punta Banda, Baja California, Mexico) to the south and the Palos Verdes fault zone [128] to the north (Greene and others, 1979; Legg and Kennedy, 1979; Ryan and others 2009).
Length (km)	km.
Average strike	
Sense of movement	Right lateral, Normal *Comments:* Based on the association of the Coronado Bank fault zone with the Agua Blanca fault zone and Palos Verdes fault zone [128], which are faults with demonstrated strike-slip offset, the Coronado Bank fault zone is considered to primarily accommodate strike-slip motion. Some strands of the Coronado Bank section show normal offset of reflectors, particularly in the areas west of Point Loma and immediately south of La Jolla fan valley.
Dip Direction	V *Comments:* Fault dips are constrained by depth-converted industry multichannel reflection profiles collected approximately perpendicular to the fault strike and displayed with no vertical exaggeration. Near the surface, the fault dips generally are between 60° and 75°, with some strands near vertical (greater than 80°). At depths of 2–3 km, some of the faults become listric with dips of 35–40°. The western fault strands tend to dip to the northeast, whereas the eastern fault strands dip to the southwest.
Paleoseismology studies	
Geomorphic expression	Although the Coronado Bank fault zone is associated with Coronado Bank, uplift of the bank pre-dates the present configuration of the fault zone, with most of the fault strands east of the bank.
Age of faulted surficial deposits	In the northern part of the Coronado Bank section near La Jolla fan valley, some strands are shown to have Holocene displacement based on the offset of a generally acoustically transparent layer that is inferred to be of Holocene age (Kennedy

	and others, 1979). However, there is no clear acoustic evidence for the presence of Holocene sediment over most of this section of the fault zone. A Quaternary age is determined for the other fault strands based on offset of shallow layered sediment and, in places, the seafloor (Kennedy and others, 1979; Clarke and others, 1987; Ryan and others 2009).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* This is estimated by age of faulted deposits (Ryan and others, 2009 #8244)
Recurrence interval	
Slip-rate category	Between 1.0 and 5.0 mm/yr *Comments:* The slip rate for the Coronado Bank fault zone is generally considered to be the same as the Palos Verdes fault zone, which has a slip rate of 3 mm/yr (McNeilan and others, 1996).
Date and Compiler(s)	2017 Holly F. Ryan, U.S. Geological Survey William A. Bryant, California Geological Survey
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