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Coronado Bank fault zone, Coronado Bank-Palos Verdes section (Class A) No. 131a

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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-Palos Verdes section of the Coronado Bank fault zone is continuous along strike with the Coronado Bank section [131b] across La Jolla fan valley. At the La Jolla fan valley, however, the fault zone is buried. North of the fan valley, the strands of this section trend more westerly (N. 45° W.) and form a positive flower structure with seafloor relief over a distance of about 15 km. It is more difficult to image this section of the fault zone farther to the north where it may continue along strike for an additional 10 km. Portions of the along-strike continuation of the fault zone are buried by sediment and may not be active. The Carlsbad Ridge fault is assigned to the Coronado Bank- Palos Verdes section. This fault has a more northerly trend, similar to the Coronado Bank section to the south. This strand is vertical, deforms Holocene-age sediment, and shows a progressive offset of reflectors with depth (Normark and others, 2009). **Fault ID:** Refers to Jennings (1994) numbers 484 and 489.
County(s) and State(s)	SAN DIEGO COUNTY, CALIFORNIA
Physiographic province(s)	LOWER CALIFORNIAN PACIFIC BORDER
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 1:750,000-scale mapping of Jennings (1994), and unspecified scale map of Ryan and others (2009). This section of the fault zone was mapped primarily using industry multichannel seismic reflection profiles that have a nominal trackline spacing of about 3 km (USGS, 2005; Ryan and others 2009). These data were supplemented by both high- resolution multichannel reflection profiles 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 (Gutmacher and others, 2000). However, there are gaps in high-resolution coverage in the offshore area between San Mateo Point and just north of Dana Point along the Coronado Bank-Palos Verdes section. In particular, the area where the Coronado Bank fault zone converges with the Palos Verdes fault zone [128] has poor

	coverage by high-resolution reflection profiles.
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-Palos Verdes section also show reverse offset of reflectors. The northern strand may accommodate both dip-slip and sinistral displacement of reflectors.
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 strands are either vertical or have relatively low dips (45° to 55°). The western strands of the fault zone dip to the northeast, whereas the eastern strands dip to the southwest; strands in the central part of the fault zone are near vertical as is the more northern strand.
Paleoseismology studies	
Geomorphic expression	Along the N. 45° W. part of the Coronado Bank–Palos Verdes section there are two areas that show pronounced geomorphic expression of the fault zone. These bathymetric features occur (1) along a 13-km-section of the fault zone located 5 km northwest of the La Jolla fan valley, which shows a seafloor relief of 10–15 m,

	and (2) at the northwest end of the N. 45° W. part of the section, which is associated with a bathymetric high. Both of these areas have fault strands that show reverse offset. The more northerly strand of this section shows about 1 m of offset of the seafloor (Ryan and others 2009).
Age of faulted surficial deposits	The northern strand of the Coronado Bank-Palos Verdes section shows offset of reflectors that are dated at 7.4 ka and 10.2 ka using sediment cores collected near the fault strand (Normark and others, 2009). Owing to lack of additional age dates, a Quaternary age is assigned 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). Normark and others (2009) determined a sinistral slip rate of 0.1 mm/yr for the Carlsbad Ridge fault.
Date and Compiler(s)	2017 Holly F. Ryan, U.S. Geological Survey William A. Bryant, California Geological Survey
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