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# Understanding pelagic stingray (Pteroplatytrygon violacea) by-catch by Spanish longliners in the Mediterranean Sea

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The pelagic stingray Pteroplatytrygon violacea is known to be a frequent by-catch in longline sheries worldwide. This study analysed the eco-geographic, technical and temporal parameters that affect pelagic stingray by-catch by the Spanish surface drifting longline eet that operates in the Mediterranean Sea. Between 2and 213, 3longline shing operations were monitored. Over this period, we recorded 4 pelagic stingray by-catches by this eet. Two gear types were involved in .of the pelagic stingray by-catch observed: traditional surface longliners targeting swordsh (LLHB) and surface drifting longliners targeting albacore (LLALB). We obtained two statistically signicant eplanatory models for the two types of gear. In both cases, two of the most important variables were sheries being sited over the continental shelf and shing during the summer season. The LLHB eplanatory model included the following variables: number of hooks, latitude where setting started, distance between the ends of the longline, and the spring season. Regarding the LLHB, we found an association between the Capture per Unit Effort of pelagic stingray from favourable sets per year and the North Atlantic Oscillation in the previous year.

Keywords: By-catch, longline, pelagic stingray, Pteroplatytrygon violacea

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## IN T R O D U C T IO N

The pelagic stingray Pteroplatytrygon violacea (Bonaparte, 132) (Dasyatidae) is distributed in circumpolar and subtropical areas, including the Mediterranean Sea. Pteroplatytrygon violacea is the only species of stingray known to occupy pelagic waters (e.g. see Mollet, 22 Veras et al., 2 ). Pelagic stingrays are caught in great numbers in longline sheries worldwide and are considered to be by-catch due to their lack of commercial value (Domingo et al., 2 Forselledo et al., 2 ). Several studies have shown that the geospatial overlap between the habitat of this species and important longline shing grounds has resulted in large amounts of by-catch with unknown effects on the population and ecosystem structure (Domingo et al., 2 De Siqueira De Sant'Anna, 2 Forselledo et al., 2 ).

The Western Mediterranean is an important shing ground for the Spanish surface drifting longline eets which target swordsh ( iphias gladius ), albacore tuna (Thunnus alalunga) and bluen tuna ( Thunnus thynnus). The main gear used for this eet are as follows: surface longliners targeting albacore (longline albacore (LLALB))surface longliners using a hydraulically operated monolament longline reel targeting swordsh (longline American (LLAM)surface longliners targeting bluen tuna (longline Japanese (LLJAP))and traditional surface longliners targeting swordsh (longline home-based (LLHB)). The principal differences in longline gear are related to hook type and size, bait type and operational depth. A brief description of the gear follows.

LLALB: This is the shallowest longline gear. The size of the hook and the thickness and length of the shing lines are less than those used in other longline sheries. Between 2and hooks are set and baited with sardine ( Sardina pilchardus). LLALB is a drifting longline that is used in high-sea shing grounds with depths of up to 1m and is mainly used from July to October. The size and type of hooks used are J-shaped Mustad number .

LLAM: A hydraulically operated monolament longline reel (commonly known as the American roller'). Unlike the traditional longline, the American roller uses a hydraulic reel that is often placed at the stern of the boat to collect the line. The monolament longline is between and 1km in length with fewer hooks (11), implying a greater distance between hooks. Fishing depth is greater than that of the LLALB and LLHB, with the deepest hooks working at m below the sea surface. This gear is used throughout the year. The size and type of hooks used are J-shape Mustad number 2 (∼. 2.cm ²), usually baited with mackerel (Scomber sp.) and squid (Ille sp.).

LLJAP: This is a monolament longline eclusively used during May, June and the rst half of July, which is the period when bluen tuna enter the Mediterranean to breed. This gear differs from LLAM in that the shing depth is

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