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Research Note

Effects of Marine Mammals on the Sport Fishery in Santa Monica Bay, California

M.O. Navarro and M. Bearzi

Ocean Conservation Society, P.O. Box 12860, Marina del Rey, California 90295

Marine mammal-sport fishery interactions in Southern California waters are often observed but far less studied than marine mammal interactions with commercial fisheries (Hanan and Read 1989, Beeson and Hanan 1996, NMFS 1997). Older studies (Fiscus and Baines 1968, Miller et al. 1983) show that sea lions rarely interact with fishing activities in and near Santa Monica Bay while, in later investigations, California sea lions (*Zalophus californianus*) are reported to negatively affect sport fishing (Beeson and Hanan 1996). Previous to our study, no information was reported on interactions between fishermen and other species of marine mammals, except for Miller et al. (1983).

The abundance of marine mammals and sport fishermen makes Santa Monica Bay an excellent area to further investigate marine mammal-sport fishery interactions, to compare results with previous findings, and to provide information for future conservation and management decisions linked with the creation of a Marine Protected Area in Santa Monica Bay. The most common marine mammals known to inhabit and feed in the bay year-round include the California sea lion, the bottlenose dolphin (*Tursiops truncatus*), the short-beaked common dolphin (*Delphinus delphis*) and the long-beaked common dolphin (*D. capensis*) (Bearzi 2005a).

A survey of sport fishermen was conducted during 1998–1999 to gather general information on the type of interactions existing between marine mammals and fishermen activities and how marine mammals affect sport fishery in Santa Monica Bay.

Of 90 interviewed sport fishermen, 30 were selected for the survey in Marina del Rey and Redondo Beach harbors during February–June 2000. The fishermen selected were required to have fished year-round and to have made at least 20 fishing trips per year in Santa Monica Bay (Point Vicente 33° 45′ N 118 24′ W to Point Dume 33° 59′ N 118 48′ W, up to 20 km offshore). Further, the fishermen were chosen from both charter boats (n = 18) and private vessels (n = 12); this was different from previous investigations where those interviewed were exclusively on charter boats (Miller et al. 1983, Beeson and Hanan 1996).

Information about Sport Fishermen and Their Catches - Of the selected fishermen, 87% stated they spent 1–3 days per month fishing in the bay and 80% preferred fishing during the summer months (June–August). Most (67%) fished less than 10 km from shore, of which 43% were within 1–5 km and only one fisherman at less than 1 km from shore. In 1998, 38% of the fishermen reported catching mostly "bass" (the term bass is generally used by local fishermen to include any fish species similar to a rockfish) and 36% reported catching mostly yellowtail, *Seriola lalandi*. In 1999, 47% of the fishermen reported catching "bass" most abundantly while only 13% reported catching yellowtail.

Interactions with Marine Mammals - All the fishermen observed dolphins in 1998 and 1999. Virtually all (97%) stated that dolphins – generally recognized as "common dolphins" - never interfered with their fishing operations; one fisherman reported one

instance in which a dolphin took a single fish off a fishing line. None observed dolphins feeding behind their vessels although 17% occasionally observed dolphins traveling nearby. California sea lions, however, were reported by 93% to commonly cause gear damage and/or fish depredation while foraging opportunistically around their boats.

Conclusions - Dolphins rarely interacted with fishing activities while California sea lions were reported to negatively affect sport fishing (see also: Hanan and Read 1989, Beeson and Hanan 1996). Considering that older studies (Fiscus and Baines 1968, Miller et al. 1983) had not reported impacts with sport fishing activities in Santa Monica Bay and adjacent areas, an increasing trend of sea lion interactions over time is suggested. This growing interaction between sea lions and fishing activities may be due to the annual rate of increase in the sea lion population of about 5–6% per year since the mid-1970s in California (NMFS 1997; see also: Beeson and Hanan 1996, Carretta et al. 2006), and the concurrent increase in sport-fishing activities in the bay with over 5.5 million sport fishing trips made annually (http://www.nationalestuaries.org/publications.htm, Dotson and Charter 2003).

Although there is a large overlap in the diet of both common dolphin species and sea lions (Bearzi 2006) and these species are often found foraging together in Santa Monica Bay (Bearzi 2005a), these animals interact differently with sport-fishing activities. This difference may be due to slight differences in the prey caught by common dolphins and sea lions. While northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax*), Pacific whiting (*Merluccius productus*) and jack mackerel (*Trachurus symmetricus*) are the main prey of both sea lions and common dolphins, rockfish (*Sebastes* sp.) are consumed mainly by sea lions (Fitch and Brownell 1968, Lowry et al. 1990, Schwartz et al. 1992, Bonnell and Dailey 1993). Based on the interviewed sport fishermen of this study and other sources (e.g., rockfish combined; SCCWRP et al. 1994, Dotson and Charter 2003) rockfish are also amongst their most targeted species in the study area.

Bottlenose dolphins likely did not interfere with sport fishing activities because: 1) of differences in targeted fish species (for a summary of bottlenose dolphin prey see: Bearzi 2003), 2) their entire coastal population usually remains at less than 1 km from shore (Bearzi 2005b) and only one fisherman was recorded to fish at this distance from the coast, 3) the offshore population are usually more frequent outside the bay (Bearzi, pers. obs.)

California sea lions have been observed to follow dolphins, possibly taking advantage of the dolphins' echolocation abilities to find prey (Bearzi 2006). Similarly, sea lions may take advantage of sport fishing activities to facilitate their foraging success in the bay and also by taking fish off the fishermens' lines. Miller et al. (1983) stated that this sea lion behavior is likely learned because they believe that depredation was not recorded from 1950–1970.

The results of this study show the need to further investigate the interactions between California sea lions and sport-fishery in the bay. This data also provides preliminary information for making sound and balanced management decisions affecting the future of sport fishing activities and the high sea lion presence in the candidate Marine Protected Area of Santa Monica Bay.

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