

Photographic Match of a Killer Whale (*Orcinus orca*) Between Peruvian and Mexican Waters

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Abstract

Killer whales are widely distributed along the Pacific coast of Mexico, but they are only occasionally seen in some areas of the southeast Pacific. Although they are found on both coasts of the Baja California Peninsula, killer whale distribution and movements have mostly been studied in the Gulf of California. Records of this species are sporadic off Peru, and sightings have been mainly anecdotal. On 27 March 2001, a pod of six killer whales was observed during a pelagic survey at 12° 52' S, 77° 53' W, ca. 148 km off Pucusana, Peru. Within the killer whale pod, a readily identifiable adult male was present. Photographs of this male were checked for matches with the Mexican killer whale catalog. During this process, a match was found with an animal previously photographed two times in the Mexican Pacific, on 4 April 1988 in Magdalena Bay at 24° 18' N, 112° 01' W, and on 5 July 1994 in La Paz Bay at 24° 36' N, 110° 26' W. The minimum distance between the Mexican and Peruvian match reached a total of 5,535 km. The inter-hemispheric match reported in this paper extends the already known maximum distance that killer whales are able to travel, and also raises further questions in relation to the population structure of the species due to its high capacity of movement throughout the oceans and, in consequence, the potential interaction between geographically distant populations.

Key Words: killer whale, *Orcinus orca*, distribution, range of movement, Peru, Mexico

Introduction

The killer whale, *Orcinus orca*, is a cosmopolitan species that inhabits all the oceans of the world but is most commonly seen in coastal, temperate waters, mainly in areas of high productivity (Ford, 2002). Important concentrations occur in waters along the northwestern coast of North

America, around Iceland, and along the coast of northern Norway (e.g., see Sigurjónsson et al., 1988; Similä et al., 1996). In the Antarctic, they are usually found up to the pack ice edge in many areas and may extend into ice-covered waters; whereas in the Canadian Arctic, killer whales are rarely seen near pack ice, but they visit the region during the open water season in later summer (Ford, 2002). According to this author, information on the species' distribution in most tropical and offshore waters is limited; however, Visser & Bonaccorso (2003) compiled published information related to sightings of the species in different locations of tropical Oceania, Indo-Pacific, and Southeast Asia, as well as new observations and a review of the species' presence in Papua New Guinea, revealing that although they are mainly considered to be a temperate to cold water species, killer whales have been reported intermittently in tropical areas around the world.

Killer whales are widely distributed along the Pacific coast of Mexico, although they are only occasionally seen in some areas. Their habitat in Mexican waters is quite variable. They can be found near-shore, in the open ocean, and around isolated oceanic islands; nevertheless, they are more frequently seen along continental and island coastlines (Guerrero-Ruiz, 1997). Although they are found on both coasts of the Baja California Peninsula (Dahlheim et al., 1982), killer whale distribution and movements have mostly been studied in the Gulf of California (Guerrero-Ruiz et al., 1998).

Records of this species are sporadic off Peru (Aguayo, 1975; García-Godos, 2004), and reports of sightings have been mainly anecdotal. Nevertheless, the concentrations of cetaceans in the area and the confirmed records of killer whales preying on pinnipeds in Peruvian waters (Majluf & Reyes, 1988; Van Waerebeek et al., 1988) suggests to us that the species may be more common than records currently indicate (García-Godos, 2004).

Materials and Methods

Between 1995 and 2003, 20 killer whale sightings were recorded in Peruvian waters during pelagic surveys conducted by the Instituto del Mar del Perú (IMARPE), from a platform of opportunity recordings (García-Godos, 2004), and during cetacean-oriented surveys conducted by the Southwest Fishery Science Center (SWFSC) in the Eastern Tropical Pacific from July to December 1998 and 2000 (Kinzey et al., 1999, 2001).

Surveys conducted by IMARPE were dedicated to fishery resources and oceanographic research, and cetacean observers were allocated depending on funds and space in the ships. Killer whales were recorded on 13 occasions off Peru during 23 surveys conducted by IMARPE in different times of the year, with a total search effort of 39,060 nmi.

Results

On 27 March 2001, one of us (IGG), working as a cetacean observer during a pelagic survey on RV Olaya from IMARPE at 12° 52' S, 77° 53' W, ca. 148 km off Pucusana, Peru, sighted a pod of six killer

whales (including one calf). The killer whale pod was observed chasing a group of at least 15 pilot whales (*Globicephala* spp.). Their predatory behavior is presented by García-Godos (2004). Within the killer whale pod, a readily identifiable adult male was present and was characterized by a dorsal fin with a wavy shape and a sharp bend to the left side close to the tip (Figure 1a). Only this adult male was photographed during this encounter, and it represents the only photographed and catalogued killer whale in Peruvian waters. Its photographs were analyzed and compared with existing catalogs of killer whales in the northeast Pacific.

Photographs of this male were checked for matches with the Mexican killer whale catalog (*Killer Whale Catalog for the Mexican Pacific-UABCS*), managed by one of us (MGR) at the Universidad Autónoma de Baja California Sur (UABCS) at La Paz, Mexico. This catalog holds more than 100 photo-identified killer whales photographed in the Mexican Pacific between 1973-2005, of which 60 are well-marked individuals and 26 of these are well-marked males.

During this process, we found a match with an animal previously photographed two times in the

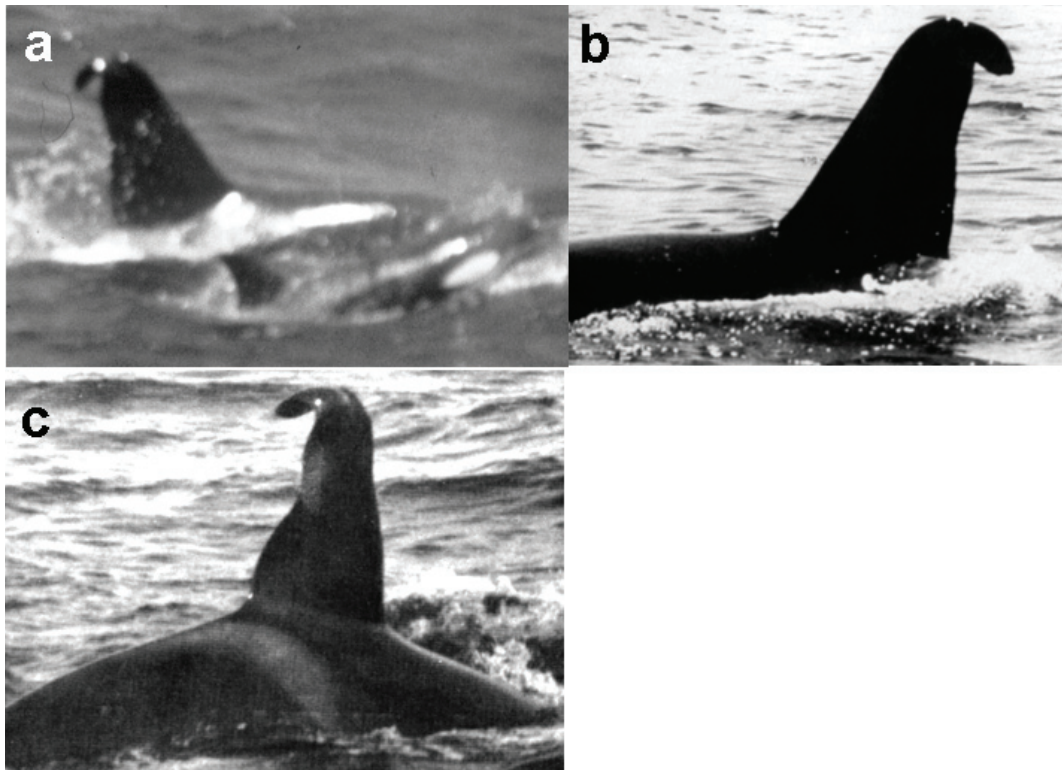


Figure 1. Male killer whale seen in (a) 2001 off Pucusana, Perú; (b) 1988 in Magdalena Bay, Mexico; and (c) 1994 in La Paz Bay, Mexico

Mexican Pacific. This male killer whale, which is also included in the killer whale catalog of California and western Mexico (Black et al., 1997), was first sighted on 4 April 1988 in Magdalena Bay at 24° 18' N, 112° 01' W (Figure 1b); and the second time on 5 July 1994 in La Paz Bay at 24° 36' N, 110° 26' W (Figure 1c) within a group of eight killer whales that included two calves. In the vicinity, a fin whale (*Balaenoptera physalus*), bottlenose dolphins (*Tursiops truncatus*), and sea lions (*Zalophus californianus*) were also observed, but no interaction took place between them and the killer whales.

The minimum distance between the Mexican and Peruvian match reaches a remarkable total of 5,535 km (Figure 2).

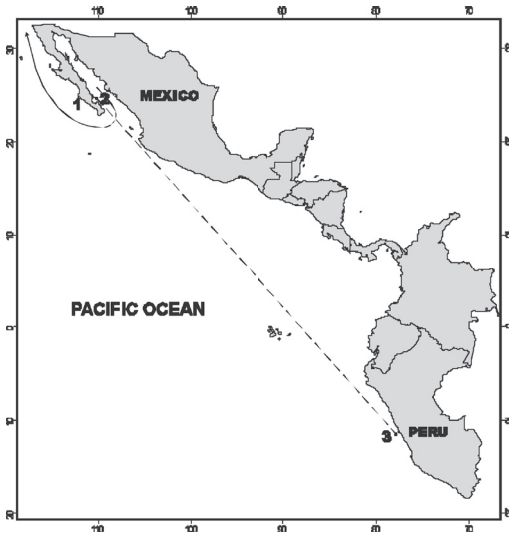


Figure 2. Location of sightings of the male killer whale: (1) off Magdalena Bay, Mexico; (2) off La Paz Bay, Mexico; and (3) off Pucusana, Peru

Discussion

Killer whales are known to travel long distances. For example, Leatherwood et al. (1984) mentioned a range of movement of 1,445 km for northeast Pacific transient killer whales, extending from southeastern Alaska to northwestern Washington, USA. In addition, Goley & Straley (1994) reported the range of movements of northeast Pacific transient killer whales from Alaska to California and estimated a ranging distance of 2,660 km.

Northeast Pacific transient killer whales seem to have no clearly defined patterns of occurrence, unlike northeast Pacific resident ones. Northeast Pacific transient killer whales gather in small groups, their encounters take place year-round, and they are marine mammal hunters (Ford & Ellis, 1999). Killer whales in Mexican waters are likely to have a life

history strategy similar to that of the northeast Pacific transients due to their seasonal distribution and feeding habits (Guerrero-Ruiz et al., 1998); however, it should be noted that at this stage, there is insufficient information about Mexican killer whales to describe in detail their life history strategy. Even though there have been some matches between a number of individuals from Mexican waters and those off California, the killer whales that are found in the Mexican Pacific and Gulf of California have not been observed with the transient killer whales that inhabit the northeast Pacific (Black et al., 1997).

There are no recognized local populations of killer whales in Peruvian waters (García-Godos, 2004). Killer whales recorded off Peru show a transient-like predatory behavior on pilot whales, bottlenose dolphins (*Tursiops truncatus*), South American fur seals (*Arctocephalus australis*) (García-Godos, 2004), and probably sperm whales (*Physeter macrocephalus*) (Dufault & Whitehead, 1995). Groups found off Peru range between one to 13 individuals and were associated with offshore warm waters and, to some extent, with El Niño events, suggesting that killer whales sighted off Peru would belong to oceanic populations of the Eastern Tropical Pacific (García-Godos, 2004). The present recapture encourages this hypothesis and partly answers the question about the origin of this species found in Peru.

The inter-hemispheric match reported in this paper almost doubles the already known maximum distance that killer whales are able to travel and also raises further questions in relation to the population structure of the species due to its high capacity for movement throughout the oceans and, in consequence, the potential interaction between geographically distant populations. A similar situation has been recorded in other cetacean species such as sperm whales. Jaquet et al. (2003), for example, recorded female sperm whales in the Gulf of California that previously had been photo-identified in Galapagos.

Curved tips are not rare in killer whales. After reviewing the six published catalogs of killer whales from Alaska to Mexico (Heise et al., 1991; Ford et al., 1994; Black et al., 1997; Dahlheim et al., 1997; Ford & Ellis, 1999; Matkin et al., 1999), we found four individuals out of more than 1,000 resident killer whales with curved tips—two of them to the right side, one to the left side, and another animal with its dorsal fin totally collapsed to the left side. These conditions were also found in transient northeast Pacific killer whales. From more than 300 individuals, only two killer whales had their dorsal fin tips bent to the left side, while two other individuals had their dorsal fins totally collapsed to the left side (Black et al., 1997; Dahlheim et al., 1997; Ford & Ellis, 1999).

Even though we are aware that the quality of the ID picture from Peruvian waters is very poor, the probability of having a potentially wrong match is

very low due to the fact that there are only three killer whales from the already mentioned catalogs with their tips bent to their left side, and even though this condition is not uncommon, the existence of another similar animal not yet identified is extremely unlikely, considering that it should combine the wavy shape of the dorsal fin, its bending to the left, and the relative length of the segment that is curved. This is why we consider this photographic match between Peru and Mexico as a correct one. More identification work in these areas is needed to back up this observation.

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