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Records of humpback whales (Megaptera novaeangliae) in Sechura Bay, Peru, in spring 2009-2010

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Abstract

Records of humpback whales in Sechura bay were obtained in spring 2009-2010 between the months of September and November. Sightings were obtained by two observers a board a small outboard engine fishing boat. Different age classes and groups were identified and some spatial difference was detected based on the distribution of sightings. Humpback whales were more abundant in October when most of the sightings and the major activity were observed. Mother-calf pairs were more frequent in October and their spatial distribution within the bay was wider than in other months. Most of the sightings involved both solitary individuals and adults with small calves. Water depth seems to be the main physical reference influencing the distribution of humpback whales in Sechura Bay. Based on the seasonal occurrence of individuals and the presence of very small calves, Sechura Bay is suggested as a nursery ground and migratory reference as well as a probable breeding ground in Northern Peru for humpback whales. Several human activities threaten the conservation of the habitat for humpback whales including oil exploration platforms, supply and traffic of oil tankers, coastal pollution from fish processing plants and projects for new large port facilities. [JMATE. 2011;4(1):29-35]

Keywords: *Sightings, group composition, categories, distribution, seasonality*

Introduction

Humpback whales (*Megaptera novaeangliae*) are known for performing long distances migration from high-latitude waters that are used mostly for feeding and breeding to low-latitude waters used primarily as calving areas (12). During their low-latitude waters migration, the south-eastern Pacific is considered a winter migratory destination for humpback whales which move within waters off Panama, Colombia, Ecuador and Peru (9). In Peru, humpback whales are frequent along the northern coast from May to November and occasionally between December and January (14).

During winter, humpback whales concentrate in tropical and subtropical areas in shallow waters of bays or around islands within the continental shelf (18). Research in winter destination areas in Panama, Colombia and Ecuador had generated empirical information on several aspects of the reproductive biology of humpback whales (1, 6, 10, 17, 21). The status of the species in Peru is limited by the scarce and outdated information due to the absence of local programs for long-term research. In Peru humpback whales were severely exploited during whaling years when catches were documented within the 100 nautical miles between 4º and 7º S from May to November (14, 15, 16). In more recent years, Sechura Bay (Figure 1) has been recognized as a significant concentration area for the species (19, 20), including observations of single individuals, mother and calves pairs and very small calves (20).

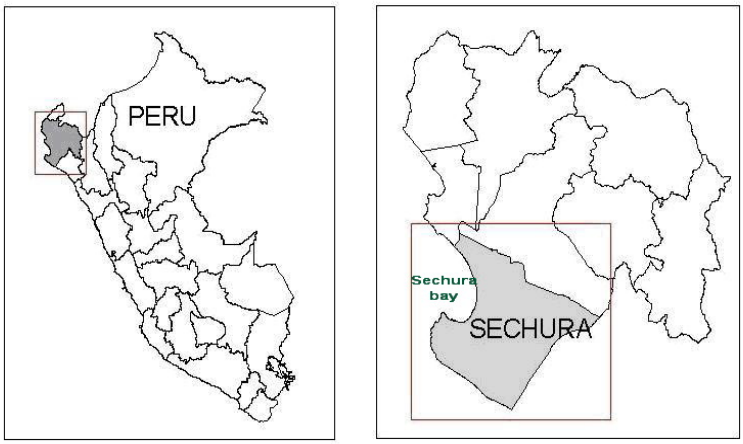

Figure 1 - Sechura Bay study area.

The status of humpback whales has been recognized of regional concern because individuals move among waters off Chile, Peru, Ecuador, Colombia and Panama (9, 10). As a consequence, regional efforts have been carried out to develop a regional strategy to protect the species (10) and to identify priorities in research. On this basis, a systematic survey starting in spring 2009 was carried out in Sechura Bay in order to fill the existing gaps on the knowledge of humpback

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whales in Peru. Some parameters were evaluated like group composition, presence of calves, spatial distribution and the photo identification of individuals.

Materials and Methods

Sechura Bay is located in the northern coast of Peru (5.6ºS; 81ºW), department of Piura (see Figure 1). Field work was conducted there from September to November in 2009 and only in September and October in 2010. The survey was designed in order to obtain: (i) periodic records of humpback whales arriving at the area; (ii) composition of groups using the bay, composition will be established through general categories like adult alone, adult plus calf and group of adults (more than one whale no futher than 100 meters between each other) and others; (iii) obtain photographs for further identification of individuals (photo id).

The survey consisted of systematic observations at sea aboard outboard motor fishing boats; where two observers performed a continued line transect sampling. The observers covered a 360º observation area; each of them covering a 180º area. They searched for blows, dorsal fins, backs or any indicators of whale's presence. Once a whale was found, the boat approached following standard procedures to approach a whale at sea in order to reduce any stress to the animal (4). Water depth was considered in order to establish differences within the survey area.

Each sighting was georeferenced in degrees and minutes using the WGS 84 system. Biological information was recorded like number of animals, presence of calves, main activity and presence of other animals (dolphins, sea lions and seabirds). Identification of individuals was pursued through photo identification of tails.

Basic equipment consisted of two pairs of binoculars (10 x 50 power), one GPS, two digital photo cameras and a video camera.

Data analysis

A monthly data base was obtained. This data was useful to define peaks in the distribution and abundance of whales in the bay in order to explore the best time of the season to find whales. Group composition in spatial and temporal scale was also determined through the methodology proposed and based in five categories: (1) Individual alone, (2) Adult + calf, (3) Two adults or juveniles, (4) Adult + calf + adult and (5) More than two adults. Categories are defined as follows:

(1)Individual alone:	A whale swimming alone without any other whale in close approximation (>100m).
(2)Adult + calf:	This category considers an adult with a calf of any size. The calf sizes were eye measured at field and small calves were considered those of less than 6m and large calves those of more than 7m.
(3)Two adults or juveniles:	Two large whales swimming or staying together in close approximation (<100m).
(4)Adult + calf + adult:	Two adults with a calf.
(5)More than two adults:	More than two whales swimming in close approximation (<100m).

Sightings were plotted in GIS georeferenced distribution maps which was used to identify areas of whale concentration within the bay.

Results

For 2009, a total survey effort of 62.4 hours of observation was obtained and an additional 18.1 hours of effort was obtained in 2010. The 2010 data is not considered in the data analysis since per month effort was not similar than 2009 survey however it is mentioned briefly as complementary information.

In 2009 during September most of the effort was applied in central and north Sechura Bay (between Punta Gobernador and Constante); while in October and November the survey area included central and south Sechura bay (between San Pedro and Punta Aguja). In relation to depth, both shallow waters (< 30m) and deep waters (> 30m) were evaluated. In 2010 during September and October the survey covered the same area considered in 2009.

Number of sightings and abundance

During the survey, 34 confirmed sightings of humpback whales were obtained, eight of which (23.6%) included calves. The total amount of individuals observed was 50 during the three months, 8 of which were calves (16%).

The trend of sightings and abundance for the three months in 2009 is presented in Figure 2a. Both

parameters sightings and abundance follow the same pattern with the peak in October and the lowest values observed in November. A similar trend seems to be established during 2010 (Figure 2b) where both the number of sightings and abundance is higher in October, however should not be overlooked that the sampling effort was much different in 2010 than in 2009.

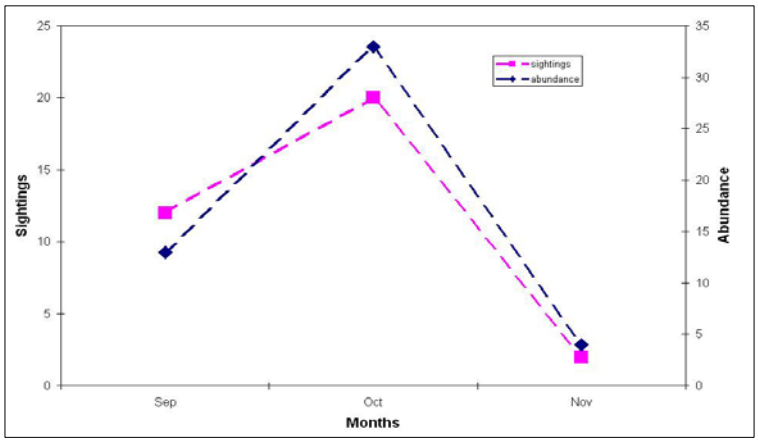

Figure 2a - Sightings (total number of observations made) shown in pink and abundance (number of animals) shown in blue of humpback whales between September and November 2009.

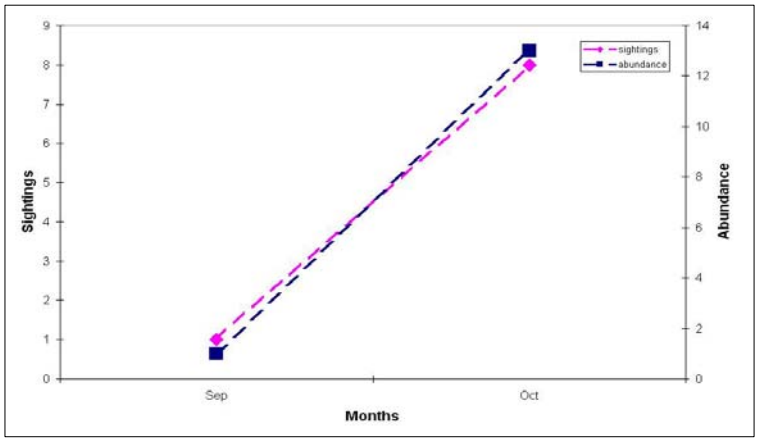

Figure 2b - Sightings (total number of observations made) shown in pink and abundance (number of animals) shown in blue of humpback whales between September and October 2010.

Between September and October there was an increase of more than 67% in the number of sightings (from 12 in September to 20 in October) and more than 100% in abundance (from 13 in September to 33 in October) of whales. After that the trend in November reduced drastically by approximately 80% in sightings and 94% in abundance.

In 2010, a total of 9 sightings were obtained and 14 individuals were accounted for; the majority of which were in October with 8 sightings obtained with an abundance of 13 whales.

Calves

Calves were observed during the whole period. October was the month when calves were most abundant with a total of 6 observations. While in September and November only one calf was observed for each month (Figure 3). Distribution of calves is wider in October where mother-calf pairs were recorded in shallow waters closer to the shoreline (Figure 4). In 2010, calves were observed only in October with a total of 2 calves noted.

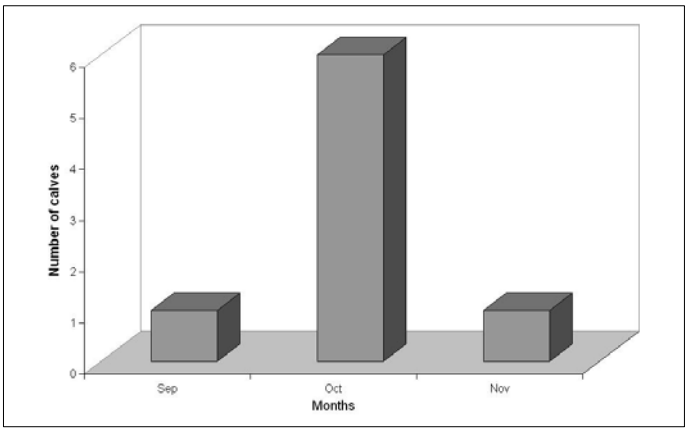

Figure 3 - Number of calves shown on the vertical axis between September and November 2009.

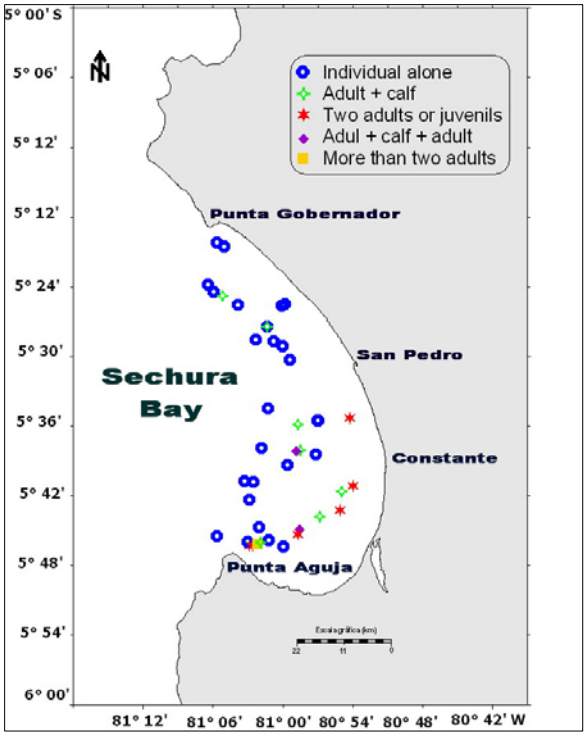

Figure 4 - Sechura Bay distribution of sightings.

Group composition

The group composition for each month is presented in the Table 1. The category with most sightings was "Individual alone" with 21 sightings. The next category well represented was "Adult + calf" with 7 sightings. Aggregations of whales like two or more individuals different to calves were observed mainly in October.

	September	October	November
Individual alone	11	10	0
Adult+calf	1	5	1
Adult+calf+adult	0	1	0
Two adults / juveniles	0	3	1
More than two adults	0	1	0

Table 1 - Categories considered in the group composition for each month, 2009.

The distribution of groups shows some spatial difference. The wider distribution was observed for individuals alone which were found in the entire bay from the northern extreme near Punta Gobernador to the southernmost region near Punta Aguja. In relation to depth this group was observed both in shallow waters and in the deepest. In the northern side of the bay the sightings of individuals alone were seen in shallow waters. This area is less frequented by fishermen and there are no fishing towns. It is possible that some of these records may be whales looking for a quiet place to give birth. Information provided by local fishermen mention that they saw single whales approaching to shore and two or three days later they saw two whales, one of them was a small whale. Additionally some other fishermen reported loss of their nets because of whales close to shore that took them away.

Calves were observed mainly close to shore and their distribution covered the entire bay but mainly in the central and southern regions. An overlap among calve occurrence and groups of more than one whale can be detected in that region of the bay.

Of the total records in 2010, most of them involved single individuals (Individual alone).

Discussion

Humpback whales are one of the most common Mysticetes species in Peruvian waters, especially in spring during the breeding season. The northern coast of Peru, including Sechura Bay is considered to be part of the southern limit of the breeding area (9). The occurrence of humpback whales in the northern coast of Peru had been recorded extensively during the whaling years, when the records were obtained from May to November, mainly in August and September and occasionally in December and January (14). The distribution of the species stated by Ramírez (14) was mainly offshore and the evidence related to Sechura Bay can be biased since the main target during whaling operations was the sperm whale (*Physeter macrocephalus*) which is an offshore species.

During seismic operations Santillán and Suazo (20) reported a high frequency of humpback whales in Sechura Bay and Pimentel port between September and November with a few records even in February. According to these observations the area attracts different age groups with spatial segregation similarly as reported for the Ecuadorian concentration waters (5, 6, 7) and recently in northernmost areas in Peru (13). Our results suggest that depth is an important feature influencing the distribution of groups mainly between adults with calves and adults or juveniles (7, 23, 13). Adults with calves prefer shallow waters while deeper waters are frequented by adults or juveniles both in groups or single animals. A similar pattern was observed in Lobos de Tierra Island (6º 25,98`S, 80º 51,20`W) located approximately 50 nautical miles linear distance from the Sechura Bay. In Lobos de Tierra Island humpback whales were present in May, while in July the whales were seen ≥ 100 m from the island. A reduction in the number of sightings occurred between August and October (11).

Some similarities can be detected between Lobos de Tierra Island (11) and Sechura Bay. For example, the occurrence of very small calves, probably newborns, as well as interactions between groups of individuals and single animals. However there is a gap of time between the occurrences of those events and the most abundant periods in the two different places, suggesting that each area might have different population dynamics for the species. It is necessary to add more scientific data to

support that suggestion. Our findings indicate that both Sechura Bay and Lobos de Tierra Island represents important habitats during the reproductive season and within the migration route of the species.

The abundance and occurrence of humpback whales observed during our survey indicates that October is the most important period. The occurrence of calves is higher in October when some were very small, probably newborns with a length less than 6 m based on eye estimates. Additionally courtship behaviour was also observed in two of our records also in October. The distribution of categories within the bay shows a probable segregation pattern mainly for adults with calves which present a shallow water affinity. On the other hand, single individuals are found both in shallow and deeper waters and the occurrence of groups of more than one whale occurred in the southern side.

Breeding activities in Peruvian waters were not clearly defined; Ramirez (14) reported calves in the area, Santillán and Suazo (20) made observations specifically in Sechura bay with some records of calves in shallow waters, and recently Pacheco *et al.* (13) confirmed the nursing and breeding activities in Los Órganos (04° 10’38.78"S, 81°8’04.40"W). In that sense we speculate that Sechura Bay represents a southern breeding and a nursing area during the winter season. Our data is in agreement with Flórez-González (8) and Félix and Haase (6) who describe breeding areas in shallow waters of Puerto Cayo, Ecuador and Gorgona Island, Colombia. Félix and Haase (7) suggested that transition between oceanic and coastal habitats occurs between 4º to 6º S. However, Sechura Bay located in 5ºS confirms the extension of the known breeding and nursing habitat described for the species. Based on previous records of Ramírez (14, 15), Flórez-Gonzalez *et al.* (9), the recent report of Pacheco *et al.* (13) and our findings, the northern coast of Peru represents a confirmed area for breeding and nursing. However more information is necessary to understand the dynamics of the species in relation to the bay and other areas in the same northern coast like Los Órganos and Lobos de Tierra Island and its contribution to the population of humpback whales in the south east Pacific.

Some other questions arise such as site fidelity. Calambokidis, *et al.* (2) suggest that site fidelity to breeding grounds is very low in contrast to fidelity to feeding grounds. In the present case, there is a small catalogue of photo identified individuals in Sechura Bay, with the first individual identified in 2006 and others in 2009-2010. Neither of them were matched, so in spite of our small sample size, there is preliminary evidence of poor recapture in the area similar to the findings reported in other places (22). However it is not possible to make a firm conclusion on this as further research is needed to fill this gap of information.

The bay holds an intensive artisanal fishing activity, and sustains five fishing ports located within the bay. Also at least five factories for fish oil and flour production operate along the coast of the bay. Crude oil activities include the presence of a national oil company, as well as a private company that performed seismic explorations in 2005-2006 and has installed oil platforms roughly 3 nautical miles from coast. Gas exploitation also occurs in the northern side of the bay, where inland facilities operate. Scallop farms are spread along the bay mainly in the central area. Several proposals for new large port facilities potentially will add further to these impacts.

Based on the above, increasing the knowledge of the ecology of humpback whales in Sechura Bay is urgent since the increasing pressure of human activities may have an additional negative impact in the natural activities for the species. It is even possible that most of those impacts may have already affected the population of humpback whales in Sechura Bay.

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