

Observations of humpback whales (*Megaptera novaeangliae*) in the Galapagos Islands, Ecuador.

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ABSTRACT

The proceeding investigation refers to the presence of humpback whales (*Megaptera novaeangliae*) in the Pacific waters of the Galapagos Islands and their subsequent migration or lack of migration from this, their breeding area, to the nutrient rich feeding grounds in the Antarctic Peninsula. A number of studies in this paper indicate the year round presence of humpback whales in the Galapagos while others suggest the seasonal migration of these marine mammals. The information presented in this document reveals, not only the incidence of humpback whales in the waters of the Galapagos Islands, but that these whales could have a year-long presence as well as information about the whale pod and composition.

KEYWORDS: *Habitat, Antarctic, Pacific Ocean, Feeding Grounds, Nutrition, Conservation, Growth, Breeding Grounds, Migration, Photo-ID*

INTRODUCTION

In the South Pacific, humpback whales migrate during the summer from southern high latitude waters where they feed, up to lower latitude regions for the winter months to breed and calve. The reproductive area for humpback whales in the eastern tropical Pacific is around the Gorgona Islands in Colombia (Florez-Gonzalez, 1991), around the Coco Island in Costa Rica (Acevedo and Smultea, 1995, Rasmussen *et al.*, 2007), Panama (Florez-Gonzalez *et al.*, 1998, Rasmussen *et al.*, 2007) and Ecuador (Scheidat *et al.*, 2000, Felix and Haase, 2001). Re-sightings have been confirmed between Colombia and Ecuador (Florez-Gonzalez *et al.* 1998, Stevick *et al* 2004) and between Ecuador and Costa Rica (Castro *et al.*, 2008; Félix *et al.*, 2009), however, the migration patterns inside the breeding area remain unknown.

Machalilla National Park, located on the southern coast of Manabi, Ecuador, is known as a breeding area for humpback whales (Scheidat *et al.*, 1997, Felix and Haase, 2001). Between 1996 and 2007 a photo-identification study of Southeastern Pacific Humpback Whales (*Megaptera novaeangliae*) was carried out off the coast of the Ecuadorian mainland (1°S, 80°W), and during this 11 year period, 1,172 whales were identified. Of this collected data, a total of 79 (6.74%) humpback whales were re-sighted throughout the years in Ecuador (Castro *et al* 2008).

As reported by Banks, the predominately cold water areas located west of the Galapagos Archipelago are rich in nutrients vital for growth and survival. In addition, confirmed in an analysis carried out from 1999 until 2001, new regions of annual primary production include this site to the west of Isabela Island of the Galapagos, known already for its high productivity (2002). According to Godfrey, humpback whales are common on the coast of Ecuador from May to October, but relatively uncommon in Galapagos, where they seem to occur most frequently in July and August (1995).

Palacios & Salazar 2002, Have registered accounts of a large number of animal sightings (N=3019) in the Galapagos, of which 0.4% (N=4) are humpback whales sightings, reaffirming the presence of the whales in the Archipelago, signaling the importance of these waters in the migratory cycle and as a place that this species finds most comfortable and settling. Genetic studies conclude that the particular genotype of the humpback whale found in the Galapagos (SP61) was encountered two times in coastal continental Ecuadorian sampling, but has also been registered on one occasion in Colombia and twice in Antarctica, demonstrating for the first time, a phylogenetic relationship between whales of the Galapagos and the continental ones (Felix *et al* 2007).

This paper presents the recording of 80 humpback whales sighted during the twelve months of the year in the Galapagos Islands, as well as information about the whale pod distribution and composition. Subsequent data not only infers a direct correlation with previous papers discussing reasons for the migration of humpback whales to the waters of and around Ecuador, also known as Breeding Stock G, but it also supports previous reports of the presence of non-migratory pods of whales in the Pacific Ocean.

MATERIALS AND METHODS

Study area

Galapagos Islands

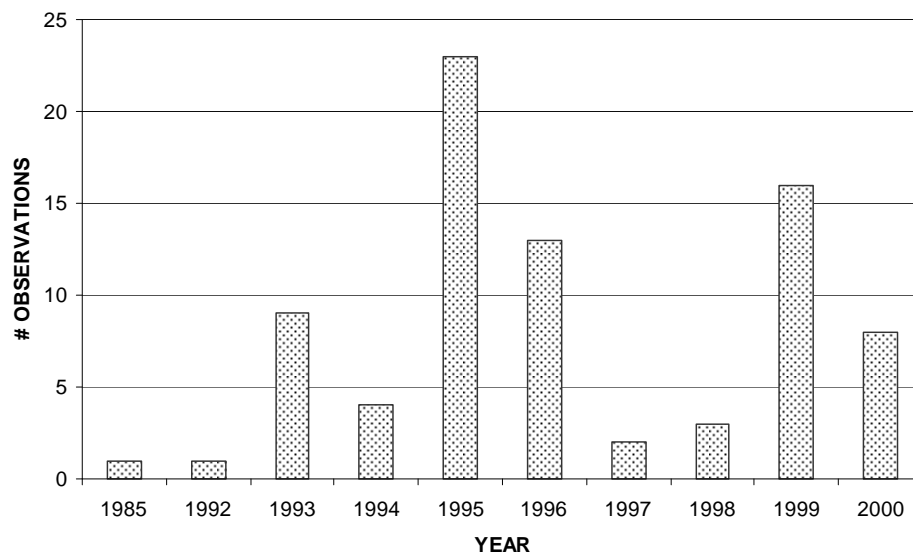
Located in the southeast Pacific Ocean, the Galapagos, a province of Ecuador, are a group of islands consisting of approximately 13 large and hundreds of smaller islands. Lying off the western coast of South America, the Galapagos Islands fall directly on the equator ranging from approximately 0°40'N to 1°23'S Latitude and 90°46'W to 89°41'W Longitude. This territory, also known as the Colon Archipelago, is noted for its vast populations of both flora and fauna and has been a protected area for a number of years. Rich in nutrients, the temperate to tropical waters average around 26°C which proves beneficial in the nutritive growth of subsequent species.

Data collection

Data regarding humpback whale sightings were recorded using daily sighting logs (1995-2000) used aboard daily tourist boat rides operating in the Archipelago, in correlation with direct report from naturalist guides of the Galapagos National Park. In addition, a portion of the collected data includes personal accounts from field researchers Godfrey Merlen. In total, information was collected over a period of 15 years from 1985 through 2000.

RESULTS AND DISCUSSION

Between 1985 and 2000, 80 sightings of humpback whales were observed in Galapagos Islands, with a total of 177 whales registered (Figure 1). The years 1993, 1995, 1996, 1999 and 2000 were years with more



information.

Figure 1: Recorded humpback whale sightings in the Galapagos from 1985 to through to 2000.

Monthly observations

The humpback whales that have been spotted in the Galapagos have been observed during all months of the year, in particular, the months of July, August and September. Of the humpback observations, 27.5 percent were in August, 25 percent in July, and 11 percent in September. The ocean waters of Machalilla National Park are a breeding area for humpback whales. These whales travel from their feeding grounds in the south to their breeding grounds in the north during the months of June through October. Re-sightings with Antarctic humpbacks have been confirmed between Breeding Stock G and Antarctic Waters (Stone *et al.*, 1990, Florez-Gonzalez *et al.* 1998, Stevick *et al.* 2004 and Acevedo *et al.* 2007).

The frequency and location of observations indicates that during the months of July and August, these particular waters off the coast of Ecuador are most plentiful, which coincides with observations being made in the Galapagos, where the majority of sightings recorded is also during the months of July and August. Studies done in Gorgona Island, Colombia indicate that the highest numbers of recorded humpback sightings were in October and November, which were frequently mothers and calves (Florez-Gonzalez *et al.* 1998). However, there is little supporting evidence of these whales following a return path through the waters of the Ecuadorian coast, meaning the presence of these whales in these particular waters during those 3 months would be a sign permanent residence.

Though there are few reports, there are occasional accounts of humpback whales along the Ecuadorian coast during the month of January. (Haase & Felix, 2004). On record, however, are present observations of humpbacks in the Galapagos during other months of the year, not including their usual migratory months, which would indicate the presence of non-migratory whales along the Ecuadorian coast line yearlong, making the nutrient rich waters of the Galapagos Islands their permanent residence. It was during the years of 1995, 1996 and 1999 that humpback observations were reported in January, February, March and April, which correlates with the years that the most observations were made and reported for data analysis (Figure 2).

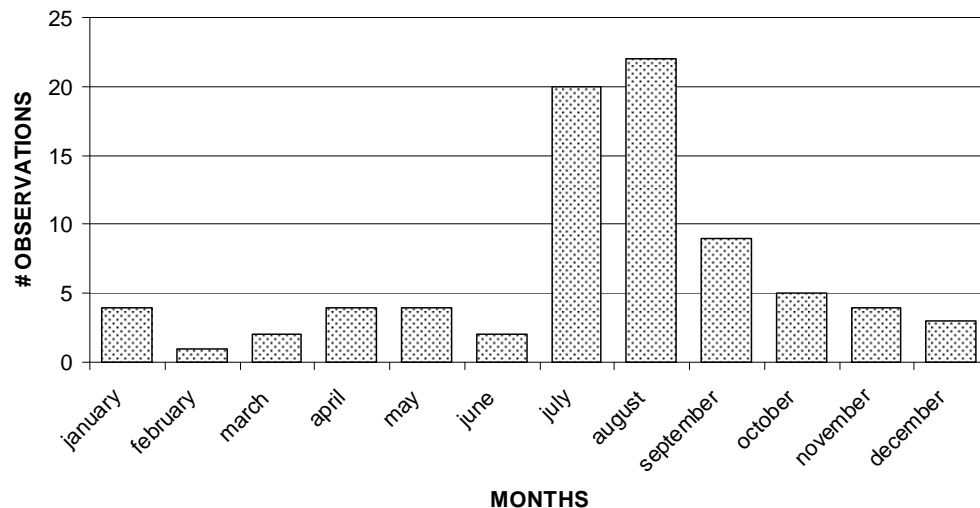


Figure 2. Compiled data from recordings of humpback whale observations made throughout different months of the year.

Pod size and Pod composition

Between 1985 and 2000, there were 80 pods that were sighted, processed and analyzed with regard to pod size and composition. Each pod sighting during the study was documented with regards to the number of adults, sub-adults and calves present and then categorized accordingly within a system of pod-typing modified from those used by Garrigue et al., (2001) and Forestell et al., (2004). The pods were analyzed with the following categorizations: single animals (SGL); mother calf pairs (MOC); pairs of animals not including a calf (PAR); mother, calf and escort pods (MCE); pods of three animals not containing a calf (TRP); pods of 4 or more whales containing a calf (GCC); and pods of 4 or more whales not containing a calf (GRP) (Figures 4 and 5).

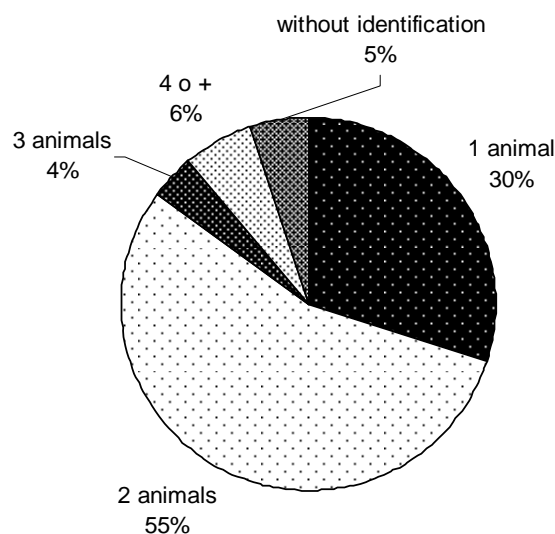


Figure 3. Percentage comparison of observed and reported pod structure between the years of 1985 and 2000 in the Galapagos Islands, Ecuador.

The majority of pod size (55%, N=44), were pods composed of two animals in Galapagos, while the largest group recorded was of more than 20 and was spotted to the east of Xarifa, Isla Espanola. Recent data collected in 2007 from Machalilla National Park indicate that 45 pods (77%, N=65) were comprised of two animals (Castro, 2007). In both places (Machalilla National Park and the Galapagos Islands), the majority of the observed groups were comprised of two individuals; the group composition, however, differs between the two research sites. Of the 55% of observed pods comprised of two individuals in the Galapagos, 29% were mother and calf pairings (Figures 3 and 4) while only 6% of the reported coupled sightings in Machalilla were MOC pairings (Figure 5) displaying a possible behavioral correlation amongst mothers swimming with their calves in the shallows of the Galapagos as a more popular location than along the coast.

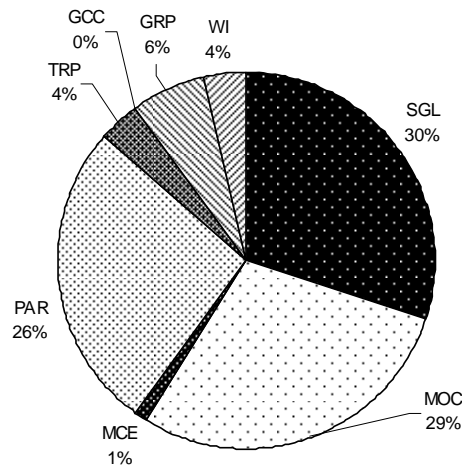


Figure 4. Comparison of type of reported pod sightings in Galapagos National Park, Ecuador from 1985 and 2000.

In total, there were more SGL pods (30% N=24) than other combinations in the Galapagos, which usually indicates a large number of males, as more males are found traveling solitary (Figure 4).

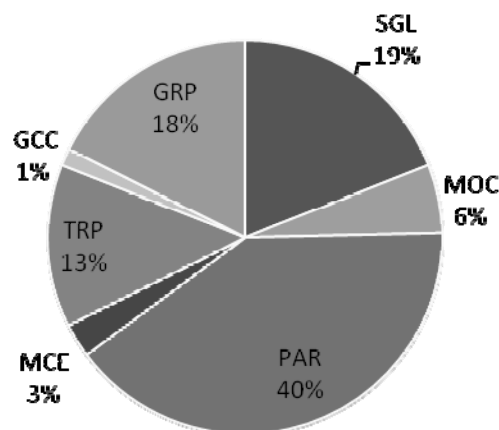


Figure 5. Comparison of size and type of reported pod sightings in Machalilla National Park – 2007 (Castro, 2007).

This is a probable sign of a direct relationship and possible reason for humpback whale calving in the Galapagos and the presence of MOC pairings in the Archipelago, helping researchers understand more about the behavioral uses of different humpback whale habitats. Traveling to the warm southeastern Pacific Ocean from the colder Antarctic depths, the presence of migratory humpback whale pods have been reported for a number of years. Previously reported as very rarely seen in the Galapagos as well as rarely seen in this convergence of currents

outside of the months of May through October, humpback whales are now on account for yearlong stay in the Galapagos Islands.

A large amount of progress has been made in the journey to fully understand the humpback whale and its migratory mechanisms. Through years of observatory accounts, scientists have been able to ascertain the knowledge essential for successful observation and pattern tracking. There is, however, a great deal to learn about the behavior of these whales and the perspective survival of their species.

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