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LONG-TERM RESIGHTINGS OF HUMPBACK WHALES OFF ECUADOR

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Abstract

This paper reports on the long-term re-sight histories of fifteen photo-identified humpback whales encountered to date transiting Ecuadorian waters. It also provides information about connections to feeding area destinations.

Whale EC1261 has been resighted over a 26 year span and provides insight into age and potential longevity of this species in the stock G. The resighting of whale EC1261 provides the earliest connection from Ecuador to Antarctica. and supports previous findings that Antarctic Peninsula is the main feeding area of humpback whales migrating to Ecuadorian waters.

Although there are only a low percentage of re-sighted animals between Ecuador and the Strait of Magellan, two records represent long-term observations of 17 and 21 years. Resightings of these whales previously confirmed the Straits of Magellan as a feeding area (Gibbons et al, 1998; Gibbons et al, 2003; Acevedo *et al.* 2007; Capella *et al.* 2008). These results are based on the individual identification of the ventral surface of humpback whale tails. This method has been used extensively by researchers, NGO's and government institutions in Antarctica, Chile, and Colombia.

Introduction

Humpback whales are a migratory species and travel each year from their feeding areas located at the poles (Arctic and Antarctic) to breeding areas in the tropics (Matthews, 1937). Ecuador is part of a large breeding area of humpback whales *Megaptera novaeangliae*, in the Southeast Pacific, known as the Stock G (IWC) which extends from Costa Rica (Acevedo and Smultea, 1995; Rasmussen *et al.* 2007), Panamá (Flórez-González *et al.*, 1998; Flórez-González *et al.* 2007; Rasmussen *et al.* 2007), Colombia (Flórez-González, 1991; Flórez-González *et al.* 2007), Ecuador (Scheidat *et al.*, 2000; Félix & Haase, 2001) up to Peru (Pacheco *et al.* 2009; 2011; Castro *et al.* 2011).

Using photo-identification migratory connections have been established between the feeding area in the Antarctic Peninsula, Magellan Straits and wintering destinations off Ecuador and Colombia (Stone

et al. 1990, Stevick *et al.* 2004, Acevedo *et al.* 2007, Castro *et al.* 2008 and Capella *et al.* 2008) and the wintering grounds off Panama and Costa Rica also using photo-identification (Rasmussen *et al.* 2004, Acevedo *et al.* 2007, Castro *et al.* 2008, Felix *et al.* 2009).

A photo-identification study of humpback whales (*Megaptera novaeangliae*) was conducted between 1996 and 2011 in the Machalilla National Park, Ecuador. There are many methods to determine the age and longevity of humpback whales. For live whales, free-swimming mysticetes, age determination techniques are currently limited to photogrammetry and photo-identification (Zeh *et al.* 1993).

Age is fundamental to interpreting and understanding many aspects of the biology of marine mammals (Hohn, 2009). Comparing other catalogues with different years of research effort has given us the ability to learn about preferences and longevity records of humpback whales that visit the coast of Ecuador. This report provides the first data on longevity for humpback whales identified in Ecuador. These results are based on photo-ID data of numerous researchers, government institutions and NGO's working in Antarctica, Chile and Colombia.

Materials and methodology

Humpback whales were photographed and identified by permanent marks natural to the whale or acquired located on the underside of the tail (Katona *et al.*, 1979). The following research groups have systematic information of humpback whales between 1985 to 2012 off Colombia, Chile, Ecuador and Antarctica: Instituto Antártico Chileno (INACH), Proyecto Antártico Brasileño (PROANTAR), College of the Atlantic (COA), Centro de Estudios del Cuaternario (CEQUA), Fundación Yubarta (FY), Whale Sound-Juan Capella Catalogue (WS-JC) and Pacific Whale Foundation (PWF).

The study areas are as follows: Antarctica (63 ° S to 65 ° S - 61 ° to 72 ° W); Magellan Strait (53°30'S-54 ° S – 73°30'W-74 ° W); Colombia (03 ° N to 78 ° W) Machalilla National Park (01,16 ° N to 81,04° W). Catalogs from Ecuador, Antarctica, Chile and Colombia were compared and each match was confirmed by independently by each research group. Once a match was confirmed data pertaining to location, date, sex class and age (if known) was shared.

Results and discussion

A total of 1580 animals identified in Ecuador were compared with 611 identified humpback whales in Antarctica, 84 in the Strait of Magellan and 30 in Colombia (Table 1). There were 70 matches between Ecuador and feeding areas, and 6 matched between Ecuador and Colombia.

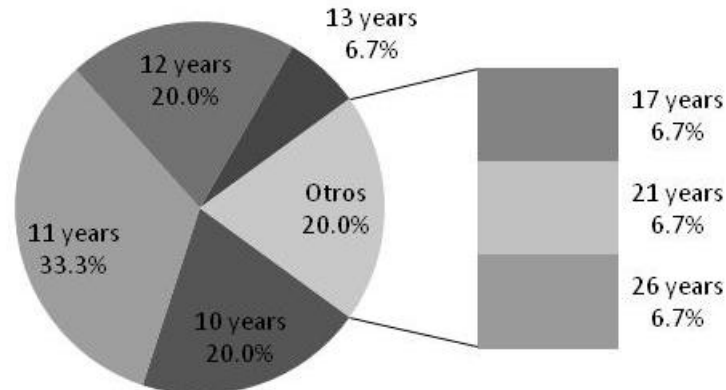
Tabla No. 1: Comparison effort between Ecuador, Colombia, the Magellan Strait and Antarctica

	AREA	# CATALOGUE	YEARS	# WHALES COMPARED	# WHALES RESIGHTED
BREEDING AREA	ECUADOR	1 CATALOGO	1996 - 2011	1580	70
	COLOMBIA	1 CATALOGO	1986-1993	30	6
FEEDING AREA	CHILE	2 CATALOGO	2000 - 2007	84	6
	ANTARTICA	3 CATALOGOS	1985 - 2007	611	64

With respect to life-span data, fifteen identified humpback whales have been observed at intervals of 10 to 26 years from first observation. Twelve of these resighting resulted from the comparison with other catalogs in Antarctica and Colombia and three cases were resighted only in Ecuador.

Three humpbacks (20%) were resighted 10 years from first identification, five humpback whales (33.3%) were sighted eleven years later and another three were sighted twelve years later. Twenty percent ($n=3$) of the identified whales have re-sighting span of 17 to 26 years after its first observation (Figure 1).

Figure 1: Life-span data with intervals of 10 to 26 years after its first observation



The sighting span more longest was by a humpback whale EC1261 that was first sighted February, 1985 off Bismarck Strait Antarctica (COA Catalogue), re-sighted August 9, 2007 off Machalilla National Park in Ecuador (PWF catalogue) and last observed off Ecuador September 30th, 2011 (PWF Catalogue). This is the longest resighting record for a humpback whale in Ecuadorian waters (26 years) and gives us the first references to age and potential longevity of this species in the stock G. It's interesting to note the acquired injury to the trailing edge of the tail in the later photos. This record is also the earliest sighting that connects to Ecuador to Antarctica, confirming that the Antarctic is the main feeding area of humpbacks coming to Ecuador (Figure 2).

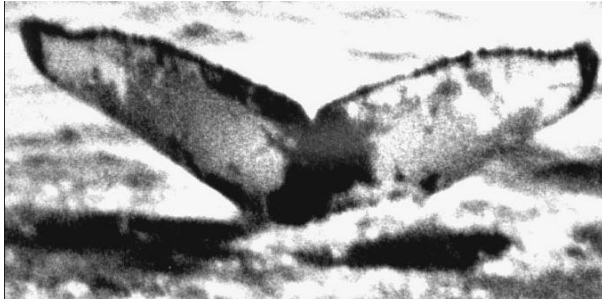
Another two humpback whales were also resighted at various times on different years in the Magellan Strait - Chile, Colombia, Panama and Ecuador. Whale EC0267 was sighted in September 2003 was identified as male and re-sighted in Magellan Strait 17 years later. Humpback whale #6512 was initially sighted September 01th, 1991, again in 1993 off Gorgona Island – Colombia (Fundación Yubarta), re-sighted in consecutive years since 2000 to 2012 in Magellan Strait (Juan Capella, Whale Sound Catalogue and CEQUA Catalogue) and observed off Ecuador on July 17th, 2009 (PWF Catalogue). This individual is identified in other catalogs as CEQUA # 003, CRC # 1031, EMa020, IG0333 (Acevedo *et al.* 2007; Capella *et al.* 2008) (Figure 3). With a 21 year resight history, whale #6512 represents the second longest recordation of a live whale in Ecuadorian water.

Although a low percentage of humpback whales were re-sighted between Ecuador and the Strait of Magellan, two records are among the longest observed at 17 and 21 years. These records also confirm that the Strait of Magellan use as a feeding area for more than a decade and reveals connection between this feeding area and the breeding grounds off Colombia and Panama (Acevedo *et al.* 2007; Capella *et al.* 2008).

The observations off Ecuador have been suggest to be animals in transit to more northern breeding area for those humpback whales that feed in Magellan Strait (Acevedo *et al.* 2007), although we recognize that need more effort to learn the movements of humpback whales in the breeding area and between breeding-feeding grounds. Likely some whales, perhaps males, are looking for opportunities

to mate and therefore may move extensively in the breeding area. Gender, maturity and activity may influence both the use of the breeding and the selection of feeding areas.

Figure 2: The longest resighted record, humpback whale EC1261.

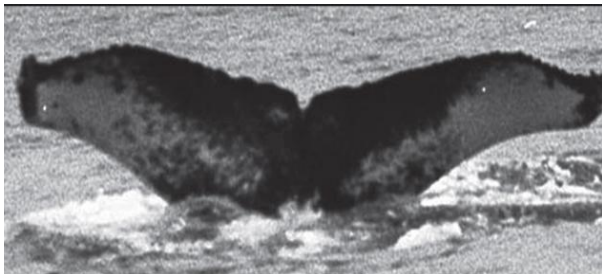


COA CATALOGUE/ AHWC0012 / COA / 1985



PWF CATALOGUE/EC1261 / 2007 /2011

Figure 3: Humpback whale #6512 resighted with Colombia and Magellan Strait



FUNDACION YUBARTA /IG 0333 / 1991 / 1993



PWF CATALOGUE /#6512/ 2009

There are many methods to determine the age of whales, photo-identification is one of the few non-invasive techniques that provide information about life stories of living whales. This work is the product of continued collaboration of many research groups in Latin America will be useful in detailing migratory pathways, residencies, rates of interchange and general distribution of humpback whales in their feeding and breeding areas. Humpback whales are a shared resource among many countries and the continued collaboration and funding of research efforts is needed to understand linkages between feeding and breeding areas.

The observations off Ecuador are considered to be animals in transit (Acevedo *et al.* 2007). Whale EC0267, identified as a male, was sighted September 2003 and re-sighted in the Magellan Strait. Humpback whale #6512, also identified as male (Rasmussen *et al.*, 2007), was sighted off Ecuador on July 17th, 2009 and also re-sighted in the Magellan Strait.

It is likely that some whales, in particular males, are looking for opportunities to mate and move extensively in the breeding area. Possibly there is segregation in the use of the breeding area depending on gender, maturity and activity of the whales. Selection of feeding areas could also depend on these aspects (gender, maturity).

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	#ID	AREA	DATE	AREA	DATE	AREA	DATE	YEARS	SIGHTED INTERVAL
1	EC035	MACHALILLA NATIONAL PARK	1-Aug-96	MACHALILLA NATIONAL PARK	8/16/2006			10	1996/2006
2	EC0582	MACHALILLA NATIONAL PARK	15-Aug-04	GERLACHE STRAIT	12-Jan-99	ANTARCTIC PENINSULA	12/21/1994	10	1994/2004
3	EC0634	MACHALILLA NATIONAL PARK	13-Sep-04	ANTARCTIC PENINSULA	12/21/1994			10	1994/2004
4	EC011	MACHALILLA NATIONAL PARK	30 JUNE 1999/ 10 AUGUST 2000	GORGONA COLOMBIA	20.09.89/30.09.89/29.09.94	ANTARCTIC PENINSULA	1999	11	1989/2000
5	EC031	MACHALILLA NATIONAL PARK	1996	GERLACHE STRAIT	15-Mar-07			11	1996/2007
6	EC0364	MACHALILLA NATIONAL PARK	19-Jun-97	MACHALILLA NATIONAL PARK	22/09/2008			11	1997/2008
7	EC0774	MACHALILLA NATIONAL PARK	8-AUGUST 2005/ 10 AUGUST 2007	ANTARCTIC PENINSULA	1/11/1996			11	1996/2007
8	EC0942	MACHALILLA NATIONAL PARK	2003	ANTARCTIC PENINSULA	14-Dec-92			11	1992/2003
9	EC050	MACHALILLA NATIONAL PARK	1-Aug-96	MACHALILLA NATIONAL PARK	4/8/2008			12	1996/2008
10	EC0503	MACHALILLA NATIONAL PARK	28-Jul-04	GERLACHE STRAIT	27-Jan-02	ANTARCTIC PENINSULA	18 dec 1992, 11 jan 1996	12	1992/2004
11	EC1631	MACHALILLA NATIONAL PARK	17-Jun-11	TRINITY	2/26/1999			12	1999/2011
12	EC1229	MACHALILLA NATIONAL PARK	18-Aug-07	ANTARCTIC PENINSULA	26/12/1994			13	1994/2007
13	EC0267	MACHALILLA NATIONAL PARK	9-Sep-03	GORGONA COLOMBIA	30 AGOSTO 1995	MAGELLAN STRAIT	feb 2000, feb 2002, jan 2003, feb 2003, jan 2004, feb 2004, may 2004, dec 2004, apr 2005, dec 2005, apr 2006, jan 2007, mar 2007, jan 2008, jan 2009, mar2009, dec 2009, apr 2010, dec 2010, apr 2011, dec 2011, apr 2012	17	1995/2012
14	IMG6512*	MACHALILLA NATIONAL PARK	17-Jul-09	GORGONA COLOMBIA	01-SEPT-1991 13-AUG-1993	MAGELLAN STRAIT	feb 2000, feb 2001, feb 2002, feb 2003, mar 2003, feb 2004, jan 2005, feb 2005, apr 2005, jan 2006, feb 2006, jan 2007, feb 2009, mar 2007, jan 2008, apr 2008, jan 2009, apr 2009, dec 2009, mar 2010, dec 2010, mar 2011, jan 2012- apr 2012	21	1991/2012
15	EC1261	MACHALILLA NATIONAL PARK	09 AUGUST 07/ 30 SEPT 2011	BISMARCK STRAIT	Feb, 1985			26	1985/2011

* Whale was sighted in Marine Protected Area Francisco Coloane in PANAMA on september 2003 (Acevedo et al. 2007). Catalogue Curator: Kristin Rassmusen.