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CHANGES IN WINTER DESTINATIONS AND THE NORTHERNMOST RECORD OF SOUTHEASTERN PACIFIC HUMPBACK WHALES

We report the first records of different migratory destinations of identified humpback whales (*Megaptera novaeangliae*) wintering in waters from Peru to Panama and the northernmost documented record of southeastern Pacific humpback whales. Through the matching of fluke and dorsal fin photographs, we establish a large wintering ground and a relationship between the calving sites for humpbacks along the western coast of South America.

Humpback whales travel annually between summer high-latitude feeding grounds and winter calving and mating areas in tropical waters (Dawbin 1966). The seasonal opposition of the hemispheres divides the worldwide population of humpback whales into northern and southern ocean populations (Mackintosh 1965). Southeastern Pacific humpback whales spend the austral summer feeding in the Antarctic Peninsula region, and in the winter migrate to the calving area of the tropical western coasts of South America (Flórez-

González 1991, Capella and Flórez-González 1993). The first confirmed record of this migration pattern (Stone *et al.* 1990) showed that southern-hemisphere humpbacks cross the equator into Colombian waters in the northern hemisphere. Humpbacks breeding in Colombian waters have been observed as early as mid-June, peaking in number between August and October (Flórez-González 1991, Flórez-González and Capella 1993). To date, calving areas of humpbacks have been documented in specific sites along nearshore waters of Colombia (Flórez-González 1991, Flórez-González and Capella 1993) and Ecuador (Haase and Félix 1992), but little is known about the movements among these specific winter sites.

Humpback whale sightings reported here were made between 1986 and 1995 off the western coast of Central and South America. Humpbacks were individually identified by unique patterns of ventral fluke pigmentation (Katona *et al.* 1979) and by distinctness of shape, size, and scarring of the dorsal fin (Clapham and Mayo 1990). Matches of humpback whales were found by comparing photographs of these markings from a catalog of 459 individuals identified off the coast of Colombia between 1986 and 1995 (Flórez-González *et al.* 1995, unpublished catalog), a catalog of 48 individuals from Ecuador (unpublished catalog of the Fundación Ecuatoriana para el Estudio de Mamiferos Marinos, FEMM), and a collection of seven photographs of animals identified off the coasts of Panama (one photograph), Colombia (four), and Peru (two) (data of the U.S. National Marine Fisheries Service, Southwest Fisheries Science Center).

The movements of seven individual humpback whales were documented. Four whales (Fig. 1) were photographically identified off Colombia (around Isla Gorgona, 02°47′N, 78°18′W) and again off Ecuador (near Isla de La Plata, 01°16′S, 81°06′W) on several occasions (Table 1). Two of the humpbacks were "singers," and another two were sighted "escorting" cow-calf pairs or within groups of adults. The Colombian and Ecuadorian study sites, both of which are used by wintering humpbacks for breeding (Flórez-González 1989, 1991; Haase and Félix 1992; FEMM unpublished data), are separated by approximately 560 km.

The whale 0078COL (Fig. 2) was observed off the Colombian site and again off Panama (08°55′N, 78°48′W) (Table 1). This whale was sighted within a group of adults on both occasions. These sites are separated by approximately 590 km.

The whale 0005EC (Fig. 2) was identified off the Ecuadorian site and again off Peru (04°47′S, 82°38′W) (Table 1). The humpback was an escort of a cow-calf pair. These sites are separated by approximately 520 km.

Finally, the whale 0367COL (Fig. 2) was identified off Peru (04°20′S, 82°27′W) and again off Colombia (Table 1). The humpback was an escort of a cow-calf pair. These points are separated by approximately 915 km.

There are no previous records of different migratory destinations or short-range movements of humpbacks for the southeastern Pacific Ocean. Within-season and between-year movements of up to 4,000 km have been documented among wintering areas in the northern hemisphere (Darling and Jurasz 1983,

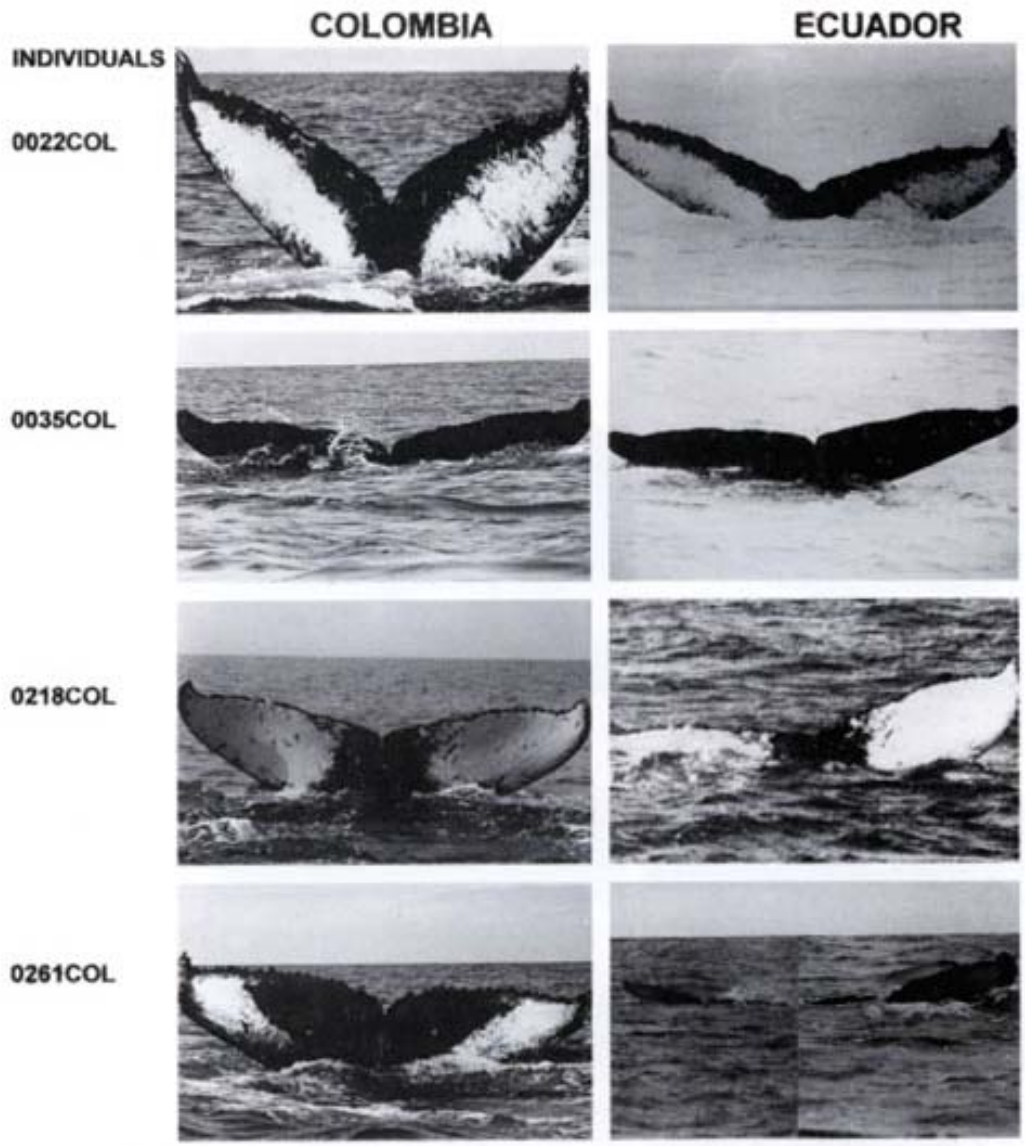

Figure 1. Flukes of four humpback whales photographed off Colombia (left) and again off Ecuador (right). Dates of sightings are in Table 1.

Darling and McSweeney 1985, Baker *et al.* 1986, Darling and Cerchio 1993). Also, year-to-year movements of individual whales over distances of 3,000 km have been reported for breeding areas in the western South Pacific (Chittleborough 1960, 1962, cited in Darling and Cerchio 1993). Despite the small sample size from Panama, Ecuador, and Peru, the successful matching of photographs from tropical South and Central American waters may indicate a larger number of humpback whales moving between these areas. It is unknown whether the individual whales described in this study are representative of winter migratory destinations of all whales within the stock, but these findings suggest that the same stock of humpback whales temporarily occupies the waters from about 4°30′S (Peru) to 9°N (Central America), a distance of more

Table 1. Summary of dates and locations of sightings of individual humpback whales identified off Panama, Colombia, Ecuador, and Peru. Whale numbers were assigned by research groups in the study areas of Colombia and Ecuador. The total number of humpbacks photoidentified from each country is included in parentheses.

Whale number	Panama (1)	Colombia (459 + 4)	Ecuador (48)	Peru (2)
0078COL	28.09.92	29.09.87		
		12.10.88		
0022COL		26.08.86	21.09.88	
		02.08.90		
		30.08.90		
		31.08.92		
		02.10.92		
		15.09.93		
		12.08.94		
		20.09.95		
		22.10.95		
0035COL		26.08.86	21.09.88	
0218COL		16.09.90	20.09.88	
		16.09.92		
		22.09.92		
		05.09.93		
		07.09.93		
0261COL		01.08.92	11.08.91	
0005EC			22.09.88	31.10.90
0367COL		24.10.93		31.10.90

than 1,400 km. Crossing by southern humpback whales into Pacific waters of the northern hemisphere is not surprising, because the oceanographic equator in the eastern tropical Pacific (ETP) lies 5–10 degrees north of the geographical equator, in the Tropical Surface Water mass (Fiedler 1992).

If distinct and exclusive breeding aggregations do exist in the ETP, their distribution and relationship are not yet defined. It is probable that the ETP is a major wintering ground of southeastern Pacific humpback whales, rather than the specific breeding sites (centered around nearshore waters of Ecuador and Colombia) that are known to date. The migratory route of arrival and departure of the southeastern Pacific humpbacks to and from the wintering ground is not known, but humpbacks near Isla de La Plata are observed until the middle of October (FEMM, unpublished data), while 560 km farther north, near Isla Gorgona, they are seen as late as early December (Flórez-González 1991).

All of these records have one or more intervening summers between them, suggesting that the whales could be choosing different breeding areas in different years within the ETP. It is not known if whales periodically change the destination of their migration in different years, or if they travel among sites during one winter. In the Colombian study site humpback whales show a low interannual return rate (26%) and a low mean occurrence in a given year (1.1 d), suggesting that whales are relatively transient in the specific study area

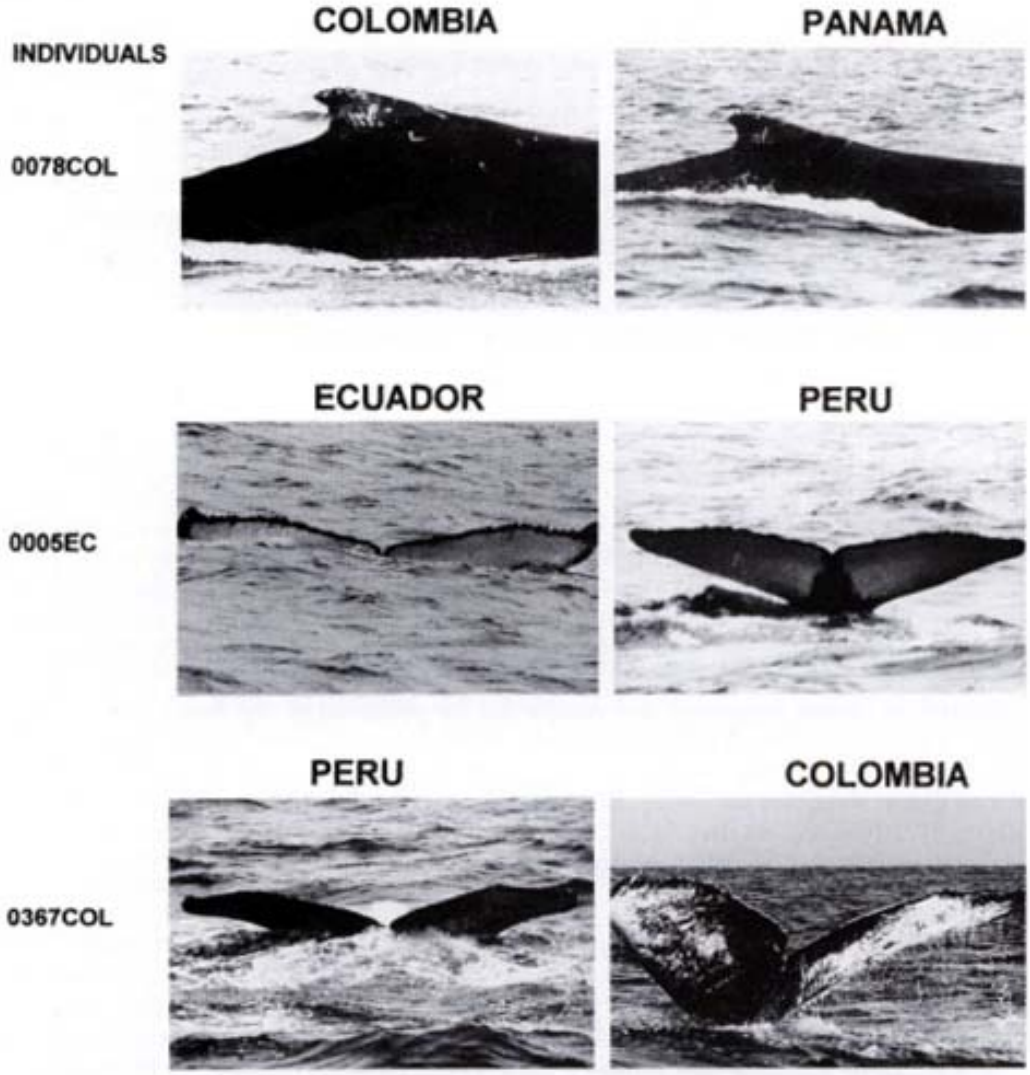

Figure 2. Dorsal fins and flukes of humpback whales identified in the study area. Whale photographed off Colombia (left) and again off Panama (right) is in row 1, whale photographed off Ecuador (left) and again off Peru (right) is in row 2, and whale photographed off Peru (left) and again off Colombia (right) is in row 3. Dates of sightings are in Table 1.

during a given winter (Capella *et al.* 1995). This is consistent with the findings by Baker and Herman (1981) that humpback whales utilize a large home range within their normal breeding grounds and rarely remain in one area long enough to allow identified individuals to be continuously observed.

The sighting at 08°55′N represents the northernmost confirmed record of a southern-hemisphere humpback. Humpback whales are occasionally seen off Central America during the southern-hemisphere winter (Wade and Gerrodette 1993, Acevedo and Smultea 1995), and historical whaling records also indicate that most whales hunted off the west coast of Panama were taken during austral winter (Townsend 1935). There are sightings of northern-hemisphere humpbacks wintering as far south as 08°30′N in Costa Rica (Steiger

et al. 1991, Acevedo and Smultea 1995), and humpbacks of unknown origin have been occasionally sighted near 07°N off the northern coast of Colombia during the boreal winter (Flórez-González, unpublished data). Our records and circumstantial evidence indicate a spatial overlap of wintering distribution of northeast Pacific (Urbán and Aguayo 1987, Acevedo and Smultea 1995) and southeast Pacific humpback whales, providing geographical support for the suggested genetic exchange between these populations (Baker *et al.* 1993, 1994; Medrano-González *et al.* 1995).

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