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FIRST RECORDS OF HUMPBACK WHALES INCLUDING CALVES AT GOLFO DULCE AND ISLA DEL COCO, COSTA RICA, SUGGESTING GEOGRAPHICAL OVERLAP OF NORTHERN AND SOUTHERN HEMISPHERE POPULATIONS

We present the first documented records of humpback whales (*Megaptera novaeangliae*), including mothers with calves, in Golfo Dulce and at Isla del Coco, Costa Rica. These sightings suggest a possible overlap in the spatial distribution of southern and northern hemisphere humpback whales near Costa Rica.

Results of biopsy studies indicate that transoceanic genetic exchange has occurred among North Pacific and Southern Ocean populations of humpback whales. This is based on similarities in mitochondrial DNA sequence (Baker *et al.* 1993, 1994). Baker *et al.* (1993) hypothesized that equatorial waters of the eastern Pacific Ocean are a likely route for such interbreeding of northern and southern hemisphere humpbacks. However, direct observational evidence of spatial or temporal overlap of northern and southern hemisphere humpbacks has not been available.

Northern hemisphere humpbacks of the North Pacific population winter primarily in low latitudes near 20°N in Mexican, Hawaiian, and Japanese waters from December to April, with most calves born between December and February; they migrate north to feeding grounds near Alaska during the summer and fall (Townsend 1935, Nishiwaki 1966, Tomilin 1967, Rice 1978, Baker *et al.* 1986). The previous southernmost confirmed record of northern hemisphere humpbacks in the Pacific Ocean were two whales photographed near Isla del Caño off Costa Rica on 16 February 1988 at 8°40'N (Fig. 1); these individuals were subsequently matched to sightings off central California (Steiger *et al.* 1991). Southern hemisphere humpbacks of the eastern Pacific population winter primarily in low latitudes near the equator off Colombia, Ecuador, and in the Gulf of Panama from June to October, with a calving peak in July and August; they migrate south to antarctic feeding grounds during the austral summer and fall (Townsend 1935; Mackintosh 1942; Chittleborough 1958, 1965; Nishiwaki 1966; Rice 1978; Stone *et al.* 1990) (Fig. 1). The previous northernmost confirmed record of a southern hemisphere humpback was at 2°57'N, 78°12'W, near Colombia on 28 August 1986; this whale was previously sighted in



Figure 1. Study area locations in Golfo Dulce and at Isla del Coco, Costa Rica.

Antarctica on 19 April 1986 (Stone *et al.* 1990). However, based on seasonality of occurrence, Townsend's (1935) charts indicate that presumably southern (but possibly northern) hemisphere humpbacks were taken as far north as 7°–8°N in the Gulf of Chiriqui between March and September, and in November (Fig. 1).

Humpback whale sightings reported here were recorded during extensive surveys for dolphins made from a 5-m inflatable vessel within Golfo Dulce, Costa Rica (8°23'N–8°45'N), from September 1991 to December 1992 and around Isla del Coco, Costa Rica (5°30'N–5°34'N), from January 1993 to July 1994. Opportunistic sightings near Isla del Coco were also recorded from dive-chartered vessels. Golfo Dulce is an estuarine embayment on the south Pacific coast of Costa Rica (Fig. 1). The gulf is about 50 km long and 10–15 km wide; it is characterized by a steeply sloped, deep inner basin with a mean depth of 140 m (maximum depth 215 m) and a shallow outer basin with a sill depth of 70 m (mean depth 30 m). Isla del Coco is a small (23-km circumference), isolated volcanic island located approximately 500 km southwest of Costa Rica; the 180-m (100-fathom) contour ranges from approximately 2 to 15 km from shore (Fig. 1).

Five humpback whale sightings were made between 1991 and 1994, four of which were photodocumented.



Figure 2. Photograph of a humpback mother and calf sighted in Golfo Dulce on 20 August 1992. Note the size and coloration of the calf relative to the mother.

On 24 February 1992 a single adult humpback whale was observed for over two hours in the upper reach of Golfo Duke at 8°38'N, 83°16'W, as it traveled west into the deep inner basin of the gulf. Since the individual must have passed through the mouth of the gulf, its southernmost position would have been at least as far south as 8°23'N. Video footage was taken of the animal's all-black flukes but was not adequate for individual identification, due to distance and poor resolution (S. Mizroch, personal communication). The whale had no visible white lateral markings.

On 11 and 14 August 1992 a humpback mother and calf were sighted about 1 km from the southeast coast (5°30'N, 87°03'W) and about 1 km from the northeast (5°33'N, 87°02'W) coast of Isla del Coco, respectively, by diving charters. Underwater video footage and still photographs were taken during the 11 August sighting but no photodocumentation was made of the 14 August sighting. Thus, it was not possible to determine whether the sightings were of the same whales. The calf was approximately one-half the length of the mother based on the video and was thus estimated to be 3–4 mo old (Glockner and Venus 1983). Both animals had dark flanks and the mother had flukes that were white ventrally; however, due to distance and poor resolution, the underwater video and photographs were not useful for photoidentification (A. Acevedo, personal observation).

On 20 August 1992 a humpback mother and calf were sighted at 8°32'N, 83°12'W, meandering slowly south in the shallow outer basin of Golfo Dulce



Figure 3. Photograph of the same humpback whale calf shown in Figure 2. Note the demarcation between the dark gray dorsal ‘stripe’ and the white flanks, a trait apparently unique to some southern hemisphere humpback whales.

toward the mouth of the gulf over a 3-h period. Videotape and still photographs were taken, but neither animal exposed its flukes. The calf was estimated to be less than 1 mo old based on its relatively small size (visually estimated to be less than one-third the length of the mother) and gray dorsal coloration compared to the mother’s dark body color (Glockner and Venus 1983; M. Smultea, personal observation) (Fig. 2). The calf also had a lateral demarcation between a gray dorsal “stripe” and white flanks (Fig. 2, 3). The mother had no obvious white lateral markings.

On 31 January 1993 a humpback mother and calf were sighted inside an embayment at Isla del Coco (5°33’N, 87°02’W) by a diving charter. Underwater video footage was taken but its poor resolution and lighting only allowed for an estimate of the calf’s length at near one-third the length of the mother; the calf was therefore judged to be 1–2 mo old (Glockner and Venus 1983). Coloration could not be discerned from the video (A. Acevedo, personal observation).

We suggest that the humpback whale mother and calf sighted in Golfo Duke in August were southern hemisphere humpback whales. This is based on the size, coloration, and timing of the sighting. The white lateral coloration of the calf, unique to some southern hemisphere whales, provides evidence for our hypothesis (Lillie 1915, Matthews 1937, Omura 1953, Symons and Weston 1958, Chittleborough 1965, Kaufman *et al.* 1987). The calf’s color pattern fits Lillie’s (1915) category 1 (of 7) that includes those humpbacks with the greatest extent of white lateral coloration. Such extensive white lateral coloration

has not been reported for northern hemisphere humpbacks (Pike 1953, Nishiwaki 1959, Glockner and Venus 1983). While Rudge (1990) reported that interviews with local Costa Rican boatmen indicated that humpbacks occur from August until March between Isla del Caño and the western edge of the Osa Peninsula (approximately 9°N, Fig. 1), our sighting is the first in which circumstantial evidence suggests that a southern hemisphere humpback whale occurred in Costa Rican waters. As such, this sighting at 8°32'N would represent the northernmost record of a southern hemisphere humpback.

We suggest that both the mother and calf sighted at Isla del Coco in January and the single humpback sighted in Golfo Dulce in February were northern hemisphere humpback whales based on the calving season and confirmed sightings of northern hemisphere humpbacks at an equivalent latitude and time (Steiger *et al.* 1991). Rudge (1990) reported that sightings of humpback whales by local boatmen between Isla del Caño and the Osa Peninsula were most numerous from December to February. The mother and calf sighting at Isla del Coco in January may thus represent the southernmost documented record of northern hemisphere humpback whales.

It cannot be ascertained whether the cow-calf pair sighting(s) at Isla del Coco in August represent an unusually early-born southern hemisphere calf or unusually late-migrating northern hemisphere whales. However, based on the relative timing of the sighting, we believe it is more likely that these whales belonged to a Southern Ocean population. Southern hemisphere humpbacks are known to be relatively abundant approximately 700 km east of Isla del Coco off Colombia and Panama in August, while northern hemisphere humpbacks are not known to remain at calving grounds later than May (Townsend 1935, Mackintosh 1942, Baker 1985, Stone *et al.* 1990).

Our observations present strong suggestive evidence that at least one southern hemisphere mother-calf pair showed geographical overlap with an area apparently used occasionally by northern hemisphere whales. This circumstantial evidence provides a geographical means for the purported genetic exchange between northern and southern hemisphere humpback whale populations of the eastern Pacific Ocean (Baker *et al.* 1993). Photoidentification comparisons and biopsy analyses of future sightings of northern and southern hemisphere humpbacks near Costa Rica and in other equatorial regions are needed to more confidently assign population of origin for low-latitude sightings in this region.

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