

Bioacoustics of marine mammals off Argentina: R/V *Hero* Cruise 71-3

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R/V *Hero* departed Punta Arenas, Chile, on June 11, 1971, in search of marine mammals and associated birds along the coast of Argentina. The main objective of this cruise was to study the underwater sounds and related behavior of marine mammals, particularly the southern right whale, *Balaena glacialis*. The work of the first three authors was concentrated upon mammals; that of the fourth, on marine birds. Other participating scientists included Comdr. Alfredo A. Yung, geophysicist with the Argentine Navy, and Mr. Angel Ferrante, marine technician at the Argentine Institute of Oceanography. Comdr. Yung and Mr. Ferrante were invited aboard *Hero* to become familiar with our technical methods of bioacoustic investigations.

We encountered numerous marine mammals and recorded in their presence, but the highlight of the cruise centered on an encounter with eight to ten southern right whales in Golfo San José, Valdés Peninsula, 834 km south of Buenos Aires.

The first record of southern right whales in the Valdés region appeared as the result of an expedition with R/V *Hero* led by Dr. Raymond M. Gilmore of the San Diego Natural History Museum (Gilmore, 1969). Dr. Gilmore observed 20 to 25 right whales in the neighboring Golfo Nuevo in July 1969. From local inhabitants, including teachers, naturalists, and divers, we learned that numerous southern right whales return to both gulfs each year, presumably to mate. "Ballenas del sur," the local name for southern right whales, come from the south and begin to appear at Golfo San José in late June. They are most numerous in late August and September, when they

also are found in Golfo Nuevo. Few right whales remain in late September and October, the remainder disappearing back towards the south in November.

This is the first published report of underwater sounds from the southern right whale. Using a calibrated hydrophone system, we recorded more than 200 low-frequency, underwater sounds from southern right whales in Golfo San José during the periods June 21 to 24 and July 1 to 13. Most numerous were belch-like utterances having an average duration of 1.4 sec and frequency components that extended from about 30 to 2,200 Hz. These sounds were very powerful, their source levels varying from 172 to 187 dB re $1 \mu\text{N}/\text{m}^2$ at 1 m. Measurements were made over the effective bandwidth from 30 to 2,200 Hz. The whales also produced a variety of moaning sounds that lasted 0.6 to 4.1 sec. Moans extended up to 1,250 Hz. As with belch-like sounds, moans had most of the sound energy in the frequency region below 500 Hz. Associated with belch-like sounds and moans were occasional pulses that lasted only 0.06 sec in the spectrum from 30 to 2,100 Hz. The rest of the sounds from southern right whales consisted of miscellaneous low-frequency phonations that varied in length from 0.3 to 1.3 sec. These miscellaneous sounds were confined to the region below 1,950 Hz (see fig.).

Despite the efforts of four trained observers, we could not associate any particular behavior with a corresponding category of sound. The sounds doubtless are manifestations of behavioral patterns, but considerably more work is required to understand their significance. Resulting from a long series of recordings and observations, we learned that the right whales moved into shallow water in the southern corner of Golfo San José during low tide.

On July 4 we witnessed a spectacular encounter involving five killer whales and two right whales. The event lasted for 25 minutes. There were no signs of physical damage, such as blood or bits of flesh, but in every other respect it appeared to be a full-fledged attack. Most of the time the killer whales were in a swimming frenzy that took them over, between, and under the two big right whales. The latter's most impressive display of defense consisted

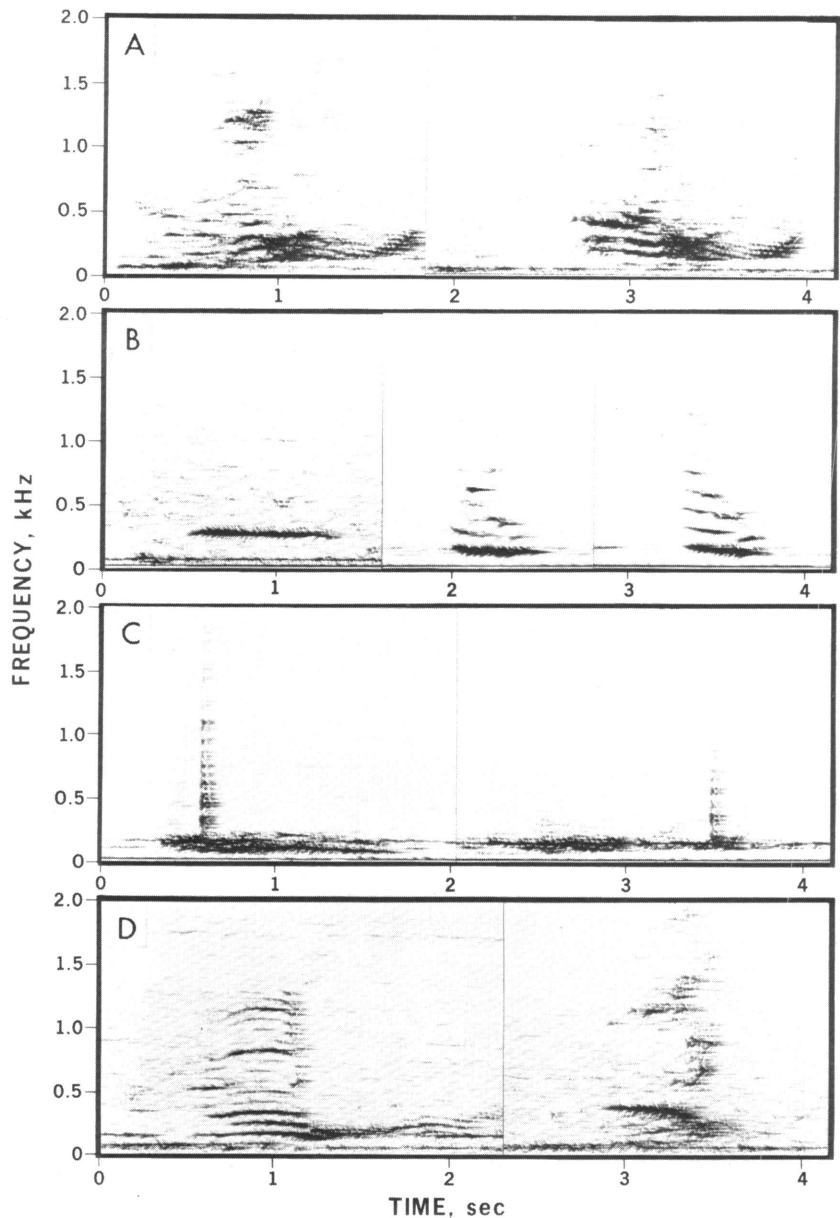
of endless slashing with flukes and flippers and constant rolling and twisting in tight maneuvers. Following the attack, the killer whales left the area, and the two right whales moved into very shallow water, where their activities decreased markedly. They stayed in the same area until nightfall, when it became too dark for us to observe them.

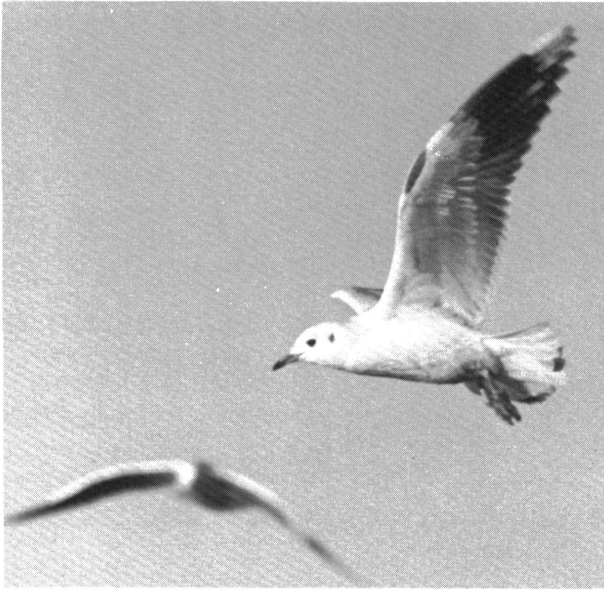
Southern right whales often were seen in pairs. Although we never actually observed intromission, nor a whale with a protracted penis, their behavior indicated that they were courting, and at times pairs appeared to be in sexual union. Pairs consorted for at least 5 hours, but we had no method for recognizing individuals that would have permitted day-to-day observations. When together, the pairs slowly rolled and twisted near the surface exposing all parts of

their bodies, including flippers, flukes, belly, back, and head.

A common behavior among pairs and singles was to extend the flukes high into the air and to keep them in this position for periods up to 1 minute. This "headstanding" behavior was confined to very shallow water (5 to 11 m), where it was possible for the whales to be in contact with the bottom and have their tails out of the water at the same time. On inquiry, we learned that this behavior is common in areas that are underlain with dense growths of mussels, or "cholgás" as they are called by local fishermen. We submit the possibility that "headstanding" right whales are feeding on the mussels, although more work is required to confirm this speculation. The idea of mussel feeding by mysticete whales is not without

Spectrograms of right-whale sounds, including belches (row A), simple and complex moans (row B), pulses with associated low-frequency rumbles (row C), and miscellaneous phonations (row D). The effective analyzing filter bandwidth was 10 Hz.





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The brown-hooded gull, one of two species of gulls observed riding on right whales. In winter plumage the head is white. Wingspan is about 30 cm.

precedent: Scammon (1874) reported that gray whales feed on mussels in the breeding lagoons of Mexico. In fact, those of us who have observed both species note a marked similarity in behavior, *i.e.*, long migrations to breed in shallow lagoons, courtship movements, "spyhopping," etc.

In addition to right whales and killer whales in Golfo San José, we observed southern sea lions (*Otaria flavescens*), elephant seals (*Mirounga leonina*), and bottlenose porpoises (*Tursiops truncatus*).

We studied a group of sea lions near Los Pirámides at Golfo Nuevo and observed another concentration of sea lions near Point Ninfas, just south of the entrance to the gulf. There were several groups of piebald porpoises, *Cephalorhynchus commersoni*, and two species of *Lagenorhynchus*, *australis* and *obscurus*, in the Strait of Magellan and in the open ocean near the eastern entrance to the Strait. Scattered, small groups of piebald porpoises were sighted en route between the Strait and the Valdés Peninsula. Points Norte, Delgada, Pirámida, and Loma, on the Valdés, are good places to observe pinnipeds. Although other marine mammals were sighted up and down the coast, we did not see right whales in any other place but the Valdés region.

It was reported to us that up to 35 right whales appear in Golfo San José and nearly that many in Golfo Nuevo at any one time in the peak of the season. Several persons interviewed claimed that all marine mammals in the Valdés region, including right whales, were increasing in numbers. The entire

region is a wildlife refuge for land and sea animals, and it is heavily patrolled. None of those interviewed ventured to guess at the total number of right whales throughout the season at Valdés, because there seemed to be continued replacement and observers had no way of accounting for individuals.

Kelp gulls, *Larus dominicanus*, and brown-hooded gulls, *L. maculipinnis*, frequently landed on the backs and bellies of right whales in Golfo San José. They even rode on the whales' backs for considerable distances. The gulls were seen to peck at the whales, suggesting that they may have been feeding on parasites. This interesting association warrants further investigation.

Emerging from our studies of the distribution and ecology of marine birds was the discovery of a small wintering population of Magellanic plovers around Golfo San José and Golfo Nuevo. This is one of the rarest and least recorded shorebirds whose range was thought to be virtually restricted to Tierra del Fuego. The present observations on this species indicate that its present classification as a plover may be in error. We also found evidence for the occasional hybridization of two species of oyster catchers in the Golfo San José area.

The physical characteristics of both gulfs, with their shallow waters, protection from high winds, and semi-enclosed conformations, seem to offer a unique locality for mammal and bird studies. Both of these faunas are poorly known in this region.

R/V *Hero* returned to Punta Arenas, Chile, on July 16, 1971, after an eventful and informative cruise in waters where there had been little or no investigation. Our northernmost exploration was in Puerto Belgrano. Except for a violent storm in Golfo San Matias and an unfortunate injury to one of the crew (Raymond Eaton), we enjoyed smooth sailing throughout the expedition. We are grateful to Captain Franklin P. Liberty and the entire crew for their splendid support. This expedition was made possible through a grant from the National Science Foundation, AG-261, to the Naval Undersea Research and Development Center. We thank Comdr. Yung and Mr. Ferrante for their assistance at sea and Messrs. Carlos Bassi, Pérez Macchi, Santiago Ortega, Carlos O. García, Jorge E. Ramírez, and Jorge R. Terenzi for providing valuable information.

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