

**R/V *Hero* cruise 80-5:
Summary report of the
distribution and occurrence of
marine birds**

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The major purpose of R/V *Hero* cruise 80-5 was to pass from Ushuaia, Argentina, to Callao, Peru, a fueling stop on the way to Los Angeles, where *Hero* was to undergo major repairs. We took this opportunity to gather information on the distribution and occurrence of marine birds as affected by several oceanographic factors. Cruise 80-5 was the fourth in a series of north to south transects of the south Pacific Ocean, spaced rather evenly toward the east from the westernmost Sydney-to-Los Angeles cruise. Once disembarking the Chilean pilot, we attempted to stay far enough offshore that proximity to land would have a minimum effect on bird occurrence. We also attempted to remain along the subtropical, western boundary of the Peru

Current, where oceanographic factors would be expected to vary widely and where we expected the distributional boundary for many central Pacific bird species to occur.

Hero departed Ushuaia on 16 April 1980, passed through the Chilean fjords to the Gulf of Penas (20 April), traveled westward of Chiloe Island on the way to Ancud, Chile, where the pilot departed (22 April), and then moved on a more or less north-northwesterly course to Callao (2 May). We departed Callao on 11 May. For one-half hour each hour, dawn to dusk, we counted and identified all birds passing within 300 meters of one forequarter of the ship, collected a surface sample of water to determine salinity and temperature, and launched an XBT (expendable bathythermograph) to measure thermal structure in the upper 400 meters of ocean. On a continual basis, the Simrad echosounder recorded the occurrence of organisms (potential bird prey) in the upper 750 meters.

The following is a brief qualitative review of our observations. A quantitative review of our work, including data from all four cruises, will probably reveal a correlation of temperature/salinity regimes with the occurrence of individual species, some more strongly than others. Such a correlation has been poorly described thus far for marine birds. The continuous echo-sounder trace will probably prove to be a useful tool for understanding sea bird occurrence. Local concentrations of birds usually coincided with concentrations of potential prey. Interestingly, there appeared to be regional differences in trace quality and characteristics that may relate to the different ecological types of sea birds found in different regions.

Over the southern Chilean continental shelf and slope, the avian community comprised 21 species with sooty shearwaters, shoemakers, black-browed albatross, pink-footed shearwaters and Wilson's storm-petrels predominating throughout. We saw a few grey-backed storm-petrels, a species never before reported for the west coast of South America, and encountered little shearwaters where they were first reported recently for the area. Over the slope, Stejneger's petrels, and just beyond the slope, Juan Fernandez petrels, were only slightly less abundant than sooty shearwaters. Upwelling of cooler waters occurred along the slope, as revealed in the XBT traces, and warmer waters occurred seaward of it. We passed through at least one eddy, or a possible tongue, of warm water which brought appropriate changes in the avifauna (from cool to warm to cool water species). Birds were most abundant just landward of the slope, and sometimes over the shelf, in conjunction with traces of fish schools on the echo-sounder.

In the transition to subtropical waters, sooty shearwaters declined in abundance, Cook's petrels "replaced" Stejneger's petrels, and white-bellied storm-petrels "replaced" Wilson's storm-petrels; Juan Fernandez petrels and Buller's shearwaters predominated. The latter shearwater, the short-tailed shearwater, and Buller's albatross (which we also observed several times), all nesting in the southwest Pacific, had not been reported in the southeast Pacific since the early 1900's when Beck and Murphy investigated the avifauna here (Murphy 1936). The great abundance of Juan Fernandez and Cook's petrels was also surprising because most recent ornithological investigations in the area reported very few. This region was characterized by a consistent, strong thermocline at about 60 meters deep. There was little potential prey (no echosounder trace) in the surface waters during daylight, but a deeper echo which moved to the surface during darkness was present.

The avifauna in offshore Peruvian waters was dominated numerically by storm-petrels, particularly white-faced, Hornby's, Markham's, and Galapagos storm-petrels. Cook's petrels declined in number, and shoemakers began to reappear; Juan Fernandez petrels continued as the dominant species. Over the southern Peruvian continental shelf and slope the sooty shearwater was by far the most abundant species. Also predominating were the shoemaker, pink-footed shearwater, Galapagos and Elliott's storm-petrel, and Peruvian booby. Sea surface temperatures dropped rapidly and strong upwelling was evident as we approached the coast. Schools of fish were again detected by the echosounder and the deep trace disappeared. After leaving Callao and moving north toward the Galapagos Islands, the Peru Current avifauna changed little except for the appearance of large numbers of Galapagos albatross at the continental slope. In general, the numbers of birds in Peruvian waters were disappointing; if earlier accounts are correct (they did originate from reliable observers), then a tremendous reduction in bird populations there has occurred in recent decades.

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Reference

- Murphy, R. C. 1936. *Oceanic birds of South America*. New York: MacMillan.