

Environmental determinants of seabird distribution in Wilkes Land, Southern Ocean

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Marine top predators such as seabirds have been used as good indicators of ecosystem changes attributable to variations in the marine environment. Therefore, surveys of seabird ecologies provide crucial information for a better understanding of the marine ecosystem. The basic information required in animal ecology survey is data on distribution and habitat. Seabird distributions are influenced by physical and biological variability over multiple temporal-spatial scales. The Southern Ocean is characterized by specific oceanographic features such as some water mass structures and sea ice. The aim of this study was to describe the relationship between the distribution of seabirds and oceanographic features during a research cruise of the training and research vessel *Umitaka Maru* off Wilkes Land in the Southern Ocean during January 2013. We conducted a 15-min scan survey every hour from sunrise to sunset, covering a distance of 100 m with 180° forward vision to ensure the best visibility. Visual observations were conducted 53 times (at 53 census stations) by two persons from 60°S to 65°S and from 107°E to 112°E when the vessel speed was above four knots. Oceanographic features (surface temperature, salinity, and chlorophyll *a* concentration) were continuously measured at 1-min intervals by an automated surface water monitoring system. Additional physical data were provided by CTD observations. The distribution and relative density of zooplankton was recorded by a scientific echosounder operating at 38, 70 and 120 kHz. We observed 1,978 seabirds belonging to 12 taxa. Cluster analysis of seabird assemblages identified three groups of census stations (groups A-C), all of which were located south of the Southern Boundary (SB) of the Antarctic Circumpolar Current (62°S-63°S). Group A, dominated by the cape petrel (50% in abundance), was observed along the 110°E transect. Most census stations belonging to groups B and C were located west of 110°E (62.3°S -64.8°S, 107°E-110°E), where the Antarctic Surface Water (AASW, here determined as water colder than -1.5°C) layer was notably thicker than those along the 110°E transect. In group B, the dominant species was the sooty shearwater (95%), which showed highly patchy distribution in the area. Group C was dominated by the cape petrel, sooty shearwater and southern giant petrel. Stations north of SB (60°S-63°S) were characterized by very low abundances. The distribution patterns of seabird communities were affected by water mass, such as the SB and AASW, and relative density of zooplankton rather than by surface features such as temperature, salinity or chlorophyll *a* concentrations. Previous studies have indicated that water mass structures also determine zooplankton and fish community structures in the Indian sector. Our results suggest that the densities of water mass-affected prey available to seabirds are likely to impact seabird distribution.