

Eat-in or take-away? Quantification of Antarctic resident and non-resident seabirds in the pelagic ecosystem in the eastern Indian sector of the Southern Ocean

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Seabirds are among the top predators in the Southern Ocean marine ecosystem because of their high biomass and metabolic rates. While the Antarctic neritic areas, including on-shelf, slope, and adjacent sea ice zones, are the main habitat of abundant central place foraging Antarctic residents such as Adélie penguins (*Pygoscelis adeliae*) and fulmarine petrels during summer, seabird abundance in the off-shelf pelagic areas between the northern edge of the sea ice and 60°S is not well documented. In off-shelf pelagic areas, non-residents flying from sub-Antarctic breeding sites are expected to be more abundant than Antarctic residents. Given the wide range of foraging and the high mobility of non-residents, quantification of seabird abundance in pelagic areas may provide insights into ecological functions to characterize the area. This study aimed to quantify seabird abundance in pelagic areas in the data-limited eastern Indian sector of the Southern Ocean based on an at-sea observational study conducted during the 2018/19 austral summer season. We estimated food consumption by seabirds based on their biomass, conceivable field metabolic rates, number of days spent in the areas, and diet composition. Among the five functional seabird groups (penguins, albatrosses/giant petrels, shearwaters, petrels/ Charadriiformes, prions/storm-petrels), shearwaters, non-Antarctic resident, were the most dominant taxa both by abundance (15,650,000 birds) and biomass (9,300 tons) in the study area during the summer. Most of the prey consumed by all seabirds in the area was presumed to be Antarctic krill (51,500 tons) and pelagic fishes (91,100 tons), such as myctophids. Although the total food consumption by the seabirds during the summer (204,000 tons) was lower than that reported in the Antarctic neritic areas (e.g., 753,000 tons in the neighboring Prydz Bay region), the higher proportion of non-resident shearwaters in biomass and estimated food consumption (88%) were the characteristic of the study area. Less coverage of krill-rich Antarctic neritic areas in the present study could be the reason for the lower contribution of Antarctic resident species and total food consumption by seabirds found in this study. Our results suggest the characteristics of the ecological function of the study area in which seabirds consumed Antarctic krill and pelagic fishes in the upper 60 m layer of the water column, and its nutrients are transported by subcutaneous fat or stomach oil to the outside of the areas mainly towards the northeast, even to the northern Pacific.