

# ROOSTS AT FORAGING SITES IN BLACK-BILLED GULLS

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## ABSTRACT

Diurnal roosts of Black-billed Gulls (*Larus bulleri*) were found at 37% of inland foraging sites during the breeding season. Roosts were most common and commuting between colony and foraging groups least common far (>5 km) from the colony. Selective use of roosts far from the colony is energetically efficient and may help to maintain local population densities at levels sufficient to permit efficient search for food by means of local enhancement.

## INTRODUCTION AND METHODS

Diurnal aggregations of gulls at roosts on or near inland foraging sites are common, but little information about these roosts has been reported. Quantitative data are lacking on roost occurrence and size and on their relationships to active breeding colonies. Whether or not the distance between foraging sites and colonies affects roosting behaviour is not known but could be important to an understanding of the overall foraging system of gulls and similar species (Ward & Zahavi 1973).

Black-billed Gulls (*Larus bulleri*) are particularly well suited to an examination of roosting behaviour because they are gregarious and conspicuous and commonly breed and feed inland in accessible agricultural regions (Stead 1932). I examined roosts at foraging sites of this species during the breeding season of 1979. Most of the observations reported here were from birds foraging out from two successful colonies on the Ashley River, near Christchurch. Supplementary data are included from four unsuccessful colonies on the Ashley River and from two successful colonies on the Hurunui and Conway Rivers. No obvious differences that could be attributed to the different populations were noted, and data for all are lumped in the analyses.

At each of 71 foraging sites, I estimated the number of gulls foraging and the number roosting to about the nearest 25 birds for groups of less than 100 and to the nearest 50 for larger groups. If the birds were spread out, full counts were made. For analyses, the observations at a given site on a given day were taken as the unit of measurement, each being considered one "site-day." Data were obtained for a total of 125 site-days (mean of 1.76 site-days per site from the 71 sites sampled). I counted the numbers of gulls arriving at foraging sites during 37 continuous watches, totalling 18.4 h at 26 different

foraging sites. The colony used by birds from a given foraging site was determined by direct observation of birds flying between the two locations. Distances between foraging sites and home colonies were obtained from topographic maps.

## RESULTS AND DISCUSSION

Roosts were present at foraging sites on 34 of 125 site-days (37.4%). When roosts were present, significantly more than half (68%,  $X^2 = 11.64$ ,  $p < .001$ ) of the gulls were at the roost, and the rest were foraging (Table 1).

The proportion of foraging sites containing roosts increased significantly ( $X^2 = 6.87$ ,  $d.f. = 2$ ,  $p < .04$ ) with distance from the colony, from a low of 13 of 55 sites (23.6%) at 0 to 5 km to a maximum of 10 of 11 sites (90.9%) at more than 10 km from the colony (Table 1). The mean number of birds present at sites not containing roosts dropped markedly at distances greater than 5 km from the colony ( $X^2 = 13.01$ ,  $p < .001$  for sites  $< 5$  km *versus* sites  $> 5$  km, median test). Beyond 5 km from the home colony, sites with roosts contained significantly more gulls ( $X^2 = 7.72$ ,  $p < .01$ ) than sites without roosts.

The number of flocks arriving at foraging sites was significantly and negatively correlated with distance from the colony (Fig. 1). This trend persisted throughout the season, but was particularly clear during the latter part of the season when foraging sites over the entire range of from less than 1 km to over 11 km from the colony were in use (see solid circles in Fig. 1).

The proportionately greater use of roosts at foraging sites located far from the colony ( $> 5$  km) and the high rate of commuting between colonies and closer foraging sites indicate that, when colonies are nearby, Black-billed Gulls return to the colony between active bouts of feeding rather than rest at roosts on or near the foraging area. More time and energy would be required to commute between a colony

TABLE 1 — Numbers of Black-billed Gulls (mean  $\pm$  SD) present at foraging sites in relation to distance from the home colony

Distance from Colony	Mean no. gulls at sites with roosts				Without roosts	
	n <sup>1</sup>	at roost	foraging	total	n <sup>1</sup>	foraging
0-5 km	13	126 $\pm$ 74.0	94 $\pm$ 80.8	220 $\pm$ 128.0	55	176 $\pm$ 127.5
5-10 km	11	144 $\pm$ 81.5	13 $\pm$ 30.4	157 $\pm$ 78.3	25	70 $\pm$ 76.6
> 10 km	10	122 $\pm$ 87.6	72 $\pm$ 74.9	194 $\pm$ 148.7	11	83 $\pm$ 58.2

<sup>1</sup>n refers to the number of foraging site-days included in the sample. The number of gulls seen at a given site when first censused on a given day provided the data for one foraging site-day.

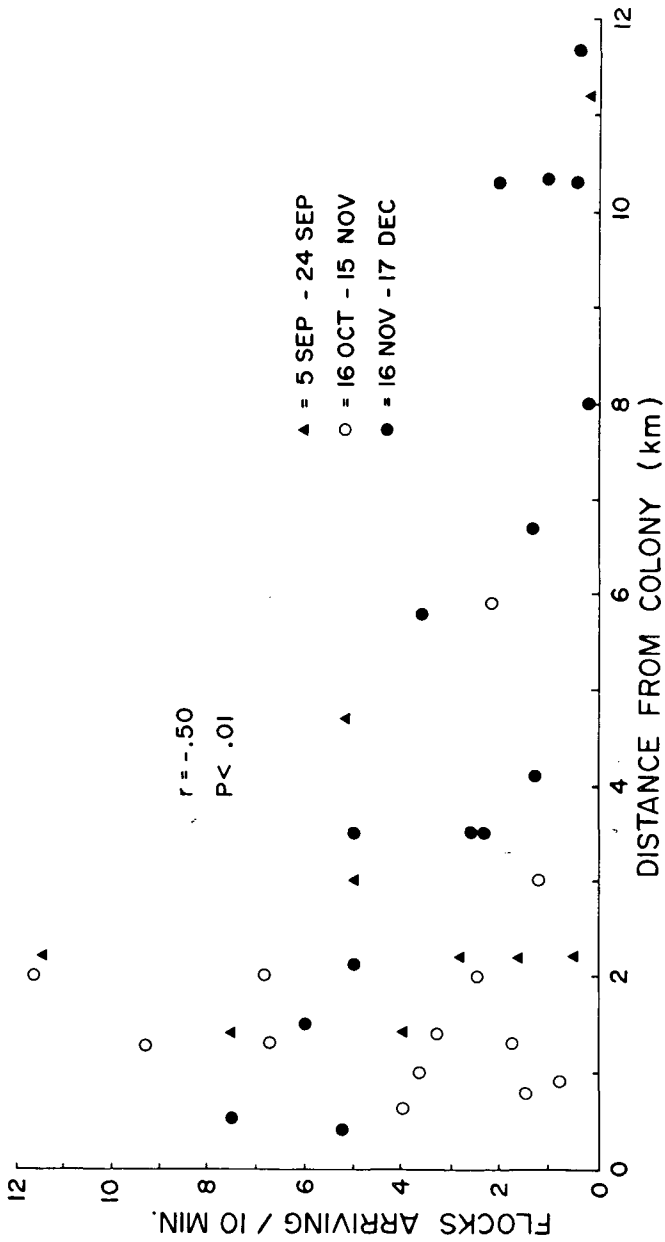


FIGURE 1 — The rate at which Black-billed Gull flocks arrived at foraging sites in relation to distance to the home colony

and more distant sites; hence periodic resting at nearby roosts rather than at the more distant colony would be energetically efficient for birds foraging far from the colony.

The presence of roosts primarily at foraging sites some distance from the colony could also be relevant to the efficiency with which Black-billed Gulls locate food. Individuals of this species, like many other conspicuous gulls and seabirds, commonly find food by cuing to the location of others already actively foraging (Stead 1932, Hoffman *et al.* 1981, pers. obs.). This form of "local enhancement" (Thorpe 1963) is necessarily most effective when local populations of foragers are large. Near a large breeding colony, the presence of the colony should alone be enough to maintain a large local population for locally enhanced search for food. Results of this study suggest that roosts could maintain large local populations when gulls forage far from the breeding colony. I have suggested (Evans 1982) that breeding colonies of Black-billed Gulls may function as "assembly points" where dispersed foragers reunite for subsequent group foraging. The results reported here suggest that this interpretation may also apply to diurnal roosts of this or similar species.

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## SHORT NOTE

### KERMADEC STORM PETREL

On 10 October 1981 at 35° 43'S 155° 50'E, four White-faced Storm Petrels (*Pelagodroma marina*) flew close to the ship. They all had white rumps which were as white as the under surfaces of their bodies. This suggests that they were of the subspecies *albiclunis*. I have never seen four *albiclunis* together before, nor have I seen them away from the Kermadec Islands.

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