DURATION OF SHIP FOLLOWING BY WANDERING ALBATROSSES *DIOMEDEA EXULANS*

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The study of the distribution of birds at sea has been complicated by the tendency of some species to follow ships (Griffiths 1982). An observer is likely either to recount individuals and thus overestimate total numbers or, by ignoring ship followers, omit at times a large proportion of the seabird community. One solution to this problem is to determine the rate of departure of individuals following ships and to maintain sampling intervals sufficiently great so as to ensure a known percentage turnover of individuals. This note examines durations of ship following by Wandering Albatrosses *Diomedea exulans*, presents a method of calculating departure rate, and shows how inferences on behaviour can be made from the resulting data.

The times which distinctly plumaged and thus individually recognizable Wandering Albatrosses spent following the M.V. *S.A. Agulhas* were recorded on a trip between Cape Town (33 54S, 18 27E) and Marion Island (46 54S, 37 45E) during 26 - 29 August 1982 (southbound) and 19 - 22 September 1982 (northbound). Birds were watched until they left the ship. A watch was kept for birds following their departures to detect any returns.

Only 14 birds were timed over the eight days because of inclement weather and an absence of distinctly plumaged birds. Nine individuals were in almost completely white adult plumage. Five birds were juveniles or in "leopard stage" (Harper & Kinsky 1978) subadult plumage. The mean duration of ship following was 44,0 minutes (SD = 57,2; n = 14). This is comparable to the mean of 80,5 minutes reported by Griffiths (1982).

The data were skewed to the right ($\gamma = 1,44$; Sokal & Rohlf 1969) so the median (16 minutes) was considerably less than the mean. The mean and median for ship following in the morning (mean = 9,4; SD = 4,8; median = 10; n = 7) were significantly less (Mann-Whitney U-test, U = 0, $p < 0,001$; Sokal & Rohlf 1969) than in the afternoon (mean = 78,6; SD = 65,4; median = 91; n = 7).

The skewness of the data precludes the use of the cumulative normal distribution to describe the departure rates. Inspection of the data suggested that departure rate could be approximated as a decay function, according to the formula :

$$F_t = F_o e^{-Kt}$$

where F_t is the number of birds remaining at time t

F_o is the initial number of birds

t is the time

and K is a fitted constant

The decay rate, K, was estimated by converting the equation to a linear form ($\ln F_t = \ln F_o - Kt$) and then regressing $\ln F_t$ against t. F_o is the y-intercept and K is the slope of the regression. Using the data from Figure 1, the regression is $\ln F_t = 10{,}84 - 0{,}013_t$ which, when converted back to the decay function, takes the form

$$F_t = 10{,}84e^{-0{,}013t}$$

The decay function gives a good description of the data; the explained variance (r^2) was 0,907. Analyses of morning and afternoon data separately gave similarly high explained variances:

$$F_{am} = 11{,}73e^{-0{,}013t}; \quad r^2 = 0{,}90;$$

$$F_{pm} = 7{,}5e^{-0{,}010t}; \quad r^2 = 0{,}94$$

The decay function can be used to evaluate the maximum number of birds remaining from a previous count. During the morning, the estimated rate of loss was 13,6 %/min. During the afternoon, the rate of loss was 1 %/min. If ship followers were counted every 60 minutes in the morning, no more than $e^{-(60)(0{,}136)} = 0{,}03$ % of the birds remained from the previous count. In the afternoons, one would expect no more than $d^{-(60)(0{,}010)} = 55$ % of the birds to remain from a count 60 minutes before. Our results indicate that time of day must be considered when setting sampling frequencies for albatrosses and probably other ship following birds.

The difference in duration of ship following between morning and afternoon also suggests that seabirds differ in their motivational states through the day. Albatrosses may follow longer in the afternoon because they are hungry but spend only brief periods behind ships in the morning because they have recently fed in the preceding hours of darkness. The duration of ship following by a species in different areas in the morning may provide an index of nocturnal food supplies. Ship following birds have been viewed as a hindrance to the study of birds at sea; they may instead further our understanding of pelagic seabirds.

ACKNOWLEDGEMENTS

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REFERENCES

GRIFFITHS, A.M. 1982. Reactions of some seabirds to a ship in the Southern Ocean. *Ostrich* 53: 228-235.

HARPER, P.C. & KINSKY, F.C. 1978. Southern albatrosses and petrels : an identification guide. Wellington: Victoria University Press.

SOKAL, R.R. & ROHLF, F.J. 1969. Biometry. San Francisco: W.H. Freeman.

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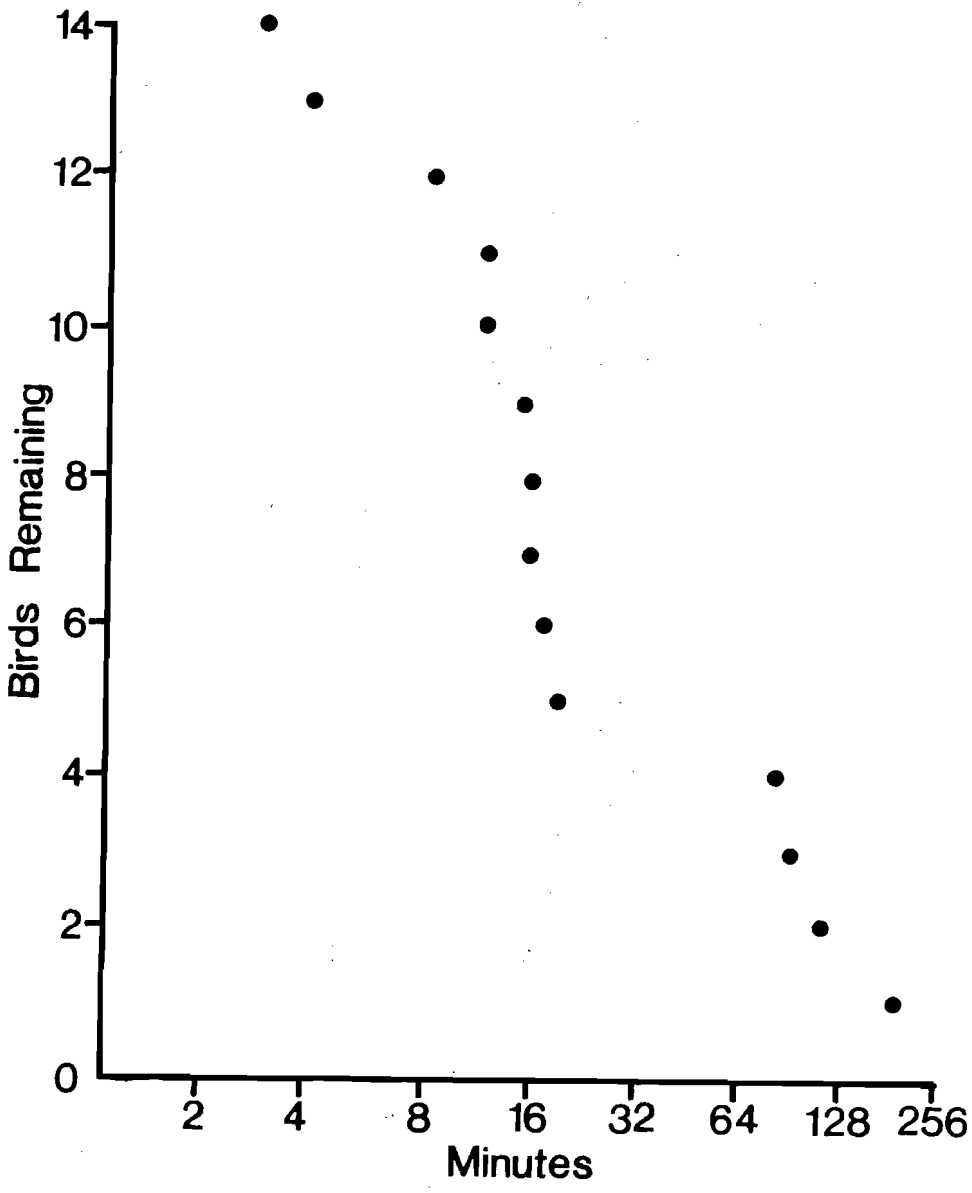
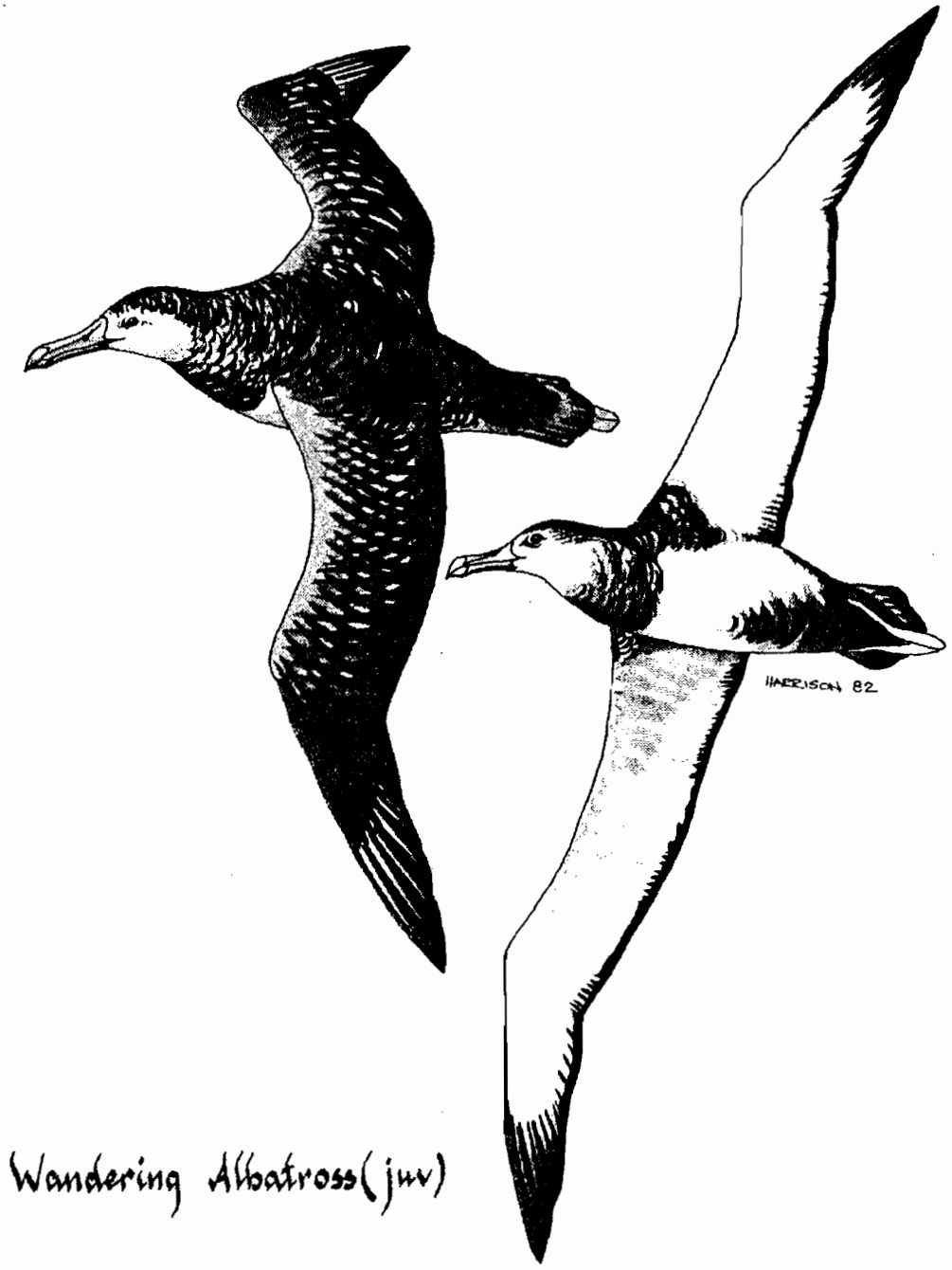


Figure 1

Duration of ship following by Wandering Albatrosses *Diomedea exulans*



Wandering Albatross (juv)