STUDIES ON THE BREEDING ORIGINS OF WADERS IN THE DUTCH WADDEN SEA: A PROGRESS REPORT

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This note reports on the progress of a major study to identify the breeding origins of waders using the Dutch part of the Wadden Sea, using chiefly bivariate analysis of wing-length and bill-length. A paper will be prepared early in 1988 for submission for publication in *Ardea*. The results shoud have wide application to the determination of the breeding origins of waders caught on wintering, moulting and migration staging areas.

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The Wadden Sea is one of the most important moulting, wintering and migration staging grounds for waders in the world. At times it supports up to 1 500 000 waders. The distribution and numbers of each species have been summarised in Smit and Wolff (Eds. 1981. *Birds of the Wadden Sea* A.A. Balkema, Amsterdam), and its use as a moulting area by Boere (1976, *Ardea* 64: 210-291).

In the early 1970s a large-scale trapping and ringing programme was started in the Dutch Wadden Sea, aimed at identifying the breeding origins of waders using the area at each time of year. This note reports briefly on th progress of these studies, and the approaching publication of the results, which should make a major contribution to the knowledge of waders on the East Atlantic Flyway.

Since the early 1970s, about 20 000 waders have been caught on the Dutch Wadden Sea, through the combined efforts of the National Forestry Service (led by Gerard Boere) on Vlieland, and the Free University of Amsterdam (led by Ebel Nieboer) on Schiermonnikoog. 12 species are the focus of the work: Ringed Plover *Charadrius hiaticula*, Grey Plover *Pluvialis squatarola* Knot *Calidris canutus*, Sanderling *C. alba*, Curlew Sandpiper *C. ferruginea*, Dunlin *C. alpina*, Bar-tailed Godwit *Limosa lapponica*, Curlew *Numenius arquata*, Spotted Redshank *Tringa erythropus*, Redshank *T. totanus*, Greenshank *T. nebularia* and Turnstone *Arenaria interpres*. Together these total over half the number of waders trapped in The Netherlands since 1911 (when ringing began). Records of these species account for at least 75% of the birds for which wing-length and bill-length have been measured. However, from the 39 000 waders trapped in The Netherlands between 1911-1982, there are only 1 800 reports from elsewhere of ringed birds involving the Wadden Sea. 35% of these involve birds ringed abroad and subsequently reported from The Netherlands. Furthermore most (60%) reports concern Dunlins (700 reports) and Redshanks (360). There are less than 50 reports for 6 species: Grey Plover (13), Sanderling (9), Curlew Sandpiper (9), Bar-tailed Godwit (32), Spotted Redshank (13), Greenshank (24). It is therefore unlikely that there will be sufficient data from ringing to use this alone to identify the breeding origins of birds on the Wadden Sea for many years to come.Hence we have turned to the use of biometrics (wing-length and the length of the exposed culmen).

There has been little published about bivariate analysis for distinguishing different breeding populations of waders, mostly due to a lack of data from breeding grounds. Hence we have enlisted the help of Cees Roselaar, who had already measured many museum specimens of the species concerned. Since joining the project, wader skins have been measured also in Copenhagen, Moscow, Toronto and Tring Museums.

The results of our analyses will be presented in a single paper, to be submitted to *Ardea* early in 1988. In the paper we aim to:

1. assess which different geographical groups can be distinguished using wing-lengths and bill-lengths. This is being analysed by bivariate analyses, taking into account wing-shrinkage in museum specimens, wear to outer primary feathers during the lifetime of the feather, and changes in culmen length during the year;
2. determine the extent of use of the Wadden Sea by each identifiable population;
3. by combining this information with other data on migration habits (ringing, moult patterns, weight changes, site fidelity etc.), clarify the role of the Dutch Wadden Sea for each population; and
4. place the function and importance of the Dutch Wadden Sea in its international perspective

Our bivariate analyses of wing-lengths and bill-lengths should have wider applicability than just for the Wadden Sea, and we hope that the paper will identify for which species of waders it is worthwhile to measure wing-length and bill-length to identify their breeding origins.