

inference is consistent with the physiological evidence presented by Jordan (1953).

In the Netherlands and France the timing of recoveries was very different. Shooting was stopped by law in the Netherlands on 3rd January, 1963 and in France from 17th January to 16th February and again from 21st February to 8th March. The ban in France evidently reduced the kill in late January and early February. The situation in the Netherlands is less clear: large-scale emigration occurred after blizzards on 30th December and 3rd-4th January, yet re-

coveries did not diminish until February, though the rate of loss was relatively low (Doude van Troostwijk, 1964).

A thorough evaluation of the effects of the hard weather of early 1963 on the White-fronted Geese wintering in western Europe cannot be made until several years have elapsed. This preliminary study suggests, however, that losses both from starvation and from shooting were probably much higher in 1963 than in any winter since 1948.

References

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Shelduck food supply in severe weather

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Shelduck (*Tadorna tadorna* (L.)) suffered heavy mortality in the Thames estuary during the icy conditions of January and February 1963. On one stretch of shore on Sheppey, Kent, 18 dead birds were found during visits on 10th February, 3rd March and 10th March. On the first date another 22 dead were found on the opposite side of the island by D. Burkett and on 17th February, D. L. Davenport found 33 in a third locality. The recorded dead represented approximately 5% of the birds in the area; actual deaths were probably much more numerous. Further up the Thames other correspondents informed me that some 150 dead were found between 26th January and 10th March (and see p. 26 of this Report).

The stomachs of nine of the birds which I found were sent to P. J. S. Olney who discovered that eight contained food and that this consisted entirely of the small snail *Hydrobia ulvae*. Only three of the birds were emaciated. One of these and one other had been shot; the rest were not obviously starved or diseased. By coincidence my own captive Shelduck 'went off' their food during the same period, ignoring 'rich feed' and consuming only corn. Unfortunately the danger was not realised until one had frozen to death during the night.

The others were then found to be in poor condition.

The presence of *Hydrobia ulvae* in the stomachs of the wild birds examined indicates that it is an important part of the Shelduck's diet in the Thames estuary. It also confirms direct observations that during winter this species has a feeding preference for the higher levels of mud flats, since it is there that the snail is most common (C. M. Yonge, *The Sea Shore*. Collins, London, 1949). During the cold spell the upper foreshore was blocked by pack ice and snow for long periods and although the birds managed to find small quantities of snails it is apparent that other essential food was either unavailable or in short supply. It seems probable that most deaths resulted from exposure amongst birds weakened by food shortage, just as my own bird died. It also seems probable that the essential food is in the upper levels of the mud flats and the outer fringe of the saltings since had they wished to feed on marine mollusca they could have done so at most low tides. During the breeding season Shelduck also feed on the fresh marshes (Hori, in press), but they do not use them to any extent in the winter. During the period in question the marshes were, of course, snow covered.