

# WINTER MORTALITY OF ADULT OYSTERCATCHERS ON THE EXE ESTUARY

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The annual mortality (autumn-autumn) of a large sample of individually colour-ringed adult oystercatchers wintering on the Exe lies somewhere between a minimum estimate of 4% and a maximum of 13.5% (Goss-Custard, Durell, Sitters & Swinfen 1982). The minimum estimate is based on the number of corpses found on the Exe and elsewhere, combined with estimates of the probability that a corpse would be recovered by the general public: 30% on the Exe, 12% elsewhere. Based on this, the minimum estimate of 4% is probably a safe basis from which to work. The problem, though, is in finding out how many of the extra 6.5% that disappear permanently each year actually died

rather than moved to other wintering areas. Since birds are known to change wintering areas, many of the missing birds may have emigrated from the Exe rather than died.

The main aim here is to examine further our estimates of how many adults die in winter. Goss-Custard *et al.* (1982) estimated that 1.5% of adults die between September and early February, i.e. in autumn and winter. However, as adults leave the Exe from early February onwards to return to the breeding areas, the large number of colour-ringed birds disappearing permanently during February and March are hard to interpret. These birds may

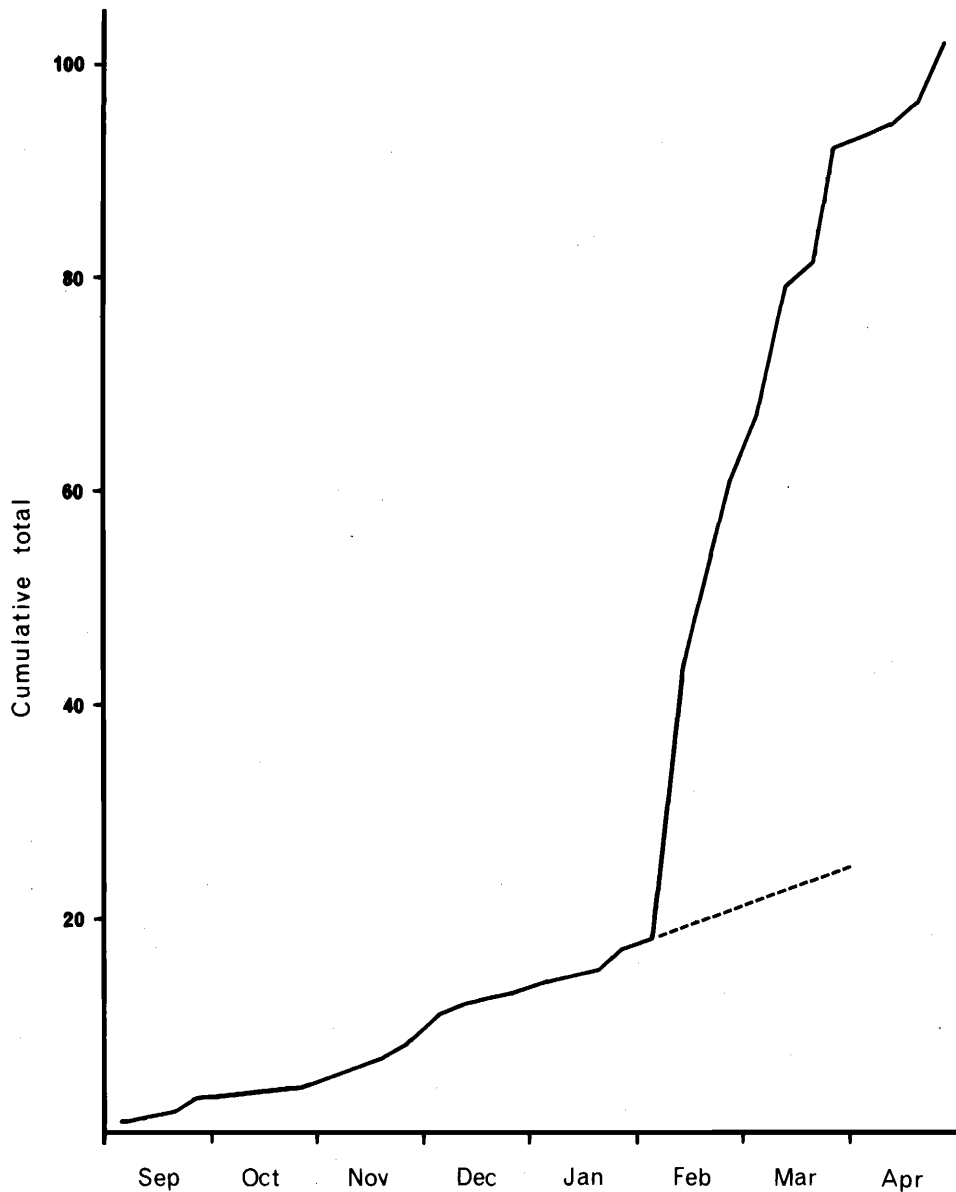


Figure 1. The cumulative number of adult Oystercatchers disappearing permanently from the Exe between September and April; 1976-1978 data.

Table 1. The known fates of birds that disappeared permanently from the Exe

Period of disappearance	Total Sample	Number of birds		
		Found dead: on Exe	elsewhere	Seen alive elsewhere winter & summer
September 1 - February 5	18	4	1	0
February 6 - April 30	84	0	3	3

either have died away from the Exe on migration or on the breeding areas, or have wintered on other estuaries in subsequent years.

The value of 1.5% mortality in winter is probably a minimum estimate as we used a fairly high value for the probability that dead birds would be recovered on the Exe (30%), and birds may have died shortly after leaving the Exe. This note attempts to estimate a maximum value for winter mortality, to establish the range within which the real value may lie.

Figure 1 shows the cumulative numbers of individually colour-ringed adults disappearing permanently from the Exe between September and April, 1976-1980. During the first 5 months, there was a gradual loss of 18 of the total of 102 that have disappeared. Most (82%) therefore disappeared from February onwards, and may either have (1) died on the Exe, (2) died later in the year on migration or on the breeding grounds, or (3) moved to new wintering areas the following autumn. Table 1 shows what happened to the small number of birds that disappeared whose fate is known. Of the 18 birds disappearing before the first week of February, one that disappeared in early January was found dead the following June in Scotland: clearly it had survived the winter. Of the remaining 17, 4 were found dead on the Exe, representing a recovery rate of 24%. None of the remainder have been seen elsewhere. For the purposes of obtaining a maximum estimate of mortality, we assume that all 17 birds died on the Exe, or shortly after they had left it.

Only 6 of the 84 that disappeared from early February onwards have been traced. Two were found dead in the spring, on the breeding areas shortly after they must have arrived. One was found dead on its breeding area in September, and 3 were seen alive in other areas.

The dotted line in Figure 1 is an attempt to guess the maximum number of birds that may have died in spring on the Exe, and on wintering areas elsewhere. This extrapolation assumes that the steady accumulation of dying birds from September to January continues at the same rate, an assumption which any extra hazards of migration might make untrue. But, in a sense, the extrapolation represents an estimate of a notional winter mortality, excluding those dying on migration. Even if mortality actually increases towards the end of the winter, the extrapolation is likely to provide an over-estimate, because the number of over-wintering birds available to die declines sharply as more and more birds begin their migration.

By this method, an extra 6-7 deaths have to be added to the 17 that occurred before February. A maximum of 24 of the total of 102 that disappeared therefore died on the wintering areas. Of these, 5, or 21%, were actually found dead, an estimate of recovery rate not too different from that used in Goss-Custard *et al.* (1982).

The maximum estimate of adult annual mortality was 13.5%, and a maximum of 23.5% (24/102) of this may have occurred on the wintering grounds. In other words, the maximum adult

winter mortality was in the region of 3.2%. We conclude that the mortality rate amongst adults on the wintering grounds between early September and late March was between 1.5 and 3.2%, confirming that it must be very low.

Another interest in doing these sums is to find out a little more about how much of the annual mortality occurs on the wintering grounds, compared with the amount that occurs on migration or on the breeding areas, a persistent debate in "waderology" (Hale 1980, Goss-Custard 1981, Evans 1983). If the minimum estimates from Goss-Custard *et al.* (1982) of both winter and annual rates are used, the value is 1.5/4.0, or 37.5% of the deaths occurring on the wintering grounds. But clearly, if the newly available maximum estimate for winter is compared with the minimum annual estimate, the value is 3.2/4.0, or 80%! If the maximum estimate of annual mortality rate is employed, the equivalent values become only 11.1% and 23.7%. If the mid points between minimum and maximum estimates of both winter and annual rates are used, the value is 2.35/8.75, or 27% of the mortality occurring on the wintering grounds. All that can be said amidst such uncertainty is that a majority of the estimates suggest, most tentatively, that less than half the mortality occurs on the wintering grounds!

What can be said with some certainty, however, is that more precise estimates of mortality are required. This article has shown how critical are the effects of making different assumptions about the fate of what happens to those birds that disappear permanently without trace. Since many of these may move to other estuaries where they are difficult to find, we suggest that more attempts should be made to estimate the proportion of dead birds that is recovered. This method has the advantages of providing estimates of mortality that are based on a known quantity, i.e. the numbers actually found dead. Our studies suggest that the recovery rate for Oystercatchers on the Exe lies somewhere between 20% and 30%, an unexpectedly high value which probably reflects the large number of people who walk around the estuary. Clearly, the recovery rate is bound to vary between species, study areas and time of year.

#### REFERENCES

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