The breeding success of Whooper Swans *Cygnus cygnus* nesting in upland and lowland regions of Iceland: a preliminary analysis

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The study assessed the reproductive success of Whooper Swans from two geographically distinct areas of Iceland, one an upland site (Jokuldalsheidi) and the other a lowland region (Skagafjordur), during the 1988 breeding season. A census at the Skagafjordur lowlands in May found 378 swans in the area, of which 126 (33.3%) were paired and occupying discrete marshy pools, 238 (63.0%) were in non-breeding flocks and 14 (3.7%) were recorded as single birds. Of 238 Whooper Swans found in the Skagafjordur area in August, just 74 (31.1%) were recorded with cygnets and 144 (60.5%) were in moulting flocks, reinforcing the view that annual recruitment was dependent upon the breeding success of just 30-40% of the population. The number of birds present at Skagafjordur decreased by 37% between May and August, which suggests that the site was also a staging area for swans migrating to adjacent highland regions.

Mean clutch size was 4.7 (+/-1.1) eggs at Skagafjordur (n = 35) and 3.8 (+/-0.8) eggs at Jokuldalsheidi (n = 49), indicating that individual birds tended to lay more eggs in the lowlands. Variation in egg size was significantly less within clutches than between clutches and females that laid larger clutches also produced larger eggs. There was no evidence to suggest that proximity to the nearest breeding pair influenced clutch size or the survival of the young. A mean brood size of 3.1 cygnets was obtained at both the lowland and the highland sites in August (n = 37, SD = 1.23 and n = 35, SD = 1.06 respectively), but the highland cygnets were significantly smaller in both size and weight. A total of 26 families (including 82 cygnets) was ringed at Skagafjordur and 23 families (73 cygnets) at Jokuldalsheidi. The number of cygnets present in 21 marked families seen in Britain and Ireland during the following winter indicated that the number lost per brood between ringing in August and resighting in the wintering range was higher for the highland swans, although the number of highland families relocated was small (n = 6).

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