

The number and distribution of Knots in Iceland in May 1990: preliminary results of an aerial survey

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Aerial surveys of possible intertidal staging sites for Knots in Iceland were carried out during 45 hrs of flight at a height of c. 60 m. The surveys took place between 14 and 24 May 1990, usually in favourable weather and always during low water periods. A total of 261,400 Knots were counted. Since it is likely that we missed only about 4,000 Knots, this brings the estimated total up to 265,000. 65% of the Knots were found in Breidafjörður and 27% in the southwest and Faxaflói.

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The aim of this study was to estimate the population sizes of high arctic waders and geese, especially Knot *Calidris canutus* and Brent Goose *Branta bernicla*, staging in spring on the shores of Iceland. The results will allow comparisons with earlier population estimates and provide information on habitat selection and geographical distribution of each species. Also, the importance of different staging sites can be assessed.

Aerial surveys of possible intertidal staging sites were carried out during 45 hours of flight between 14-24 May 1990. By 14 May most of the Knots staging in Iceland are supposed to have arrived, whereas the main departure towards the breeding grounds has not yet started on 24 May (Gudmundsson & Alerstam 1992). The observation period each day was adapted to the tidal cycle, with work restricted to within a period from three hours before to three hours after low water. The observations were made from a twin engine aircraft, a Cessna Skymaster. Most of the coast of Iceland was covered by flying in a clockwise direction around the country. Flight altitude was generally about 200 feet (60 m). Counts were made by two observers facing the shore, with a third person taking notes. All conversation during counting bouts was recorded on tape. Photographs and ground checks were made in some cases, and the pilot and the recorder estimated flocks away from the shore missed by the counters.

Small flocks (< 30) were counted one by one, but larger flocks were estimated to the nearest 10, 50, 100, 500 or 1,000 depending on size (≤ 100 , ≤ 300 , $\leq 1,500$, $\leq 4,000$ or $> 4,000$ respectively).

As it was not possible to cover the complete coastline within the short time period available, some areas were excluded from the survey. These were mostly areas well known to be of limited importance from earlier ground surveys or for which we had good reasons to believe that they held few shorebirds. In some instances fog prevented coverage or the areas were too close to highly trafficked airports. The coastline of Iceland was covered from the air (Figure 1) with the following exceptions: most of the West fiords from Naustabrekka on Raudasandur to Mjoiðfjörður at Djúp, most of Jökulfirðir and Hornstrandir, Strandir from Drangavík to Drangsnes, the inner Skagafjörður, Eyjafjörður, Grimsey, the eastern fiords from the south end of Vopnafjörður to Reyðarfjörður, most of the exposed south coast, the Vestmannaeyjar, and some small parts near Keflavík and Reykjavík. Certain areas were counted more than once: Laxarvogur, Leirarvogur, Straumfjörður - Hjörsey, Akraos, Gilsfjörður.

Weather conditions were generally favourable, calm and bright, although fog prevented adequate coverage of the northernmost Strandir and some outlying northern areas, as well as Holtsos on the south coast.



Figure 1. Map of Iceland showing the coastal areas covered in aerial surveys during 14-24 May 1990 (shaded). The division of the country into sections, used in Table 1, is shown with arrows marking the borders.

PRELIMINARY RESULTS

When interpreting our observations there are several sources of error that should be taken into account:

1) The behaviour of certain species. We saw fewer Brent Geese than expected, probably because of the low flight altitude of the aircraft. Some species of waders were seldom seen, probably because they did not fly when the plane approached. This was especially striking in the case of the Oystercatcher *Haematopus ostralegus*.

2) Species identification and correct assessment of the proportion in mixed flocks of small waders is frequently difficult.

3) The timing of count may not have coincided with the timing of passage of a particular wader population, as the counting period was selected especially to cover the main staging period of Knots.

4) Mistakes in coverage, especially over expanses of

featureless intertidal flats such as Löngufjörður at Faxaflói.

5) Direct counting error, especially in the estimation of very large flocks.

We tried to account for error source (3) by monitoring the numbers of waders near Reykjavik during the period of the aerial work. Daily counts were made at low tide in Grafarvogur and Kopavogur during 15-23 May 1990. The results corroborate earlier notions (Gardarsson & Nielsen 1989): the numbers of Knots were mainly stable in this period (mean $2,007 \pm 125$ SE individuals).

The estimation of Knot numbers from the air was comparatively easy, although with the important reservation that there may have been some direct counting errors, as some flocks were extremely large.

Table 1. Numbers of Knots in Iceland seen in aerial surveys during 14-24 May 1990 and estimated numbers missed due to incomplete coverage. The division of the country into sections is shown in Figure 1. Percentage of the estimated total in each section is shown.

| Area | Numbers seen | Estimated no. missed | % |
|---------------|--------------|----------------------|-------|
| Southwest | 16,300 | | 6.1 |
| Faxaflói | 54,400 | 1,000 | 20.9 |
| Breidafjörður | 170,500 | | 64.2 |
| West fiords | 1,000 | 2,500 | 1.3 |
| Northwest | 3,200 | | 1.2 |
| Northeast | 15,300 | 500 | 6.0 |
| Southeast | 700 | | 0.3 |
| Total | 261,400 | 4,000 | 100.0 |

An overview of the numbers and distribution of Knots is shown in Table 1. A total of 261,400 Knots were found. We estimate, based on earlier counts from the ground (Gardarsson *et al.* 1980; G.A. Gudmundsson unpubl.) that only about 4,000 Knots (1.5%) were missed due to incomplete coverage, thus bringing the total up to 265,000. Almost 65% of the Knots were found in Breidafjörður, 27% in the southwest and Faxaflói, and 6% at Melrakkasletta and Langanes in the northeast. In Breidafjörður more than half of the Knots were in the northeast part, from Skard and Gilsfjörður west to Skalmarnes. Thus the northeastern Breidafjörður seems to have

considerably greater importance to this population than previously thought. The northeast coast of Faxaflói and the north coast of Snaefellsnes on the other hand seemed less densely occupied than expected. Comparison with earlier observations (mainly unpublished) at selected areas will be made to study variation between years.

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