

# DENSITIES OF BREEDING WADERS IN HEIDMÖRK CITY PARK, SOUTH-WEST ICELAND

Jeff Kirby and Gudmundur Gudmundsson

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J.S. Kirby, British Trust for Ornithology, Beech Grove, Tring, Hertfordshire, HP23 5NR, UK.  
G.A. Gudmundsson, Institute of Biology, University of Iceland, Grensasvegur 12, 108 Reykjavik, Iceland.

## INTRODUCTION

Iceland is one of the richest breeding grounds for waders in the western Palearctic. Comparisons of population sizes in different countries highlight the great importance of Iceland for breeding populations of many species (Piersma 1986). Yet, there is relatively little published information on the densities of breeding waders in Iceland. This paper provides details of wader populations, particularly breeding densities, in an area of mixed habitats at Heidmörk, near Reykjavik.

## STUDY AREA AND HABITATS

Heidmörk (64° 04'N, 21° 46'W) is a 28 sq.km city park situated approximately 10 km south-east of Reykjavik in south-west Iceland. It is owned by the city and administered by Reykjavik Silvicultural Society. The park was established in 1947, both to preserve remnant natural birchwoods *Betula pubescens* and to provide areas for small scale reforestation. The park also provided an attractive area for

outdoor recreation close to the city. It was fenced in 1948 and tree-planting began in 1949.

Since that time, some 4 million trees of some 20-30 species have been planted, although these have met with variable success. The most commonly planted species was Sitka Spruce *Picea sitchensis* (Marteinsson 1975). Since 1959, the nitrogen fixing Lupin *Lupinus nootkatensis* has been sown in some areas of open heath, both to prevent soil erosion and to prepare the ground for tree-planting. The planted areas are now widely distributed within the park.

Our study area was 3 sq.km in size and situated in the centre of the park (Figure 1). Altitude increases gradually from approximately 80m a.s.l. in the north to 160m a.s.l. in the south. The terrain is very uneven with rocky knolls, depressions and more open, flatter areas. There is a small shallow lake on the northern boundary of the study area, with volcanic lava marking the western boundary, and roads defining the south and eastern edge. The area is traversed by numerous small roads, although it is not heavily disturbed.

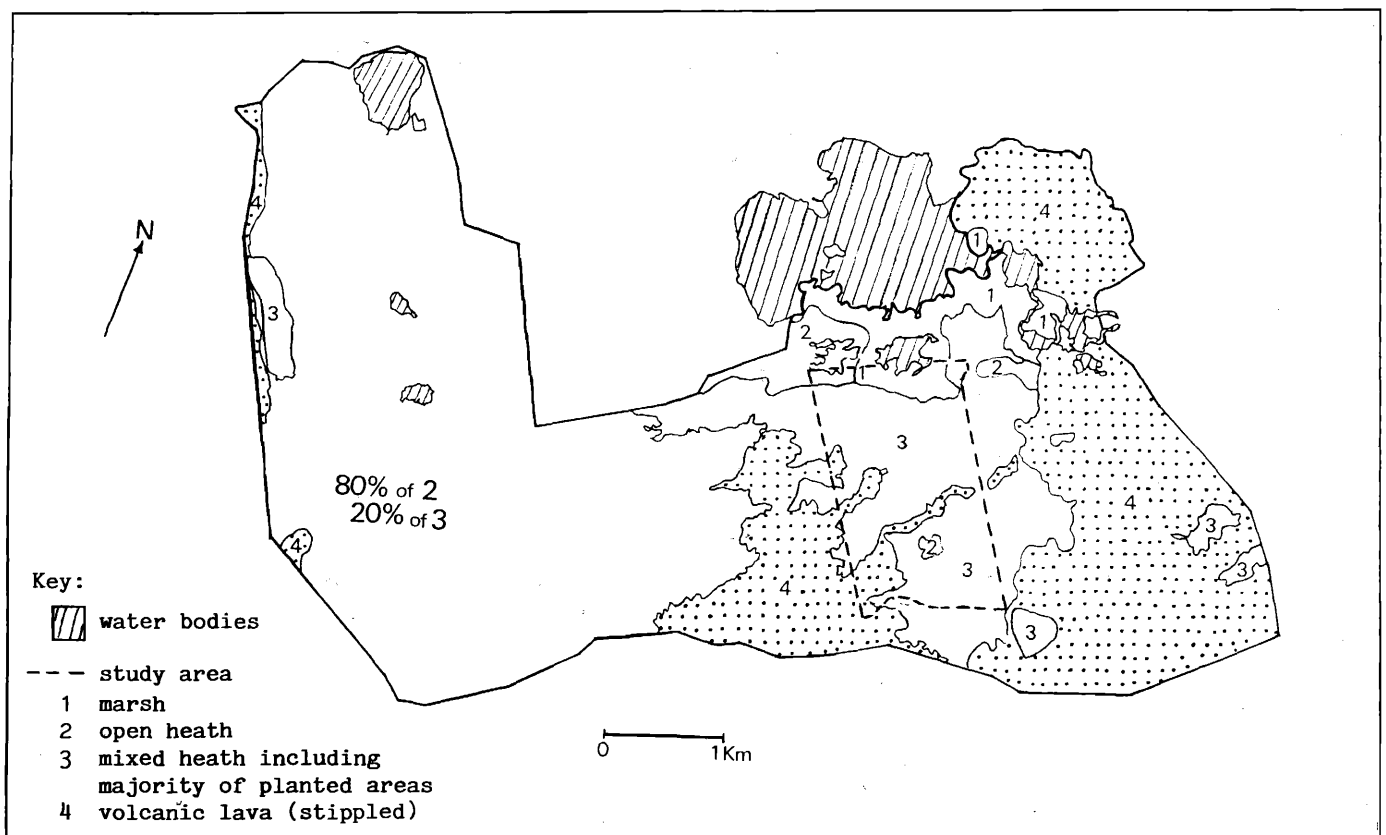


Figure 1. Map showing Heidmörk city park, location of the study area and distribution of main habitat types (percentage figures give the relative proportions of each habitat type in an area of very mixed habitat).

The area was chosen because of its diversity of habitats; the distribution of main habitat types is given in Figure 1. The habitats present were classified into four main types: marsh (c. 0.2 sq.km), open heath (c. 0.1 sq.km), mixed heath (c. 2.1 sq.km) and lava (c. 0.6 sq.km). The marsh contained a great variety of plants: grasses and sedges (mainly *Carex nigra* and *C. rariflora*) were dominant and *Eriophorum angustifolium* was also abundant. In the open heath, *Empetrum nigrum*, *Calluna vulgaris*, *Arctostaphylos uva-ursi*, *Vaccinium uliginosum* and various *Salix* species (*S. herbacea*, *S. lanata* and *S. callicarpaea*) were abundant, and some areas were planted with lupin. The mixed heath also contained some of these species, along with *Betula sylvestris*, and various grasses in the undergrowth. The lava was carpeted by mosses (mainly *Racomitrium lanuginosum*), along with some *E. nigrum*, *Festuca vivipara*, *Juncus trifidus*, *Carex bigelowii* and *B. pubescens*. Lupin swards were generally less than 0.25m in height and the conifers were less than 5m tall. Planted areas were mainly situated close to roads.

#### METHODS

Ten visits were made to the area between 9-23 June 1986. On each occasion, observations were made on the behaviour and distribution of breeding waders. To estimate breeding density for the main species present, the area was surveyed twice (11 and 19 June 1986) using a transect method similar to that described by Reed and Fuller (1983). On the first visit, the area was traversed in a NE to SW direction, and on the second in a NW to SE direction i.e. at right angles. Both visits took place between 08.00 - 12.00 hours. On each visit two observers walked parallel transect lines 100m apart and recorded locations and behaviour of all wader species on 1: 5,000 maps. This was repeated until the whole study area had been covered. The recording symbols used were the same as those listed by Reed and Fuller (1983). Details of weather, as well as start and finish times of each transect were recorded. To reduce the likelihood of double recording, observers met to cross-check registrations at the end of each pair of transect lines.

The data were analysed in two ways, the aim being to interpret field registrations in terms of "breeding pairs".

##### Method 1.

The data from each visit were treated separately and analysed using rules given by Reed and Fuller (1983). These rules deal with each species separately, behavioural characteristics being considered before decisions are made on minimum distance for pair designation or exclusion. In this analysis, the following distances were used, the magnitude of the distance being based on field observations: 100m for Redshank *Tringa totanus robusta* and Golden Plover *Pluvialis apricaria*, and 250m for Whimbrel *Numenius phaeopus* and Black-tailed Godwit *Limosa limosa islandica*. The highest population estimate resulting from either visit was taken.

##### Method 2.

Registrations from both census visits were pooled and transferred to a single map for each species. These species maps were then interpreted to produce a minimum estimate of breeding pairs. Greater emphasis was assigned to registrations involving birds occurring in

Table 1. Density estimates of breeding waders within the study area.

| Species             | METHOD 1                 |                               | METHOD 2                 |                               |
|---------------------|--------------------------|-------------------------------|--------------------------|-------------------------------|
|                     | Number of breeding pairs | Density (pr/km <sup>2</sup> ) | Number of breeding pairs | Density (pr/km <sup>2</sup> ) |
| Golden Plover       | 49                       | 16                            | 39                       | 13                            |
| Whimbrel            | 20                       | 7                             | 19                       | 6                             |
| Redshank            | 22                       | 7                             | 18                       | 6                             |
| Black-tailed Godwit | 16                       | 5                             | 10                       | 3                             |
| Totals              | 106                      | 35                            | 86                       | 28                            |

the same place on both visits, than to those recorded on just one visit. Registrations involving pairs of birds, and those exhibiting parental behaviour were included, whilst records of single non-vocalising birds, or of birds flying through the area were discarded.

Following Reed and Fuller (1983) the number of Snipe *Gallinago gallinago faeroeensis* present was estimated by summing the numbers of drumming, "chipping" or alarm-calling birds. However, it must be stressed that this is only a crude estimate of abundance and is likely to under-estimate the true level of occurrence.

#### RESULTS

Approximately 80-100 pairs of four species of breeding waders were present (Table 1), together with an estimated 90 pairs of Snipe, at an overall density of 58-65 pairs of waders per sq.km. The first method of analysis produced consistently higher estimates than the second, especially for Golden Plover and Black-tailed Godwit. These two species tended to follow the observer for considerable distances, perhaps making it more difficult to obtain accurate measures of density for these species. Snipe were present at very high densities, but proved too numerous to be plotted accurately on visit maps. They can also be very inconspicuous, even at close range, and hence the transect method employed proved unsuitable for quantifying their abundance. Reed and Fuller (1983) also considered the transect method to be inadequate for this species.

Small numbers of Dunlin *Calidris alpina schinzii* and a single pair of Ringed Plover *Charadrius hiaticula* were present on the edge of the study area. The distribution of pairs exhibiting parental behaviour is shown in Figure 2. The majority of pairs occurred at lower altitudes. These distributions do not necessarily reflect preferred nesting habitats, as some records involve birds with chicks which may have moved considerable distances from where they nested.

##### Snipe

Snipe were the most numerous of the waders present. They were widely distributed over the study area, being present in considerable numbers in all the main habitat types, especially in mixed heath. Many nests and chicks were found, often within the small conifer plantations and lupin areas.

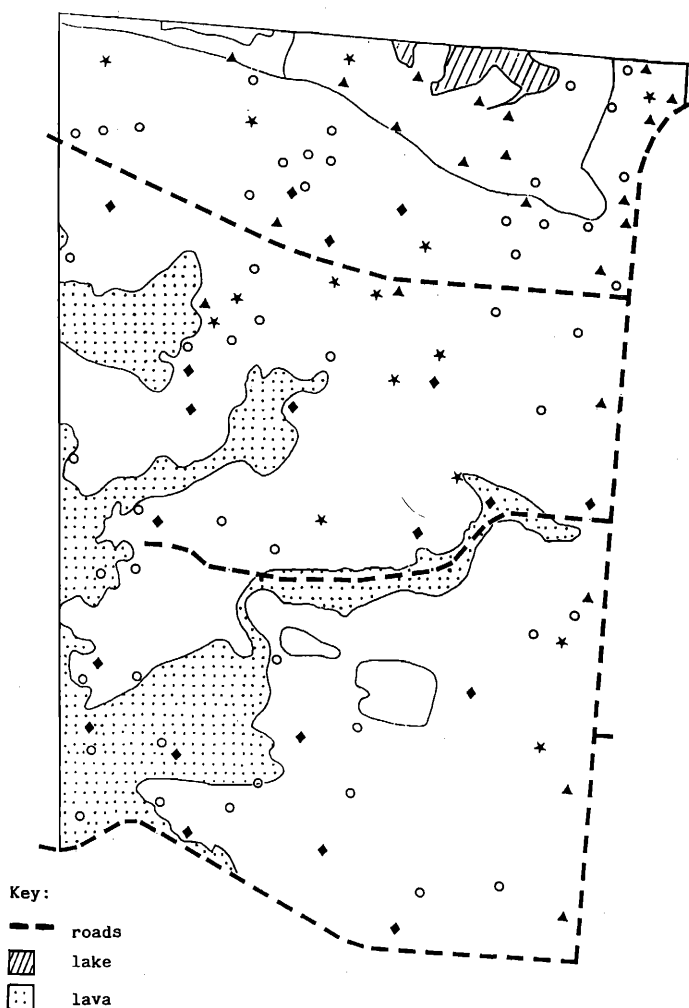


Figure 2. Diagram of the study area showing the approximate positions of those pairs of Golden Plover (O) Redshank (▲), Whimbrel (◆) and Black-tailed Godwit (★) with either nests or chicks. The thin lines denote the distribution of the main habitats within the study area.

#### Golden Plover

Between 40-50 pairs of Golden Plover occupied the study area at a breeding density of 13-16 pairs/ sq.km. Like Snipe, they were widely distributed over the area, even on volcanic lava (Figure 2). They were most numerous in mixed heath of lower altitudes and on the edge of the lava flow. Unlike Snipe they seemed to prefer open areas affording good all round visibility and were not recorded in planted areas. Only one nest and one chick were found; the nest was located on lava and the chick in open heath.

#### Whimbrel

Whimbrel were very conspicuous and approximately 20 pairs were present (6-7 pairs/ sq.km). They were most abundant on the edge of the lava flow and at middle to high altitudes (Figure 2). Few pairs occupied lower regions of the area. Like Golden Plovers, they apparently preferred more open areas away from conifer plantations.

#### Redshank

About 20 pairs of Redshank occupied the area, at a breeding density of 6-7 pairs/ sq.km. Redshanks were especially concentrated into lupin areas alongside roads and few were found away from them, apart from several pairs within

marshy habitat. Such areas were suitable for nesting and are probably good feeding areas for chicks.

#### Black-tailed Godwit

We located 10-16 pairs of Black-tailed Godwits on the area (2-3 pairs/ sq.km). However, detailed observations of this species, including regular mapping of all territorial birds, suggested that the true figure was 10 or 11 pairs. The majority were in mixed heath (Figure 2), often in close proximity to planted areas which provided good cover for nests and chicks. Only two Black-tailed Godwit nests were located, both situated under small conifers. Whilst with chicks, conifers provided the birds with excellent vantage points from which to watch over their broods. Broods were highly mobile and wandered in search of food. They were often located in lupin swards and in the marsh.

#### DISCUSSION

It is likely that densities of breeding waders in the study area were relatively high compared with the remainder of Heidmork. Observations in the main area of volcanic lava, and in the open heath to the west of the study area revealed fewer birds. We attribute the high densities within the study area to the diversity of habitats present, particularly the many small conifer plantations, birch and willow scrub and lupin swards, and possibly also to the unevenness of the terrain. Cramp and Simmons (1983) suggest that, at least for Whimbrel, irregular features afford more visual isolation leading to relatively high densities and a tendency to nest in loose groups. This was probably true in this study for Whimbrel, and possibly also for Golden Plover.

Our densities are compared to those from other Icelandic studies in Table 2, although the available data are rather sparse (especially for Black-tailed Godwits) and cover a wide variety of habitats. It is necessary to view such comparisons with caution, because the studies differ considerably in methods, extent of study areas, timing, years of study etc.. The estimated density of Snipe at Heidmork was relatively high compared with other parts of Iceland. The plantations seemed to provide favourable habitat for this species and may be responsible for the high densities present. Tuck (1972) found an average of 9.3 pairs/ sq.km on peatland areas in Newfoundland, Canada, which accords fairly well with figures for areas of the Netherlands, and for the agricultural fenland of East Anglia, England (Cramp and Simmons 1983).

According to Table 2, Golden Plovers occur at densities of up to 40 pairs/ sq.km for Iceland, which is considerably higher than those recorded at Heidmork. Wink (1973) gives even higher densities (100 pairs/ sq.km) for Iceland, and Ratcliffe (1976) records 16 pairs/ sq.km as the highest known density in Britain at that time. Cramp and Simmons (1983) give densities of 10-15 pairs/ sq.km in Scotland and NE England, and lower densities in Scandinavia. The densities at Heidmork are similar to those in Britain and Scandinavia.

The densities of Whimbrel on the area was low compared with other parts of Iceland, where 10-20 pairs/ sq.km seem commonplace. Elsewhere densities of up to 12 pairs on 0.4 sq.km in Russia and 5.5 pairs/ sq.km at Smola Island (Norway) have been recorded (Cramp and Simmons 1983).

Table 2. Densities (pairs/sq.km) of some breeding wader species in Iceland.

| Location                   | Habitat | Source | Snipe | Golden Plover | Whimbrel | Redshank | Black-tailed Godwit |
|----------------------------|---------|--------|-------|---------------|----------|----------|---------------------|
| Heidmork (SW)              | 1       | 1      | 30*   | 13-16         | 6-7      | 6-7      | 3-5                 |
| Lambafellsver (C)          | 8       | 3      | 0-5   | 20            | 6.5      | 1        | 0                   |
| Nedri Seydisardrog (C)     | 8       | 3      | 0     | 20            | 1        | 0        | 0                   |
| Gullfoss (S)               | 7       | 3      | 0-5   | 18            | 24       | 0        | 0                   |
| Brunasandur (S)            | 7       | 3      | 0-1   | 0-3           | 12-13    | 0        | 0                   |
| Holtos (S)                 | 6       | 3      | 3     | 1             | 3        | 14       | 2                   |
| Dyrholaey (S)              | 6       | 3      | 0     | 0             | 4        | 4        | 0                   |
| Hella-Selfoss (S)          | 6       | 3      | 6     | 2             | 4        | 30       | 6                   |
| Neslandatangi (NE)         | 2       | 2      | 21    | 10            | 26       | 26       | 0                   |
| Hofstadaheidi (NE)         | 1       | 2      | 1     | 41            | 18       | 0        | 0                   |
| Geirastadaland (NE)        | 4       | 2      | 30    | 22            | 7        | 7        | 0                   |
| Onundarfjordur (NW)        | 3       | 2      | 15    | 0             | 0        | 8        | 0                   |
| Flatey, Breidafjordur (NW) | 5       | 4      | 90    | -             | -        | 80       | 0                   |

\* = estimate

habitat codes: 1 heath; 2 wetland; 3 marsh; 4 grassland; 5 island; 6 cultivated pasture; 7 wet-meadow; 8 dry-meadow.

sources of information: 1 this study; 2 Nielsen 1980; 3 Mulder and Philippona 1986; 4 Petersen 1979.

The densities of Redshanks recorded at Heidmork were relatively low compared with other sites in Iceland, possibly due to unsuitable habitat.

Petersen (1979) recorded up to 80 pairs of Redshank per sq.km on the island of Flatey in north-west Iceland. Cramp and Simmons (1983) suggest 100-300 pairs/ sq.km in most habitats, and up to 100 pairs/ sq.km on larger salt marshes. Fuller et al. (1986) give densities of Redshanks as high as 73 pairs/ sq.km on the wet machair of the Outer Hebrides.

At Heidmork, Black-tailed Godwits were present at low density. Jonas (1979) recorded 33 pairs/ sq.km (West Germany) and Cramp and Simmons (1983) give densities of 40-60 pairs/ sq.km of the nominate race *L. l. limosa* in favourable localities in the Netherlands. Beintema (unpublished mss.) records even higher densities, with 100 pairs/ sq.km in favoured habitat in Holland.

Overall, the densities of breeding waders at Heidmork were not as high as some of those recorded at other sites in Iceland. Nevertheless, they were comparable with the majority of sites in Britain, with only the Outer Hebrides (80-20 pairs/ sq.km, excluding Snipe) recording much higher densities (Fuller et al. 1986). High densities (>100 pairs/ sq.km) have also been reported from the Baltic shore meadows in Sweden and Finland, but on the peatlands of these countries the density of waders rarely exceed 10 pairs/ sq.km (in Fuller et al. 1986). The highest densities reported from Greenland are 16-17 pairs/ sq.km at 76° N (Meltofte 1985).

It was interesting to see that both the conifer and lupin areas were apparently favourable to some species, particularly Snipe, Redshank and Black-tailed Godwit. Stroud and Reed (1986) demonstrated that waders in upland Britain avoid areas close to coniferous plantations. At Heidmork, both Golden Plover and Whimbrel preferred the more open areas away from plantations, but Snipe nested within, and

Black-tailed Godwit and Redshank close to, conifer plantations. These plantations were, however, small and very different to the large scale blanket afforestation of upland Britain. Lupin swards provided good cover for nests and represented good feeding areas for chicks; observations confirmed an abundance of insect foods there. We do not know how commonly areas are planted with lupin, but if widespread, such plantings could influence the breeding success of some of these species.

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## THE DISTRIBUTION OF BREEDING WADERS IN CZECHOSLOVAKIA IN 1973-1977

Vera Hromádková

Hromádková, V. 1987. The distribution of breeding waders in Czechoslovakia in 1973-1977. *Wader Study Group Bull.* 50: 24-27.

An atlas survey covering 1360 010 km squares was undertaken between 1973 and 1977. Ten species of waders were found breeding. Most waders are scarce and declining as breeding species, largely as a consequence of habitat loss; only Lapwing, Little Ringed Plover, Woodcock and Snipe are widespread.

Vera Hromádková, Halasova 824, 500 09 Hradec Kralove, Czechoslovakia.

### INTRODUCTION

Between 1973 and 1977 an atlas project to document the breeding distribution of birds in Czechoslovakia was carried out. The data was compiled from Bohemia by Dr. Stastny and from Slovakia by Ing. Randik. Since the results of this survey are still awaiting publication, and in view of the recent attention paid to breeding waders in Europe (Piersma 1986), this note presents the provisional distribution maps of breeding waders in Czechoslovakia. It expands on the numerical data presented in Piersma (1986).

### METHODS

Between 1973 and 1977 a total of 1360 10 km squares in Czechoslovakia were surveyed for breeding waders. Of these, 846 squares were in the Czech Socialist Republic (Bohemia and Moravia) and all were fully surveyed. The remaining 514 squares were in the Slovak Socialist Republic (Slovakia) with 216 (51%) covered in detail.

The breeding status for each 10 km square was assigned to one of 3 categories:

1. Possible breeders (small dots on the figures),
2. Probable breeders (medium dots on the figures), and
3. Confirmed breeders (large dots on the figures).

### RESULTS

Czechoslovakia is a land-locked and largely mountainous country with limited habitat for

Table 1. Approximate numbers of breeding pairs of waders in Czechoslovakia. The figures are based on the national Atlas work carried out between 1973 and 1977.

| Species  | No. of pairs. |
|--|---------------|
| Black-winged Stilt<br><i>Himantopus himantopus</i> | 4             |
| Stone Curlew<br><i>Burhinus oedicnemus</i>         | 15-30         |
| Little Ringed Plover<br><i>Charadrius dubius</i>   | 1000          |
| Lapwing<br><i>Vanellus vanellus</i>                | 2000*         |
| Snipe<br><i>Gallinago gallinago</i>                | 1000          |
| Woodcock<br><i>Scolopax rusticola</i>              | 1000          |
| Black-tailed Godwit<br><i>Limosa limosa</i>        | 300-600       |
| Curlew<br><i>Numenius arquata</i>                  | 125-150       |
| Redshank<br><i>Tringa totanus</i>                  | 80-150        |
| Common Sandpiper<br><i>Actitis hypoleucos</i>      | 1000          |

\* this estimate is probably very low

breeding waders. Ten species of waders were found breeding in Czechoslovakia during the survey. The approximate breeding population of each, derived from information collected during Atlas Survey work, is shown in Table 1. The same data set was used for Breeding Waders in Europe (Piersma 1986).

The status and distribution of each species in