



## Counts of spring passage Golden Plover *Pluvialis apricaria* in north Lewis

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In spring, large numbers of Golden Plover *Pluvialis apricaria* feed in lowland areas of the Outer Hebrides, Scotland, and many of these are presumed to be birds which breed in Iceland. This study estimated how many Icelandic birds pass through north Lewis, the most northerly part of the island group. Birds were counted during spring 2005, and samples of these birds were scored on a scale of 0–9 by the boldness of their plumage. Northern Golden Plover have bolder breeding plumage than southern forms. Birds with scores of 5–9 were recorded early in the season and these were believed to be of the *altifrons* form which breed in Iceland. Locally breeding birds of the *apricaria* form were found to have plumage scores of 2–5 for females and 6–8 for males. From counts and the proportion of birds with high plumage scores, an estimated minimum of 14,000 Icelandic Golden Plover passed through north Lewis that spring. This represents 4.7% of the Icelandic breeding population and 5.6% of the UK wintering population. The birds used lowland grasslands as foraging areas during stopover on passage to their breeding grounds, and these could be important for the conservation of Icelandic Golden Plover.

The breeding and wintering ranges of Golden Plover *Pluvialis apricaria* have been well documented but, although they are known to move within their winter quarters, there is little information on their migration routes and habitats used during passage. Ireland and western Britain are important for wintering Icelandic Golden Plover (Whittingham 2002) and overwinter survival can affect Golden Plover breeding populations (Parr 1992). Therefore the availability of favourable winter habitat may be important for their conservation (Whittingham 2002), and it is presumed that any stopover points on their migration are also important for their survival and return to their breeding grounds in good condition.

The plumages of the *apricaria* form of the Eurasian Golden Plover which breed in Britain and southern Scandinavia vary greatly, with a general gradation from poorly marked birds in the south, eg the Pennines, to well marked birds in eg the north of Scotland. While there is considerable variation in plumage patterns within this geographical range, they are typically duller than the birds of the dark *altifrons* form which breed in Iceland, northern Scandinavia and Russia. These differences arise from differing proportions of retained wintering (pale) feathers and newly grown breeding feathers (bold). Icelandic breeding birds of the northern, *altifrons* form

have on average more bold (darker head, breast and belly) plumage than Lewis breeding birds, which are of the southern, *apricaria* form, and males of both populations have more bold markings than females do (Byrkjedal & Thompson 1998). Although these breeding populations are not recognised as separate subspecies, if the habitats used by each form in winter and on passage were identified, this might focus attention on the conservation requirements of plovers from different breeding areas.

Information on the habitats used at different times by Golden Plover in Lewis is scarce, although the abundance and distribution of breeding birds is well understood (Whitfield *et al* 1998) and the locations of some lowland feeding grounds, eg intertidal, coastal grasslands and agricultural habitats, have been identified (Rabbitts 1998, 2001, SNH unpublished data). The Golden Plover which use the Lewis lowlands are likely to be local breeding birds (the adjacent Lewis Peatlands Special Protection Area (SPA) holds approximately 2,000 pairs (Whitfield *et al* 1998)) augmented by an unknown number of Icelandic birds on passage (Whittingham 2002). The proportions of the two populations which use these feeding grounds are unknown, and the status of the Icelandic birds is of particular conservation concern with respect to their feeding in grassland while on passage. As most of the lowland in the Outer Hebrides is managed for agriculture, any changes in land-use due to agricultural or economic

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factors could impact on the survival of that population of Golden Plover. High numbers of Golden Plover have been observed in the Outer Hebrides lowlands in spring and many are thought to be Icelandic breeding birds (pers. obs., Rabbitts 1998, 2001). This study aimed to estimate how many Icelandic Golden Plover pass through north Lewis, the most northerly part of these islands, in spring and to identify their main feeding and roosting areas.

## METHODS

### Study area

Lewis (58° 20'N 6° 25' W) is the most northerly island in the main chain of the Outer Hebrides. The interior of the island is mostly upland peaty mire and between this and the coast there are strips of lowland grasslands and improved farmland, seldom more than 3 km wide. Golden Plover are known to use estuaries, arable land, improved pasture and grassland as feeding grounds during winter, and also some of these habitats during the breeding season (Ratcliffe 1976, Parr 1980, Byrkjedal & Thompson 1998). Therefore, in spring 2005, all such habitats in north Lewis, between Shawbost and Ness in the west and from Stornoway to Gress in the east, were searched for the presence of feeding plovers, by driving or walking around likely areas, and the number of birds seen was recorded. All potentially suitable ground was considered to have been surveyed and there were 321 records of no birds at sites on days surveyed.

### Bird counts

As the peak numbers of passage Golden Plover were expected in the area in April (Rabbitts 2001, Whittingham 2002), counts of birds were made approximately twice a week, for each potential site, from 16 March to 10 May. All counts were made between 0700 and 1900hrs, scanning with binoculars and telescope. Although Golden Plover feed at night, no counts were made under darkness as their accuracy could not be assured. No birds were seen moving from one survey site to another during any day, and so each daily count is considered as accurate, with no birds counted twice. Most birds foraging in these areas in summer were likely to be local breeding birds (Whittingham 2002), so the surveys were continued every 7–10 days until 24 July to gain an estimate of how many birds from the local breeding population used these areas.

### Plumage scores

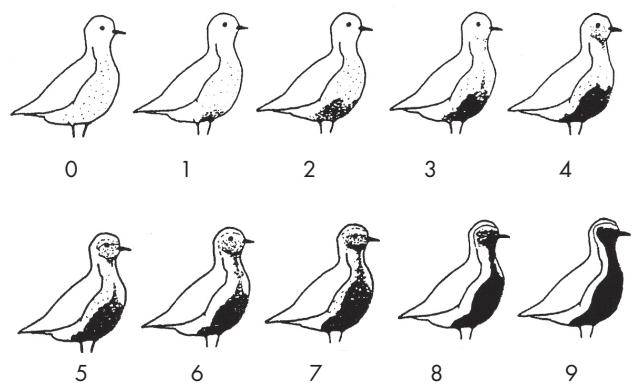
Samples of birds were scored by their plumage approximately once a week until mid May and then three times in June. The plumages of as many birds as were seen clearly were scored (0–9), nine being the most bold, according to the classification of plumage gradings by Chris Thomas (in

Byrkjedal & Thompson 1998) (Fig 1). Samples of birds on the nearby breeding grounds of the Lewis peatlands were also scored in order to identify the range of plumage scores typical of the local breeding population. As the number of bird plumages scored each day varied, the percentages of each class per sample were used for comparisons.

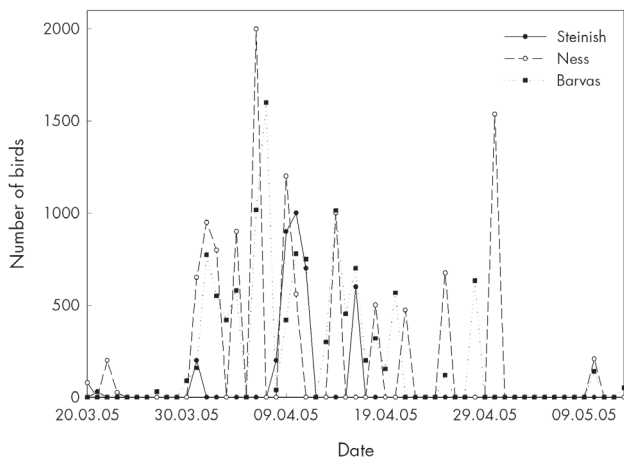
## RESULTS

### Bird counts

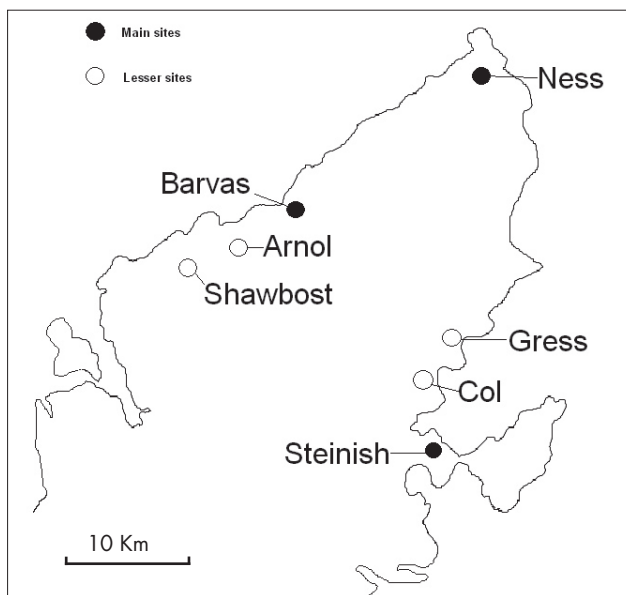
The first birds were recorded feeding on the lowland grasslands on 20 March. Most lowland feeding and roosting areas were on grassland, in fields of improved pasture or machair, and some birds used estuary mudflats, saltmarsh or freshwater loch shores. The birds typically roosted in the same areas as they fed, the flocks gathering together to roost and dispersing to forage by walking or short flight. The numbers of birds feeding at all sites varied according to the day they were surveyed. Peak total counts of 1,500–3,000 birds were recorded at feeding sites on 2, 5, 7, 10 and 15 April and 1 May, with numbers dropping abruptly after each peak (Fig 2). The three main feeding areas were grasslands at Ness, Barvas and Steinish, which together held 95% of all Golden Plover lowland feeding records between 17 March and 10 May (Fig 3). During this period, Ness held a mean of 719 birds per day when birds were present (range 25–2,000, median = 625,  $n = 17$ ), Barvas held a mean of 512 (range 30–1,600, median = 320,  $n = 29$ ), and Steinish held a mean of 519 (range 30–1,000, median = 600,  $n = 7$ ). Other areas at Shawbost, Arnol, Col and Gress held a mean of 67 birds when birds were present (range 1–150, median = 25,  $n = 26$ ). The last birds seen at Steinish, the southernmost of the three main sites, were on 16 April and the last high counts of more than 100 birds were on 10 May at both Ness and Barvas.



**Figure 1.** Plumage scoring of Golden Plover (after Thomas in Byrkjedal & Thompson 1998).



**Figure 2.** Numbers of Golden Plover on the three lowland sites with the highest counts in spring 2005; Ness, Barvas and Steinish. This represents cumulative counts of birds at all sites when more than one site was surveyed on any day.



**Figure 3.** Locations of lowland sites used by Golden Plover for feeding and roosting in north Lewis, Outer Hebrides.

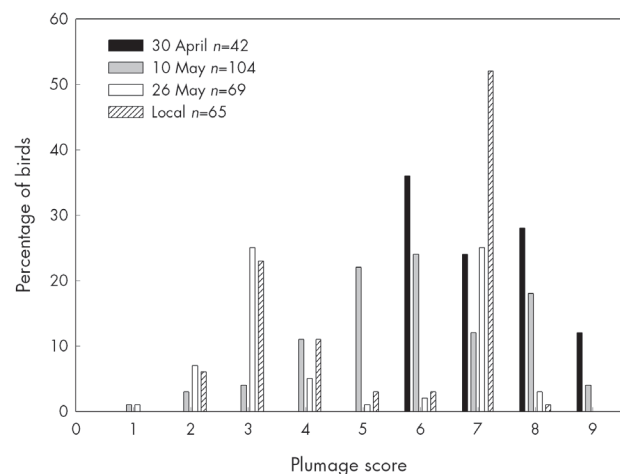
Any estimation of the number of birds passing through the area depended upon concurrent counts of, or near to, zero at all sites which the birds were known to use (Fig 2). Any birds counted before these troughs were considered to have left the whole area, and any birds counted after the troughs were considered to have arrived. If the numbers of birds in each peak count are considered conservatively to include repeat counts of individual birds within the flocks, *ie* birds remaining for more than one day at a site or moving between sites within the same peak count period, a minimum total of 14,566 birds are estimated to have passed through the north Lewis lowlands in March,

April and May. However, if the birds counted within each site per day are considered as separate records, *ie* each bird had passed through and out of the survey area then been replaced by other new birds which have flown in, then a higher total of 22,000 birds are estimated to have passed through.

### Plumage scores

The scores for the locally breeding birds gave bimodal peaks around 3 and 7 (Fig 4). Birds with plumage scores around 3 were likely to be mostly females and those with scores around 7 were likely to be mostly males. There were clear differences between the proportions of plumage scores as the season progressed. On 30 April, there were no birds in the lowlands with plumages scored less than 6, so it is unlikely that there were any locally breeding females there that day, and probably no males either as they are usually on territory during the day (Byrkjedal & Thompson 1998). On 10 May, 19% of birds scored in the lowlands were likely to have been local breeding female birds with plumage types of 1–4. Ratios of plumage scores of birds in the lowlands later in the season were very similar to that of the known local breeding birds. Therefore, a high proportion of the high counts in April and early May were probably Icelandic birds and it is likely, from the early bimodal peaks in the scores, that the Icelandic females typically have a score of around 6 and the males around 8.

It was likely that there was a mix of Icelandic and local birds on 3, 4 and 10 May (Table 1) as there were no scores of 1 or 2 before 10 May, and no scores of 9 from 17 May onwards. The range of scores for birds feeding in grassland off the breeding grounds on 26 May is very similar to that



**Figure 4.** Plumage scores of birds in north Lewis in spring 2005. Boldly marked birds, which are assumed to be Icelandic breeding birds, have high scores. Plumages scored on given dates were all of birds on lowlands. The plumages of known local birds were of birds on the moorland breeding grounds recorded during May.

**Table 1.** The numbers of Golden Plover in north Lewis in spring 2005 with plumages scored between 0 and 9, after Thomas (Fig 1). Dates are for birds seen in the lowlands and the local birds are those scored on the upland breeding grounds. Birds recorded am and pm were counted before midday and in the evening.

Date	Score										n
	0	1	2	3	4	5	6	7	8	9	
30/04	0	0	0	0	0	0	15	10	12	5	42
03/05	0	0	0	5	6	7	11	12	3	0	44
04/05	0	0	0	8	29	17	30	94	43	11	232
10/05	0	1	3	4	12	23	25	13	19	4	104
17/05	0	1	2	8	4	2	8	14	2	0	41
26/05 am	0	1	4	11	1	1	0	13	3	0	34
26/05 pm	0	0	3	14	4	0	2	12	0	0	35
22/06 am	0	0	11	26	4	1	2	1	0	0	45
22/06 pm	0	0	5	9	1	0	1	5	0	0	21
23/06	0	1	1	21	0	1	7	12	1	0	44
29/06	0	0	2	6	1	0	1	1	0	0	11
local	0	0	4	15	7	2	2	34	1	0	65

of local breeding birds. Therefore, both passage Icelandic Golden Plover and local breeding birds appeared to use the same foraging and roosting sites in north Lewis in spring, although the majority of birds in the flocks were Icelandic, especially early in the season.

Most of the plumage scores were collected between 0900 and 1300hrs, when it would have been expected that the majority of foraging, off-duty breeding birds would have been female. On 22 June, when birds were scored at midday and early evening, most birds foraging at midday were paler (probably female), whereas in the evening when birds were again scored there was a drop in proportion of probable females and an increase in the proportion of bolder (probably male) birds (Fig 5).

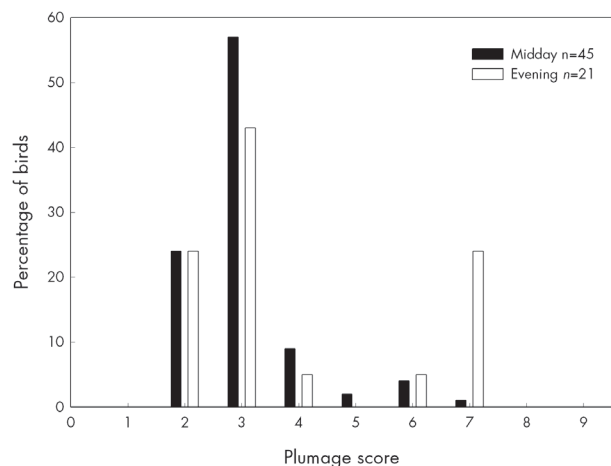
## DISCUSSION

It is estimated that a minimum of 14,000 Icelandic-breeding Golden Plover pass through north Lewis in spring, representing 4.7% of that national population of 300,000 birds (Byrkjedal & Thompson 1998). Although these birds do not overwinter on the island they qualify as wintering birds of which there are approximately 250,000 in the UK (Stroud 2001). Therefore the birds passing through north Lewis represent 5.6% of the UK wintering population. If the higher possible figure of 22,000 were followed this would represent 7.3% of the Icelandic population or 8.8% of the UK wintering population.

Most birds foraging at midday on 22 June were female, as was expected because the males incubate the eggs or care for the young during the day (Byrkjedal & Thompson 1998). The drop in proportion of females in the evening,

together with an increase in the proportion of males, would coincide with females returning to incubate eggs or guard chicks in the evening. The smaller number of males feeding in the lowlands would result from fewer males travelling as far off-site as the females to feed, because they often feed closer to the nest than the females (O'Connell *et al* 1996, Whittingham *et al* 2000, Pearce-Higgins & Yalden 2003).

If all the off-duty birds from the local breeding population in the Lewis peatlands were to feed in the same lowland areas there should have been many more birds there in late May and June than those recorded. The highest combined daily total count of Golden Plover feeding in all the lowland sites was approximately 400 birds. These would have been mostly females, as the surveys were made in daytime, and it was estimated that 750 off-duty birds



**Figure 5.** Plumage scores of Golden Plover foraging on lowland grasslands in north Lewis 22 June 2005.

might have nested within commuting distance between their nests and feeding sites. Therefore approximately half the local population of females probably feed on grasslands closer to their moorland nest sites, such as those around lochs and on hillocks. Off-duty males have been seen to use such sites (S. Rae, pers. obs.), and these findings agree with Whitfield *et al* (1998).

Migrant American Golden Plover *Pluvialis dominica* follow the coast until they have to leave it to cross to South America by the shortest over-sea route (Richardson 1979). It is likely that any migrant Icelandic Golden Plover which pass through Lewis would also fly along the coast, and probably travel along such routes from their wintering grounds farther south in Britain or Ireland. The position of these feeding areas in the farthest northwest region in the UK place them as the last possible stopping and feeding sites for passage birds heading to Iceland, 800 km distant. Therefore, these feeding grounds are probably important as refuelling sites for these birds before they cross the northeast Atlantic in one long flight and arrive in their breeding grounds, potentially while these are still snow-covered and access to food is limited.

The feeding grounds used by Golden Plover in Lewis comprised mostly grasslands and all were cropped short by grazing sheep. The same lowland grasslands were used by passage Icelandic birds and local breeding birds. Although the reasons for their selection are not known, as there were many more, apparently similar grasslands, this was likely to have been due to choice of habitats with the highest densities of prey, such as earthworms (Whittingham *et al* 2001) or larval tipulids (Pearce-Higgins & Yalden 2003). They also seemed to favour pasture of short sward height, as did Golden Plover in the Pennines (Pearce-Higgins & Yalden 2003). There were few tilled fields in the area and these were typically small, enclosed by fences and seldom used by the birds. Although field size was not measured, this is perhaps a critical factor that may have limited their attraction to Golden Plover (Whitfield 1997, Whittingham *et al* 2001).

Other feeding sites were known beyond the study area, and there might have been more sites where birds were overlooked. Any of these sites, and other similar sites in the Outer Hebrides could hold large numbers of passage plovers, and so increase the significance of these islands for Icelandic Golden Plover. If further surveys of Golden Plover throughout their range in late winter and spring were to include plumage scoring, a more thorough understanding could be developed of areas where the different forms overwintered and occurred on passage.

The areas identified in this study (and any other similar sites in the Outer Hebrides) for migrating Golden Plover are considered undervalued for the species' conservation, as none is designated for protection under any legislation. For, although the number of Golden Plover counted at any one time at any site within the Lewis lowlands was

less than 1% of the total wintering UK population, the number of birds passing through equated to approximately 5% of that total, and it is likely that there are more birds using other grassland sites within the archipelago. Even if the lower estimate is taken of the number of birds that use the surveyed sites, there are more there than at any SPA in the UK which has wintering Golden Plover as a qualifying species category, with the single exception of the Humber Flats, Marshes & Coast.

Foraging areas used by northern-breeding waders during stopover on their return passage to their breeding grounds can be vital. Therefore the lowland grasslands identified in this study could be important for the conservation of Icelandic Golden Plover, and the same areas seem to be important for local breeding birds. It is not known why most of the birds used the same few sites, however, nor whether other areas of grassland would be sufficient if these primary sites were lost. It may be that sympathetic management of the favoured grasslands would be appropriate for the conservation of Golden Plover in the Outer Hebrides.

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