

Breeding waders around the Duddon estuary in 1994

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The Duddon Estuary is a site of international importance for wintering and migrating waterfowl. In 1994 the first comprehensive survey of the waders breeding around the estuary was undertaken. Oystercatcher *Haematopus ostralegus* and Ringed Plover *Charadrius hiaticula* nested at high densities on slagbanks, but the estuary population of Ringed Plover had declined since national surveys in 1973/74 and 1984. Lapwing *Vanellus vanellus* and Curlew *Numenius arquata* densities in fields were similar to densities at the best sites in lowland Scotland. Redshank *Tringa totanus* density on saltmarsh was very low relative to 'good' sites such as are found in Morecambe Bay and Essex, but their density in fields was high in comparison with other sites in northern England and Scotland. Small numbers of Dunlin *Calidris alpina*, Snipe *Gallinago gallinago* and Common Sandpiper *Actitis hypoleucos* were found. A proposal for a power generating barrage, overgrazing on some saltmarsh and fields, undergrazing at North Walney and human disturbance are the main threats to breeding waders.

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INTRODUCTION

The Birds of Estuaries Enquiry (now the Wetland Bird Survey - WeBS) supplemented by the fieldwork of a few dedicated individuals has demonstrated that the Duddon Estuary is a site of international importance for wintering and migrating waterfowl (e.g. Waters & Cranswick 1993), but breeding waterfowl have never been comprehensively surveyed. Terns (*Sterna* spp.) have been monitored annually since 1986 (Hutcheson 1987, 1988; Callion 1989 - 1994; McAlone 1995), Ringed Plovers *Charadrius hiaticula* were surveyed as part of national surveys in 1973/74 and 1984 (Prater 1976, 1989), waders at North Walney Island were covered in a survey of saltmarshes in 1985 (Allport *et al.* 1986), and Shelducks *Tadorna tadorna* were surveyed nationally in 1992 (Wildfowl & Wetlands Trust unpubl.).

The recent proposal for an energy generating barrage and road across the mouth of the estuary (ETSU 1994), and the development of an estuary management plan (Bayliss 1994) have highlighted the need for an assessment of the estuary's importance for breeding waders, especially in the context of national declines in the breeding populations of many species of waders (Batten *et al.* 1990).

STUDY AREA

The Duddon Estuary lies to the west of the Furness Peninsula in south-west Cumbria (Figure 1). Its length from Duddon Bridge to North Walney is 15 km, but much of the estuary is only 2-3 km wide until it opens into the Irish Sea between Haverigg and Walney Island. With the exception of small areas of mixed mud, sand and pebbles at Haverigg and in the north end of Walney Channel, the estuary to the south of Millom and Askam-in-Furness is

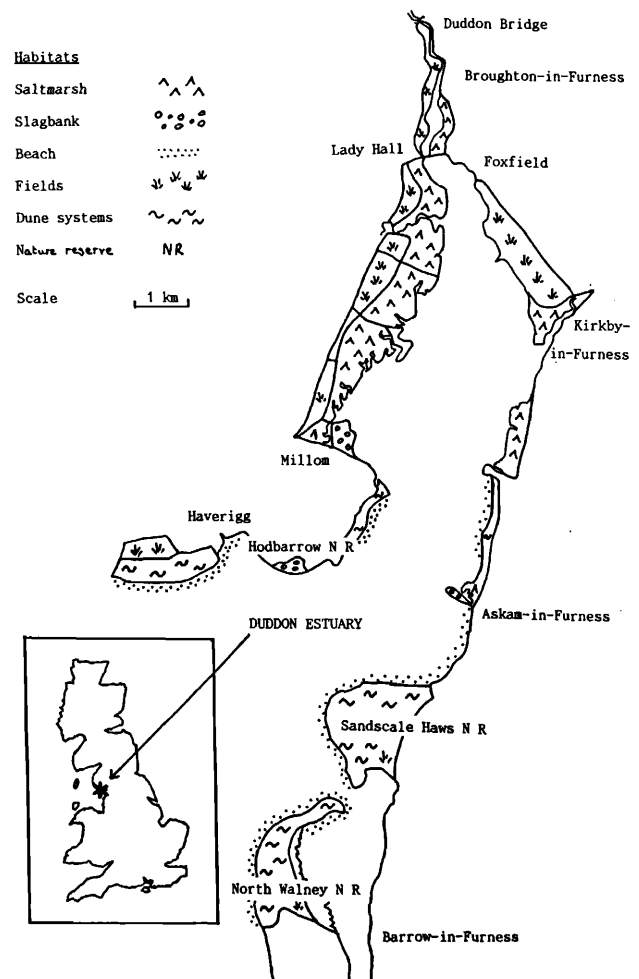


Figure 1. Location of study areas around the Duddon Estuary.

dominated by extensive and highly mobile sand flats, and large sand dune systems which lie on both sides of the mouth at Haverigg, Sandscale and North Walney.

The estuary becomes progressively muddier from Millom and Askam-in-Furness, and the middle and upper reaches are flanked by saltmarsh which has developed since the most recent land claims in the 19th century. Most of the saltmarsh and the surrounding agricultural land is grazed by sheep and cattle, and there are areas of lowland raised mire between Kirkby-in-Furness and Foxfield, and near Lady Hall.

During the late 19th and early 20th centuries, mining and processing of iron ore had dramatic effects on the landscape around Millom and Askam-in-Furness, creating Hodbarrow Lagoon and the slagbanks at Borwick Rails, Millom (21 ha), Hodbarrow (8 ha) and Askam-in-Furness (4 ha). Slag is a waste product from the iron smelting process on which vegetation develops very slowly. The slagbanks are used by birds which normally nest on shingle, and today are regionally important nesting areas for waders and terns.

SURVEY METHODS

In recent years breeding waders at the nature reserves on either side of the estuary mouth at Hodbarrow, Sandscale and North Walney have been monitored annually by the reserve wardens. In 1994 this information was combined with the results of survey work undertaken by local BoEE/WeBS counters, either in the government's Training for Work programme or voluntarily. The survey area was divided into sections based on habitat: saltmarsh, slagbanks, dunes and dune slacks, beach, and fields where they were adjacent to dune systems or saltmarsh.

Visits were made to each section during the morning on at least three occasions between mid April and mid June (first visit: 15-30 April; second visit: 1-21 May; third visit: 22 May-18 June), and also at least once at dusk to record Snipe *Gallinago gallinago*. Observations of birds on the saltmarsh and adjacent fields were made from the embankment between the two habitats using a telescope;

this was considered to be preferable to walking on the saltmarsh, where the short turf allowed most waders to be seen easily. For the areas outside the nature reserves, the numbers of pairs of the six most numerous species were assessed using the following methods recommended by Bibby *et al.* (1992) and O'Brien & Smith (1992):

Oystercatcher <i>Haematopus ostralegus</i>	number of paired individuals (maximum across three visits) divided by two = pairs
Ringed Plover <i>Charadrius hiaticula</i>	nest or territorial bird (average of three visits) = pair
Lapwing <i>Vanellus vanellus</i>	maximum number of individuals (average of first two visits) divided by two = pairs
Dunlin <i>Calidris alpina</i>	Duddon criteria - bird(s) on site during season
Snipe <i>Gallinago gallinago</i>	maximum number of drumming birds
Curlew <i>Numenius arquata</i>	number of paired individuals (maximum across three visits) divided by two = pairs
Redshank <i>Tringa totanus</i>	number of birds (average of first two visits) = number of pairs
Common Sandpiper <i>Actitis hypoleucos</i>	Duddon criteria - bird(s) on site during season

Observations on the nature reserves were more frequent than elsewhere, allowing a more accurate assessment of numbers to be made. Although no evaluation of the differences between results was undertaken, any underestimates outside the nature reserves were probably insignificant.

Table 1. Breeding waders around the Duddon Estuary in 1994. Total number of pairs, and densities in the four main habitats.

Species	Estuary total	Saltmarsh		Fields		Slagbanks		Beach	
		no.	density	no.	density	no.	density	no.	density
Oystercatcher	130	60	12.8	0		43	130.2	27	2.0
Ringed Plover	51	0		0		24	72.7	27	2.0
Lapwing	85	29	6.2	38	13.1	7	21.2	0	
Dunlin	1	0		0		1		0	
Snipe	6	0		4	1.4	0		0	
Curlew	12	3	0.6	9	3.1	0		0	
Redshank	59	22	4.7	29	10.0	1		0	
Habitat 'area'		4.70		2.89		0.33		13.5	
		km ²		km ²		km ²		km	

* units of measurement for habitats and densities: saltmarsh, fields and slagbank in km² (densities in pairs/km²), beach in km (densities in pairs/km).

Table 2. Average wader densities (in pairs/km²) in fields around the Duddon Estuary in 1994 compared with surveys of lowland breeding waders in Scotland (O'Brien 1994) and northern England (Murray *et al.* 1995).

Survey	Lapwing	Snipe	Curlew	Redshank
Duddon 1994	13.1	1.4	3.1	10.0
Scotland 1992 (key sites)	11.3	5.2	3.4	3.9
Scotland 1992 (random sites)	2.2	0.5	1.4	0.1
N. England 1993 (random sites)	3.0	0.1	1.7	0.2
Cumbria 1993 (random sites)	3.0	0.2	2.8	0.1
Lancashire 1993 (random sites)	6.8	0.0	3.7	0.1

Key sites (Scotland) are those considered to be important for breeding waders by regional conservation workers.

Random sites are a random sample of lowland sites of unknown status as breeding wader sites.

RESULTS AND DISCUSSION

The results are summarised in Table 1. Densities of the five most numerous species were calculated for the four main habitats used by breeding waders, (saltmarsh, fields, slagbank, beach) but not for the dune systems where small numbers of waders nest in a complex arrangement of microhabitats. Densities of Lapwing *Vanellus vanellus*, Snipe, Curlew *Numenius arquata* and Redshank *Tringa totanus* in fields are compared with the results of surveys of lowland habitats in Scotland in 1992/93 (O'Brien 1994) and northern England (Murray *et al.* 1995) in Table 2. These data are not strictly comparable, as the area covered in the Duddon survey was much smaller than the total areas covered in the others. The original data are stored at the RSPB's Campfield Marsh Nature Reserve.

The results from each species are considered below, with reference to the most recently available national population estimates and trends.

Oystercatcher

Incubating birds were often easy to see, especially on the slagbanks and grazed saltmarsh. Otherwise, birds (usually pairs) apparently occupying territories were taken as evidence of breeding. Oystercatchers nested on slagbanks, saltmarsh and beaches, but had a clear preference for the slagbanks. The overall density conceals a patchy distribution with some groups being almost colonial in places; for example, about 15 pairs nest on the 2 ha island at Hodbarrow each year.

The British population is increasing mainly as a result of range expansion inland into arable farmland in eastern England (Gibbons *et al.* 1994). The combined population of Britain and Ireland represents about 20% of the European Oystercatchers breeding outside the former USSR, although recent information suggests that the

United Kingdom population is considerably higher than indicated in the New Atlas (Murray *et al.* 1995).

Ringed Plover

Numbers were derived from apparently territorial birds (usually pairs) in all suitable locations except Hodbarrow, where incubating birds are easy to observe (nine pairs on 3 ha of suitable habitat). Numbers were probably underestimated at Borwick Rails, Millom (13 pairs estimated on 21 ha). The three slag banks at Hodbarrow, Borwick Rails and Askam-in-Furness (combined area 33 ha) held about three-quarters of the estuary population. Numbers breeding in England and Wales increased by 20% between the national surveys in 1973/74 and 1984 (Prater 1989), but the Cumbrian totals were 247 and 190 pairs respectively (*i.e.* an apparent decline against the national trend).

In 1973/74 Hodbarrow and North Walney contributed 65 pairs to the county total, and this figure was used in the 1984 estimate as these two sites were not counted that year (Prater 1989), but in 1994 the combined total for Hodbarrow and North Walney was only 25 pairs. Reductions in areas of suitable nesting habitat in the last 20 years at North Walney (development of vegetation on 4 ha of shingle following the cessation of grazing in 1971; T. Jones, *pers. comm.*) and at Hodbarrow (vegetation development on 5 ha of slagbank) cannot alone account for such a large decline; an increase in the use of beaches for recreation is likely to be another factor.

Lapwing

Lapwings were the most widely distributed of the species covered by this survey, using fields, saltmarsh, slagbanks and dune slacks. There was considerable variation in the quality of fields, which ranged from uniform short turf to poorly drained ground dominated by rushes *Juncus* spp. Highest densities of Lapwings were found on what was formerly raised mire between Foxfield and Kirkby-in-Furness. In contrast there were few on heavily grazed fields, where there was little cover for eggs or chicks. Average density in fields (13.1 pairs/km²) is comparable to the average density at 'key sites' in lowland Scotland in 1992 (11.3 pairs/km², O'Brien 1994). The density on saltmarsh (6.2 pairs/km²) was relatively low; Allport *et al.* (1986) recorded densities of up to 40 pairs/km².

In England and Wales, over 90% of Lapwings breed on agricultural land, preferring to nest in fields cultivated in the spring near to grass. Such sites combine bare ground, the most productive nest sites, with grass which is the best habitat for rearing chicks (Gibbons *et al.* 1994). The Duddon population is a very small proportion of the national population, but the decline in mixed farming in lowland Britain combined with sharp increases in stocking rates on grassland are leading to reduced breeding numbers and productivity, and saltmarshes are likely to assume relatively greater importance in the future.

Dunlin

Birds in breeding plumage were present on the grassy island at Hodbarrow during the spring and summer in 1993 and 1994, and singing was heard. A female doing a broken-wing display on 12 July 1994 was taken as proof of breeding. Dunlin breed on saltmarsh around Morecambe Bay in small numbers (Allport *et al.* 1986; J. Wilson, *pers. comm.*), and may have bred on the saltmarsh to the north of Millom in the 1980s (D. Thexton, *pers. comm.*).

Snipe

Birds were all recorded in areas of poorly drained pasture, either at nests (three at Sandscale) or during display flights (drumming). There is little suitable breeding habitat in the survey area, but Snipe probably nest outside this area in the marshy fields and raised mires at the head of the estuary.

Curlew

All records relate to displaying birds on the saltmarsh and adjacent fields around the inner estuary to the north of Millom and Askam. The density in fields (3.1 pairs/km²) is similar to the average density at 'key sites' in lowland Scotland in 1992/93 (3.4 pairs/km², O'Brien 1994). The dozen or so pairs recorded are but a fraction of the Cumbrian breeding population, which is found mainly on moorland, low intensity grassland and raised mires, and which forms a significant proportion of the British population.

Redshank

The Redshank is one of the hardest species to census, especially at high densities. The saltmarsh density of 4.7 pairs/km² is very low, probably a reflection of the heavy grazing pressure to which most of the saltmarsh is subjected (but see comment about North Walney below). At North Walney NNR four pairs were recorded in 1994, but only two were on the saltmarsh (both on the upper edge) where there were 20-21 pairs (density 53 pairs/km²) in 1985 (Allport *et al.* 1986). The saltmarsh at North Walney was grazed for centuries until cattle grazing ceased in 1970, but by 1993 the cover of Sea-lavender *Limonium vulgare* and Sea Purslane *Halimione portulacoides* had become very dense (T. Jones, *pers. comm.*), and is now probably too dense for breeding waders. Another important influence on the saltmarsh at North Walney is tidal inundation; 80% of the area is covered by 20% of the high tides in the spring (T. Jones, *pers. comm.*).

On the saltmarsh managed by the RSPB in Morecambe Bay (light cattle grazing), Redshanks nest at a density of 47 pairs/km², compared with 2-8 pairs/km² on the heavily grazed saltmarsh outside RSPB control (J. Wilson, *pers. comm.*). In 1993 the best Essex saltmarsh for Redshank held 80 pairs/km², but declines at some sites in Essex since 1985 may be related to a combination of erosion

and tidal inundation causing vegetation change from upper to lower saltmarsh communities (Cook *et al.* 1994). In contrast to the low average density on the Duddon saltmarshes, the high average density in the fields (10.0 pairs/km²) is probably due to a large proportion being poorly drained and lightly grazed. The loss of wet grasslands to drainage and agricultural intensification is probably the cause of declines on inland sites (Gibbons *et al.* 1994).

Common Sandpiper

The preferred habitat of this species, shingle banks and stony shores mainly by freshwater, is found in the survey area only at the head of the estuary near Duddon Bridge. Its extent varies with water conditions and may be insufficient for breeding in some years.

CONSERVATION

The immediate threat of a barrage across the mouth of the estuary (ETSU 1994) has receded as a result of a change in government policy, but the proposal will probably re-emerge in the future as energy and transport requirements are reconsidered. Such a development is likely to have profound effects on the wildlife of the estuary. Improvements to the road crossing near Duddon Bridge were being considered during 1994, but the effect on breeding waders is likely to be small.

Agricultural practices have an important influence on many breeding waders. Drainage of grassland habitats lowers the water table and reduces food supply, and heavy grazing on pasture and saltmarsh leaves nest sites more exposed and increases the chance of trampling. Around the Duddon Estuary much of the saltmarsh is heavily grazed by sheep. However, the complete cessation of grazing on the saltmarsh at North Walney also appears to have had an adverse effect on breeding waders. Between 1985 and 1994 numbers of pairs of Oystercatcher declined from 16 pairs to zero, Lapwing declined from 11 pairs to zero, and Redshank from 20-21 pairs to two. The site was described by Allport *et al.* (1986) as "one of the top ten in the country for density of breeding Oystercatcher" and "one of the best of the surveyed saltmarsh sites for diversity of breeding birds", but clearly this is no longer the case.

Reduction in grazing pressure would improve much of the saltmarsh around the Duddon for most of the breeding wader species, but the reintroduction of light cattle grazing seems necessary at North Walney to restore the saltmarsh as breeding habitat. In contrast to the situation prevailing on the saltmarshes, the fields appear to support healthy numbers of most species; hopefully they will not be degraded by increased drainage. Mechanisms exist to promote appropriate management practices for the improvement of wildlife habitats in the Lake District Environmentally Sensitive Area (ESA), but unfortunately the low-lying land around the Duddon Estuary lies just outside the ESA. However, it may be possible for management agreements to be arranged for areas within

the Duddon Estuary Site of Special Scientific Interest; the publication of an estuary management plan (Bayliss 1994) should facilitate this.

Disturbance may also have an important effect on breeding waders, especially on the popular stretches of beach to the south and west of Askam and Millom. Relatively few walkers use the embankments and saltmarshes in the northern half of the estuary, although numbers may increase with the recent development of the Cumbria Coastal Way long distance footpath, which follows much of the shoreline. Use of the slagbanks at Askam and Borwick Rails by dog walkers and anglers (some in cars) appears to be increasing, and is likely to have an adverse effect on the productivity of Oystercatcher, Ringed Plover and Lapwing, as well as the Little Tern *Sterna albifrons* colony at Borwick Rails.

In the south and east of England, the large proportions of the populations of Oystercatchers and Ringed Plovers now nesting in nature reserves and protected areas is probably a result of intensive use of the seashore for recreation (Gibbons *et al.* 1994). Densities therein may be high; for example, Ringed Plovers nested at a density of 40 pairs/km on the shingle islands in Langstone Harbour, Hampshire in 1984 and 1985 (Radford 1985a, 1985b). Around the Duddon Estuary, only the slagbank at Hodbarrow has some degree of protection from human disturbance.

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