Waders wintering on the open shores of Galicia, NW Spain

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A total of 728 waders of 13 species were counted in a sample survey of the open coasts of Galicia. The most numerous were Curlew, Turnstone and Oystercatcher. The overall mean population density was 4.1 birds/km; no single species exceeded an overall density of 1 bird/km. In spite of these low densities, the result of this preliminary survey suggests that, for species inhabiting rocky and sandy substrates, the open Cantabro - Atlantic coast of Spain may make a much greater contribution to totals for the Iberian Peninsula than previously thought. Indeed, for Purple Sandpiper the estimated total wintering in Galicia exceeds the number previously estimated for the whole of Iberia.

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INTRODUCTION

Winter counts of waders in the Iberian Peninsula have been carried out mainly in estuaries with very few data for open shores (Domínguez & Maneiro 1988; Ramon *et al.* 1991). The large area occupied by open coasts in the Iberian Peninsula nevertheless suggests that, as in Great Britain (Moser & Summers 1987) and Ireland (Green *et al.* 1988) significant numbers of waders may winter in these zones.

In the work reported here, we have begun the task of determining the numbers and distribution of waders wintering on the open coasts of the NW Iberian Peninsula.

STUDY AREA AND METHODS

This study was conducted on the coast of Galicia (NW Spain), which has a total length of 1,216 km (546 km in estuaries plus 670 km of non-estuarine coast). Counts were carried out along 176.5 km of open coast (i.e. 26.3% of the total open coastline), of which 49 km was in the province of Pontevedra (10.5 km of sandy beach plus 38.5 km of rocky coast), 92 km in the province of A Coruña (29.5 km and 62.5 km respectively), and 35.5 km in the province of Lugo (9.5 km and 26 km respectively) (Figure 1). All coastal lengths were measured from 1:50,000 and 1:25,000 maps along the high water mark.

Following Moser (1987), open or non-estuarine coasts were defined as all the coastline lying outside estuarine rias plus certain stretches of seaward ria that are directly exposed to the influence of the open sea and lack any broad intertidal zone.

Counts were performed between 28 December 1989 and 22 February 1990. Each count was carried out between 3 hours before and 3 hours after low tide. The observer walked along

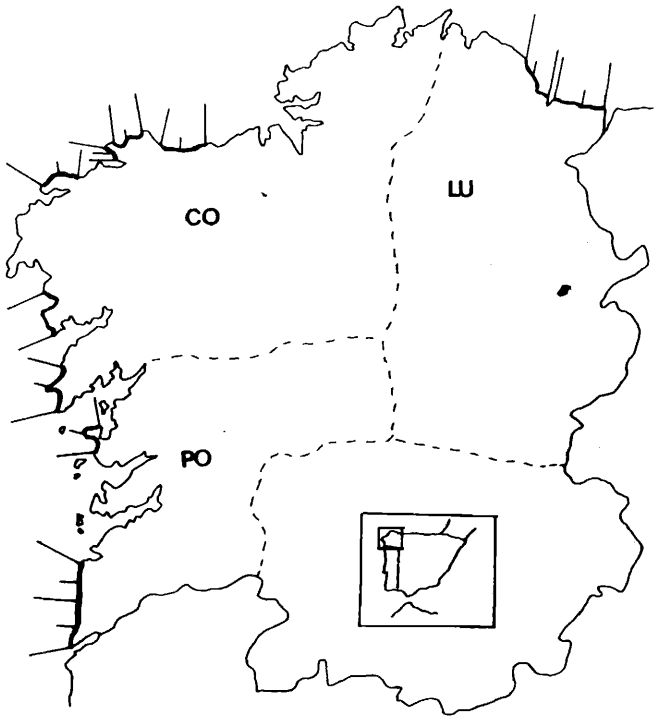

Figure 1. Galicia, NW Spain; the coastline surveyed is shown by the thick line. Provincial boundaries are also indicated as follows: PO, Pontevedra; CO, Coruña; LU, Lugo.

the coastline noting all the birds seen, the substrate they were occupying and their activity (feeding, resting, flight, preening). Islets adjacent to the shore were examined closely by telescopes and wader were counted individually. All human beings in the intertidal and immediately supratidal zones were also recorded, together with their activity (fishing, shellfish gathering, walking, hunting and other activities), any dogs and possible predators (mainly Falconiformes) were likewise noted.

The frequency of occurrence (F) of each species was defined as the percentage of shoreline on which it was observed, each of the 21 stretches considered (Figure 1) being the distance covered by a single observer in one day.

Meteorologically, the winter of 1989-90 was notable for the absence of any spells of intense cold either in the Iberian Peninsula or on the coasts of western Europe.

RESULTS

A total of 728 waders of 13 species were counted. The three most numerous species were Curlew *Numenius arquata*, Turnstone *Arenaria interpres* and Oystercatcher *Haematopus ostralegus*. The overall mean population density was 4.1 birds/km of shoreline; no single species reached an overall density of 1 bird/km (Table 1).

Table 2 lists numbers of the various species on five different substrates, and their densities in the two most important ("mud" refers to an intertidal flat behind a dune on just one of the beaches visited, while "meadow" and "uncultivated" both refer to supratidal areas adjacent to the shore). Ringed Plover *Charadrius hiaticula*, Grey Plover *Pluvialis squatarola*, Dunlin *Calidris alpina*, Redshank *Tringa totanus* and Greenshank *T. nebularia*, all of which had very low F values (Table 1), were found only on a small intertidal mud surface, and Golden Plover *Pluvialis apricaria* only on uncultivated areas above one stretch of coast in Lugo. The other seven species were observed in sandy or rocky habitats. Purple Sandpiper *Calidria maritima* and Turnstone were found exclusively on rocks, whilst Sanderling *Calidria alba* and the few noted Kentish Plover *Charadrius alexandrinus* were found exclusively on sand. Oystercatcher, Curlew and Common Sandpiper *Actitis hypoleucos* were found in substantial numbers on both substrates, though Oystercatcher and Curlew occurred in significantly greater densities on sand than on rock. In keeping with this behaviour, these three

Table 1. Number and frequency (F) of waders counted on non-estuarine coasts, giving both Galician and provincial totals, and overall linear densities (birds/km).

	Pontevedra	Coruña	Lugo	Galician Total	No waders/km	F(%)
H. ostralegus	4	111	11	126	0.71	38.0
C. hiaticula		22		22	0.12	4.8
C. alexandrinus		4		4	<0.10	9.5
P. apricaria			22	22	0.12	4.8
P. squatarola		5		5	<0.10	4.8
C. alba	8	36		44	0.25	14.3
C. maritima	2	5	21	28	0.16	28.6
C. alpina		85		85	0.48	4.8
N. arquata	2	158	8	168	0.95	42.8
T. totanus		8		8	<0.10	4.8
T. nebularia		1		1	<0.10	4.8
A. hypoleucos	38	12	9	59	0.33	66.7
A. interpres	76	61	19	156	0.88	61.9

Table 2. Numbers of waders on various substrates on non-estuarine coasts in Galicia, with densities (birds/km) on rock and sand in brackets.

	Rock	Sand	Mud	Meadow	Uncultivated
H. ostralegus	56 (0.44)	59 (1.19)			
C. hiaticula			22		
C. alexandrinus		4 (<0.10)			
P. apricaria					22
P. squatarola			5		
C. alba		44 (0.89)			
C. maritima	28 (0.22)				
C. alpina			85		
N. arquata	42 (0.33)	93 (1.88)		24	
T. totanus			8		
T. nebularia			1		
A. hypoleucos	35 (0.27)	10 (0.20)		1	
A. interpres	145 (1.14)				

species, together with Turnstone, were those with the greatest frequency of occurence (F).

DISCUSSION

The mean density of waders observed in these counts is very much smaller than that recorded on various open shores in Great Britain (Summers *et al.* 1975; Summers & Buxton 1983; Moser & Prys-Jones 1988; Kirby 1989). The same is true of most of the individual species recorded: Ringed Plover, Dunlin and Redshank are minority species on the open coasts of Galicia, in contrast to their relative abundance in this kind of habitat in Great Britain and Ireland (Moser & Summers 1987; Moser & Prys-Jones 1988; Kirby 1989); the Kentish Plover is uncommon and the other species recorded also have densities very much smaller than those reported from British localities; the only exception being Common Sandpiper, which does not usually winter north of the Iberian Peninsula (Smit & Piersma 1989).

The observed densities of the Purple Sandpiper and Common Sandpiper are very similar to those reported by Domínguez & Maneiro (1988) for a rocky stretch of open shore in southern Pontevedra, 0.3 birds/km for Purple Sandpiper and 0.2-0.3 birds/km for Common Sandpiper. The densities of Oystercatcher, Curlew and Turnstone at the southern Pontevedra site (Domínguez 1988) differ rather more from those found in the present work, but are all likewise less than 3.5 birds/km, in marked contrast to their densities in Great Britain.

In spite of these low densities, these results compared with the estimate of Smit & Piersma (1989) of populations on the Atlantic coast of Iberia (Table 3), suggest that, for species inhabiting rocky and sandy substrates, the open Cantabro-Atlantic coast of Spain may hold more wintering waders than hitherto suspected. This is especially the case for Oystercatcher, Purple Sandpiper, Curlew and Turnstone. For Purple Sandpiper, the southern limit of whose winter range is the northern Spanish coast (Smit & Piersma 1989), though there is probably also a very small population in Portugal (Luis 1982), the estimated number of wintering birds in Galicia exceeds the number estimated by Smit & Piersma (1989) for the whole Iberian Peninsula.

The low densities recorded may be partly explained by Evans' (1981) suggestion that the numbers of waders wintering on the Atlantic coast of Iberia must be influenced by the small intertidal range, limiting the exposed tidal area, and hence also the quantity of food available. The frequent strong onshore westerly winds on the Atlantic coast seem also likely to decrease the intertidal area. Another factor limiting bird density may be the density of their invertebrate prey in the open Galician intertidal zone. Though there is little information available in this respect, there may be wide differences between different coastlines (Míguez & García 1990); the most favourable sites appearing to be certain rocky intertidal

Table 3. Populations of waders wintering on the whole Galician non-estuarine coastline as estimated from observed densities, as a proportion of the populations wintering on the Iberian Atlantic coast (Smit & Piersma 1989).

	Population estimate open coast Galicia	Population estimate Atlantic coast Iberia	%
H. ostralegus	450-500	1900	23.7-26.3
C. alexandrinus	<50	4900	<1
C. alba	150-200	1400	10.7-14.3
C. maritima	100-150	100	100-150
N. arquata	600-650	3700	16.2-17.6
A. hypoleucos	110-150	500	24.0-30.0
A. interpres	550-600	1100	50.0-54.5

stretches with considerable densities of shellfish such as mussel *Mytilus galloprovincialis*.

Rock mussel is the main prey of shellfish cultivators, who gather juveniles for subsequent fattening on ropes suspended from rafts in the estuaries. Indeed, a large proportion of humans noted during counts (31%) were gathering mussels or, to a lesser extent, sea urchins (Table 4). There has been no evaluation of the consequences of these activities for the composition and structure of Galician rocky invertebrate populations, but Hockey (1987) underlined the role of human predation and disturbance of rocky habitats in the disappearance of the Black Oystercatcher *Haematopus meadowaldoi* from the Canary Islands. The total density of humans noted during counts, 0.57 persons/km of coast, would not appear to be excessive, at least in comparison with those found on the intertidal flats inside the rias (Domínguez 1988), which even in winter have high densities of people involved in fishing or shellfish gathering activities. On the open shore the predominant forms of human activity are largely substrate determined: most people noted on rocky shore were engaged in fishing or shellfish gathering, while those noted on beaches were strolling, bathing or surfing. Though in summer there is a massive presence of holidaymakers on the Galician coast, our preliminary data suggest that there is little competition between waders and humans for space on the open coast winter; this is nonetheless a question that should be looked into further.

Moser & Summer (1987) noted the role of British open shores in harbouring waders during spells of intense cold. Winter counts of a larger length of Iberian coastline, both on a regular basis and coinciding with continental cold weather, would help establish the importance of open shores in this

Table 4. Activities and linear densities (persons/km) of people counted on non-estuarine coast in Galicia.

	Pontevedra	Coruña	Lugo	Total	Persons/km
Shell-fisherman	2	27	2	31	0.17
Fisherman	3	21	6	30	0.17
Hunter		6		6	<0.10
Walker	1	14	3	18	0.10
Swimmer	3	2	4	9	<0.10
Others	4	3		7	<0.10
TOTAL	13	73	15	101	0.57

respect. Regular counts should also be performed during migration periods, since the few available data show quite moderate prenuptial numbers of Turnstones and Purple Sandpipers (Domínguez & Maneiro 1988) and an important spring migration of Sanderlings by Galician beaches. This is more marked in some years than others (Domínguez & Rabuñal 1989; Ramón *et al.* 1991).

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