Summering coastal waders on Fuerteventura, Canary Islands, Spain

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Data on the abundance and richness of waders summering on the island of Fuerteventura (Canary Islands) is presented. Fewer birds occur here than at sites on the adjacent West African coast, though the species composition is similar. Waders show a strong preference for coastal areas with soft substrates (mudflats and sandy beaches) as opposed to those with hard or mixed substrates (intertidal lava platforms and pebble beaches), a situation which contrasts markedly with that of the wintering wader community. The number of summering waders represents 27.1% of the winter total, and the majority of individuals are juveniles. The summering population of Whimbrels *Numenius phaeopus* is similar in size to the wintering population which is nationally important.

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INTRODUCTION

The Canary Islands are situated on the western extreme of the East Atlantic Flyway. During winter, 3,000-4,000 waders are present in this archipelago (Emmerson & Lorenzo *in prep.*). More birds use the islands as a stopover site during migration periods, but there is no published information in summer. As noted by Van Dijk *et al.* (1990), summering waders have been less studied than those that are breeding, wintering or on migration. Moreover, Smit & Piersma (1989) stressed the need for studies of the size and composition of summer wader communities along the East Atlantic Flyway, a continuing and important gap in existing knowledge.

In this paper, we present information about coastal wader communities during summer on Fuerteventura, an eastern island of the Canary Archipelago (Figure 1).

STUDY AREA AND METHODS

Fuerteventura is semi-arid and highly eroded, with important potential habitats for wintering coastal waders (sandy beaches, intertidal lava platforms, mudflats, *etc.*). Its total coastline measures 321.1 km of which only 157.3 km (49.4%) represents suitable wader habitat on the basis of its physical constitution (intertidal lava platforms, mudflats and sandy beaches). However, a previous study demonstrated that only 35.7 km (22.7%) of this potential habitat harboured high concentrations of waders (Emmerson 1988). The eight localities considered in the present study cover this length of coastline (Figure 1) for which information about substrate type and length censused is given in Table 1.

Censuses were carried out during the third week of June 1989 and consisted of linear transects along the shoreline during low tide when most birds were actively feeding.

Variables considered were abundance (total number of birds), species richness (total number of species), length of coastal area and substrate type. The latter were classified into three principal categories: soft (sandy beaches, mudflats, etc.), hard (intertidal lava platforms and pebble beaches) and mixed coast (a combination of the previous two).

A Spearman Rank Correlation was carried out to compare abundance and species richness with the length of coastline surveyed and the frequency of occurrence of birds in each habitat type. The G-test was used to determine statistically significant differences between variable frequencies.

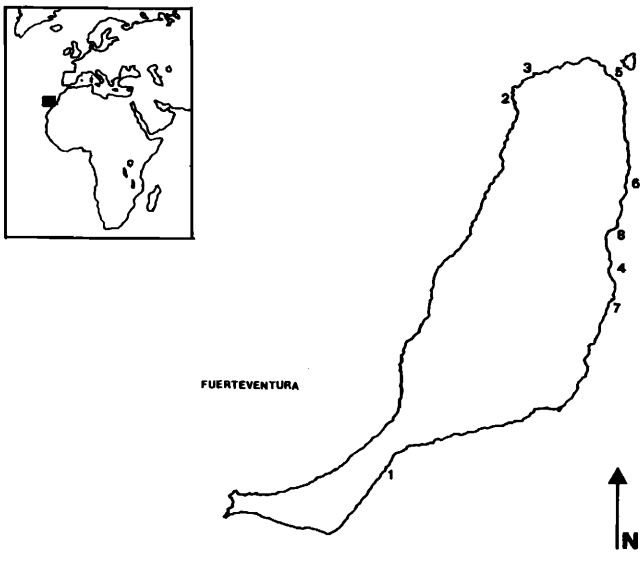

Figure 1. Map of Fuerteventura (Canary Islands) showing survey sites (numbering designation of sites correspond to that of Table 1).

Table 1. Kilometres surveyed and substrate type of the localities censused on Fuerteventura. Location of sites shown in Figure 1.

Localities	Length (km)	Substrate type
1 Sotavento	5.1	Soft, sandy beach and intertidal mudflat
2 Cotillo	7.2	Mixed, intertidal lava platform and mudflat
3 Majanicho	8.3	Hard, intertidal lava platform
4 El Matorral	1.3	Mixed, intertidal lava platform and supratidal lagoon
5 Corralejo	4.8	Mixed, intertidal lava platform and sandy beach
6 La Lajita	2.3	Hard, intertidal lava platform and pebble beach
7 Caleta de Fuste	4.6	Mixed, intertidal lava platform and mudflat
8 Puerto de Rosario	2.1	Hard, intertidal lava platform and pebble beach

RESULTS

A total of 35.7 km were surveyed during the study. The results of the censuses are presented in Table 2. A total of 453 birds of 13 species were recorded. The locality with the maximum values of abundance and species richness was Sotavento (226 birds and 10 species), whilst the lowest values were found at the rocky coast of La Lajita (only nine birds and two species).

During the summer, as in winter, Kentish Plover *Charadrius alexandrinus* is by far the commonest wader (Table 2). Other species present in relatively high numbers were Grey Plover *Pluvialis squatarola*, Whimbrel *Numenius phaeopus* and Turnstone *Arenaria interpres*. The remaining species are rare, most accounting for less than 1% of the total.

Table 3 presents the number of waders recorded at each locality during winter 1990/91 compared with the present study. The presence of summering birds differed strikingly between species, varying between less than 5%

Table 2. Combined census results, abundance and species richness.

Species	1	2	3	4	5	6	7	8	Total	% of total
Ringed Plover *Charadrius hiaticula*	1	3	5				3		12	2.6
Kentish Plover *Charadrius alexandrinus*	202	64	8	10	33	7	18	10	352	77.7
Grey Plover *Pluvialis squatarola*	8	2	2	2	4		5		23	5.1
Knot *Calidris canutus*	1								1	0.2
Sanderling *Calidris alba*	5								5	1.1
Dunlin *Calidris alpina*	1								1	0.2
Bar-tailed Godwit *Limosa lapponica*	1				2				3	0.7
Whimbrel *Numenius phaeopus*		3	10	3	4	2	6	1	29	6.4
Curlew *Numenius arquata*			1						1	0.2
Redshank *Tringa totanus*	1	1						1	3	0.7
Greenshank *Tringa nebularia*	2								2	0.4
Common Sandpiper *Actitis hypoleucos*								1	1	0.2
Turnstone *Arenaria interpres*	4	12		1			3		20	4.4
Abundance (total number of birds)	*226*	*85*	*26*	*16*	*43*	*9*	*35*	*13*	*453*	
Richness (total number of species)	*10*	*6*	*5*	*4*	*4*	*2*	*5*	*4*	*13*	

of the wintering population to nearly 50% or even more. With respect to summering Kentish Plover, most birds were probably of the local breeding population. Whimbrel was the only species to maintain similar population levels during both seasons.

The abundance values are significantly correlated with species richness (rs=0.847, d.f.=8 , p=0.025), in other words, the more species there were, the more birds there were. The length of coast surveyed is not correlated with either the abundance of birds or with richness (rs=0.643, d.f.=8 , p=0.089 and rs=0.687, d.f.=8, p=0.068, respectively). Thus the differences in the length of the different coasts surveyed did not account for the differences in the numbers of birds recorded at those locations.

The number of censuses undertaken in each substrate

type did not differ statistically (G=1.836, d.f.=2, N.S.) and thus, the results can be considered representative of the community. The proportion of the total on each substrate is shown in Table 4. More birds and species occurred on soft habitats followed by mixed coast and finally hard substrate coast.

The abundance of waders in each habitat type differed significantly (G=132.9, d.f.=2, p<<0.01), but species richness did not (G=0.70, d.f.=2, N.S.). Knot *Calidris canutus*, Sanderling *Calidris alba*, Dunlin *Calidris alpina* and Greenshank *Tringa nebularia* showed a marked preference for soft substrates whereas Curlew *Numenius arquata* and Common Sandpiper *Actitis hypoleucos* preferred intertidal lava platforms. The remaining species appeared in either two or three of the habitat types. The overall abundance of each species was positively correlated with the number of habitat types it used (rs= 0.769, d.f.=13 , p=0.007).

Table 3. Numbers and percentage of wader species wintering and summering at study sites on Fuerteventura.

Species / season	Winter	Summer	% of winter total occuring in summer
Ringed Plover *Charadrius hiaticula*	128	12	9.4
Kentish Plover *Charadrius alexandrinus* *	215	352	61.1
Grey Plover *Pluvialis squatarola*	115	23	20.0
Knot *Calidris canutus*	3	1	33.3
Sanderling *Calidris alba*	90	5	5.5
Dunlin *Calidris alpina*	29	1	3.4
Bar-tailed Godwit *Limosa lapponica*	11	3	27.3
Whimbrel *Numenius phaeopus*	31	29	93.5
Curlew *Numenius arquata*		1	-
Redshank *Tringa totanus*	8	3	37.5
Greenshank *Tringa nebularia*	4	2	50.0
Common Sandpiper *Actitis hypoleucos*	26	1	3.8
Turnstone *Arenaria interpres*	142	20	14.1
Total	372	101	

* because Kentish Plover is a breeding species (Lorenzo & Emmerson 1995) it is not included in the total.

When comparing winter and summer substrate preferences of waders on the Fuerteventuran coast, the overall distribution appears to be different (G=60.72, d.f.=2, p<<0.01), as more birds are present on hard substrate coast during the winter than in the summer, when soft substrate coast was the preferred habitat. Furthermore, at the eight localities no correlation exists between numbers counted in summer with those of winter (rs=0.5714, d.f.=8, p=0.1306).

DISCUSSION

The June date of the study should imply that the waders recorded were summering birds and not migrants departing late or returning early. During the same year on Tenerife, prenuptial migration finished in May and postnuptial migration commenced in July (Lorenzo 1993). Similar timings have also been documented on the West African coast (Cabo & Sánchez 1985; Piersma *et al.* 1987; Zwarts & Piersma 1990; Piersma *et al.* 1990).

Table 4. Totals and percentages of waders summering on each substrate type on Fuerteventura (H: hard substrate, S: soft substrate, M: mixed substrate).

Species / habitat type	Percentage of birds S	H	M
	% (n)	% (n)	% (n)
Ringed Plover *Charadrius hiaticula*	8.3 (1)	41.7 (5)	50.0 (6)
Kentish Plover *Charadrius alexandrinus*	57.4 (202)	7.1 (25)	35.5 (125)
Grey Plover *Pluvialis squatarola*	34.8 (8)	8.6(2)	56.5 (13)
Knot *Calidris canutus*	100.0 (1)		
Sanderling *Calidris alba*	100.0 (5)		
Dunlin *Calidris alpina*	100.0 (1)		
Bar-tailed Godwit *Limosa lapponica*	33.3 (1)		66.6 (2)
Whimbrel *Numenius phaeopus*		44.8 (13)	55.2 (16)
Curlew *Numenius arquata*		100.0 (1)	
Redshank *Tringa totanus*	33.3 (1)	33.3 (1)	33.3 (1)
Greenshank *Tringa nebularia*	100.0 (2)		
Common Sandpiper *Actitis hypoleucos*		100.0 (1)	
Turnstone *Arenaria interpres*	20.0 (4)		80.0 (16)
Total	49.9 (226)	10.6 (48)	39.5 (179)

Fuerteventura harbours low numbers of waders (compared to West African coastal areas) as also is the case elsewhere in the archipelago, and indeed only 3,000-4,000 waders over-winter (Emmerson & Lorenzo *in prep*). It is not possible to obtain the total number of waders summering on Fuerteventura by simply extrapolating the number censused in different habitat types to the total extention of these habitats as undertaken by Piersma (1986) in April 1986 on three islands. Waders tend to use specific areas in the Canary Islands, and, moreover, they are encountered in irregular concentrations along the coast, possibly due to variations in, for example, invertebrate productivity and the degree of human disturbance. Such circumstances have been detected in other areas (Recher 1966; Wolff 1969; Domínguez 1989; Goss-Custard & Durell 1990; Kirby *et al.* 1991; Mouritsen & Jensen 1992; Nehls & Tiedmann 1993). This is also the case on Fuerteventura, as shown by the fact that the abundance of birds or richness of species was not correlated with length of habitat at each locality.

The overall percentage of waders spending the summer on the coast of Fuerteventura represents 27.1% of the numbers counted at the same sites in winter, and corresponds reasonably well with the reports for other wetlands in other sites (Van Dijk *et al.* 1990). However, the winter counts used in this comparison are from the preceding winter 1990/91 (Emmerson & Lorenzo *in prep.*) and one therefore has to bear in mind the possibility of

significant between year variations in population size. No major changes, however, were detected on Tenerife between 1989/90 and 1990/91 winter censuses and thus the same situation has been assumed for Fuerteventura.

As regards individual species, Fuerteventura could be an important summering area for Whimbrel, the only species for which the number recorded in summer was similar to that in winter. Emmerson & Lorenzo (in prep.) indicate that the wintering Canarian population represents 63.6% of total Spanish winter numbers.

The species composition of the summering population is more or less similar to that found on the West African coast, although Oystercatcher *Haematopus ostralegus*, Little Stint *Calidris minuta* and Curlew Sandpiper *Calidris ferruginea* are notably absent on Fuerteventura. According to Summers *et al.* (1987) virtually the entire population of waders wintering in East Africa leaves the area; however, this is not the case on Fuerteventura or the Banc D'Arguin on the adjacent West African coast (Van Dijk *et al.* 1990).

As regards habitat use, the seasonal differences are noteworthy. In winter, maximum values of abundance and richness were registered on hard substrates, especially intertidal lava platforms, whilst in summer the opposite occurred, waders preferring sites with a predominance of soft substrates.

Finally, as regards the age of the birds, for the majority of species, individuals were in fresh first winter or juvenile plumage. In particular, for Grey Plover, Bar-tailed Godwit *Limosa lapponica* and Sanderling no individuals were observed in breeding plumage. This seems to indicate that immature birds spend their first summer outside their breeding areas, usually in their winter quarters (Cramp & Simmons 1983). Thus, it is essential that summering areas for waders are conserved, since they harbour a significant percentage of first-year birds whose importance lies in their value for future generations of waders.

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