
Importance of small man-made wetlands for breeding waders in south-eastern Spain

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Barera et al. 1990. Importance Of small man-made wetlands for breeding waders in south-eastern Spain. *Wader Study Group Bulletin*. 60.24 - 26

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INTRODUCTION

The size and distribution of the populations of waders breeding in Spain is still poorly known (see Martinez Vilalta 1985), despite the importance of this country for some species. Recent censusing effort has enhanced our knowledge of the number of waders breeding in international, national and regionally important wetlands (e.g. Sociedad Española de Ornitología 1987; Grimmet & Jones 1989) but little attention has been paid to those using more dispersed aquatic or terrestrial habitats.

Agricultural management is known to affect breeding wader populations and its effects have been well studied in northern and central European countries with high rainfall (see papers listed in Piersma 1986). In arid and semi-arid areas, such as most of Spain, irrigation schemes associated with agricultural development may provide new breeding habitats, partly compensating for the losses of natural wetlands.

This paper reports on the use by breeding waders, chiefly the Black-winged Stilt *Himantopus himantopus*, of a complex of artificial ponds dispersed over a wide agricultural area surrounding the Mar Menor Lagoon (Murcia, SE Spain). Its aim is to evaluate the importance of these aquatic habitats in a local (Mar Menor area), regional, and national context.

STUDY AREA AND METHODS

The agricultural landscape surrounding the Mar Menor Lagoon, as well as other areas of the Murcia and Alicante provinces, is characterized by the presence of many small artificial ponds storing water for irrigation purposes. Water may come from wells, or from the channels of the Tagus-Segura Irrigation Scheme. Some also receive sewage water. We selected a 5 km wide fringe surrounding the lagoon shoreline, with a total surface of 193 km², comprising 245

ponds. A sewage treatment plant of the Municipality of Los Alcazares, comprising four ponds, also lies within the study area (Figure 1).

Ponds were mapped with the aid of aerial photographs and field checking. Pair counts were carried out in late June-early July 1988 and late May-early June 1989, during which three teams of observers visited most ponds and the sewage plant. Though the study concentrated on Black-winged Stilts, we also noted all other waterfowl present and any evidence of breeding. Information was also collected on the size, shore slope, substrate type, water level, presence of submerged and emergent vegetation, and origin of the water. The estimated number of Black-winged Stilts breeding in the sewage plant in 1988 was based on a detailed nest count supplied by the site warden.

RESULTS AND DISCUSSION

A total of 241 ponds were surveyed in 1988, access being denied to the remainder. In 1989, we were able to survey only 131 ponds, but believe this second census to give more reliable results. In 1988, the number of pairs of Black-winged Stilts was estimated mainly on the basis of counts of adults with fledged young, which could have moved from nearby areas by the time of the census. In 1989, most counts were of adults showing aggressive behaviour, or with nests or non-flying young. This also allowed us to relate the presence of the species to the features of the ponds.

Pond size averages 0.29 ha (s.d. = 0.3, n = 222, range 0.02-2.9). All ponds were similar in design, having earthen elevated banks with a plastic coating, often overlain by a gravel or shingle layer. Thus, besides size, shore slope and substrate type, they differ only in the development of submerged and emergent vegetation, and in the quality of the water, as well as in the degree of human disturbance (some ponds are fenced, and the distance to the nearest human settlement



Figure 1. Distribution of artificial wetlands in the study area (dots = ponds, star = sewage treatment plant).

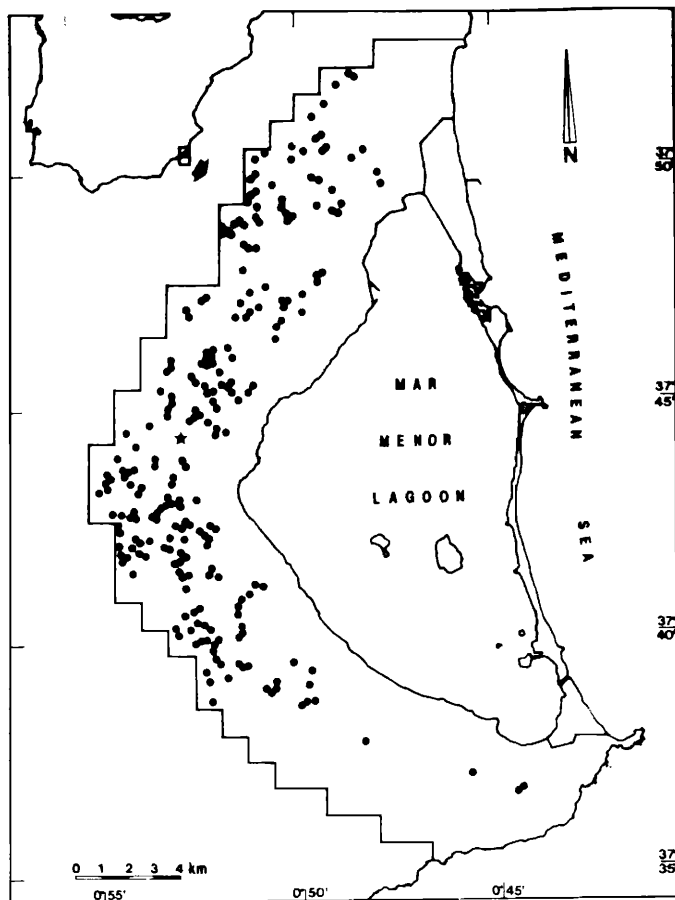


Table 1. Numbers of breeding pairs of waders in artificial wetlands of the Mar Menor Lagoon area.

Species	Habitat type	Year	
		1988	1989
Black-winged Stilt <i>Himantopus himantopus</i>	Ponds	51	68
	Sewage plant	60	71
Little Ringed Plover <i>Charadrius dubius</i>	Ponds	3	2
	Sewage plant	0	3
Kentish Plover <i>C. alexandrinus</i>	Ponds	9	0
	Sewage plant	16	9

from both years were quite similar (Table 1, Figure 2). A total of 51 pairs of Black-winged Stilts were counted in the ponds in 1988, and 60 were known to have nested in the sewage treatment plant, compared to 68 and 71 respectively in 1989. This suggests that most breeding ponds were included in the 1989 survey. The similar proportion of surveyed ponds used for nesting in both years (11.2% and 12.2%), however, suggests a more dispersed distribution in 1988.

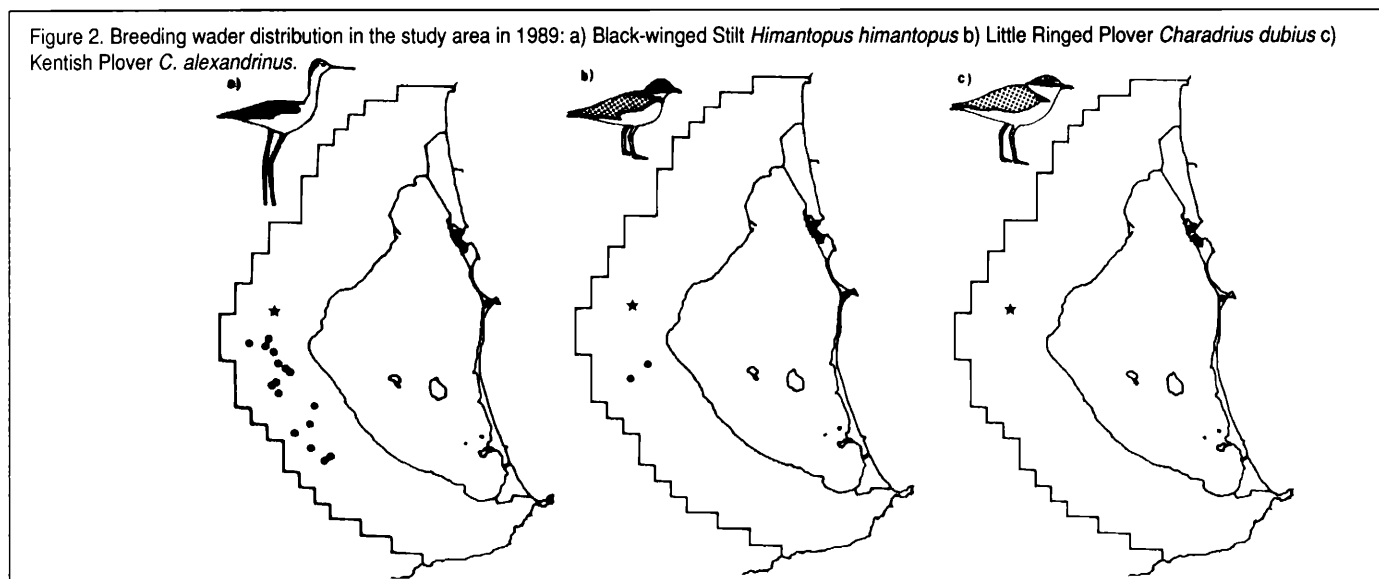
Other waders (Little Ringed Plover *Charadrius dubius* and Kentish Plover *C. alexandrinus*) were rather scarce in both habitat types (Table 1, Figure 2), although lower detectability may also have contributed to this. Associated species were Little and Common Terns (*Sterna albifrons* and *S. hirundo*), both nesting only in the sewage plant.

varies greatly among ponds).

Despite the different timing and censusing effort the results

Shore slope and, especially, water quality were the main factors affecting pond selection (unpublished data). The latter was reflected in an active selection of ponds receiving sewage, and in the location of the main breeding colony in

Figure 2. Breeding wader distribution in the study area in 1989: a) Black-winged Stilt *Himantopus himantopus* b) Little Ringed Plover *Charadrius dubius* c) Kentish Plover *C. alexandrinus*.



Los Alcazares sewage plant. This seems related to the high invertebrate productivity of these habitats. Security from predators and man could also influence pond choice, although no detailed investigations were made on this subject. The largest colony (Los Alcazares sewage plant) is protected by fencing, but others with up to 13 pairs, on isolated ponds, have free access.

Only 28-30 pairs of Black-winged Stilts are known to breed in natural and semi-natural wetlands in the Mar Menor area, far less than the 139 breeding in artificial ones. Pairs on artificial sites form almost half of the whole Murcia region population, estimated at around 300 pairs (unpublished data). As ponds are widespread over a far larger area than we studied this proportion may be even higher.

Spain holds one of the largest populations of Black-winged Stilt in Europe (Piersma 1986), its size varying in relation to the water conditions in seasonal wetlands (Dubois & Maheo 1986; Seriot 1989). The use of more permanent wetlands (e.g. salt pans) is restricted, at least in south-eastern Spain, by the presence of shallow, densely vegetated, flooded areas, often with a freshwater inflow (see also Seriot 1989). As these habitats are being altered through developments such as housing, new salt production techniques, recreational pressure, artificial ponds provide suitable new habitat. Pond building could compensate for wetland reclamation, and provide alternative breeding habitat in dry years.

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