

MONITORING OF WATERBIRD HABITATS IN SALINE WETLANDS OF SOUTH-EASTERN SPAIN. GUIDELINES FOR THEIR MANAGEMENT

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ABSTRACT

During a study made in 1987-88 on waterbird use of saline wetlands of SE Spain, it became evident that under current management regimes, much wetland surface and resources were unusable for a large number of species. While it seemed worth preserving large tracts of particular wetland habitats, for those favouring deep or highly hypersaline waters (e.g. Black-necked Grebe, Shelduck, Red-breasted Merganser, Avocet, Flamingo), it also looked essential to maintain particular structural and functional features, favoured by other bird groups -namely waders, and to reproduce these in managed sites. Recently, the environmental office of Murcia Region (Consejería de Medio Ambiente) has started a more detailed ornithological monitoring programme of particular habitats, most of them belonging to protected areas, and some managed directly by it, focusing on both waterbird use and features tied to management opportunities. Many different situations are found, ranging from almost natural functioning of wetlands, to conservation or industrially-oriented artificial management. Among the latter, of special importance are the salinas, submitted to different levels of human use. In the active industrial ones, bird use can be prevented by too high water levels and loss of structural quality. Traditional salinas prone to abandonment, and small unused surfaces inside industrial ones, provide a experimental field for habitat management solutions. All the experience gained during natural and man-made active wetlands' monitoring, can be incorporated in restoration projects of actually abandoned and derelict salinas and other degraded wetlands. The main preliminary results of this monitoring programme are presented and discussed, as a contribution to the adjustment of current management to these findings. Particular attention is

paid to the complementary or alternative role that newly created or restored wetlands can play under unfavourable conditions in natural or industrially managed ones.

INTRODUCTION

Murcia Region's coastal wetlands are located in the semiarid south-eastern corner of the Iberian Peninsula. There, lack of permanent freshwater courses, low rainfall, and high evaporation rates lead to predominantly saline conditions. Many basins have hydrological connections with the sea, through groundwater seepage, surface channels, or both. Surface connections have been modified historically by man to favour salt production or to facilitate the capture of migratory fish (Robledano and Esteve, 1992).

Studies made in 1987-88 (Robledano *et al.*, 1993) revealed that the highest waterbird densities recorded in these wetlands were usually associated with high benthic or planktonic biomass, in habitats receiving fresh or seawater, nutrient rich inflows. It was also evident that physical characteristics rendered unusable large sections of wetlands of high trophic biomass. Only a few species were able to exploit efficiently the extensive open water surface of some saline wetlands, particularly large lagoons and industrial salinas: specialized feeders like Flamingo, generalist, salt tolerant ones like Shelduck, diving species (Red Breasted Merganser, Black-necked Grebe), and large waders like Avocet. In summer these are joined by other waders and seabirds finding suitable nesting habitats in natural and industrial saline wetlands (Britton and Johnson, 1987).

A monitoring programme, started in 1993 and fully implemented in 1994 by the regional environmental authority (Consejería de Medio Ambiente, CMA) tries to evaluate these effects in more detail, by studying waterbird dynamics in response to water level changes and flooding regimes, particularly in man-made wetlands. This programme is co-financed by the European Union through LIFE-Nature funds.

STUDY AREA AND DATA COLLECTION

All the sites studied lie around the Mar Menor lagoon, a large (135 km²), relatively deep (mean 4 m), slightly hypersaline lagoon. Their main characteristics are summarized in **Table 1**, and their location shown in **Figure 1**. Two types of data were collected:

Bird censuses: Counts of waterbirds were made periodically along pre-established itineraries, covering fixed areas representative of each wetland type. Some counts concerned only waders, a group given special attention since it was thought to be particularly responsive to water level changes, whether natural or man-induced.

Wetland status: The flooding status of each wetland was recorded on each visit, noting both natural trends and unusual changes in water levels. Levels were monitored precisely only in the Interpretation Pond, created by the CMA for endemic fish reintroduction and now devoted to nature interpretation by visitors. Water is supplied continuously by an experimental fish-farm, and levels can be controlled by regulating the outflow. The marsh is a by-product of pond flooding, and has proved to be a valuable nesting area for waders. Monitoring aims at developing a management model for both sites.

Table 1: General characteristics of the wetlands studied. In the columns marked with an asterisk, (*) the figures in brackets show the proportion of area available to at least one species of wader, used in the calculation of bird density. This criteria (<30 cm deep) was not applied to the smaller wetlands, where deepwater habitats do hardly occur.

Site type	Wetland Total area (ha)	Area censused 1987-99*	Area censused 1993-94*	Wetland characteristics
A. Golas (Coastal lagoon opening to sea)	166	130 (34.4)	86 (58)	Mudflats shallows and islands cut by deeper channels
B. San Pedro Del Pinatar (Industrial salina)	463	321 (202)	294 (200)	Large evaporation and precipitation ponds
C. Marchamalo (Small traditional salina)	52.52	52.52	52.52	Small evaporation and precipitation ponds
D. Rasall (Small traditional salina)	17.42	17.42	17.42	Large evaporation and precipitation ponds
E. Interpretation Pond (Restored saltpond)	8.3	-	-	Irregular pond with some islands filled with seawater
F. Interpretation Marsh (Flooded saltmarsh)	1.8	-	-	Saltmarsh flooded by seepage from Interpretation pond

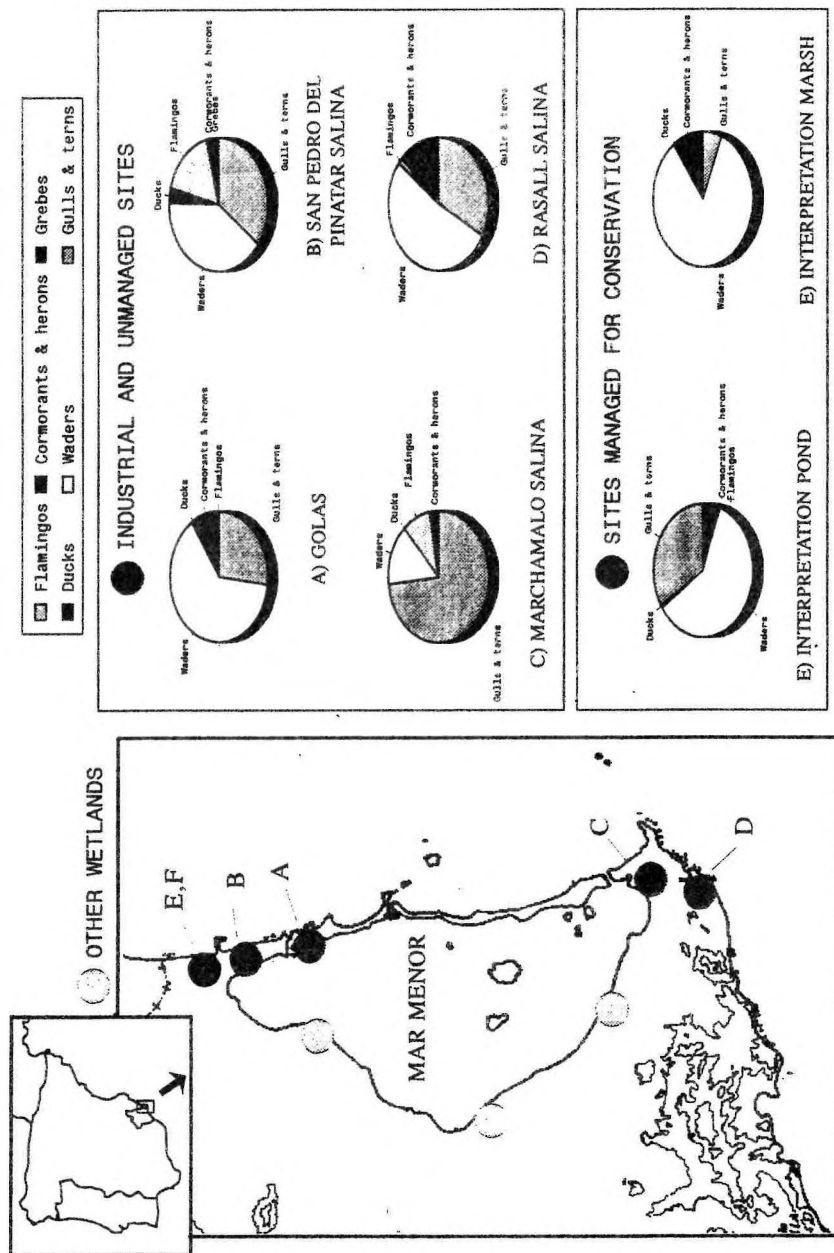


Figure 1. Location of the wetlands studied around the Mar Menor Lagoon. The average composition of their waterbird communities is shown in the pie charts, based on monthly censuses during a year cycle (October 1987-September 1988) in the industrial and managed sites, and on fortnightly censuses made between January 1993-October 1994 in the sites managed for conservation.

At present, the two small traditional salinas undergo irregular level changes as a result of rainfall and intermittent pumping, a consequence of its marginal role in the salt market. In 1994 pumping ceased at all in Marchamalo for some months, being lately re-flooded. In the Golas, water levels -and consequently the area of exposed mudflats- vary in relation to flows between the lagoon and the sea, with a general yearly pattern and unpredictable short-time changes.

RESULTS AND DISCUSSION

Waders were dominant in all sites except in the small Marchamalo Salinas. Only the larger salinas, especially the industrial ones, were used significantly by Flamingos, Ducks and Grebes (**Figure 1**). These groups comprise most of the species previously referred to as typical of coastal saline wetlands.

Golas represent a particularly good habitat for waders -like other Mediterranean coastal areas submitted to aperiodic water fluctuations (e. g. Britton, 1985; Martinez-Vilalta, 1985; Britton and Johnson, 1987), provided that water levels are low, as it occurred in November 1987, January and September 1988 (**Figure 2, a**). Piscivorous birds also favour this fish-migration corridor. The industrial salina of San Pedro del Pinatar has usually lower wader numbers and densities than the adjacent Golas. Wader numbers increase in the salina when high water prevails in the Golas, but it seems that only a fraction of the birds apparently displaced can find suitable conditions in the salina (**Figure 2, a**).

The small Rasall Salina and the Interpretation Marsh are also better habitats for waders in terms of density, compared to the Marchamalo Salina and the Interpretation Pond, as shown by 1993-94 data (**Figure 2, b**). Its physical structure, with abundant shallow zones and high shoreline/area ratio, can explain this fact. In the pond-marsh system, water level was fairly constant in 1993, being lowered in the spring of 1994 (other level changes were incidental) to coincide with one of the peaks of wader migration. This had little influence on wader density in the pond, and it is not clear to what extent it favoured the increase recorded in the marsh in April. It is evident, however, that high water levels due to strong rainfall in early spring and autumn 1994 greatly reduced the use of the pond and marsh with regard to 1993 (**Figure 2, c**).

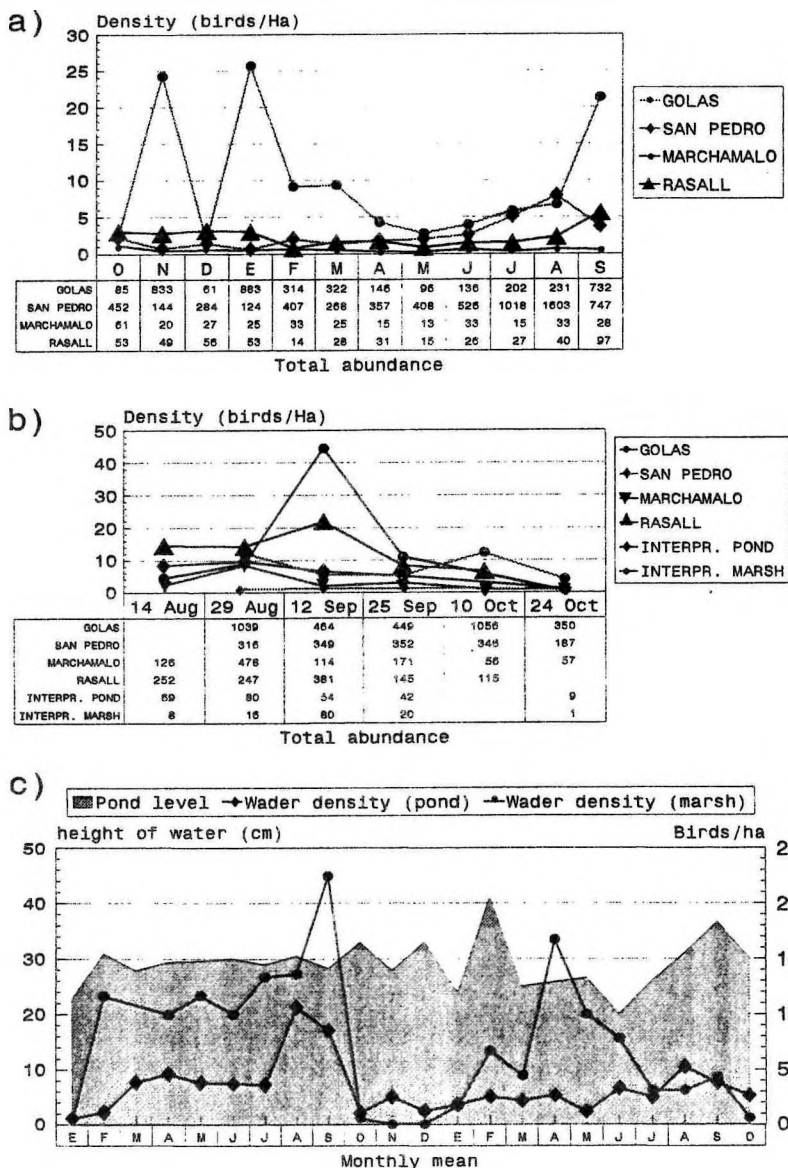


Figure 2: Changes in wader density in different wetland sites during three monitoring schemes: a) the monthly survey of 1987-88; b) a 1993 fortnightly survey of autumn migration; and c) the monitoring of wader density and water level changes in the interpretation pond and marsh since January 1993.

Thus, small wetland surfaces of no economic significance can have an outstanding importance for waders and other waterbird groups, not dealt with here in the same detail. Using 1993 autumn data to compare sites, the industrial salina hosted only 18.7% of the total number of waders counted, despite it contributes a 58% of the theoretically available surface, a feature shared with other large Mediterranean active salinas, where high water levels leave only small usable surfaces (Britton, 1985; Baccetti *et al.*, 1991). If we exclude the Golas, where hydrological management is not feasible, the remaining wetlands, representing only 24% of the available surface (85 ha), were used by a 30.9% of the birds recorded. By properly managing these wetlands, and restoring other drained and degraded sites, the carrying capacity of the whole wetland system could be raised.

In conclusion, while other bird groups seem well adapted to present management regimes, at least in the larger wetlands (industrial salinas and the Mar Menor Lagoon), conditions for waders can be improved by:

- Preserving preferred natural habitats (Golas) against reclamation and disturbance (e.g. by clam-collectors, amateur fishermen, walkers and swimmers)
- Creating or restoring small wetlands, independent of industrial management, where suitable physical conditions can be reproduced and maintained. Small traditional salinas of marginal activity could be managed for this purpose.
- Maintaining a mosaic of different conditions, through the management of these sites, able to maximize bird diversity at the scale of wetland complex, and to provide alternative suitable habitats when conditions deteriorate locally
- Developing management models for newly created or restored wetlands, that maximize prey abundance and its availability to waders (Rehfishch, 1994), while taking into account the needs of other taxa.

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