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# Habitat preference and breeding performance of the Black-winged Stilt *Himantopus himantopus* in Italy

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Tinarelli, R. 1991. Habitat and breeding performance of the Black-winged Stilt *Himantopus himantopus* in Italy. *Wader Study Group Bull.* 65: 58-62.

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## INTRODUCTION

This paper presents some of the most important results obtained from a monitoring programme of the Italian breeding Black-winged Stilt *Himantopus himantopus* population between 1983 and 1988.

All the data collected during the research and the methods used are described more fully in a report published by the Istituto Nazionale di Biologia della Selvaggina (Tinarelli 1990). The data were gathered from the whole country in a standardized manner thanks to the voluntary contribution of 54 amateur and professional ornithologists.

The main aim of this study was to assess the precise distribution and population size of this species in Italy. Additionally, breeding performance in many different habitats was investigated to provide useful information for management and conservation. Information on laying dates, egg size, colony and nest description were also collected but they are not analysed in this paper.

## RESULTS

The most important breeding areas for Black-winged Stilts in Italy are situated in the north eastern Regions and in Sardinia (Figure 1).

Figure 2 shows the national population trend for this species from 1978 to 1988; the figure includes also population estimates for a few years prior to the study period. A considerable decline was recorded in 1984 although the population was relatively stable in the following four years. The most recent data indicates a general increase in breeding numbers and a new period of expansion in range.

The population of Black-winged Stilt breeding in Italy uses a wide range of habitats, including:

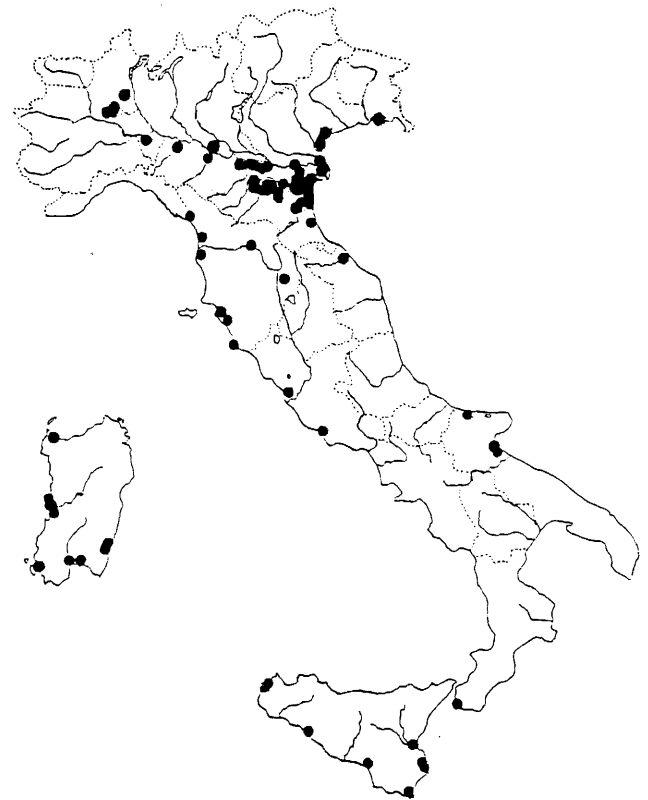


Figure 1. Distribution of the Italian breeding population of Black-winged Stilts during the years 1978-1989.

- a) operational and recently abandoned salt-pans, brackish lagoons, marshes occasionally connected to the sea and temporarily flooded ponds (historically the distribution was probably limited to these habitats);
- b) dammed ponds of brackish water for extensive fish-farming, including small islands and foreshore, originating from recent changes to lagoons and coastal marshlands;
- c) drainage canals, flooded clay-pits, freshwater marshlands, man-made ponds for fish-farming and hunting, although only



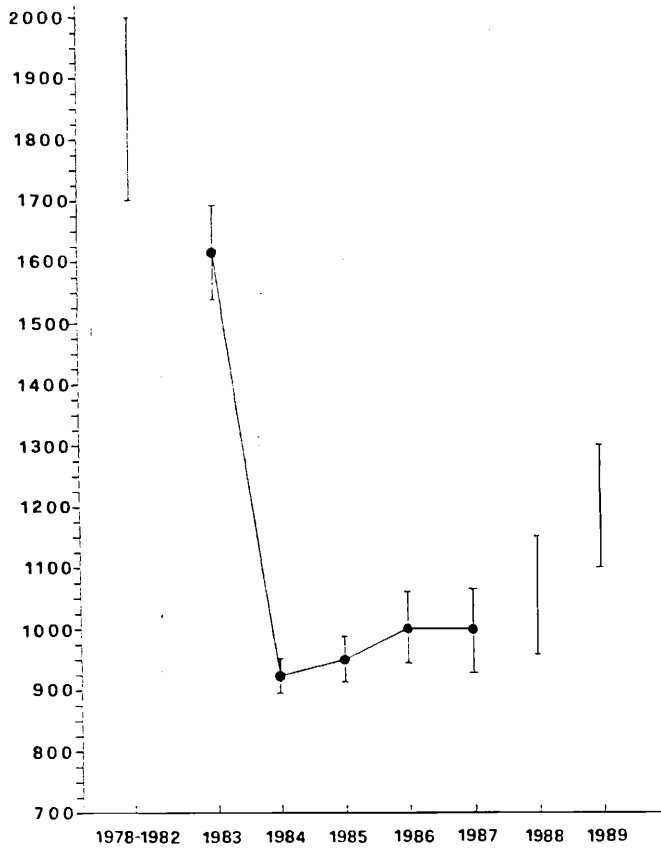


Figure 2. Trend of the Italian population of Black-winged Stilts during the years 1978-1989.

when they have low water levels and gently shaped banks;

d) rice fields (flooded from the last ten days of March until August and localised mainly in the north-western Regions);

e) settling ponds of sugar factories scattered mainly in the Po plain far from the largest wetlands (their water levels change according to the annual sugar production cycle and generally they have low water levels and emergent mud flats of organic substances from March-April until August). In this habitat the highest densities of feeding birds were recorded during the migration and breeding season.

f) settling ponds of piggeries, byres and waste waters.

In the years 1983-1987, four habitat categories were of greatest importance: salt-pans, dammed ponds, lagoons and sugar factory settling ponds (Figure 3).

Year-to-year variations in breeding numbers vary between different habitats. Salt-pans and sugar factory settling ponds seem to have a major role when the total population is

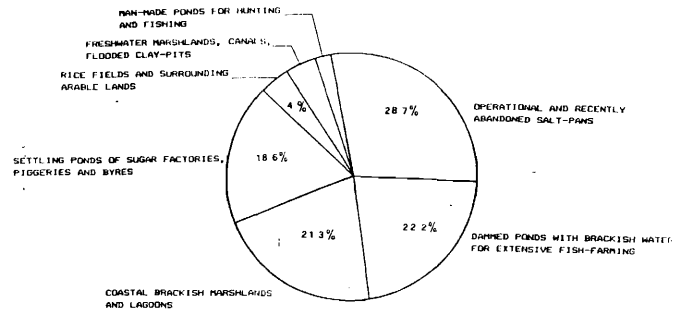


Figure 3. Average percentage of pairs of Black-winged Stilts breeding in different habitat categories in Italy during the years 1983-1987.

decreasing, while other habitats, in particular dammed ponds and lagoons, tend to be abandoned in such situations. The population breeding in Piedmont, Lombardy and Emilia-Romagna Regions has been surveyed with particular accuracy, such that an exact trend can be drawn (Figure 4). In this area it is clear that the importance of dammed ponds decreased in parallel with the decrease in the overall popula-

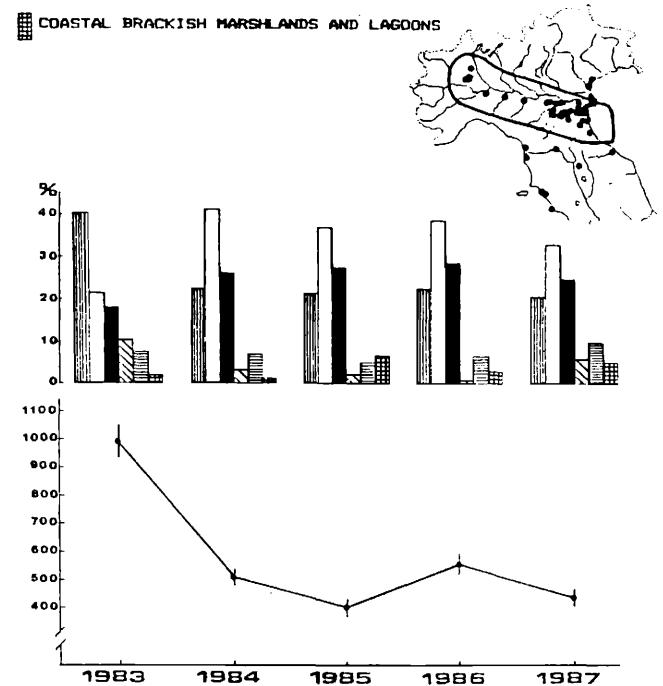
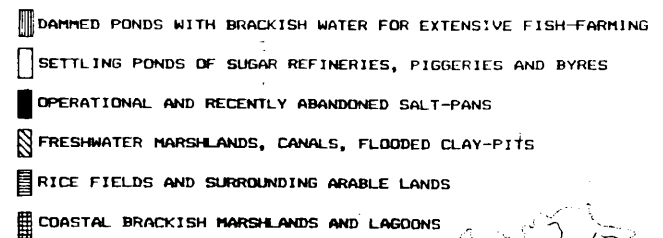


Figure 4. Trend of the population of Black-winged Stilts breeding in northern Italy regions and between-year variations in the percentages of pairs nesting in six habitat categories.



HABITAT	N	Average clutch size
OPERATIONAL AND RECENTLY ABANDONED SALT-PANS	346	3.75
SETTLING PONDS OF SUGAR REFINERIES	327	3.99
DAMMED PONDS WITH BRACKISH WATER FOR EXTENSIVE FISH-FARMING	132	3.79
COASTAL BRACKISH MARSHLANDS AND LAGOONS	79	3.27

Significance levels: P < 0.02 (Salt-pans vs Settling ponds), P < 0.01 (Settling ponds vs Dammed ponds), P < 0.001 (Settling ponds vs Coastal marshlands), P < 0.01 (Dammed ponds vs Coastal marshlands).

Table 1. Average clutch size of Black-winged Stilts in different habitats in Italy.

tion while salt-pans and sugar refineries had a constant or increasing role. This was observed despite the fact that during the study one of the two salt-pan complexes was abandoned and five of the 18 sugar refineries stopped their activity after 1984.

Pooling clutch size data in different localities and years for the same habitat type shows that the settling ponds of sugar refineries are the most favourable habitat followed by salt pans and dammed ponds (Table 1). The difference between the average number of eggs per nest from one year to another in the same locality was not generally significant.

Nests with more than five eggs were not uncommon (6.9 % of 984 examined clutches) especially in sugar factories (12.2 %, n = 327). It is probable that some females do not complete a clutch in their own nest and lay eggs in other nests because, at all sites where nests with more than five eggs were recorded, a significant correlation was found between their number and that of nests with less than three eggs (Spearman test = 0.518, p < 0.001). The percentage of hatched eggs in nests with more than four seems to be very low, as family groups with more than four young were never observed.

Pooling data for breeding success in different localities and years for the same type of habitat shows that sugar refineries are the most favourable. In Table 2 two kinds of indices are shown: the average number of fledged young per successful pair, and breeding success (the ratio between total number of fledged young and the total number of breeding pairs). In salt-pans breeding success has not been calculated due to the marked asynchrony of egg laying and the unknown percentage of replacement clutches; but on average it is unlikely to exceed two young per breeding pair. For many large breeding localities, as in several dammed ponds and lagoons, we have a small sample of data because the family groups with chicks may walk for kilometres before fledging, changing site very frequently. In other habitats also, adults with young a few days old were observed at sites up to two

HABITAT	AVERAGE NUMBER OF FLEDGED YOUNG PER SUCCESSFUL PAIR		BREEDING SUCCESS	
	$\bar{X}$	No PAIRS	$\bar{X}$	No PAIRS
SETTLING PONDS OF SUGAR FACTORIES	2.68	231	2.14	394
RICE FIELDS AND SURROUNDING ARABLE LANDS	2.52	63	1.67	95
DAMMED PONDS WITH BRACKISH WATER FOR EXTENSIVE FISH-FARMING	2.32	69	1.31	122
COASTAL BRACKISH MARSHLANDS AND LAGOONS	1.93	29	1.29	21
MAN-MADE PONDS FOR HUNTING AND FISHING	2.07	14	1.53	19
OPERATIONAL AND RECENTLY ABANDONED SALT-PANS	2.63	82	NOT ASSESSABLE	

Table 2. Breeding success of Black-winged Stilts in different habitats in Italy

SETTLING PONDS OF SUGAR FACTORIES	0.15
OPERATIONAL AND RECENTLY ABANDONED SALT-PANS (Cervia and Comacchio)	0.19
DAMMED PONDS OF BRACKISH WATER FOR EXTENSIVE FISH-FARMING (Valli di Comacchio)	0.23
BRACKISH LAGOONS AND MARSHES PERMANENTLY CONNECTED WITH THE SEA (Pialasse Ravennati)	0.38
RICE FIELDS AND SURROUNDING ARABLE LANDS	0.51

Table 3. Exchange indexes of colonies of Black-winged Stilts in different habitats in Italy.

kilometres away from the nest - crossing canals, fields of corn and roads.

For many sites where the colony location was recorded with accuracy for several years, an exchange index (Erwin et al. 1981) has been calculated (Table 3) through the formula:

$$IR = 0.5 (S1/N1 + S2/N2)$$

where:

S1 is the number of sites occupied only in first year, N1 is the total number of sites in first year, S2 is the number of sites occupied only in second year, and N2 is the total number of sites in second year.

This index varies between 0 and 1 and indicates the year-to-year stability of ecological conditions suitable for Stilts. Sugar factories are the habitat with the greatest colony stability, followed by salt-pans, coastal marshlands and lagoons and rice fields.

Figure 5 indicates, for the four most important breeding habitats, the percentage of pairs exposed to each of the main threats. In particular note that sudden changes of water level, other than those caused by very rainy springs (as in 1984 and



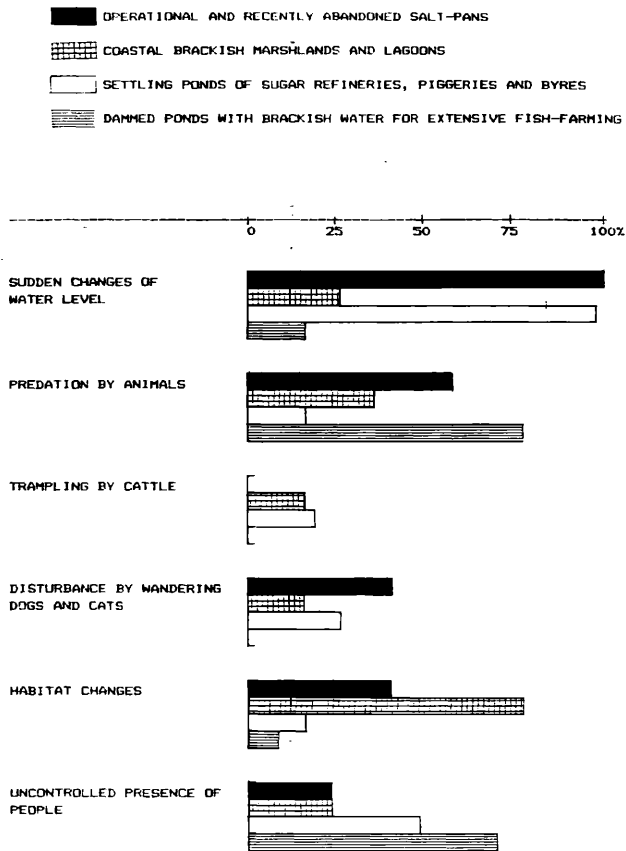


Figure 5. Main threats observed to Italian breeding Black-winged Stilts during 1983-1988.

1985), happen regularly in sugar refineries, salt pans and rice fields. These follow the production activities that take place there.

Predation by wild animals seems lowest in sugar refineries and quite high in salt pans. Species of *Circus*, *Larus* and *Corvus* are usually involved. Predation by *Rattus norvegicus* seems to be less important than for other colonial species breeding in the same wetlands. Destruction of nests caused by the trampling of cattle, although of considerable local impact, is certainly one of the less frequent threats at a national level. Apart from these sources of mortality, dead young were found mostly after some days of rain and cold. Almost all young found dead were between 2-3 and 10-12 days old.

From data collected in some breeding localities (Table 4), it is possible to estimate that every year, in northern Italy, more than 10% of the clutches are submerged by water, although in central-southern Italy the figure is considerably less. Sudden water level rises are the main factor affecting breeding success in sugar factories. Table 5 shows the average number of fledged young per successful pair has small annual

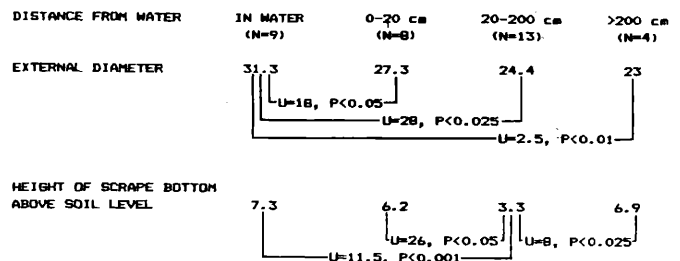


Figure 6. Dimensions of Black-winged Stilt nests in the same colony (Salina di Cervia 1987) in relation to the distance from water.

	$\bar{x}$	N
SETTLING PONDS OF SUGAR REFINERIES (BOLOGNA PROVINCE 1983-1987)	17.3%	421
OPERATIONAL AND RECENTLY ABANDONED SALT-PANS (CERVIA 1984-1987, COMACCHIO 1983-1987)	13.1%	601
DRAINAGE CANALS (VALLE NEZZANO 1983-1985)	84.1%	82

Table 4. Average percentage of Black-winged Stilt nests destroyed by water level increases in Italy.

	1984	1985	1986	1987
NUMBER OF NESTS	69	50	50	36
AVERAGE CLUTCH SIZE	3.96	3.88	3.92	3.97
% OF NESTS DESTROYED BY WATER LEVEL INCREASE	6.5%	35.7%	14.3%	11.7%
AVERAGE NUMBER OF YOUNG PER SUCCESSFUL PAIR	2.73	2.53	2.65	2.63
BREEDING SUCCESS	2.53	1.62	2.28	2.33

Table 5. Breeding performance of Black-winged Stilts in the settling ponds of six Italian sugar factories (Bologna Province).

variation and that the breeding success is inversely correlated with the percentage of nests destroyed by rising water levels (Kendall test = -1,  $p < 0.0087$ ).

Two strategies to avoid nest destruction by rising water levels were found:

1) The capability of Stilts to build large nests near and in the water. The nest dimensions are influenced both by distance from water (Figure 6) and by the amount of available material for construction (see Tinarelli 1990).

2) The capability of modifying the nest shape and size during rising water levels is successful only when water rises very slowly. Average variation in the dimensions of six nests at the same distance from water, along the edge of a settling pond in a sugar factory, are shown in Figure 7, during a progressive increase of water level.

Raising the support of every nest placed in the water with muddy material gathered nearby, before and during every



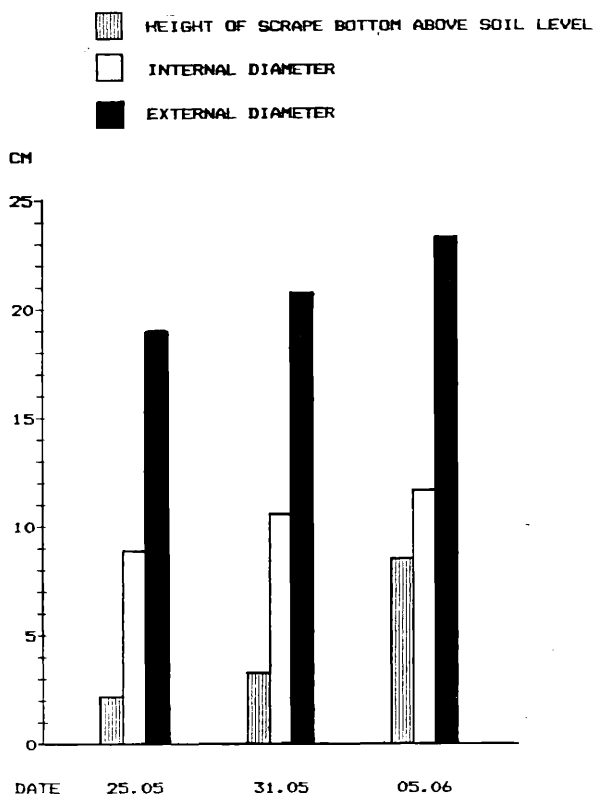


Figure 7. Average variations in dimension of six Black-winged Stilt nests during a progressive increase in water level.

rapid water rise, has been successfully adopted as a conservation measure by myself and others in salt-pans and sugar factory settling ponds.

#### DISCUSSION

Analysing the data collected on the breeding performance of the Italian Black-winged Stilt population shows that most eutrophic habitats and salt-pans, where water levels are managed according to production cycles, seem to be preferred habitats although they have the highest percentages of nests destroyed by rising water levels.

Preference for two distinctly different habitat categories, such as sugar factory settling ponds and salt pans is difficult to explain. It seems likely to be connected mainly with food availability. We thus need more information on the feeding behaviour of chicks and adults and need to study the prey fauna in different habitats.

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