

Habitat selection by Black-winged Stilts *Himantopus himantopus* in a Macedonian wetland, Greece

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The Black-winged Stilt *Himantopus himantopus* is included in the list of the waders needing protection within the European Community countries (EEC Directive 79/409 - 85/411). Most studies on this species in the Mediterranean region have been carried out in Italy (Bologna et al. 1978, Tornielli 1979, Romé & Travison 1982, Casini 1986, and others) whereas studies are in progress both in Italy and in other countries (Dubois 1986, 1987).

Black-winged Stilts breed regularly in the largest wetlands of Northern and Western Greece (Bauer et al. 1969, Jerrentrup 1982, Szijj 1982, Goutner 1983), but no studies had been conducted in Greece on its breeding biology.

The present paper aims to fill to begin this gap and to stimulate research and conservation of Black-winged Stilts in Greece. The study was carried out as part of an international Wader Study Group project (see Dubois 1986, Tinarelli 1986).

STUDY AREA AND METHODS - The study area was a shallow pond, surrounded by saltmarshes (local name "Epanomi"); it is situated at the far eastern exit of the Gulf of Thessaloniki. It belongs to a complex of very interesting wetlands which surrounds the Gulf.

The study area covered about 400 ha. The pond is separated from the sea by a strip of low sand dunes (50-100 m wide). Rainwater floods these marshes and the pond in winter and early spring, the water evaporating later, in the summer months (late June-July). The salinity of this water measured on 5 May 1985 was 6.4 ‰ in the flooded marshes and 6.1‰ in the pond. Due to flooding a few small islets appear at the highest sites within the pond in spring.

In 1984 the entire area was declared a hunting reserve and no hunting has taken place since then. A camp site is situated next to the study area and people frequent the beaches.

The study was carried out from 8 April to 30 June 1985 when a population of about 50 pairs of Black-winged Stilts bred in the area. The following data were recorded on all nests found: distance from water, nearest land (for solitary nests), nearest conspecific and heterospecific nest (when present), plant species and maximum height of each plant in a 1 m radius around nests. To check for elevation preferences at nests made above water, I measured the depth of water at arbitrarily selected distances of 20 cm and 200 cm far from nest centres in random directions: each one of the eight compass points was given a number and a relative direction was chosen by randomly selecting one of these numbers.

I considered two nests as a group when they were found at distance of less than 25 m from each other.

RESULTS - All 34 nests studied were close to water (Table I). 71% were isolated and were made both on the small islets available within the pond and/or above water. These nests were generally distant from the surrounding mainland (Table I).

TABLE I. Black-winged Stilts nest site characteristics. (1) For nests made above water.

	Average	S.D.	Range	n
Distance from water (cm)	22	33	0 - 137	34
Nearest land from isolated nests (m)	59.4	46.2	2.5-150	24
Waterdepth (1) 20 cm of nest (cm)	4.3	2.1	1-10	13
Waterdepth (1) 200 cm of nest (cm)	12.1	7.9	2-25	13

TABLE II. Vegetation surrounding the Black-winged Stilt nests at Epanomi (n=34). All measurements in cm. Plant names from Tutin et al. (1964) and Tutin et al. (1972-1980).

	% Frequency	Mean max	HEIGHT	
			S.D.	Range
<i>Arthrocnemum fruticosum</i>	55.9	38	12	20 - 56
<i>Salsola soda</i> (dry)	38.2	48	15	25 - 85
<i>Aeluropus litoralis</i>	17.6	24	6	15 - 30
<i>Halimione portulacoides</i>	14.7	31	13	15 - 45
<i>Salicornia europaea</i>	11.8	25	12	14 - 38
<i>Halocnemum strobilaceum</i>	8.8	38	6	35 - 45
<i>Bolboschoenus maritimus</i>	5.9	34	8	28 - 40
<i>Suaeda maritima</i>	2.9	19	-	19
<i>Limonium gmelinii</i>	2.9	21	-	19
Lacking plants	2.9	-	-	-

TABLE III. Nearest neighbour distances (m), of Black-winged Stilt nests.

	Mean	S.D.	Range	n
1. Conspecific				
General	30.54	30.23	2.28 - 100	34
Solitary nests	58.8	28.3	30.0 - 100	14
Groups	10.72	5.87	2.28 - 22.10	20
2. Heterospecific				
<i>Sterna hirundo</i>	8.14	5.30	3.50 - 13.92	3

The remaining nests were made on vegetated bars connected to the mainland and surrounded by shallow water.

At the nests made above water, the water depth differed significantly between the points at 20 cm and 200 cm from nests ($t=3.68$, $df=24$, $P<0.001$, log transformed data, Table I). This indicated that these nests were made on elevated sites of the pond bottom. Almost all the nests ($n=33$) were found close to vegetation (Table II). The plant species reflected the type of habitat used (saltmarsh with temporary brackish water). A survey of the breeding area revealed that the most abundant plants on elevations and islets were *Arthrocnemum fruticosum*, *Salsola soda* and

Halimione portulacoides and at flat sites *Aeluropus litoralis* and *Salicornia europea* (all ranked in order of importance). These five species also appeared to be most abundant around nests (Table II) suggesting that the Black-winged Stilts bred without any special vegetation preference. 62% of the nests constituted seven groups including 2-5 nests (mean=2.8). Three Common Tern (*Sterna hirundo*) nests were found on islets close to Black-winged Stilt nests. Their mean distance to the nearest Stilt nests was not different (t-test) from that of Stilts in groups (Table III).

DISCUSSION - In my study area, Black-winged Stilts bred on small islets and on elevations above water, a habitat frequently used by Black-winged Stilts when available (Tinarelli 1986). Proximity to water and/or breeding above water has been recorded in other studies too (Castan 1963, Robin 1968a, b; de Naurois & Bonnaffoux 1969, Bologna et al. 1978).

During my study (1985), many Black-winged Stilts bred in the area, and the water table was much higher than other years, although the rainfall in the Thessaloniki area was not more abundant than in other years (meteorological data obtained from the Thessaloniki airport weather Station). The higher water level may however have been due to local storms (Balafoutis 1977) and this may have attracted the Black-winged Stilts. When the weather conditions are dry in the general area, small wetlands appear to play a major role as breeding sites for Black-winged Stilts (see also Joensen & Jerrentrup 1988).

Black-winged Stilts are generally known to be relatively independent of vegetative cover for nests, although nests may be found close or among vegetation (Lippens et al. 1966, Bologna et al. 1978, Cramp & Simmons 1985). In my area the nesting Stilts tolerated high cover provided by particular plant species. For example, *Arthrocnemum fruticosum*, *Halimione portulacoides* and *Halocnemum strobilaceum* form low bushes providing particularly high cover (Babalonas 1979, Goutner 1987). This vegetation played an important role after hatching for chick cover. The most frequent use of these plants occurred mainly on elevated ground bars and islets and their use by the Black-winged Stilts reflected the habitat structure. Vegetation height increases through the season, but most data were taken in early May and therefore they again reflected the availability of vertical plant cover. The fact that floating nests were constructed on elevations of the pond bottom, indicated that perhaps the primary search of birds was related to nest supporting ground which was only available under the condition described.

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RIASSUNTO - Habitat di nidificazione del Cavaliere d'Italia *Himantopus himantopus* nella Grecia settentrionale

- L'habitat riproduttivo del Cavaliere d'Italia è stato studiato nella palude di Epanomi (Golfo di Salonicco, Grecia) durante la primavera del 1985.

- L'area di studio comprendeva uno stagno poco profondo circondato da paludi, a poca distanza dal mare.

- I Cavalieri d'Italia nidificavano in prossimità dell'acqua, soprattutto su isolotti; alcuni nidi erano posti in mezzo all'acqua su rilievi del fondo.

- Le specie vegetali nei pressi dei nidi erano prevalentemente alofite, generalmente alte, ma la loro presenza attorno ai nidi rifletteva la disponibilità nell'area di studio (Tab. II).

- Oltre a nidi isolati sono stati rivenuti gruppi di 2-5 nidi, la sola associazione eterospecifica osservata è stata con Rondine di mare *Sterna hirundo* (Tab. III).

- Si ipotizza che precipitazioni atmosferiche aumentando la superficie sommersa, abbiano attratto i Cavalieri d'Italia ad Epanomi e in ambienti umidi simili.

TAB. I. Caratteristiche dei siti di nidificazione del Cavaliere d'Italia. (1) è riferito ai nidi posti sopra il livello dell'acqua

TAB. II. Vegetazione limitrofa ai nidi di Cavaliere d'Italia a Epanomi (n=34). I nomi dei vegetali sono tratti da Tutin et al. (1964, 1972-80).

TAB. III. Distanze dei nidi più vicini ai nidi di Cavaliere d'Italia (in m.).

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