WINTERING BIOLOGY OF THE BLACK-WINGED STILT IN THE MAHGREB REGION

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The major wetlands of Tunisia, Algeria and Morocco were surveyed in January-February 1987 for the presence of wintering Black-winged Stilts *Himantopus himantopus*. 7 marked birds seen in Morocco had been marked in the same areas in previous years. Data on habitat preferences, population structure, intraspecific interactions and feeding activity were collected. Birds fed most successfully in salt-pans. Some age- and sex-related differences in foraging were detected. At one site in Tunisia birds fed for most of the daylight hours, but the duration of feeding was much shorter at a Moroccan site, although the reasons for the difference are not clear.

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INTRODUCTION

The population of Black-winged Stilts *Himantopus himantopus* breeding in Southern Europe has shown marked fluctuations in numbers during the last 5 years. This phenomenon, and the general lack of information about the species, has been the impetus for several research projects in different countries (Dubois 1986a). International aspects of the studies are being co-ordinated as a Wader Study Group project. As part of these studies, chicks are now colour-ringed in France, Italy and Portugal. One of the main aims of this ringing is to discover the winter distribution of the birds breeding in Europe, but as yet little research has been carried out in the potential wintering areas. I visited some wetlands in Tunisia, Algeria and Morocco in January-February 1987, to check on the importance of the Maghreb Region as a wintering site for European breeding Black-winged Silts, and to obtain some data on their winter ecology. This paper reports the results.

Wintering areas in north-west Africa are mainly salt-pans, salt-lakes (Sebkhets and Chotts), coastal lagoons and seasonal marshlands along the Mediterranean and Atlantic coasts. Flocks of several hundred birds have been observed irregularly also on inland chotts in Tunisia and Algeria (Johnson and Hafner 1971, Goldschmidt and Hafner 1973). During the last 20 years an apparent northwards shift of the winter quarters has been noted. The regular presence of 8-9 birds has been recorded in Sardinia since 1964 (H.Schenk 1976), and numbers now reach 10-60, depending on the water levels (H.Schenk, pers. comm.). Some 50-150 individuals winter in Portugal (R.Rufino, pers. comm.), and the Spanish national counts (Alberto and Purroy 1981, 1983) between 1978 and 1982 showed a trend of increasing numbers, with 800-1400 Black-winged Stilts observed in most recent winters (L.J.Alberto, pers. comm.). However, most Black-winged Stilts that breed in Europe are believed to overwinter in Afica.

STUDY AREA AND METHODS

The sites were as follows:

Tunisia, 4-14 January 1987: Lac de Tunis, Sebkha Sedjoumi, lagune de Korba, salines et lagune de Soliman, Sebkhet Kelbia, Sebkha et salines de Kairouan, northern part of Golf de Gabes, salines de Tyna, and Sidi Mansour.

Algeria, 15-30 January 1987: Chott Melrhir, Chott Merouane, Chotts et Sebkhas of Constantine Region, Lac Fetzara, Lac des Oiseaux, Barrage de Bougzhoul, Chott el Hodna (coverage 80%), Grande Sebkha d'Oran, Salines d'Arzew, Lac Sale, Saline de Relizane, Marais de la Macta, and Chott ech Chergui (coverage 20%).

Morocco, 31 January - 14 February 1987: salines et etangs de Sidi Moussa-Oualidia, Sebkha Zima, etangs de Sidi Bennour, Grande Daya, Merja Zerga, Merjas Daoura, Sidi Mohammed Ben Mansour, salines de Larache.

Behavioural observations were made at 3 sites: Sebkha Sedjoumi, Tunisia: a salt-lake of 2700 ha, affected by urban sewage overflows; Sidi Moussa-Oualidia salt-pans, Morocco, and; Grande Daya, Morocco: a seasonal wetland of 200 ha, partly supplied by waste-water from a phosphate factory. At each site, 50 1-minute observations were made of different individuals. During each 1 minute sequence, the number of paces, pecks and successes were recorded. All peck-like intention movements were considered as pecks, and every swallowing movement was registered as a success. Search index (number of paces/ number of pecks) and success index (number of successful pecks/number of pecks, varying between 0 and 1) were calculated. At Sidi Moussa salt-pans, these indices were calculated separately according to the age and sex of the birds, and water-depth. Two categories of water-depth were considered: 0 - 12 cm (the approximate height of tibio-tarsal joint), 12 - 23 cm (length of the whole leg).

Field observations were carried out with 10x40 binoculars and a 15-60x60 zoom telescope. At both Sebkha Sedjoumi and Grande Daya the numbers of inactive, feeding and preening birds were recorded every 10 minutes. The average time spent in feeding activity by a single individual was calculated as the sum of the percentages of birds feeding in each count/(100 x 6) (Tinarelli 1987).

RESULTS

Census data

The numbers of birds found in Tunisia, Algeria and Morocco in winter 1987 are summarized in Tables 1-3, together with data available from previous censuses (Johnson and Hafner 1971, Goldschmidt and Hafner 1973, Johnson *et al.* 1975, Thevenot and Beaubrun 1984, Ochando *et al.* 1985, Gaultier 1986). In addition to these

Table 1. Numbers of wintering Black-winged Stilts in Tunisian wetlands.

Site	Nov 1971[a]	Jan 1973[b]	Jan 1985[c]	Jan 1986[d]	Jan 1987
Lac Ichkeul	0	0	0	3	0
Sebkhet Er Ariana	2	6	0	5	40
Lac de Tunis	56	15	0	7	0
Sebkha Sedjoumi	60	60	70	435	260
Lagunes de Korba	0	0		14	4
Barrage Mlabi				1	
Salines de Tyna	15	0	0	11	4
Kneiss				1	0
Birhet El Bibane	0	7		1	
Sebkhet El Jem	210	4	0		
Sidi Mansour	75	3			0
Sebhka et Salines de Monastir	10		0		
Sekhet El Kourzia	180	0	0		
Garaet El Kebira	16	0			
Sebkhet El Rharra		400			
Sebkha Kelbia	0	12	0	0	2
Sebkha et Salines de Kairouan	10				19
Total	634	507	70	479	329

[a] Johnson and Hafner (1971)
[b] Goldschmidt and Hafner (1973)
[c] Iapiohinu (pers. comm.)
[d] Gaultier (1986)

Table 2. Numbers of wintering Black-winged Stilts in Algerian wetlands.

Site	Nov 1971[a]	Jan 1973[b]	Jan 1975[c]	Jan 1985[d]	Jan 1987
Grande Sebkha d'Oran			3	30	0
Salines d'Arzew			67	7	0
Marais de la Macta			145	0	0
Salines de Relizane			1		0
Lac Sale			2		0
Barrage de Bougzhoul			5		0
Marais de Mekhada			3		
Marais de Mengoub			1		
Lac des Oiseaux	6	0			0
Garaet Et Tarf	7	0	0		0
Lac Fetzara	0				5
Ouled Zoulai	0		0		27
Total	13	0	227	37	32

[a] Johnson and Hafner (1971)
[b] Goldschmidt and Hafner (1973)
[c] Johnson *et al.* (1975)
[d] Ochando *et al.* (1985)

sites, it is probable that there are a number of wetlands in north-west Africa that are suitable for Black-winged Stilts, but which have not yet been surveyed.

In Tunisia, in addition to the numbers reported in Table 1, 98 Black-winged Stilts were counted in the Golf de Gabes in winter 1984 (van Dijk *et al.* 1984), and that Czajkowski (in Smit 1986) reported some 1300 birds wintering in the whole country, in 1977 and 1978. About 500 birds were estimated by Smit (1986) to winter in Algeria. However, this figure now seems too high when compared with other published data and the results of this study. On the basis of these recent observations, the population wintering in Southern Europe and the Maghreb can now be estimated at between 2810-4310 individuals (Tunisia 900-1300, Algeria 50-300, Morocco 1000-1100, Portugal 50-150, Spain 800-1400, Italy 10-60). Wintering areas are shown in Figure 1.

Table 3. Numbers of wintering Black-winged Stilts in Moroccan wetlands.

Site	Jan 1984[a]	Feb 1987
Restinga Smir	1	
Salines et Marais du Bas Loukkos	34	36
Merjas Daoura et Sidi Mohammed Ben Mansour	50	0
Merja Zerga	7	49
Sed El Mejnoun	1	
Sebkha Zima	100	51
Sidi Moussa-Oualidia	477	619
Grande Daya		166
Sidi Bennour		16
Oued Massa	1	
Sebkha Bou Areg	34	
Total	705	937

[a] Thevenot and Beaubrun (1984)

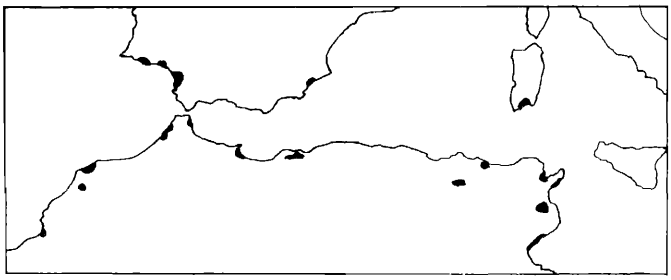

Figure 1. Wintering areas of Black-winged Stilt in Maghreb Region and Southern Europe.

Marked birds

Over 1000 Black-winged Stilts (283 in Tunisia, 30 in Algeria, 937 in Morocco and 80 in Spain) were checked for colour-rings. Six colour-ringed birds were seen between 2 and 6 February at Grande Daya and Sidi Moussa, Morocco. These were amongst 26 birds marked at Sidi Moussa-Oualidia in September 1986, by a Ligue pour la Protection des Oiseaux (LPO) expedition. In addition, the ring number of a metal-ringed bird was read at Sidi Moussa on 2 February 1987. This bird had been ringed as an adult male there on 4 March 1981.

Habitat preferences

49.1% of individuals observed were in salt-pans, 23.3% in salt-lakes, 14.4% in seasonal fresh-water marshes and 13.3% in coastal lagoons. Within large wetlands such as Sebkha Sedjoumi, Sidi Moussa-Oualidia, Sebkha et salines de Kairouan, Lagune de Korba, Grande Daya, areas showing eutrophication or/and organic pollution were often preferred.

Population structure

644 (49.6%) out of the total of 1298 birds censused in Maghreb could be sexed and aged. Results are shown from two countries in Table 4. The sex-ratio in Morocco is similar to that recorded in autumn 1986 by Dubois (1986) who found 49% males. However, the proportion of adults in both Morocco and Tunisia in 1987 was higher than Dubois' value of 74%.

Feeding activity

Search and success indices from a salt-lake (Sebkha Sedjoumi) a seasonal eutropic fresh-water marsh (Grande Daya) and a series of salt-pans (Sidi Moussa) are compared in Table 5, to give an idea on feeding patterns in different habitats.

From these observations, it seems that salt-pans may provide the most favourable feeding places. At Grande Daya, birds had significantly lower numbers of successful pecks, and a higher search index than the other two areas (F-test $p<0.01$). At Sebkha Sedjoumi pecks occurred with every pace. This high peck rate may have been due to the turbidity of the water, or to a very small size and high mobility of the prey.

However, information on the distribution and abundance of the prey is needed to explain differences in feeding habits. Feeding techniques were similar to those described by Dubois (1986b). Birds feed by surface pecking when they are walking in shallow water (depth less than 12 cm). In deeper waters, feeding by immersion of head seems much more common. In autumn, immature and adult birds show different feeding strategies according to water-depth (Dubois 1986b). Table 6 summarizes the search and success indices at two different water levels for immatures and sexed adults at Sidi Moussa on 8 February 1987). Both males and females were more successful in deep water, and females show the higher success index. The success index for males was similar in high and shallow water. Immatures had a higher number of paces in the deep water, compared with the adults, and had the lowest number of success and pecks. This resulted in immatures having a significantly higher search index ($p<0.05$). Immatures had a high search index at both depths of water, but still in February different from the adults' one, getting good results with less effort in shallow waters.

Feeding and preening patterns throughout daylight hours at Sebkha Sedjoumi on 8 January 1987 and Grande Daya on 5 February 1987, are shown in Figures 2 and 3. Average time spent feeding by each individual was 5.0 h at Grande Daya and 9.9 h at Sebkha Sedjoumi. The much longer period of feeding may be due to differences in the type and density of prey. However, feeding may have been affected also by adverse weather conditions at Sebkha Sedjoumi during the middle of the day: after rain had ceased there was an increase in feeding activity.

Intraspecific interactions

In the first half of February, 40% of individuals seen in Morocco were paired. On 7 February copulation occurred repeatedly among 15 pairs at Grande Daya.

The ringed male at Sidi Moussa was feeding beside a female and two immatures, and repeatedly attacked all the other individuals that came within 20-30 m. This suggests that parental bonds might last the whole winter. Six night-time roosts were observed. All were in the water (depth 5-14 cm), and quite far from shore (20-400 m). Roosting birds were usually spaced 20-50 cm apart, in elongated groups. Paired birds did not seem to join these roosting flocks.

Table 4. Age and sex ratios of Black-winged Stilts in Tunisia and Morocco in January/February 1987.

	Immatures	Adults	Males	Females
Tunisia				
n	37	143	65	78
%	20.6	79.4	45.5	54.5
Morocco				
n	92	372	183	189
%	19.8	80.2	49.2	50.8

DISCUSSION

Few wetlands of Morocco and Tunisia seem to have a regular role as wintering areas for the Black-winged Stilt. However, wintering in the whole Maghreb region is greatly affected by the amount of autumn-winter rains, which increase the extension of flooded areas and dilute the salt concentrations in the lakes, so there may be considerable yearly differences in the numbers overwintering in the area. However, the ringing evidence suggests that many individuals return to overwinter in the same sites, and spend the whole winter at one site. In addition to the 7 ringed birds recorded in this study at

Table 5. Feeding behaviour of Black-winged Stilts in January/February 1987 at three wintering sites. Each value is the mean of 50 1-minute observations.

	n	paces		pecks		success		search index		success index	
		mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
Sebkha Sedjoumi	50	63.6	12.8	57.3	14.1	10.8	3.4	1.11	0.06	0.19	0.02
Grande Daya	50	56.9	17.1	21.4	11.6	7.5	4.3	2.66	0.40	0.35	0.03
Sidi Moussa	50	70.1	14.1	33.0	13.7	16.2	5.7	2.12	0.70	0.49	0.06

Table 6. Feeding behaviour of Black-winged Stilts of different ages and sexes in shallow and deep water at Sidi Moussa on 8 February 1987. Values for paces, pecks and successes are the number per minute.

	n	paces		pecks		successes		search index		success index	
		mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
Shallow water (0-12 cm)											
adult males	8	65.7	6.3	31.5	3.7	16.0	2.4	2.08	0.06	0.51	0.03
adult females	10	75.6	7.6	41.9	4.9	12.4	2.4	1.80	0.03	0.30	0.03
immatures	7	66.5	6.3	28.5	3.3	17.0	1.4	2.33	0.05	0.60	0.02
deep water (12-33 cm)											
adult males	10	64.6	6.3	34.6	4.9	19.6	2.8	1.87	0.09	0.57	0.01
adult females	8	71.3	4.6	22.3	4.0	17.3	1.5	3.20	0.41	0.78	0.07
immatures	7	81.0	9.5	20.5	3.8	14.5	1.3	3.95	0.28	0.71	0.07

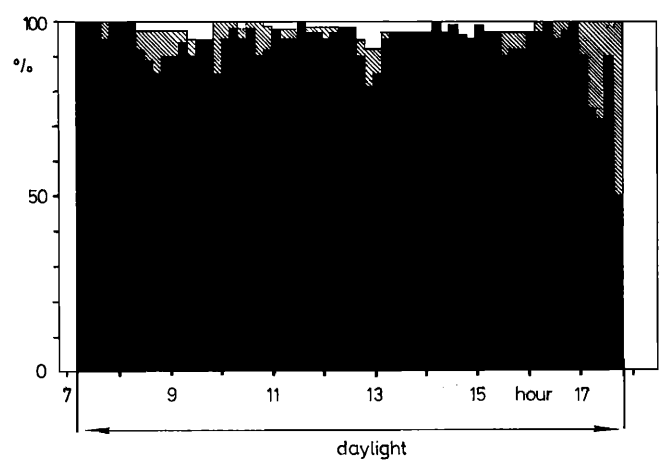

Figure 2. Frequency of feeding (solid), preening (cross-hatched) and loafing and resting (open) by 260 Black-winged Stilts during daytime at Sebkha Sedjoumi on 8 January 1987.

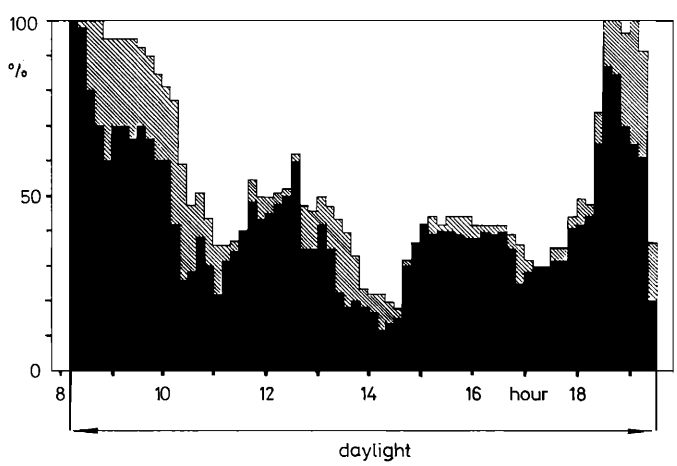

Figure 3. Frequency of feeding (solid), preening (cross-hatched) and loafing and resting (open) by 160 Black-winged Stilts during daytime at Grande Daya on 5 February 1987.

Sidi Moussa and Grande Daya, one individual ringed as a juvenile on 19 September 1972 at Sidi Moussa was recaptured there on 18 December 1973 (Pienkowski and Knight 1977), and 2 Tunisian-ringed birds were reported locally in later years (Thomsen and Jacobsen 1979). The recent increase of the number of birds wintering in Southern Europe may result from the establishment of sedentary wintering populations, like those in the Maghreb.

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REFERENCES

Alberto,L.J. and Purroy,F.J. 1981. Censos de limicolas invernantes en Espana (1978, 79 y 80), realizados por la Sociedad Espanola de Ornitologia. *Ardeola* 28: 3-33.

Alberto,L.J. and Purroy,F.J. 1983. Datos del Censo invernal de limicolas de 1981 y 1982

en Espana. *Ardeola* 30: 93-100.

Dijk,A.J.van, Dijk,K.van, Dijksen,L.J., Spanje,T.M.van and Wymenga,E. 1984. Waders of the Gulf of Gabes, Tunisia, January to March 1984. *Wader Study Group Bull.* 41: 16-18.

Dubois,P.J. 1986a. WSG international project on Black-winged Stilts: First progress report. *Wader Study Group Bull.* 46: 10-11.

Dubois,P.J. 1986b. Rapport de mission d'etudes hivernales de l'Echasse blanche, *Himantopus himantopus* sur ses quartiers africains. Rapport preliminaire I. L.P.O./S.R.E.T.I.E. Ministere de l'Environment.

Gaultier,T. 1986. Recensement des oiseaux d'eau en Tunisie, Janvier 86. Unpublished report of the Ministere de l'Agriculture.

Goldschmidt,B. de and Hafner,H. 1973. Denombrement de la sauvagine en Tunisie et dans le nord-est de l'Algerie. Janvier 1973. Unpublished report of the Station Biologique de la Tour de Valat, Arles.

Johnson,A.R. and Hafner,H. 1971. Denombrement de sauvagine en automne sur des zones humides de Tunisie et d'Algerie. Unpublished report of the Station Biologique de la Tour de Valat, Arles.

Johnson,A.R., de Jong,A. and Dierman,J.van. 1975. Denombrement de la sauvagine en Algerie en Janvier 1975. Unpublished report of the Station Biologique de la Tour de Valat, Arles.

Moreau,R.E. 1967. Water birds over the Sahara. *Ibis* 109: 232-259.

Ochando,B., De Smet,K., Oldache,E.H. and Benkouider,M. 1985. Recensements hivernaux d'oiseaux d'eau. Oranie et sud constantinois. Janvier 1985. Unpublished report of the Institut National Agronomique El-Harrach Alger.

Pienkowski,M.W. and Knight,P.J. 1977. Migration des limicoles au Maroc. *Alauda* 45: 165-190.

Schenk,H. 1976. Analisi della situazione faunistica in Sardegna. Uccelli e Mammiferi. *SOS Fauna*: 465-556.

Serrano,P., Cabot,J. and Haeger,F. 1983. Dieta de la ciguenuela (*Himantopus himantopus*) en las salinas del estuario del Guadiana. *Acta Vertebrata* 10(1): 55-69.

Smit,C. 1986. Waders along the Mediterranean. A summary of present knowledge. In: *First Conference on Birds Wintering in the Mediterranean Region.* Aulla 1984. *Suppl. INBS* 10: 297-317.

Thevenot,M. and Beaubrun,P. 1984. Recensement hivernal d'oiseaux d'eau au Maroc - Janvier 1984. Report of the Direction des eaux et forets and of the Institut Scientifique de Rabat.

Thomsen,P. and Jacobsen,P. 1979. *The birds of Tunisia.* Jelling Bogtrykkeri, Copenhagen.

Tinarelli,R. 1987. Aspetti della biologia invernale dell'Avocetta *Recurvirostra avosetta* in alcune zone umide costiere del nord Adriatico. *Avocetta*: 11: 37-45.