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PALAEARCTIC BIRDS WINTERING IN SOUTHWEST MAURITANIA: SPECIES, DISTRIBUTIONS AND POPULATION ESTIMATES

by P. W. P. Browne

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INTRODUCTION

Since the pioneering work (in so far as West Africa is concerned) of Morel & Roux (1966, 1973), it has been known that many Palaearctic birds winter in northern Senegal. There are also important wintering grounds for Palaearctic waders, terns and gulls in northwest Mauritania (Banc d'Arguin - Nouadhibou, Pététin & Trotignon 1972, Trotignon 1980). The inundation zone of the Niger in Mali is another immense wintering area for Palaearctic birds and information for that country has recently been summarized by Lamarche (1980-81). This paper reports on a study of Palaearctic birds wintering in that part of Mauritania which lies between these three zones (Fig. 1). The only previous work apparently consisted of two surveys from a boat of *c.* 20 km of the north bank of the Senegal River (about 16°30'N, 15°40'W) by Dr G. Morel (pers. comm.) in December 1963 and January 1964, an aerial survey of 25 localities (mostly near the Senegal River) which attract water birds by Tréca and Roux (Roux *et al.* 1978 and pers. comm.) on 6 December 1975 and records of recoveries of two ringed birds near Nouakchott in January 1978 (Trotignon 1980).

I attempted to determine which Palaearctic species occurred, to delineate the limits of winter quarters of those not found over the whole area and to estimate the total numbers present.

All the observations were my own made in the months of January and December 1978, 1979, 1980, 1981 and January 1982 (except for supporting data collected in other months). December and January were chosen to as to avoid if possible the inclusion of passage migrants. Passage of Palaearctic birds was found to be noticeable in November and again in February (as shown below, it also occurred to a small extent in December and January).

A total of 122 hours of observation was made at 73 different localities, usually near main roads reached by car from Nouakchott, and including all major types of habitat in southwest Mauritania (see Table 1, Fig. 1). The amount of time spent in each habitat (Table 1) was not proportional to the extent of that habitat in southwest Mauritania. In fact, this part of the country is about 90% dry steppe, little influenced by man (A in Table 1), but only about 35% of my time was spent in such habitat. More time was spent in wet habitats where most of the Palaearctic species occurred.

Because birds were quite visible on dry steppe with scattered bushes and little ground cover, I was able to identify and count most small birds in an area of about 30 ha (0.3 sq km) per hour (and greater areas for larger birds). The 30 localities visited in natural dry steppe were a reasonably random selection, so I have been able to estimate the populations of some species which seemed to be evenly spread.

Table 1 Description of habitats and visits made to each

Natural habitat	Influence of man	Identifying symbol	Number of localities	Hours of observation
Dry steppe: sandy soil, vegetation varying from scattered bushes to occasional *Acacia* forest	Insignificant (occasional herds of domestic animals)	A	30	42.1
	Significant - buildings, refuse heaps, cultivation without surface water	B	16	25.6
Rocky escarpment	Insignificant	C	3	4.8
Open ocean observed from beach	Insignificant	D	2	2.1
On and around salt (*) water shores and pools; some bushes	Insignificant	E	9	9.6
	Significant - buildings, refuse	F	4	9.2
Vicinity of fresh (*) water	Significant - cultivation, irrigation systems	G	9	28.6
Total			73	122.0

(*) To some extent the distinction between salt and fresh water pools was arbitrary as varying amounts of salt are present in the soil and so in standing water in many parts of Mauritania, but the closer to the coast, the greater the amount of salt. I have assumed that all standing water in the Senegal River delta was salt as well as all pools near Nouakchott except in the irrigated gardens; all other pools were considered fresh.

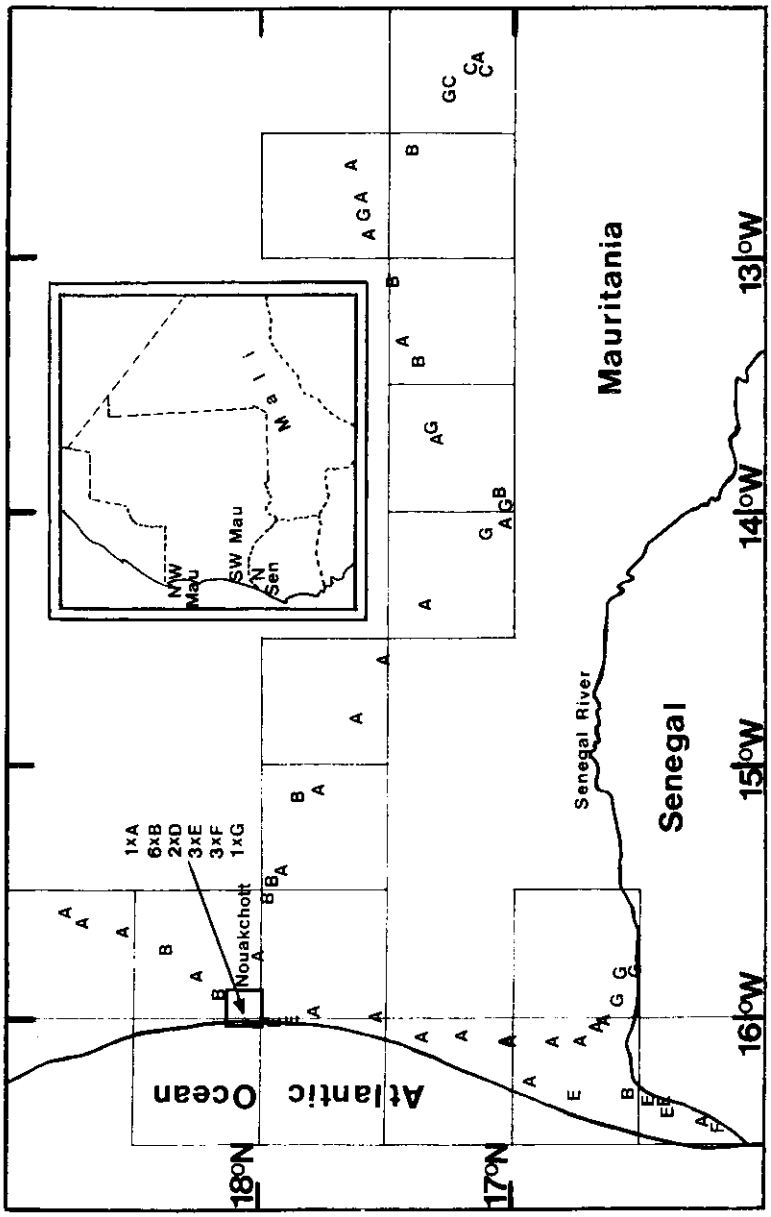

Figure 1 Southwest Mauritania showing localities and half degree squares where observations were made on wintering Palaearctic birds and, inset, neighbouring areas used for comparison. See Table 1 for meaning of A-G.

SPECIES CONCERNED

Altogether I observed 103 Palaearctic species. 11 are excluded as being probable passage migrants and 14 more because they breed in or near Mauritania and their Palaearctic origin was uncertain. Three species' identities needed confirmation. See Appendix 3 for evidence used in including and excluding species. Morel (pers. comm.), Tréca & Roux (pers. comm.) observed *Platalea leucorodia*, *Limosa limosa* and *Sterna leucoptera*, while Trotignon (1980) recorded the recovery of *Stercorarius skua* and *S. parasiticus*. I saw none of these five species in December and January.

I counted the number of birds of each species at each locality on each visit and subsequently the bird days were summed for each species in each type of habitat. A summary of the records of the 83 (103-11-14+5) species is given in Table 2. This shows the number seen in each type of habitat as well as the number of localities at which each species was recorded. At the end of the table is a summary per type of habitat. For localities at which each species occurred see Appendix 2.

LIMITS OF WINTER QUARTERS

(a) Habitat preference

For 55 species which I observed, winter quarters were limited by habitat preference. 45 species were confined to the vicinity of standing water, either salt or fresh. They can be divided into four groups:

(1) Open ocean: along the whole coast:

Sula bassana, *Sterna sandvicensis*.

(2) Salt water shores and pools: the whole coast and pools in the Senegal delta, mainly west of 16°W:

Ciconia nigra, *Pluvialis squatarola*, *Charadrius hiaticula*, *Limosa lapponica*, *Arenaria interpres*, *Calidris canutus*, *C. ferruginea*, *C. alba*, *Haematopus ostralegus*, *Larus fuscus*.

(3) Vicinity of fresh or salt water shores and pools (winter quarters (2) and (4) combined):

Egretta alba, *E. garzetta*, *Ardea cinerea*, *Anas acuta*, *Circus pygargus*, *Charadrius dubius*, *Tringa hypoleucos*, *T. totanus*, *Calidris alpina*, *C. minuta*, *Philomachus pugnax*, *Recurvirostra avosetta*, *Larus ridibundus*.

(4) Vicinity of fresh water: mainly pools and lakes left by rain, which gradually dry up as the dry season advances (Nov.-June) but are still very significant Dec.-Jan. The pools appear to be found right across the country south of about 18°N. Also irrigated areas near Rosso (16°31'N, 15°48'W) and Nouakchott:

Ciconia ciconia, *Plegadis falcinellus*, *Anas querquedula*, *A. clypeata*, *Circus aeruginosus*, *Coturnix coturnix*, *Tringa nebularia*, *T. stagnatilis*, *T. glareola*, *T. ochropus*, *T. erythropus*, *Gallinago gallinago*, *Calidris*

temminckii, Apus melba, Riparia riparia, Motacilla cinerea, Anthus trivialis, A. cervinus, Saxicola torquata, Luscinia megarhynchos.

The other ten species showed habitat preferences as follows:

(5) Where the influence of man was significant (mainly in or near towns and villages):

Milvus migrans, Hirundo rustica, Motacilla alba.

(6) Near water as well as man's influence (wet areas; on steppe near cattle):

Motacilla flava.

(7) In areas with many large trees:

Streptopelia turtur, Phoenicurus phoenicurus.

(8) Rocky escarpment and also around buildings:

Hirundo obsoleta, Monticola solitaria.

(9) Natural dry steppe:

Sylvia hortensis, Phylloscopus bonelli.

(b) Geographical limits

Thirteen species and one race were quite widespread but were not found over the whole area studied, each being confined (or almost so) to one section of the territory. My observations covered a range from 16°N to 19°N and from 12°W to 16°30'W. In this area there are 51 half degree squares lying wholly or partly in Mauritania; I visited 17 of them (Fig. 1). Because the coverage was so sparse, I consider that half degree squares define the occurrence of species with sufficient accuracy. Also this ties in with the standard methods for mapping African bird distributions suggested by Ash & Pomeroy (1981).

The amount of time spent in each half degree square was very variable (Fig. 2), but I was able to calculate an abundance rating of any species by dividing the number of bird days by the number of hours of observation. The rating takes the value 1 to 9 on a logarithmic scale (base: $\sqrt{10}$ or *c.* 3.2 - see Fig. 2). It has a wider range than the rating of 0-5 suggested by Ash & Pomeroy, though the range can be changed easily. However, it is of a different nature from theirs in that it is based objectively upon counts of birds observed per hour instead of on a subjective assessment of abundance. It has the advantage that scarcity, corresponding to low values of the rating, can only be shown when the number of hours of observation in a square is high. On the other hand, misleadingly high ratings can occur when the number of hours of observation is very low, especially if the observer chooses a relatively rich habitat for his brief survey. In the present study, observations from all habitats were lumped together to produce the ratings,

Table 2 Palaearctic winter visitors to southwest Mauritania: bird days in each habitat and number of localities at which seen

Species	Bird days in each habitat								Number of locs.
	Dry				Wet			Total	
	A*	B	C	D	E	F	G		
Sula bassana	-	-	-	24	-	-	-	24	2
Egretta alba	-	-	-	-	50	-	6	56	2
E. garzetta	-	-	-	-	12	-	3	15	2
Ardea cinerea	-	-	-	-	32	-	40	72	7
Ciconia ciconia	-	-	-	-	-	-	1	1	1
C. nigra	-	-	-	-	3	-	-	3	1
Plegadis falcinellus	-	-	-	-	-	-	30	30	1
Platalea leucorodia	seen by Tréca and Roux								
Anas acuta	-	-	-	-	1	3	401	405	4
A. querquedula	-	-	-	-	-	-	93	93	5
A. clypeata	-	-	-	-	-	-	20	20	2
Gyps fulvus	1	-		-	-	-	-	1	1
Neophron percnopterus	-	1	2	-	-	-	1	4	3
Circus macrourus	1	-	-	-	-	-	-	1	1
C. pygargus	-	-	-	-	1	-	3	4	4
C. aeruginosus	-	-	-	-	-	-	7	7	4
Circaetus gallicus	-	-	1	-	-	-	1	2	2
Buteo rufinus	1	-	-	-	-	2	-	3	2
Hieraaetus pennatus	1	-	-	-	-	-	1	2	2
Milvus migrans	7	331	-	-	2	181	65	586	18
Falco peregrinus	-	1	2	-	-	-	1	4	3
F. tinnunculus	5	4	-	-	-	1	12	22	14
Coturnix coturnix	-	-	-	-	-	-	5	5	1
Pluvialis squatarola	-	-	-	-	14	5	-	19	3
Charadrius hiaticula	-	-	-	-	21	58	11	90	7
C. dubius	-	-	-	-	-	2	18	20	6
Limosa limosa	seen by Tréca and Roux								
L. lapponica	-	-	-	-	3	1	-	4	2
Tringa nebularia	-	-	-	-	-	-	3	3	2
T. stagnatilis	-	-	-	-	-	-	8	8	5
T. glareola	-	-	-	-	-	-	13	13	5
T. ochropus	-	-	-	-	-	-	3	3	3
T. hypoleucos	-	-	-	-	-	2	2	4	3
T. totanus	-	-	-	-	8	2	8	18	5
T. erythropus	-	-	-	-	-	-	28	28	4
Arenaria interpres	-	-	-	-	1	1	-	2	2
Gallinago gallinago	-	-	-	-	-	-	7	7	3
Calidris canutus	-	-	-	-	8	1	-	9	4
C. alpina	-	-	-	-	63	17	4	84	6
C. ferruginea	-	-	-	-	15	2	-	17	3
C. minuta	-	-	-	-	36	50	38	124	11
C. temminckii	-	-	-	-	-	-	1	1	1
C. alba	-	-	-	-	216	217	-	433	4

Philomachus pugnax	-	-	-	-	-	1	757	758	5
Haematopus ostralegus	-	-	-	-	12	2	-	14	2
Recurvirostra avosetta	-	-	-	-	25	1	1	27	3
Stercorarius skua	recovery reported by Trotignon								
S. parasiticus	recovery reported by Trogignon								
Larus ridibundus	-	-	-	-	18	6	8	32	7
L. fuscus	-	-	-	-	116	102	-	218	4
Sterna sandvicensis	-	-	-	38	-	-	-	38	2
S. leucoptera	seen by Morel								
Streptopelia turtur	500	-	-	-	-	-	79	579	3
Apus melba	-	-	-	-	-	-	1	1	1
Calandrella brachydactyla	7	92	-	-	-	-	306	405	5
Riparia riparia	-	-	-	-	-	-	54	54	5
Hirundo rustica	-	17	-	-	3	63	37	120	17
H. obsoleta	-	3	2	-	-	-	3	8	3
Delichon urbica	-	5	-	-	-	1	-	6	3
Motacilla flava	7	3	-	-	1	9	57	77	12
M. cinerea	-	-	-	-	-	-	5	5	1
M. alba	13	178	-	-	1	199	585	976	23
Anthus campestris	6	5	-	-	-	-	3	14	9
A. trivialis	-	-	-	-	-	-	5	5	2
A. cervinus	-	-	-	-	-	-	7	7	1
Lanius senator	15	-	-	-	-	-	5	20	9
Saxicola torquata	-	-	-	-	-	-	3	3	1
Oenanthe oenanthe	22	22	-	-	1	18	21	84	27
O. hispanica	28	7	-	-	-	2	15	52	21
O. deserti	21	40	-	-	3	7	-	71	22
O. isabellina	-	2	-	-	-	2	-	4	3
Monticola solitaria	-	3	1	-	-	-	-	4	2
Phoenicurus phoenicurus	3	-	-	-	-	1	13	17	5
P. ochruros	-	-	-	-	-	1	1	2	2
Luscinia megarhynchos	-	-	-	-	-	-	2	2	1
Sylvia hortensis	13	-	-	-	-	-	-	13	9
S. atricapilla	4	7	-	-	-	5	59	75	8
S. communis	1	-	-	-	-	-	-	1	1
S. melanocephala	4	10	-	-	3	3	42	62	12
S. cantillans	23	10	-	-	2	3	12	50	21
S. conspicillata	17	6	-	-	-	2	-	25	12
Phylloscopus collybita	3	22	-	-	-	19	119	163	11
P. bonelli	16	-	-	-	-	-	-	16	7
Number of species	24	21	5	2	28	36	56	78	
Total birds	719	769	8	62	671	992	3034	6255	
Total hours	42.1	25.6	4.8	2.1	9.6	9.2	28.6	122.0	
Birds/hour	17	30	2	29	70	108	106	51	

* Habitats A, B, C, D, E, F, G defined in Table 1

though as shown in the bottom line of Table 2, the number of birds/hour varied a lot from one habitat to another. More uniformity would have been achieved by using only the results for natural dry steppe, but then less complete geographical coverage would have been achieved. I would urge other authors to explore the use of such objective ratings by counting all birds seen and the number of hours of observation. The same rating can be used to show seasonal distributions, as is done in Appendix 3.

The ratings are used in Fig. 2 to indicate the geographical distributions of the 13 species and one race. A layout such as this allows the distributions of many species to be shown on the same map. By keeping the position of each species constant within the square and indicating species not found by "-", it is easy to scan the map and pick out the distribution of each species. This procedure is facilitated if a mask is made of the size of the map, with one hole in the same position (*eg* top right hand corner) for each half degree square, just large enough to reveal the record for a single species. The fact that many species can be shown on one page without the use of colour should allow distribution atlases to be produced more cheaply.

Anthus campestris, Lanius senator, Sylvia hortensis and *Phylloscopus bonelli*, exhibited a strong preference for southern areas. On the other hand, *Oenanthe deserti* was limited to the northern part of the region. *Oenanthe oenanthe, O. hispanica* and *Sylvia cantillans* were fairly evenly distributed except in the very north. *Sylvia atricapilla, S. melanocephala, S. conspicillata* and *Phylloscopus collybita* were observed only in western areas. *Calandrella brachydactyla* and *Oenanthe oenanthe seebohmi* (the black-throated race, some specimens of which could be recognised in the field) were mainly seen in the east.

ESTIMATES OF POPULATIONS

For eight species which were widespread and evenly distributed over the natural dry steppe, it was possible to calculate approximately the populations of birds in this habitat. Evenness of distribution was determined from the value of χ^2 based on observed occurrences (bird days) and the number expected at each locality, given the number of hours of observation there and that the number to be seen per hour was constant at all localities. Of nine species occurring in five or more localities on natural dry steppe, only *Sylvia conspicillata* gave a significant value of χ^2, indicating its distribution was uneven (*ie* flocking or bunching), so it was excluded. An estimate of the total population of each of the other eight species was calculated by dividing the number of birds observed per hour (on dry steppe only, therefore not the same as the ratio used for calculating abundance ratings in Fig. 2, which refers to all habitats) by the number of km^2 searched per hour (0.3 km^2 for all passerines except shrikes, 0.4 km^2 for shrikes, 1.0 km^2 for raptors) and multiplying the result by the number of km^2 of dry steppe in the area where the species is believed to winter (Table 3). The total estimated population of these eight species is 1,000,000 birds.

The only other species for which I have even partial estimates of the wintering population were *Milvus migrans* and *Motacilla alba*. Nouakchott attracted by far the largest numbers of both species and all those present in Nouakchott often appeared to form a single group. I counted *c.* 300 *M. migrans* in January 1981 at the slaughter house, and twice during Dec.

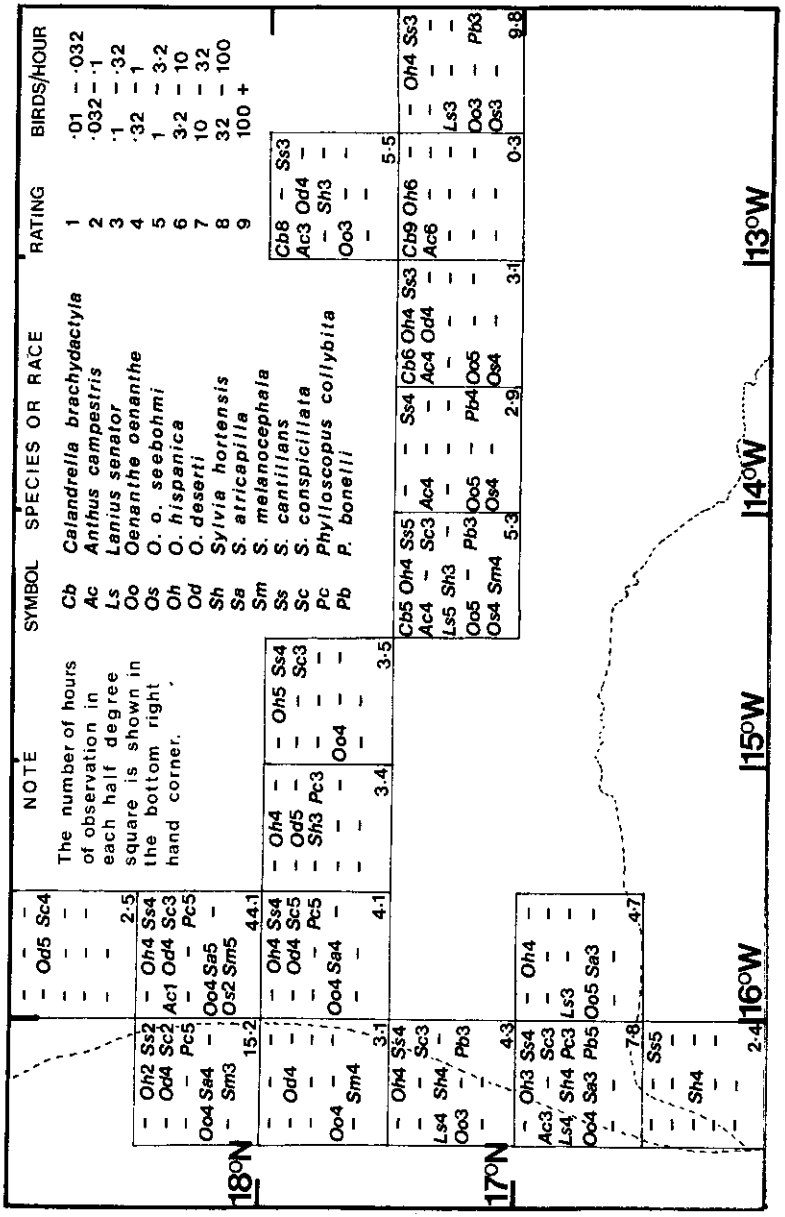

Figure 2 Abundance ratings per half degree square of 13 Palaearctic species and one race wintering in southwest Mauritania

Table 3 Calculation of populations of eight species on natural dry steppe

Species	Area (1)	Birds counted	Hours of obser.	Birds/ hr.	Birds/ km²	km² (2)	Estimated population
Falco tinnunculus	south of 18°00'N	5	37.6	0.13	0.13	76,000	10,000
Lanius senator	south of 17°21'N	15	20.7	0.73	1.5	48,000	70,000
Oenanthe oenanthe	south of 18°02'N	22	37.6	0.59	2.0	77,000	150,000
Oenanthe hispanica	south of 18°00'N	28	37.6	0.75	2.5	76,000	190,000
Oenanthe deserti	north of 17°26'N	21	21.4	0.98	3.3	67,000	220,000
Sylvia hortensis	south of 17°54'N	13	34.4	0.38	1.3	72,000	90,000
Sylvia cantillans	south of 17°47'N	23	33.4	0.69	2.3	67,000	150,000
Phylloscopus bonelli	south of 17°21'N	16	20.7	0.77	2.6	48,000	120,000
			Total				1,000,000

(1) From the extreme northerly or southerly observations on natural dry steppe

(2) 90% of the Mauritanian land area shown in Figure 1 within the limits indicated in the column "Area"

1978 I counted *c.* 3500 *M. alba* leaving the apparently only roost in the town, in *Eucalyptus* trees in the town centre.

DISCUSSION

(a) Comparison with neighbouring areas

Publications dealing with Senegal (de Smet & van Gompel 1980, Morel 1972, 1980), northwest Mauritania (Pététin & Trotignon 1972, Trotignon 1980) and Mali (Lamarche 1980-81), together with the present paper, give information on Palaearctic birds wintering in a vast area comprising the western third of the Sahel and the southern Sahara (*c.* 17°W to 3°E, see inset map Fig. 1). In Table 4, I have summarized the status of 171 Palaearctic species which are considered to be winter visitors to one or more of the areas: northwest Mauritania, southwest Mauritania, northern Senegal (north of 14°N) and central Mali (north of 14°N).

All but one of the 83 Palaearctic species found to winter in southwest Mauritania have also been observed wintering in at least one of these neighbouring areas. The exception is *Phoenicurus ochruros*, but that has previously been recorded south of the Sahara in Mauritania (Atar, 20°31'N, 13°03'W, 7 April 1947, Heim de Balsac 1949-51) and in south Mali (Lamarche 1980-81).

All aquatic species found wintering in southwest Mauritania also winter in nearby northern Senegal, in similar habitats. In northwest Mauritania, the aquatic species occurring in winter are mainly those found in salt water habitats further south, though there are exceptions, *eg Tringa stagnatilis* and *Motacilla cinerea*, which have only been observed wintering near fresh water in southwest Mauritania. Even though aquatic species made up a majority of the species observed in southwest Mauritania, they must represent a minority of the Palaearctic winterers since suitable habitat is very restricted. The birds of the dry steppe form the majority of the wintering populations. There are a few species of raptor, which are much the same as those found in northern Senegal. The most characteristic and numerous Palaearctic birds are passerines.

For two species, *Sylvia melanocephala* and *S. conspicillata*, western Mauritania west of 14°W is the main wintering ground south of the desert. *S. melanocephala* occurs in northern Senegal occasionally (Morel 1972, de Smet & van Gompel 1980), but *S. conspicillata* has not been recorded at all in that country. Neither species has been recorded in Mali. *S. melanocephala* is quite common in the vicinity of Nouadhibou in northwest Mauritania in winter (Trotignon 1980), but the records there of *S. conspicillata* are very few. Consequently it appears that the principal southern wintering ground of that species is in southwest Mauritania.

The other two species confined even more closely to western districts in southwest Mauritania, *Phylloscopus collybita* (west of 15°W) and *Sylvia atricapilla* (west of 15°30'W), winter commonly in both northwest Mauritania and northern Senegal but in Mali apparently only in the south (Lamarche 1980-81). That these species and the two above appear limited to western areas may be accounted for by the marked difference in type of vegetation on the dry steppe as one proceeds from west to east. Non-spiny bushes and trees (*Salvadora persica, Euphorbia balsamifera* and *Tamarix senegalensis*)

Table 4 Palaearctic winter visitors to the western Sahel and southwestern Sahara

	NW Maurit.	SW Maurit.	N (14°+) Senegal	Cent (14°+) Mali
Podiceps ruficollis	w	a	A	A
Sula bassana	W	W	W	-
Ixobrychus minutus	-	-*	W	W
Nycticorax nycticorax	p	P*	W	W
Ardeola ralloides	-	p	A	W
Egretta alba	w	W	A	A
E. garzetta	W	W	W	W
Ardea cinerea	W	W	W	W
A. purpurea	p	p*	W	W
Ciconia ciconia	p	w	W	W
C. nigra	p	w	w	p
Geronticus eremitus	-	-	-	w
Plegadis falcinellus	w	W	W	W
Platalea leucorodia	w	w	w	p
Phoenicopterus ruber	W	P*	W	-
Branta bernicla	w	-	-	-
Anser fabalis	-	-	-	w
Tadorna tadorna	-	-	w	-
Anas penelope	w	-	w	W
A. strepera	-	-	w	w
A. crecca	-	-*	W	W
A. platyrhynchos	-	-	-	w
A. acuta	p	W	W	W
A. angustirostris	-	-*	w	w
A. querquedula	p	W	W	W
A. clypeata	-	W	W	W
Aythya ferina	p	p	w	W
A. nyroca	-	-*	w	W
A. fuligula	-	-	w	W
Melanitta nigra	w	-	-	-
Gyps fulvus	w	w	w	w
Neophron percnopterus	w	w	w	W
Circus macrourus	-	w	W	W
C. pygargus	p	w	W	W
C. aeruginosus	W	w	W	W
Circaetus gallicus	p	w	W	W
Accipiter nisus	-	-	-	w
Buteo rufinus	w	w	w	W
B. buteo	w	p	w	P
Hieraaetus spilogaster	w	a	a	a
H. pennatus	p	w	w	w
Milvus migrans	w	W	W	W
Pernis apivorus	-	p	w	w
Pandion haliaetus	W	p	w	W
Falco biarmicus	w	a	w	W

F. cherrug	w	p	w	w
F. peregrinus	w	w	w	W
F. vespertinus	-	-	w	w
F. tinnunculus	w	W	W	W
Coturnix coturnix	p	w	W	W
Porzana parva	-	-*	w	-
P. pusilla	-	-	w	-
P. porzana	p	-*	W	w
Gallinula chloropus	p	p*	W	W
Fulica atra	p	-*	w	W
Burhinus oedicnemus	p	p*	W	W
Vanellus vanellus	p	p	w	-
Pluvialis apricarius	w	p	w	-
P. squatarola	W	W	W	-
Charadrius hiaticula	W	W	W	w
C. dubius	-	W	W	W
C. alexandrinus	W	A	w	w
C. asiaticus	-	-	-	w
Numenius phaeopus	W	P	w	w
N. arquata	W	p	w	w
Limosa limosa	w	W	W	W
L. lapponica	W	w	W	-
Tringa nebularia	W	w	W	W
T. stagnatilis	w	w	W	w
T. glareola	-	W	W	w
T. ochropus	p	w	W	W
T. hypoleucos	-	w	W	W
T. totanus	W	W	W	w
T. erythropus	p	W	W	w
Arenaria interpres	W	w	W	P
Gallinago media	-	-	w	w
G. gallinago	-	w	W	w
G. minima	-	-	P	w
Calidris canutus	W	w	w	P
C. alpina	W	W	w	w
C. ferruginea	W	W	w	w
C. minuta	W	W	W	W
C. temminckii	-	w	w	w
C. alba	W	W	W	w
Limicola falcinellus	-	-	-	w
Philomachus pugnax	w	W	W	W
Phalaropus fulicarius	w	-	p	-
Haematopus ostralegus	W	W	w	w
Recurvirostra avosetta	P	W	W	W
Cursorius cursor	a	A	w	w
Glareola pratincola	p	P	W	W
Stercorarius skua	W	w	w	-
S. pomarinus	W	p	p	-
S. parasiticus	W	w	w	-
Larus melanocephalus	p	-	w	-
L. tridactylus	w	-	p	-
L. ridibundus	W	W	W	W
L. genei	A	P	A	w
L. argentatus	P	p	w	w

L. fuscus	W	W	W	W
Sterna nilotica	A	P	a	W
S. caspia	A	P*	W	W
S. sandvicensis	W	W	W	w
S. dougalii	W	p	p	w
S. hirundo	W	p	W	W
S. hybrida	-	p	W	W
S. leucoptera	p	w	W	W
S. nigra	w	p	W	p
S. albifrons	W	P	W	A
Streptopelia turtur	P	W	W	W
Otus scops	p	p*	W	w
Asio flammeus	p	p	p	w
Caprimulgus ruficollis	-	p	p	w
C. aegyptius	-	-*	W	W
Apus melba	p	w	p	W
A. apus	P	P	P	W
A. pallidus	W	-	p	W
Upupa epops	W	P*	W	W
Jynx torquilla	p	p	w	p
Calandrella brachydactyla	W	W	P	W
Riparia riparia	-	W	W	W
Hirundo rustica	W	W	w	w
H. rupestris	-	-	p	w
H. obsoleta	w	w	-	a
Delichon urbica	w	w	p	P
Motacilla flava	w	W	W	W
M. cinerea	w	w	w	p
M. alba	W	W	W	W
Anthus campestris	w	W	W	W
A. novaeseelandiae	-	-	-	w
A. trivialis	P	w	w	W
A. cervinus	W	w	w	W
A. pratensis	w	-	-	-
Lanius collurio	-	-	-	w
L. minor	-	-	-	w
L. excubitor	a	A	W	A
L. senator	P	W	W	W
L. nubicus	-	-	-	w
Sturnus vulgaris	w	-	-	-
Saxicola rubetra	P	P	w	p
S. torquata	w	w	a	p
Oenanthe oenanthe	W	W	W	W
O. hispanica	p	W	W	W
O. deserti	W	W	w	W
O. isabellina	-	w	w	W
Monticola saxatilis	-	p	-	w
M. solitaria	-	w	w	-

Phoenicurus phoenicurus	P	W	W	W
P. ochruros	-	w	-	-
Cercotrichas galactotes	p	p*	W	W
Luscinia megarhynchos	P	w	W	p
L. svecica	P	P*	W	w
Locustella luscinioides	-	-	w	w
Acrocephalus schoenobaenus	P	P*	W	W
A. paludicola	p	-	p	w
A. scirpaceus	p	P*	w	W
A. arundinaceus	-	p	w	w
Hippolais pallida	p	P*	W	W
Sylvia hortensis	p	W	W	w
S. atricapilla	W	W	w	w
S. communis	p	w	W	P
S. curruca	-	-	-	w
S. melanocephala	W	W	w	-
S. cantillans	p	W	W	W
S. conspicillata	w	W	-	-
Phylloscopus trochilus	P	P	P	w
P. collybita	W	W	W	W
P. bonelli	-	W	W	W
P. sibilatrix	-	-	p	w
Ficedula hypoleuca	p	P	w	w
Emberiza calandra	w	-	p	-

KEY:

Common	Scarce	Status
A	a	Observed in winter but probably of Afrotropical origin
P	p	Palaearctic passage migrant
W	w	Palaearctic winter visitor (Dec.-Jan.)
	-	Not recorded
	*	Will probably be found to winter in southwest Mauritania

Note: A further 38 species have been recorded as passage migrants or vagrants in at least one of these areas but are not known to winter in any of them, so do go further south or have been overlooked.

are abundant in the west near the coast, while *Maerua crassifolia* appears mainly west of 14°W. *Salvadora persica* and *Maerua crassifolia* are important berry bearing trees. Spiny vegetation (*Acacia* sp. and *Balanites aegyptiaca*) occurs right across southwest Mauritania, but is predominant in the east with the decline of non-spiny types. Humidity of the air is another factor; it steadily declines on the average as one gets further from the coast (Toupet *et al.* 1977).

The only Palaearctic species wintering exclusively in northern areas of southwest Mauritania (north of 17°N), *Oenanthe deserti*, is common also in northwest Mauritania but is very scarce and has only recently been recorded in Senegal (Morel 1980). In Mali it occurs south to 15°N (Lamarche 1980-81). I often saw it in association with *Sylvia conspicillata*, where the ranges of the two species overlapped.

The four species *Anthus campestris*, *Lanius senator*, *Sylvia hortensis* and *Phylloscopus bonelli* which favour southern parts of southwest Mauritania, as well as *Oenanthe oenanthe*, *O. hispanica* and *Sylvia cantillans* which are more widespread, are all common on the dry steppe in northern Senegal. The observations reported in this paper establish the known northern limits of the winter quarters of six of these species in West Africa (all except *Oenanthe oenanthe* which winters as far north as northwest Mauritania): *Oenanthe hispanica* and *Sylvia cantillans* about 18°30'N, *Anthus campestris* and *Sylvia hortensis* about 18°N, *Lanius senator* and *Phylloscopus bonelli* about 17°30'N. These seven species occur east to Mali, where northern limits in winter are given as 18°N for *Oenanthe hispanica* and 17°N for *Anthus campestris*, *Sylvia cantillans* and *Phylloscopus bonelli* (Lamarche 1980-81 and pers. comm.). For a further eight species which are scarcer or require more specialised habitats, the wintering records in southwest Mauritania appear to include the most northerly in West Africa: *Ciconia nigra* (16°26'N), *Circus pygargus* (17°07'N), *Circaetus gallicus* (17°20'N), *Hieraaetus pennatus* (16°51'N), *Streptopelia turtur*, *Riparia riparia*, *Phoenicurus phoenicurus* and *Luscinia megarhynchos* (18°04'N).

One species, *Calandrella brachydactyla*, was found to be common (especially in millet fields) in winter in southwest Mauritania east of 14°30'W, but it is considered to be a passage migrant only in northern Senegal (Morel 1972). In Mali it is common in winter south of 16°N (Lamarche 1980-81). Most ornithological work in Senegal has been carried out west of 14°30'W; it can confidently be predicted that the species will eventually be found to winter in eastern Senegal.

The common wintering of *Oenanthe o. seebohmi* in the eastern part of southwest Mauritania (Fig. 2) indicates that this is the principal wintering area of that form; for no other has been found. Lamarche (1980-81) mentions it in Mali, but only "quelques individus" and Morel (1972) has only two records for Senegal, both in April. This finding answers a question raised by Heim de Balsac in 1951 as to where this bird winters, for he had noted that they leave their breeding grounds in the Atlas mountains and had observed two specimens in April south of the breeding area, one in southern Morocco, the other in northern Mauritania. We can roughly estimate the population of this race in southwest Mauritania. East of 14°30'W, 8 out of 25 *Oenanthe oenanthe* were black-throated (compared with only 2 out of 59 west of 14°30'W). Since only the male has this plumage, that would indicate the majority in the east are *seebohmi*, with a population of at least 50,000 birds.

In view of the finding of Morel & Roux (1966) that *Oenanthe isabellina* was the commonest wheatear on 16 February 1965 80 km north of Rosso, Mauritania (around 17°10'N, 15°15'W), it is surprising that I saw so few of them, and these near Nouakchott. Possible reasons may be that I did not visit the locality concerned, that their 1965 observation was outside the December-January period and that there has been a marked climatic change since 1965. Lamarche (1980-81) reports that *O. isabellina* is the commonest wheatear north of 16°N in Mali.

It seems likely that most Palaearctic species which have been recorded as wintering regularly in northern Senegal near the frontier of Mauritania, but have not so far been recorded wintering in Mauritania, will be found eventually to winter there too. In Table 4 the 21 species concerned are marked with an asterisk. 15 species are aquatic and six non aquatic.

It is worth noting that for a number of species which breed in the Afrotropical zone as well as the Palaearctic, there is often no clear evidence of the origin of the birds observed. This may lead to assessments of status which differ among authors in neighbouring areas. For instance, my assessment of *Egretta alba* as being a Palaearctic winter visitor and *Upupa epops* as not so being in southwest Mauritania (Appendix 3) is just the opposite of the assessment of Morel (1972, 1980) in northern Senegal only a short distance away. The evidence available is different in the two countries.

The finding (Appendix 3) of passage migrants as late as 14 December (*Asio flammeus*) and as early as 20 January (*Upupa epops*) was unexpected and shows that there is only a very short time (about 5 weeks) when there was no evidence of movement of Palaearctic birds.

(b) Estimates of populations

Of 24 species seen on the natural dry steppe, only eight were evenly distributed (Table 3). If the densities of these eight species are summed within the geographical limits where each species is found, they average about 10 birds per km^2 at 17°N and 3 per km^2 at 18°30'N. The other 16 species were unevenly distributed. Excluding a roost of 500 *Streptopelia turtur*, the average density (calculated using the same assumptions regarding area searched per hour as for the evenly distributed species) of all 24 Palaearctic species is about 22 per km^2 at 16-17° N, 16 per km^2 at 17-18° N and 12 per km^2 at 18-19° N.

Comparable densities can be obtained from other sources. Moreau (1961 and 1972) estimated that about 155,000 birds migrate from the Palaearctic into Africa per km of longitude. If we assume that these birds winter from the southern edge of the Sahara to the Gulf of Guinea the distance is 1,600 km; this gives an average density of Palaearctic winter visitors to tropical West Africa of around 97 birds per km^2. Elgood *et al.* (1966) estimated in a similar way about 200 per $mile^2$ or 77 per km^2 for Nigeria. These figures are averages based upon quite general assumptions. Confirmation of their validity for northern areas derives from seven counts of Palaearctic birds on a 0.25 km^2 study area of bush savanna at Fété-Olé in northern Senegal (16°13'N, 15°06'W) in December and January between 1969 and 1979 (G.J. and M.Y. Morel, pers. comm.). These give 99 ± 30 (95% confidence limits) birds per km^2.

These three estimates of 77-99 birds per km^2 are about four times higher than my estimate for the part of Mauritania lying only slightly north of the counts made by the Morels. This may be partly accounted for by the difference in techniques. We both used visual counts. However, they did an exhaustive census of a small area by three observers. I counted the birds I saw during steady walks at about twice their speed (*c.* 3.6 km/hr instead of 1.7 km/hr), and assumed I could detect all birds present within a certain distance. This assumption was based upon measurements of the distance at which I first detected birds in the vicinity of Nouakchott, on very lightly vegetated steppe. The further south one goes, the denser the vegetation because of increased rainfall. Approximate rainfall annual averages are (Toupet *et al.* 1977): 16-17°N 300 mm. 17-18°N 200 mm, 18-19° N 100 mm. I think it is likely that my density estimates for a given species are quite realistic in the 18-19°N zone, but too low by a factor of 2 or 3 at 16-17°N. This implies that the population of eight evenly spread species is about 2,000,000 instead of 1,000,000 in southwest Mauritania. Unevenly spread species are not included in this estimate; these apparently are as numerous as the evenly spread species. Also I have excluded because of insufficient evidence of Palaearctic origin (Appendix 3) *Cursorius cursor, Upupa epops* and *Lanius excubitor* which occurred in numbers on the dry steppe and which are considered Palaearctic winter visitors to Senegal (Morel 1972). Thus the total Palaearctic wintering population could well be of the order of 5 million birds.

The records of Tréca and Roux, obtained by aerial survey on 6 December 1975, show how difficult it is to estimate the population of water birds in southwest Mauritania. This is because of the huge variation in the numbers found on a given body of water. For instance, 44,900 Pintail *Anas acuta* were counted on that day. The species was found on only six of the 22 lakes inspected, in the following numbers:- 35,000, 8,000, 1,000, 500, 300, 100. Yet, during a previous aerial survey on 5 November 1975 of the same lakes, only 4,475 were present and the numbers on the same 6 lakes respectively were:- 0, 0, 250, 0, 0, 0. The bodies of water in Mauritania form part of a system which also includes lakes, marshes and irrigated areas in Senegal (not included in the figures for the Pintail quoted above); conditions can change quite rapidly as lakes dry out or according to irrigation needs. This must cause large movements of birds between aquatic habitats in the two countries, making calculation of wintering populations in Mauritania alone rather meaningless.

Even though the number of species of water birds wintering in southwest Mauritania probably exceeds that in the northwest, it seems clear that southwest Mauritania does not rival northwest Mauritania as a wintering ground for these birds, where the population is estimated of the order of 1,000,000 (Trotignon 1980). However, the population of birds of the steppe in southwest Mauritania exceeds that number, probably by several times.

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RESUME

Cette étude sur les oiseaux paléarctiques cantonnés dans le sud-ouest de la Mauritanie a été menée au cours des mois de décembre et janvier 1978, 1979, 1980, 1981 et Jan. 1982. 78 espèces furent identifiées par l'auteur et 5 (principalement des espèces aquatiques) par d'autres personnes. La densité des oiseaux terrestres cantonnés sur la steppe (surtout des passereaux) a été estimée à 12 oiseaux au km^2 au nord et au moins à 22 oiseaux au km^2 au sud; l'effectif a été estimé entre 2 et 5 millions. Les espèces trouvées étaient en général les mêmes que celles observées dans les régions avoisinantes: nord du Sénégal, nord-ouest de la Mauritanie et centre du Mali. Cependant, de nouveaux quartiers divers furent découverts pour *Oenanthe oenanthe seebohmi*, *Sylvia melanocephala* et *Sylvia conspicillata* tandis que les limites septentrionales approximatives de quartiers d'hivers en Afrique de l'Ouest furent établies pour 14 espèces.

REFERENCES

ASH, V.S. & POMEROY, D.E. (1981) Mapping schemes in the Afrotropical Region. *Ibis* 123: 552-3

BROWNE, P.W.P. (1981) Breeding of six Palaearctic birds in southwest Mauritania. *Bull. B.O.C.* 101(2): 306-310

DE SMET, K. & VAN GOMPEL, J. (1980) Observations sur la Côte sénégalaise en décembre et janvier. *Malimbus* 2: 56-70

HEIM DE BALSAC, H. & T. (1949-51) Les migrations des oiseaux dans l'ouest du continent africain. *Alauda* 17-18: 129-143, 206-221; 19: 19-39, 97-112, 157-171, 193-210

HEIM DE BALSAC, H. & MAYAUD, N. (1962) *Les Oiseaux du Nord-Ouest de l'Afrique*. Editions Paul Lechevalier, Paris

LAMARCHE, B. (1980-81) Liste commentée des oiseaux du Mali. *Malimbus* 2: 121-158; 3: 73-102

MOREAU, R.E. (1961) Problems of Mediterranean-Saharan migration. *Ibis* 103a: 373-427, 580-623

MOREAU, R.E. (1972) *The Palaearctic-African Bird Migration System*. Academic Press, London & New York

MOREL, G.J. (1972) *Liste Commentée des Oiseaux du Sénégal et de la Gambie*. ORSTOM, Dakar

MOREL, G.J. (1980) *Liste Commentée des Oiseaux du Sénégal et de la Gambie, Supplement No 1*. ORSTOM, Dakar

MOREL, G.J. & M.-Y. (1978) Recherches écologiques sur une savane sahélienne du Ferlo septentrional, Sénégal. Etude d'une commaunauté avienne. *Cah. ORSTOM Sér. Biol.* 13(1): 3-34

MOREL, G.J. & M.-Y., ORSTOM, personal communication

MOREL, G.J. & ROUX, F. (1966) Les migrateurs paléarctiques au Sénégal. *La Terre et la Vie* 20: 19-72, 143-176

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Appendix 1

Latitude and longitude of localities and hours spent at each

Locality no.	N	W	Hours	Locality no.	N	W	Hours
A01	1615	1624	0.7	B10	1805	1557	0.5
A02	1639	1601	0.1	B11	1805	1558	0.6
A03	1640	1602	1.6	B12	1806	1559	4.9
A04	1644	1605	0.8	B13	1806	1601	3.2
A05	1651	1606	4.0	B14	1807	1559	4.6
A06	1656	1615	0.3	B15	1810	1554	4.8
A07	1701	1605	0.9	B16	1822	1544	0.8
A08	1702	1403	1.2				
A09	1703	1605	1.0	C01	1709	1212	2.3
A10	1709	1212	4.0	C02	1710	1212	1.5
A11	1711	1604	0.3	C03	1715	1218	1.0
A12	1718	1343	1.5				
A13	1721	1423	2.2	D01	1804	1602	1.6
A14	1721	1604	2.1	D02	1805	1602	0.5
A15	1726	1320	1.4				
A16	1731	1435	2.2	E01	1622	1622	0.1
A17	1732	1559	1.7	E02	1623	1620	0.3
A18	1734	1254	1.1	E03	1626	1620	0.3
A19	1736	1245	0.5	E04	1646	1618	0.5
A20	1737	1449	1.3	E05	1753	1602	1.7
A21	1738	1238	2.3	E06	1756	1602	1.4
A22	1746	1506	1.1	E07	1804	1602	3.2
A23	1747	1558	1.1	E08	1806	1602	1.0
A24	1754	1525	1.0	E09	1807	1602	1.1
A25	1801	1545	1.6				
A26	1802	1558	1.6	F01	1613	1625	1.0
A27	1815	1550	2.0	F02	1803	1601	0.5
A28	1833	1540	0.1	F03	1805	1559	3.6
A29	1842	1537	1.2	F04	1805	1602	4.1
A30	1846	1535	1.2				
				G01	1632	1548	2.3
B01	1634	1618	0.5	G02	1633	1548	2.0
B02	1703	1355	0.1	G03	1636	1555	0.4
B03	1724	1324	0.7	G04	1702	1356	0.5
B04	1725	1234	0.3	G05	1707	1404	1.9
B05	1729	1306	1.0	G06	1715	1220	1.0
B06	1751	1508	1.0	G07	1720	1340	0.8
B07	1757	1528	0.3	G08	1735	1250	1.6
B08	1758	1531	1.3	G09	1804	1559	18.1
B09	1804	1556	1.0				

Appendix 2

Localities at which each species was observed

Sula bassana D01 02, *Egretta alba* E03 G01, *E. garzetta* E01 G01, *Ardea cinerea* E01 02 03 G01 02 04 06, *Ciconia ciconia* G01, *C. nigra* E03, *Plegadis falcinellus* G05, *Anas acuta* E05 F02 G06 09, *A. querquedula* G02 05 06 08 09, *A. clypeata* G02 06, *Gyps fulvus* A03, *Neophron percnopterus* B01 C02 G07, *Circus macrourus* A17, *C. pygargus* E04 G01 02 05, *C. aeruginosus* G01 02 05 06, *Circaetus gallicus* C03 G07, *Buteo rufinus* A29 F02, *Hieraaetus pennatus* A05 G01, *Milvus migrans* A03 05 16 B01 09 12 13 14 E02 07 F02 03 04 G01 02 04 07 09, *Falco peregrinus* B11 C02 G07, *F. tinnunculus* A03 08 12 13 25 B05 11 13 F03 G02 04 07 08 09, *Coturnix coturnix* G05, *Pluvialis squatarola* E05 07 F04, *Charadrius hiaticula* E05 06 08 F01 02 04 G09, *C. dubius* F01 03 G01 02 04 09, *Limosa lapponica* E05 F04, *Tringa nebularia* G01 02, *T. stagnatilis* G01 02 04 06 07, *T. glareola* G01 02 05 06 08, *T. ochropus* G01 02 06, *T. hypoleucos* F01 G03 06, *T. totanus* E05 F02 G01 02 06, *T. erythropus* G01 02 05 06, *Arenaria interpres* E05 F04, *Gallinago gallinago* G01 05 09, *Calidris canutus* E05 06 F01 04, *C. alpina* E04 05 F01 02 04 G01, *C. ferruginea* E05 F02 04, *C. minuta* E04 05 06 F01 02 G01 02 04 05 06 07, *C. temminckii* G04, *C. alba* E05 07 08 F04, *Philomachus pugnax* F02 G01 02 05 06, *Haematopus ostralegus* E07 F04, *Recurvirostra avosetta* E05 F02 G02, *Larus ridibundus* E04 05 06 08 F04 G04 07, *L. fuscus* E03 07 08 F04, *Sterna sandvicensis* D01 02, *Streptopelia turtur* A12 G07 09, *Apus melba* G08, *Calandrella brachydactyla* A13 B03 04 G05 08, *Riparia riparia* G01 02 04 05 09, *Hirundo rustica* B05 07 08 09 11 12 13 15 E05 09 F03 04 G01 06 07 08 09, *H. obsoleta* B12 C02 G09, *Delichon urbica* B11 12 F04, *Motacilla flava* A01 B04 05 E05 F03 04 G01 02 05 07 08 09, *M. cinerea* G09, *M. alba* A09 13 25 26 B02 05 06 10 11 12 13 14 15 E02 F01 02 03 04 G01 02 03 04 09, *Anthus campestris* A06 08 13 B03 04 05 G07 08 09, *A. trivialis* G01 09, *A. cervinus* G09, *Lanius senator* A03 05 07 08 10 13 G02 05 06, *Saxicola torquata* G09, *Oenanthe oenanthe* A04 05 07 08 10 12 13 15 16 17 25 26 B03 05 12 13 15 E06 F03 04 G01 02 03 04 07 08 09, *O. hispanica* A05 07 08 13 14 15 16 17 20 22 23 24 25 B03 04 06 12 F02 G03 06 09, *O. deserti* A15 18 19 21 22 23 24 25 27 29 30 B06 08 12 13 14 15 16 E06 09 F03 04, *O. isabellina* B13 15 F03, *Monticola solitaria* B12 C01, *Phoenicurus phoenicurus* A03 05 12 F04 G09, *P. ochruros* F04 G09, *Luscinia megarhynchos* G09, *Sylvia hortensis* A01 03 04 05 07 13 14 18 24, *S. atricapilla* A05 17 B08 12 14 F04 G03 09, *S. communis* A01, *S. melanocephala* A13 27 B11 12 13 14 15 E05 07 F03 04 G09, *S. cantillans* A01 03 05 06 08 10 12 13 14 16 18 23 B05 12 13 14 16 E04 F01 G05 09, *S. conspicillata* A04 07 13 17 20 23 25 27 29 B13 14 F03, *Phylloscopus collybita* A03 17 B06 08 11 13 14 16 F03 04 G09, *P. bonelli* A03 04 05 07 10 12 13.

Appendix 3

Evidence for including and excluding certain species

1. Confirmation of identity of three species

12 x 40 binoculars were used.

Hirundo obsoleta: observed at Nouakchott perched on ledges of unfinished houses at a range of *c.* 10 metres - grey-brown above with white spots on tail, pale buff below with whitish unstreaked throat.

Sylvia conspicillata: distinguished from Whitethroat *S. communis*, which also has a rufous wing patch, white on sides of tail, grey head and whitish eye-ring, by call - a sharp rattling "trrrrrt" - and active flitting behaviour, flying from bush to bush (Sharrock 1962). Also the season was different: Spectacled Warblers were seen only from 16 November to 21 February, whereas Whitethroats were netted in a garden at Nouakchott 29 March-25 April and 19 September-25 October (nets set 27 January-13 June and 15 September-29 November). No Spectacled Warbler was netted (they did not come into the gardens), but one was shot by Mr C. Lasausse (in my company) near Nouakchott on 7 February 1982. Identity confirmed by wing 57-58 mm, emarginated 3rd-6th primaries, rufous patch on wing (Williamson 1976b). The specimen was deposited in the collection of ORSTOM at Richard-Toll, Senegal.
Phylloscopus collybita: my impression, based on appearance, that no Willow Warblers *P. trochilus* were present in winter was confirmed by examination of birds caught in the nets referred to above - 24 Chiffchaffs between 27 January and 18 May and on 21 October and 37 Willow Warblers between 22 March and 3 June (identification based on Williamson 1976a). Also Chiffchaffs were heard in song at Nouakchott from December to April whereas Willow Warbler song was heard only in April and May.

2. Palaearctic species which breed in or near Mauritania

26 species which breed in or near Mautirania as well as further north (Browne 1981, Heim de Balsac & Mayaud 1962, Morel 1972, 1980) were seen in winter in southwest Mauritania.

For six species there was direct evidence of migration from the north. *Egretta alba*, *Ardea cinerea* and *Calandrella brachydactyla* were observed flying north in spring or south in autumn near Nouakchott (well away from breeding areas). For three species, Palaearctic races were identified. *Milvus migrans*: all birds observed closely in December and January had black beaks. In addition two found dead on 17 January 1981 had black beaks and a wing length of 470 and 483 mm (upper limit of local race *tenebrosus* is 454 mm, Mackworth-Praed & Grant 1970). *Falco tinnunculus* was observed over flat steppe, whereas the local race *rufescens* is confined to rocky areas (Serle & Morel 1979). *Saxicola torquata*: a male photographed at Nouakchott in November 1981 had the characteristics of the west European race *torquata* rather than of any of the African or eastern races - the whole underparts were rufous without a white belly and the mantle was dark brown striped instead of being black (confirmed by Dr J.C.O. Harrison *in litt.*).

For the other species, the evidence is indirect, and based upon seasonal presence or absence. The abundance rating (scale given in Figure 2) of each of 24 species in two month periods (first letter of months used) during the year over the whole of southwest Mauritania was as follows:

	F,M	A,M	J,J	A,S	O,N	D,J	
Ardeola ralloides	1	1	1	1	1	1	
A. ibis	4	6	5	5	5	5	
Egretta alba	2	1	-	1	1	4	W
E. garzetta	2	1	-	2	3	3	W
Ardea cinerea	4	3	1	2	3	4	W
Plegadis falcinellus	-	-	-	3	3	3	W
Falco biarmicus	-	1	1	1	1	1	
F. peregrinus	-	-	-	-	1	1	W
Charadrius alexandrinus	5	5	4	4	4	4	
Cursorius cursor	3	4	4	3	3	5*	
Pterocles senegallus	1	5	5	2	6	4	
Upupa epops	5	5	4	5	3	3	
Alaemon alaudipes	4	4	4	3	4	4	
Ammomanes cincturus	2	3	3	2	2	3	
Calandrella brachydactyla	6	2	-	3	6	6	W
Galerida cristata	5	5	5	5	5	5	
Hirundo obsoleta	-	-	-	-	2	2	W
Lanius excubitor	3	2	3	4	4	4	
Corvus ruficollis	5	4	6	4	5	4	
Saxicola torquata	1	-	-	-	1	1	W
Oenanthe deserti	3	1	-	2	4	4	W
Sylvia conspicillata	2	-	-	-	2	3	W
Rhodopechys githaginea	5	4	4	4	4	2	
Passer simplex	4	2	4	1	4	5*	

* high value because of one large flock

A peak in the column D,J indicates that the species is probably a winter visitor. Ten species believed to have this status have a W in the last column. For the other 14 species, I believe the evidence of Palaearctic origin to be insufficient. As shown below, there was reason to think that *Upupa epops* was on migration at Nouakchott in December and January. Hoopoes were also seen further south, but in two cases song was heard, indicating the local race *senegalensis*, which breeds in southwest Mauritania (nest at 16°44'N, 16°05'W, 11 July 1978).

3. Probable passage migrants

Ten species seen at Nouakchott in December and January were observed only during either the first three days of December or the last two days of January. These have been excluded as being probable late autumn or early spring migrants (indicated respectively by A and S): *Nycticorax nycticorax* (A), *Ardea purpurea* (A), *Pandion haliaetus* (A), *Gallinula chloropus* (A), *Vanellus vanellus* (A), *Numenius arquata* (A), *Sterna*

hirundo (A), *Saxicola rubetra* (A), *Locustella naevia* (S) and *Hippolais pallida* (S). Also the only example of *Asio flammeus* was one flying south along the shore at Nouakchott on 14 December 1979. *Upupa epops* was not observed at Nouakchott between 3 December and 20 January, though they were common just before and just after that period, presumably on passage. Records of *Calandrella brachydactyla* on and before 6 December are excluded because birds were seen flying south near the coast up to that date.

REFERENCES *cont. from p. 87*

MOREL, G.J. & ROUX, F. (1973) Les migrateurs paléarctiques au Sénégal, Notes complémentaires. *La Terre et la Vie* 27: 523-550

PETETIN, M. & TROTIGNON, J. (1972) Prospection hivernale au Banc d'Arguin (Mauritanie). *Alauda* 40: 195-213

ROUX, F., MAHEO, R. & TAMISIER, A. (1978) L'exploitation de la basse vallée du Sénégal (quatier d'hiver tropical) par trois éspèces de canards paléarctiques et éthiopiennes. *La Terre et la Vie* 32: 387-416

SHARROCK, J.T.P. (1962) The field identification of Sardinian, Subalpine and Spectacled Warblers in autumn. *British Birds* 55: 90-92

TOUPET, C., LACLAVERE, G. & MONOD, T. (1977) *Atlas de la République Islamique de Mauritanie*. Editions Jeune Afrique, Paris

TRECA, B. ORSTOM & ROUX, F. CRBPO, Paris. Personal communication

TROTIGNON, J. (1980) *Parc National du Banc d'Arguin. Comptes-Rendus d'Activités Scientifiques* (Oct. 77-Fév. 79). Nouadhibou

WILLIAMSON, K. (1976a) *Identification for Ringers The Genus* Phylloscopus. B.T.O. Tring

WILLIAMSON, K. (1976b) *Identification for Ringers The Genus* Sylvia. B.T.O. Tring

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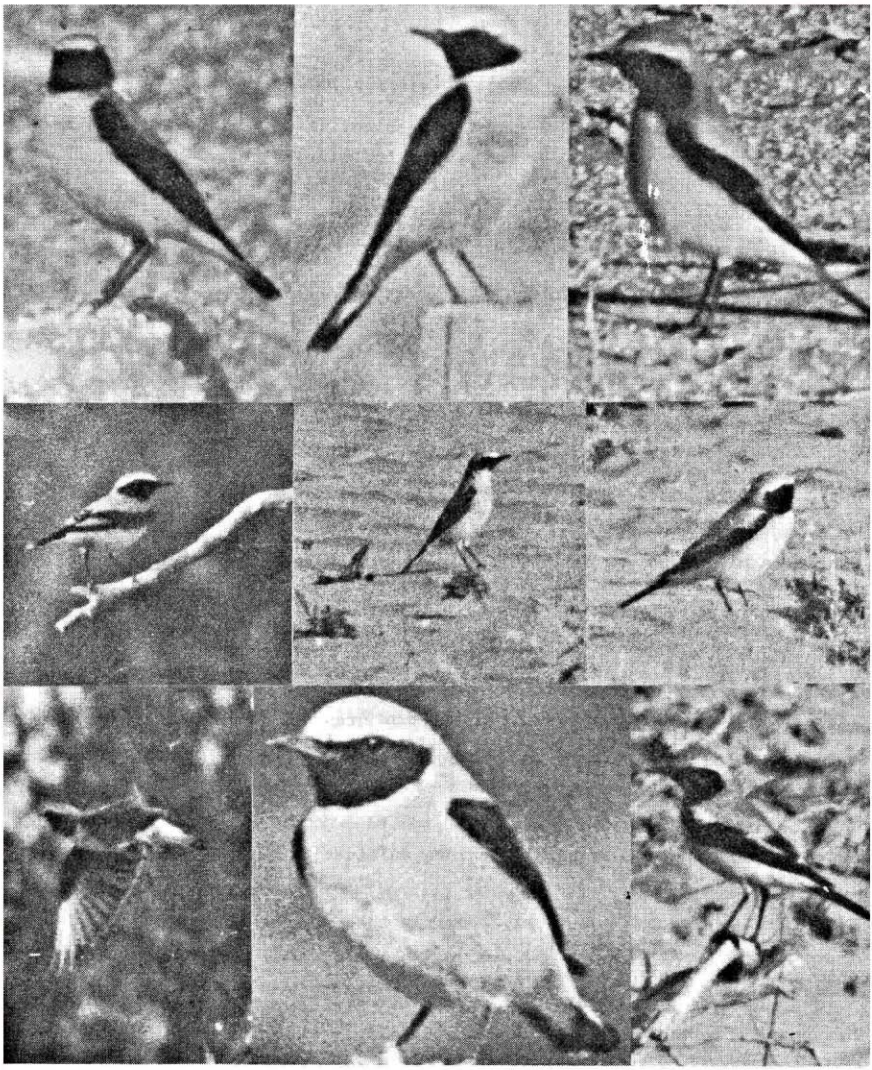

Wheatears in Mauritania. Left column *Oenanthe oenanthe seebohmi*; centre column *O. hispanica*; right column *O. deserti*. See p. 84. Photos P.W.P. Browne