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BIRD DISTRIBUTION ON WEST/CENTRAL AFRICAN GREAT RIVERS AT HIGH WATER

C.H. Fry

This article records counts made in November and December 1969 of riparian birds on the lower Niger and Benue rivers in Nigeria, the Logone and lower Chari rivers in Cameroun and Tchad, and part of the Oubangouï river in Central African Republic.

It is probably not immodest to claim that the possibility of making a linear transect of nearly a thousand miles of waterway in such a few days' travelling has never previously existed, and the unconventional means of transportation which provided the opportunity was a Hovercraft. In 1968 an SR.N 6 Hovercraft was used by a British expedition as a means of penetrating the Amazon and Orinoco rivers, for geographical exploration and scientific researches. So well did the vehicle perform and so successful was the expedition, that further trials were planned for tropical Africa, and the result was the launching of the Trans-African Hovercraft Expedition at St. Louis in Senegal on 13 October 1969. Conceived and led by Mr. David Smithers, it comprised 26 participants representing the International Publishing Corporation, the British Hovercraft Corporation, B.C.T.V., the Ministry of Technology, the United Nations, and a number of academic institutes. I was appointed jointly by the International Union for the Conservation of Nature and Natural Resources and the British National Appeal of the World Wildlife Fund.

The Hovercraft used was a Winchester Class SR.N 6, and a brief specification might not be out of place. The craft is 14.7 metres long, 7 m in beam, and in motion it does not draw any draught since it is supported fractionally above the (water) surface by a downdraught of air. It weighs 7 tons unloaded and will carry a 5 ton passenger and freight load. The engine

develops 900 s.h.p. at cruising speed of 40 knots, and 1,050 s.h.p. at full speed of 55 knots. The aft-mounted Rolls-Royce Gnome gas-turbine engine with 2.7 m (9 ft.) diameter variable-pitch props, provides thrust as well as lift, and the Hovercraft is of course extremely noisy.

However, the sound is directional, and under normal operating conditions volume is greatly diminished at any angle except immediately aft of the vehicle. It had been anticipated that birds would be scared away by the oncoming Hovercraft, but this proved not to be the case, and the great majority of waterfowl permitted a sufficiently close approach for identification to be no problem.

Unfortunately I was not able to join the expedition during its first few weeks, and so missed the abundant riverine avifauna of the Senegal river, the coastal lagoons of Senegal and Mauritania, and the inland delta of the Niger in the region of Timbuktu in Mali. By the accounts of other members of the expedition, these were wealthy in river bird life, and the expedition noticed in particular an estimated 20,000 pelicans (all photographed were clearly Great White Pelicans Pelecanus onocrotalus) and several hundred flamingos on lakes near Richard-Toll in Senegal. Discovered on this coast as recently as 1962, the Lesser Flamingo Phoeniconaias minor was found breeding on Lake des Tombos in Mauritania in 1965 (Naurois 1965), and this is the only colony in Africa north and west of the rift valley: near Lake Victoria. (Greater Flamingos Phoenicopterus ruber formerly occurred on the Cape Verde islands, but doubtfully breed there now.) Colour transparencies of the flamingos made by members of the expedition do not clearly identify the species at Richard-Toll, but the density of pink in a distant flock indicates P. minor. 1,700 birds were counted in an enlarged print.

Numbers of wildfowl seen in the inland delta of the Niger south-west of Timbuktu and between Bourem and Niamey were

apparently not noteworthy, although in February 1969 Roux (1970) recorded 200,000 Garganey Anas querquedula on the latter stretch.

Joining at the Kainji Dam Site in western Nigeria, I accompanied the expedition to the following schedule :

<u>Niger</u>	10 November	Kainji (Nigeria)
	14 November	Lokoja
<u>Benue</u>	16 November	Yola
	17 November	Garoua (Cameroun)
	19-24 November	By road to Waza National Park and Fort-Lamy (Tchad)
<u>Logone</u>	29 November	Yagoua to Fort-Lamy
<u>Chari/Lake Chad</u>	30 November - 3 December, 11-16 December	Fort-Lamy-Djimtila-Hadjer el Hamis-Baga Kawa-Bol-Mao
<u>Oubangouï</u>	4-11 December	Bangui to 60 km downstream (Central African Republic)

These waterways (except the Oubangouï) are shown in Fig. 1. The rivers varied greatly in physical details at this time of year, and there follow brief characterisations.

Niger. The level was still so high that very few sand-bars were exposed. For nearly all of its length from Kainji to Lokoja, vegetation overhung the banks and densely occupied the shallows, so that exposed ground was rare. There was no substrate for wading birds, which were scarce as a result. Larger species of herons were common; storks, ibises and shags were scarce, and pelicans and cranes absent. This is in marked contrast with the situation near the beginning of the wet season, when numerous sand-bars afford resting and feeding stations for all of the above birds and many others besides.

In November there were sand-bars at the outfall of the Kaduna river, and a few between Baro and Koton Karifi, but large water-birds were not nearly as numerous as on the upper Benue.

Notable features of this stretch of the Niger at the time were the concentrations of scavengers and piscivores at the turbulent water below the sluices of the Niger Dam (mainly Black Kites Milvus migrans, herons, egrets and shags Phalacrocorax africanus, with Caspian Terns Sterna tschegrava and an Osprey Pandion haliaetus), and the extensive marshes in the vicinity of Bacita and at the Benue confluence, rich in White-faced Ducks Dendrocygna viduata and Openbill Storks Anastomus lamelligerus.

Benue. (i) From Lokoja to near Ibi ($09^{\circ}45' E$) the Benue was so broad that it was often not possible to estimate or even see large birds on the far bank. As far as Makurdi there were only a few sand-bars, but for much of this stretch there were broad marshes by the edges of the river, where White-faced Ducks and other waterfowl were probably common. Between Makurdi and Ibi sand shelves became more common, and bird counts rose accordingly. Furthermore, the river valley became deeper and there were fewer waterside marshes. Towards Ibi many large aquatic birds were common.

(ii) and (iii) Upstream from Ibi to Numan, Yola and the confluence of the Benue and Faro ($12^{\circ}55' E$), there were far more numerous exposed sand bars in the river, and birds were very common. On these stretches enumeration of all individuals seen of the majority of species became possible, and fewer birds than previously were thought to have been overlooked in riverside marshes. Because of the high and fairly accurate figures involved, counts in the accompanying Table I are given separately for (ii) Ibi/Numan and (iii) Numan/Faro.

(iv) Between the confluence with the tributary Faro (which actually discharges more water than the Benue it joins) and Garoua, the nature of the river was quite different; it was narrow, the steep banks covered with shrubs and trees, but a lot of mud and sand was exposed by a two-metre fall in level from the wet-season maximum. An accurate census of all species was made.

Logone. (i) For 52 km downstream from Yagoua (10°20' N) the Logone was fairly broad at this season, with much exposed sand, like sections (ii) and (iii) of the Benue.

(ii) By a sudden transition at the village of Gamsay the river became narrow, rather meandering, and bounded by a marsh of wild rice and sedges as far as the eye could see, with a few hamlets and some wheat cultivation on islands of drier ground. The avifauna changed abruptly, Squacco Herons Ardeola ralloides and shags being abundant, and Black Herons Egretta ardesiaca and Glossy Ibis Plegadis falcinellus making an appearance.

(iii) The lower reaches of the Logone, between Gana and Fort-Lamy, were similar to (ii) but far more wooded, especially immediately by the main stream. Avifaunal composition continued to change.

Chari. Traversed from its outfall into Lake Chad as far upstream as 25 km above Fort-Lamy. Similar in physical features and avifauna to Benue (ii) and (iii) and Logone (i).

Lake Chad. At this season the open waters of the lake were almost devoid of birds. The only sand-bar seen was one which emerged in the mouth of the Chari - and became daily larger - in the third week of December and immediately acted as a focus for White-winged Black Terns Sterna leucoptera and Grey-headed Gulls Larus cirrhocephalus. These were the only two species seen on open water out of sight of the borders of the lake or its islands.

In the south-east, the border near the inselberg called Hadjer-el-Hamis was not unlike the well-defined but atypical lakeshore at Malamfatori, on the Nigerian shore near the outfall of the Yobe (described by Ash et al., 1968, and in greater detail by Fry et al., 1970). Elsewhere on the eastern side the character is quite different, with outlying floating papyrus islands

(especially in the central "Grand Barrière" region), and including "îlots bancs" - long sandy islands rising to 10 or 15 metres and fringed with a narrow zone of green vegetation, oriented NW and SE like sand ripples left on the beach by an ebbing tide. At Bol ($13^{\circ} 27' N$, $14^{\circ} 42' E$) and elsewhere, barrages have been built over suitable inlets, which have been drained and the resulting Dutch-type polders farmed. The complex of adjacent sandy Acacia savanna, rich market garden farmland, residual marshes, exposed mud, and stands of papyrus Cyperus papyrus, Phragmites, Vossia etc. is extremely attractive to a wide variety of birds, which were far more abundant than on the western shore (note, however, that Malamfatori still remains the ideal locale for migration studies, because the narrow shoreline and Salvadora zones concentrate migrants, facilitating netting; in the îlots bancs birds were more diffusely distributed and in any case a dearth of Salvadora means that many Palaearctic passerines, like Sylvia warblers, are scarce).

Oubangouï. For the most part broader than the lower Benue, the banks heavily forested to the water's edge, the great Oubangouï had no sand or mud bars in December and was not attractive to water birds other than king-fishers and a few waders. 56 km were traversed downstream from Bangui to the mouth of the Lésé, a narrow stream almost enclosed by forest, with the canopy sometimes meeting overhead. 10 km of the Lésé were penetrated by native canoe.

Travelling at a mean of 35-40 knots, for much of the time not in the cabin of the Hovercraft but riding outboard to afford unrestricted views, it proved not difficult to identify aquatic birds (except small waders), but estimating their numbers was often much less easy. Particularly after a long reach of river free from sand-bars, a solitary bar encountered was liable to have several hundred wildfowl, herons, storks and so on resting on it, and assessing their numbers as they all took flight simultaneously was difficult. Frequent stops were made, enabling

positive identification of rarities like Black Storks Ciconia nigra or Egyptian Vultures Neophron percnopterus, and confirming identities of waders and passerines.

Table I shows numbers of most of the species encountered on these waterways. A few birds (herons, egrets, etc.) were not counted and their status is represented by c (common), v.c. (very common), a (abundant), and occ. (occasional). Other widespread species are briefly discussed below.

Notes on Table I

Great White Pelican Pelecanus onocrotalus. The most westerly was at 09° 07' E, and the great majority was between 10° and 11° E.

Grey Pelican P. rufescens. The most westerly was at 08° 20' E.

Crowned Crane Balearica pavonina. On the Benue from 11° 25' E upstream.

Spur-winged Plover Vanellus spinosus. In addition, a flock of 65 was seen in marshland 30 km north of Waza National Park.

Caspian Tern Sterna tschegrava. The Niger birds were at Kainji Dam.

Other species

Little Bittern Ixobrychus minutus. 1, mouth of Chari.

Cattle Egret Ardeola ibis. Associated not so much with rivers themselves, as with human habitation and herds of cattle along their banks. Both this species and A. ralloides were present in thousands on the seasonally inundated marshland ("yaérés") north of Waza National Park.

Yellow-billed Egret Egretta intermedia. Doubtless widely overlooked. Identified at Lokoja (1), Yola (3) and near Waza N.P. (1).

Black Stork Ciconia nigra. An immature bird in the company of 10 Ibis ibis was seen on the Benue at 11° 00' E, 09° 10' N, near Lau. A full description was taken during two close approaches by the Hovercraft.

Abdim's Stork C. abdimii. Being so late in the year, only odd late emigrants were encountered: 1 at Ibi, and 4 50 km north of Waza National Park on 24 November.

Woolly-necked Stork C. episcopus. A flock of 30 on flooded land 70 km north of Waza, with two White Storks C. ciconia.

African Spoonbill Platalea alba. 1 at Bol, Lake Chad.

Pigmy Goose Nettapus auritus. Not a bird of open waters, and the only ones recorded were occasional pairs in small ponds away from the rivers.

White-eyed Pochard Aythya nyroca. 1, central stretch of Logone.

Purple Gallinule Porphyrio porphyrio. Common in an extensive wet marsh at Bol, 6 or 8 appearing from the reeds at the edges of an open pool at a time, but voices suggesting hundreds in the area.

Pinfoot Podica senegalensis. Single birds on three occasions on the Lesse tributary of the Oubangouï.

Lily-trotter Actophilornia africana. A few on the lower Niger and around Lake Chad, but none other than these recorded on any of the rivers.

Lesser Lily-trotter Microparra capensis. 1 on water-lily beds, south-east corner of Lake Chad.

Waders. It was impossible to be certain of the specific identity of most waders seen when the Hovercraft was travelling at speed. Charadrius spp. were quite common, and Ch. hiaticula, dubius, pecuarius and marginatus were identified incidentally. Except for T. hypoleucos and nebularia, Tringas were rare, but T. ochropus, glareola, stagnatilis and erythropus were noted definitely. Calidris spp. were not usually identified.

Black-headed Plover Vanellus tectus. Recorded only from Waza N.P.

Senegal Wattled Plover V. senegallus. Ten in Waza National Park. The only river records were 2 and 3 on the Benue between Yola and the Faro confluence.

Curlew Numenius arquata. 1, upper reach of the Logone, 29 November.

Turnstone Arenaria interpres. 1, Fort-Lamy, 27 November, a surprising occurrence.

Sanderling Calidris alba. 1 on a sand-bar at the confluence of the Kaduna and Niger rivers on 14 November. Identification was made only because the Hovercraft had stopped, of course, and a full description was taken. It was with three Dunlin Calidris alpina, Crocodile-Plovers Pluvianus aegyptius and Gray Pratincoles Glareola cinerea. Sanderlings have only rarely been found inland in Nigeria and west Africa.

Avocet Recurvirostra avocetta. 2, Bol, Lake Chad, 15 December. On that date also an ornithologist with O.R.S.T.O.M. in Fort-Lamy, M. Jacques Vieilliard, found 800 Avocets at Baga Sola at the eastern end of the Grand Barriere, 14° 19' E, 13° 32' N. (In addition, M. Vieilliard made the following most interesting finds : 1 Pochard Aythya ferina; 200 Shoveler Anas clypeata; a few Cape Teal Anas capensis; many Hottentot Teal A. hottentota (one with an ovarian egg); 200 Skimmers Rhynchops flavirostris; Marsh Sandpipers Tringa stagnatilis equally as abundant as Greenshank T. nebularia; a few Curlew-Sandpipers Calidris testacea; White-faced Lapwings Vanellus crassirostris; about 20 Caspian Terns Sterna tschegrava; Three-banded Plovers Charadrius tricollaris; Kittlitz' Plovers Ch. pecuarius; and the warblers Acrocephalus rufescens, A. gracilirostris and Bradypterus sp. probably baboecala.

Crocodile-Plover Pluvianus aegyptius. Not counted. Common in ones and twos or small parties wherever there was a firm substrate, along all the rivers.

Pied Kingfisher Ceryle rudis. Common throughout. Not counted.

Discussion

Assuming more-or-less constant vigilance by the observer throughout the journey, and that the presence of at least the larger and more conspicuous water birds was not overlooked on very broad reaches of the rivers and in places where there were extensive peripheral marshes - assumptions which I believe to be justified - it is apparent from Table I that the distribution of most species was far from uniform. Indeed, about the only birds which were found along all the rivers in any constancy were Egretta alba and E. garzetta, Ardeola ibis, Ibis ibis, Pluvianus aegyptius, Ceryle rudis, and perhaps Ardea cinerea.

The rather localised occurrence of a few birds, such as Pelecanus onocrotalus, was determined by the vicinity of suitable breeding sites, in this instance the well-known Wase Rock at the south-east edge of the Jos Plateau (Lunger 1965). Other birds, like Egretta ardesiaca, and the lapwings Vanellus spinosus and V. albiceps (Fig. 1) had ranges more circumscribed than the prevalence of their apparently preferred habitat might lead one to suppose. But in the majority of cases, the presence or absence of exposed sand and mud on a stretch of river was clearly an over-riding factor determining the distribution of wading birds over hundreds of miles of rivers. Observations at other seasons of the year tend to substantiate this. Downstream from the Kaduna confluence, the Niger had very few exposed sand-bars in November, and there were hardly any wading birds there besides herons. I have been along the same stretch of river in May, however, when the water is low and there are extensive sand banks and bars in the river, and at that time of year there were numerous storks, ibises, cranes, thick-knees, etc., using the exposed ground for resting as well as feeding at its edges. (Fry 1967). In addition, several other birds utilised the sand bars for nesting, like Skimmers Rhynchops flavirostris, and various lapwings and bee-eaters.

After the end of the rains the level of the rivers fall rapidly, so that the amount of exposed sand-bars and the area and location of shallows suitable for feeding change quickly. In December this change was quite apparent from one day to the next at Fort-Lamy where the immediate 'colonisation' of newly-exposed surfaces in the Chari by a variety of birds for resting and feeding was obvious.

The interest of these observations is that it is fashionable to consider that the distribution of birds within their normal ranges, particularly outside the breeding season, is generally determined by the distribution of available food resources. Although the observation is speculative in so far as it has not been categorically demonstrated that there are no changes in distribution or availability to birds of the plankters and other aquatic organisms on which they feed, it seems highly probable that there is no appreciable shift in the biomass or availability of water-borne foods in the immediate vicinity just after the emergence of a sand-bar, and if so, the alteration of distribution of many bird species is a response not to changes in their food supplies, but to changes in the nature of the substrate. It is true of course that for several of the birds referred to in this article food resources can only be exploited in wet sand and mud or in shallows at the very edge of the water. This is the case with most charadriid and scolopacid waders, which would be quite unable to feed in water deeper than a few mm, however rich in plankton. Herons, too, are not adapted for feeding in deep water, although there are usually suitable shallows at the edges of rivers even in full spate. In this connection it should be noted that herons and egrets are less affected than some other species by fluctuations in water levels and the local appearance or disappearance of firm substrate; most species were distributed on the rivers travelled more evenly than any other large aquatic birds. Some piscivorous species also, such as Phalacrocorax africanus, appear not to be affected by the distribution of exposed sand, probably because they rest on trees more readily(?) than on sand.

Interest turns on those species whose feeding success is not much affected by the rise and fall of water levels, but whose movements - over distances of tens or even hundreds of miles - are evidently determined to a great extent by the provision of resting places. Skimmers, terns, gulls, pelicans, cranes, Marabous Leptoptilos crumeniferus and Openbill Storks are amongst the birds whose local movements on the rivers appear to be determined by the suitability of resting stations rather than immediate changes in the quantity or quality of food resources. This would seem to imply that for these birds at the non-breeding seasons in question, food is abundant over great areas, and other factors, like the protection from predators afforded by flat sand islands where available, become operative in inducing large scale and often long-distance migrations. Larger and more comprehensive patterns of migration may be imposed on top of these local movements, like the journeys of some of the species of terns between tropical Africa and the Palaearctic, or the trans-equatorial migration of the Openbill Stork, but it is pertinent to draw attention to the seasonal and spatial abundance of food for many birds inferred from these observations (an abundance which could be investigated and quantified without difficulty in the field), and their relevance to the status, distribution and migrations of water birds in the tropics.

At a local level, the distribution of all animals is determined as much by the provision of shelter and protection - "a place in which to live" - as by food, and it is where feeding and resting stations are some distance apart that daily roosting and feeding flights of birds are characteristic. On the great rivers of tropical Africa, however, we have a case where the occurrence of suitable substrate, rather than of food, determines bird distribution over hundreds of miles and brings about seasonal movements of populations (migration) rather than daily ones.

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TABLE I, Bird counts and estimates on the great rivers, November-December 1969

NIGER	BENUE					LOGONE			Lower CHARI			LAKE CHAD (BOI)	CURRA
	Ikoja /Ibi	Ibi Numan	Numan /12°58E	Benue trib.		Yagoua /Gamsay	Gamsay /Gena	Gena /F-Iamy					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)		
<i>Pelecanus onocrotalus</i>	1	470(12)				50	200	100					
<i>P. rufescens</i>	1	4(3)		21			3						
<i>Phalacrocorax africanus</i>	40(5)	15(4)		2		10(4)	c.100(20)	17(7)	12(10)	19(4)	1*	2(1)	
<i>Ardeola ralloides</i>						a.	a.	a.					
<i>Butorides striatus</i>				2(2)	2			9(8)	2(2)				
<i>Egretta ardesiaca</i>							5(3)	14(9)					5(4)
<i>E. alba</i>	c.	c.	c.	c.	c.	c.	c.	c.	c.	c.	c.		
<i>E. garzetta</i>	c.	c.	c.	c.	c.	c.	a.	c.	c.	c.	c.		
<i>Ardea cinerea</i>	V.C.	V.C.	V.C.	occ.	occ.		8(6)		50(2)	30	1		
<i>A. melanoccephala</i>	c.	c.	c.						4(2)				
<i>A. goliath</i>													
<i>A. purpurea</i>	c.	c.	c.				8(5)	c.	1	6(5)*	3		
<i>Scopus umbretta</i>				2	4(3)								
<i>Ciconia ciconia</i>						10+	?						

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
<i>C. episcopus</i>	3		14(4)	4	16(3)				2		
<i>Ephippiorhynchus senegalensis</i>	1		1	1	2				4(2)	5(3)	
<i>Anastomus lamelligerus</i>		120(12)	1	28			3		5(2)	15*	12(5)
<i>Leptoptilos crumeniferus</i>			4(2)	17(3)	8	3(2)	5(3)		26(3)		
<i>Ibis ibis</i>	23(6)	5	160(18)	16(3)	50+(3)		35(3)	12(2)	8		37(3)
<i>Threskiornis aethiopica</i>			3(2)	1	2	16(5)	2	12(5)	8(5)		
<i>Bostrycchia kagedash</i>	6(3)			3(2)	4(3)	?	?				
<i>Plegadis falcinellus</i>							3	27(3)		25*	
<i>Dendrocygna viduata</i>	350(11)	80(3)	1900(9)	280(8)		2500(10)	1000(7)		400(3)		
<i>Alopochen aegyptius</i>						13(2)			4(2)		
<i>Plectropterus gambensis</i>		20(3)	45(3)	230(8)		?	5		9(2)		
<i>Sarcidiornis melanota</i>			18(3)	15		50(6)			20		
<i>Anas acuta</i>									10		
<i>A. hottentota</i>											
<i>A. querquedula</i>											150

2*, 60

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Neophron percnopterus			2						9(3)		
Haliaeetus vocifer	2					3(2)	1		18(15)	2	
Pantheria haliaetus	1	2	4(3)		3(3)	4(3)			4(4)	1*	1
Belairica pavonina			20(4)	10(2)					130(5)	80(3)	
Burhinus senegalensis and/or B. vermiculatus	2			165(11)	20(3)				70(4)	4	
Vanelus spinosus	20(7)		4(2)	55(20)	15(7)	23(8)	11(4)		30(12)		
V. albiceps (See Fig.1)	38(4)	18(5)		40(15)	42(14)	2			2		3
Tringa nebularia	10(4)	130(22)	100(15)	130(30)	82(19)	47(11)	7(4)	5(3)	58(13)	3	7
T. hypoleucos	17(13)			31(14)	26(12)						c.
Phalommachus pugnax			70(2)	250(5)	200(3)	7000(2)	500(4)		1000	3	
Himantopus himantopus	3		2	2	2(2)	22(6)	10(3)		14(2)	2	
Glaireola pratincola			1000	3000		200				200*	
G. nuchalis											28(6)
G. cinerea	700(20)	v.c.	c.	c.	f	f.			f		
Larus fuscus				4(2)	1						1
L. cirrhocephalus							5(4)		5(2)	100*	
Rhynchops flavirostris				14(2)		200(2)					1

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11)

Sterna nilotica
S. tschegreva
S. leucoptera
Ceryle maxima
Halcyon leucocephala

		32(2)	23(7)		30(6)	22(6)			1	
2		1			20	?		23(3)	1	
150(3)	18(3)					c.		130(7)	100,*	5
1	3(3)	2(2)		3(2)				1		1
2(2)				6(4)		1	6(4)			