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OBSERVATIONS OF ALLEN'S GALLINULE *PORPHYRIO ALLENI* AT MOMBASA, KENYA

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INTRODUCTION

Allen's Gallinule *Porphyrio alleni* is widespread over much of sub-Saharan Africa, from Senegal to Somalia and South Africa. It is mainly migratory, north and south of the Equator, breeding during the wet season and then migrating to lower latitudes, but the extent of migration is not known and in areas where habitat remains suitable throughout the year it may be sedentary (Keith, in press). In East Africa it is a local and generally uncommon resident in permanent swamps, but in some areas it may wander or occur seasonally (Britton 1980). It is reasonably common on Zanzibar and Pemba islands (Pakenham 1979). Like other gallinules it is an inveterate wanderer, and is the only Afrotropical bird which regularly occurs as a vagrant to Europe (Cramp & Simmons 1980).

Although common in some parts of Africa, Allen's Gallinule has been little studied, and little is known of its habitat and habits (Keith in press). I became familiar with it in Zambia from 1974 to 1980 and on moving to Mombasa (Kenya) in Dec 1980 I found a small, easily observable nonbreeding population at a dam near Bamburi. Allen's Gallinule had been recorded there in previous years (EANHS 1978, 1980) but its status on the Kenya coast was unclear (Britton 1980). I visited the dam frequently throughout 1981 and occasionally in 1982 and 1983. Few Allen's Gallinules were present after early 1982, owing to a drastic fall in water level. Data on its habitat, seasonality, habits, moult and breeding, from Bamburi, Zambia and elsewhere in Kenya, are given below, together with a comparison with four other water birds sharing its habitat at Bamburi.

THE STUDY AREA

Most observations were made at a permanent dam near Bamburi (03°59'S 39°42'E). In 1980-81 the dam and its reedbeds covered 1.96 ha of a shallow valley in overgrazed and eroded grassland. Regular observations of rails were also made at nearby Nguuni (Taylor 1985), in little-eroded grassland with several small dams of areas from 0.1 to 0.8 ha. The area is 30-60 m a.s.l. and is 4 km inland.

The margins of the dam were frequently visited by people and stock, but the reedbeds and open water were undisturbed (except at periods of very low water). Dense beds of *Typha* (total area 0.55 ha) and *Cyperus* (0.1 ha) extended along 690 m of the 750 m of shoreline and up to 25 m into the water. Water-lilies *Nymphaea* and patches of Nile Cabbage *Pistia stratiotes* covered about 0.74 ha of the shallow water by the reedbeds; the remaining 0.57 ha was open water. These values are for the dam at its greatest area. In Aug-Sept 1981 about 0.26 ha of the reedbeds dried out and were trampled

by cattle, floating vegetation decreased by c. 0.25 ha, and the shallows became mud banks. Recovery of the vegetation was rapid as the dam filled up in Sept. The small dams on the Nguuni property had little or no floating vegetation and were partially fringed with *Typha* (on the larger dams only) and *Cyperus*.

Rainfall in 1981 was normal (R. Haller, pers. comm.) (Table 1). During the 'long rains' (Mar-June) and the 'short rains' (Oct-Dec) the dam was fed by streams. Conditions in Feb and Sept were greatly improved by the dam being filled by inflow from a nearby leaking water pipeline at a time when the water level was falling rapidly (Table 1).

Table 1 Allen's Gallinules, rainfall, water levels and habitat extent at Bamburi, Dec 1980 to Dec 1981. Parenthetic figures are estimates.

Month and year	Total no. <i>P. alleni</i>	Max. no. juveniles	Monthly rainfall (mm)	Water level	<i>P. alleni</i> habitat extent*
1980					
Dec	(21)	1	14	high	90%
1981					
Jan	(21)	1	23	falling	100%
Feb	(20)	0	0	low to full (inflow)	90%
Mar	(20)	0	220	low to full (rain)	85%
Apr	3	0	99	full	90%
May	3	0	184	full	100%
June	10	4	85	full	100%
July	8	4	45	falling slightly	85%
Aug	8	4	61	falling	65%
Sept	35	24	46	low to full (inflow)	65%
Oct	35	23	157	full	100%
Nov	30	15	105	full	100%
Dec	30	5	80	full	95%

* Given as a percentage of the maximum during the study period and includes feeding and roosting areas.

METHODS

101 visits to the dam were made from 20 Dec 1980 to 28 Dec 1981, at intervals of 1-10 days, mainly at 0615-0815 h and 1700-1845 h. Observations were made from the open shore; most visits included a walk around half of the shoreline with my dog. Accurate counts were made from Apr to Dec 1981 of Allen's Gallinules, Purple Gallinules *P. porphyrio* and Moorhens *Gallinula chloropus*. Numbers of Black Crakes *Amaurornis flavirostris* and African Jacanas *Actophilornis africana* were estimated (Table 2). The Nguuni dams were also visited frequently, 379 visits being made to the whole area. Allen's Gallinules were seen on all visits to the study dam and were not difficult to observe. It was not necessary to flush them from cover with the dog as they readily fed in the open during the day. At the Nguuni dams, however, there were few open areas, and the few records there were of birds flushed from cover by the dog.

HABITAT PREFERENCES

Allen's Gallinules used the reedbeds for cover, roosting and feeding. The 2.5 m high stands of *Typha* were used much more than the dense, 1.5 m high beds of *Cyperus* (about 15% of the reedbeds). The preference for *Typha* may have been in part due to its location, as most *Cyperus* was either on the shoreward side of the *Typha* or in shallow inlets some distance from open feeding areas. Areas of floating *Nymphaea* leaves and of *Pistia* were used for feeding.

At the small Nguuni dams 11 sightings of Allen's Gallinules were made, seven in *Typha* and four in *Cyperus*, all at times of high population at the study dam; none of these birds remained for more than 15 days. Elsewhere at Bamburi, Allen's Gallinules were absent from a large seasonal pool with emergent grass, much *Nymphaea* but no permanent reedbeds. In central and western Kenya I have observed them at small dams (a) with *Cyperus* and *Nymphaea*, and (b) with *Typha* and *Papyrus C. papyrus* beds and *Nymphaea*, but not at dams in the same areas (a) with extensive *Typha* beds and floating vegetation of matted grass and *Pistia*, and (b) with *Typha* and *Cyperus* cover and only *Polygonum senegalense* as surface vegetation.

At Itawa swamps, Ndola (Zambia: 12°57'S 28°47'E), 1600 visits in six years produced only one sighting of a bird on *Nymphaea* at the edge of extensive *Typha* and reed *Phragmites* beds in permanent swamp. Large areas of floating vegetation were scarce at the swamp edge, and open areas within the swamps, where birds may have occurred, were inaccessible. Allen's Gallinules occur seasonally elsewhere in Copperbelt Province, in habitat like that at Bamburi but without *Pistia* and sometimes with *Polygonum*. At Lochinvar (Kafue Flats 15°47'S 27°14'E) they are seasonally quite numerous (Taylor 1979) where there are *Papyrus* beds and floating vegetation, including *Nymphaea*.

Purple Gallinules at Bamburi occupied *Typha* beds but fed little on floating vegetation; Black Crakes frequented *Typha* and *Cyperus*, adjoining floating vegetation and shoreline in grass and tangled vegetation. Moorhens used *Typha* for cover and fed in open water and among floating plants, African Jacanas used all of the reedbeds for cover and fed on floating vegetation and on short grass among *Acacia* saplings on the shore.

MIGRATIONS AND PATTERN OF OCCURRENCE

Numbers of Allen's Gallinules varied considerably during the study period (Table 1). Of c. 20 birds in Dec 1980, most departed in late Mar 1981 leaving three adults in Apr-May. In mid-June four juveniles and three adults arrived, and in Sept there was a further influx of 20 juveniles and seven adults. 30 birds remained until the end of the year, the juveniles apparently moulting into adult plumage (Table 1). At Nguuni dams birds were irregularly present in Sept-Dec, suggesting local movements then.

The late March exodus coincided with the start of the long rains, when habitat became extensive (Table 1). Habitat was at its maximum extent in April-May when bird numbers were lowest, and remained so until well after the June influx. The new arrivals remained, despite habitat decrease in July-Aug, and when the Sept influx occurred the habitat was at its least extensive.

Moorhens increased markedly in Feb-Mar, decreased in Apr, and increased from mid-Sept until Dec (Table 2). One pair bred at the end of the long rains. African Jacana numbers fell in late Mar-Apr and rose in Oct-Nov; some birds remaining in the long rains nested. Black Crakes bred after the long rains and numbers showed no major fluctuations. Of these Purple Gallinules in Mar, only one remained until 8 Nov; these are the first coastal Kenya records of this species (Britton 1980).

POPULATION

Birds utilised all of the available habitat only from Sept to Dec 1981 (the time of maximum population), when observations here and at Nguuni suggested that these 30-35 resident birds fed entirely at the study dam. Floating vegetation, increasing to 0.74 ha in Oct-Nov, provided the main feeding area. Open water was little utilised; some feeding occurred in up to 0.65 ha of reedbeds, mainly at the edge of *Typha* beds in about 0.13 ha of habitat. Thus a total feeding area of 0.87-1.39 ha supported a maximum of 35 birds (density of 25-40 birds/ha). They roosted and sheltered in 0.55 ha of *Typha* beds (maximum density of 64/ha).

BREEDING, BREEDING SEASON AND MOULT

Breeding did not occur either at Bamburi or Nguuni in 1981. Arrivals at Bamburi in June and Sept had probably recently bred elsewhere. The three juveniles first seen on 10 June were only 90% grown but they fed independently and associated with a pair of adults for only three weeks. One juvenile first seen on 14 June, and most of the juveniles which appeared in Sept, were fully grown and scarcely associated with adults. The June juveniles had not moulted to adult plumage by the end of Aug; proportions of birds in juvenile plumage from Sept indicate that most juveniles moulted in Oct-Dec (Table 1).

The periods of incubation, fledging and post-fledging dependence, and the timing and duration of post-juvenile moult in Allen's Gallinule are not known. Information about other similar-sized rails is very limited, but estimates can be made from figures in Cramp & Simmons (1980).

Table 2 Numbers and breeding records (B) of Black Crakes, Moorhens, Purple Gallinules and African Jacanas at Bamburi, Dec 1980 to Dec 1981. Parenthetic figures are estimates.

Month and year	<i>Amaurornis flavirostra</i>	<i>Gallinula chloropus</i>	<i>Porphyrio porphyrio</i>	<i>Actophilornis africana</i>
1980				
Dec	(8)	(10)	?	(40)
1981				
Jan	(8)	(10)	2	(40)
Feb	(8)	18	2	(50)
Mar	(8)	32	3	(40)
Apr	(6)	20	2	(25)
May	(10)	4	1	(20) B,1
June	(8)	2 B,1	1	(20)
July	(8) B,1	4	1	(20)
Aug	(10) B,1	4	1	(20)
Sept	(10)	7	1	(20) B,1
Oct	(10)	10	1	(30)
Nov	(10)	13	1	(40)
Dec	(12)	16	0	(35)

Assuming an incubation period of 21 days (Purple Gallinule 23-25, Moorhen 21-22, Coot *Fulica atra* 21-24) and a fledging period of 55 days (Purple Gallinule over 60, Moorhen 40-50, Coot 55-60), juveniles would be fully-fledged about 75 days after egg-laying. At that age they may not be independent or capable of sustained flight, and I assume that they become so when they are about 60 days old (Purple Gallinule up to 56, Moorhen average 72, Coot 55-60) i.e. about 80 days after egg-laying.

On these assumptions, the June juveniles would have been hatched from eggs laid in late Mar-early Apr. Some of the Sept juveniles could have been of similar age and others were possibly from eggs laid as late as June-July. Thus the breeding season was probably Mar-July, during and just after the long rains in coastal Kenya (Brown & Britton 1980). The June juveniles could not be identified with certainty after the Sept influx, and moulting birds in Oct-Dec could have been 3-5.5 months old at the start of moult and 5.5-8 months old at the end. Body moult in some was apparently completed in about 2 months.

BARE PARTS

A half-grown chick in Zambia had a grey bill and shield, pinkish legs and dark brown eyes. Fully-grown birds' bare parts colours agree with those given in Cramp & Simmons (1980). At what age birds assume adult bare parts

colours is not known; one juvenile in late July, c. 100 days old, had dull adult bare part colours. One in May, 'adult' but with a rather dull bill and shield, could have been 5.5-12 months old.

BEHAVIOUR

The Allen's Gallinules appeared indifferent to people and were quite bold, at times venturing up to 35 m from cover on floating vegetation. They were much more confiding than Black Crakes and Purple Gallinules. A bird alarmed far from cover raised its tail to display the white undertail coverts and then either flew or ran rapidly into the reedbeds with long strides and lowered head. A bird disturbed close to cover flicked its tail repeatedly, adopted an upright pose and moved into cover quietly with short steps.

They were most active from just after dawn (0630 h) to at least 0930 h and from 1745 h to dusk (about 1830 h), when the entire population was in the open. There was little activity during the hottest part of the day (1200 h to 1600 h) and one visit on a moonlit night showed no activity. All five species roosted in the reedbeds, Allen's and Purple Gallinules probably in tall stands of *Typha*.

At all times except Apr-May adults often fed in pairs. Adults actively defended their immediate feeding area, and that of any accompanying juveniles, chasing away other Allen's Gallinules which approached closer than 3 m.

FOOD AND FEEDING

Food included aquatic and terrestrial insects, worms, and other small invertebrates. Birds often turned over *Nymphaea* leaves with the bill, sometimes lifting the entire leaf out of the water to do so, and then held the leaf down with the feet while inspecting the underside for animal food. Floating *Pistia* plants were shifted around with the bill and dead vegetation was moved or turned over in a search for invertebrates. Birds often made short rapid runs to pick up moving prey, and most food was taken while the birds walked over floating plants or in the reedbeds. An important food item at the dam was developing seedheads of *Nymphaea*, which were taken soon after the petals had fallen. The stem was broken off in the bill just below the seedhead, which was carried away to a quiet spot. The bird then held the seedhead down with one foot and tore off pieces, apparently to reach the developing seeds. Birds climbed up to 2 m high in *Typha* beds, presumably to feed, and they also occasionally fed while swimming, taking invertebrate and plant material in a similar manner to Moorhens. When undisturbed, they occasionally walked in short grass on the shore searching for insects in the manner of African Jacanas.

The gallinules fed alongside Moorhens, African Jacanas and Purple Gallinules, but seldom came into close contact with Black Crakes. They were aggressive towards Pygmy Geese *Nettapus auritus* (the only other species feeding commonly on *Nymphaea* seedheads); once a Pygmy Goose was chased until it dropped the seedhead which it was carrying; the gallinule then seized the seedhead and carried it off.

VOICE

Three types of call were heard. (1) A subdued 'kup', the commonest call of adults and juveniles, apparently a contact note. (2) A variety of sharp 'klip', 'kleep', 'kik' and 'kerr' notes, given by adults probably in an alarm or aggressive context; also sharp dry 'kep' and 'kup' notes; all at 3-4 notes per sec. (3) A rapid high-pitched 'kli-kli-kli' at 6-8 notes per sec, given in flight and apparently in alarm (probably the "short shrill flight call" of Cramp & Simmons 1980). In Zambia a half-grown chick gave a fourth call when with an adult, a quiet 'tack' probably a contact note.

Calls (1) and (2) were heard infrequently throughout the year, but calling increased markedly in Nov and Dec. In December many calls (2) and some calls (3) were heard for much of the day.

DISCUSSION

These observations suggest that Allen's Gallinule prefers areas of permanent fresh water with much floating vegetation, especially *Nymphaea* which is an important source of plant and animal food. *Pistia* and floating matted grasses do not attract the species unless *Nymphaea* is also present. *Polygonum* beds are not frequented. A good fringing cover of tall permanent reedbeds such as *Typha* and *Cyperus* is essential. Waters with good fringing cover but little or no suitable floating vegetation attract these birds only transiently.

They also occur on rivers and rice fields (Keith in press) and on seasonal waters (Maclean 1984). They are usually in extensive habitat but also occur (and in Zambia breed) on ponds as small as 0.5-2 ha.

Movements of Allen's Gallinules to and away from the dam cannot be attributed directly to changing local conditions: habitat in Mar was extensive and increasing, while Sept birds arrived when habitat was most restricted (Table 1). Possibly they abandoned their breeding habitat because it became even less suitable than was Bamburi at that time. The Bamburi wintering habitat appeared similar to breeding habitat in Zambia, but the birds' departure suggests that it was not suitable for breeding - possibly it could not provide enough food for the young. Although the dam appeared to have much food in the breeding season, the fact that most of the Moorhens and African Jacanas (not strongly migratory species) also left at that time suggests that it could support only a very few breeding pairs of rails and jacanas. There was apparently no other suitable habitat near Mombasa; and Bamburi, with habitat artificially maintained by pipeline water, is an isolated area such as these birds are prone to colonise opportunistically when dispersing from their breeding areas.

The breeding grounds of this population of Allen's Gallinule are not known. Breeding occurs on Zanzibar and Pemba in May-Aug (Pakenham 1979), but migration is not recorded in that area. The only breeding record from coastal Tanzania is of nest-building at Soya (near Dar-es-Salaam) in November (EANHS Nest Record Scheme).

Of the comparison species, all except Purple Gallinule are resident on Zanzibar and/or Pemba. Moorhens breed in June-Dec, African Jacanas in May-Aug and Black Crake in Jan (Pakenham 1979). Breeding of African Jacana

is recorded at Bamburi in Feb, May and July (EANHS Nest Record scheme) but nowhere else on the Kenya coast. My observations are the first breeding records of Moorhen and Black Crake in coastal Kenya, but breeding at Bamburi has probably been overlooked previously.

A Bamburi record of a "70-80% grown" juvenile Allen's Gallinule in Sept 1975 (EANHS Nest Record Scheme, Brown & Britton 1980) is of interest. The bird was unaccompanied, so had probably been reared elsewhere and not bred at Bamburi. Similarly a Sept immature near Lamu (north Kenya coast), possibly "bred in the vicinity" (Jackson 1938), cannot be taken as proof of breeding there.

The estimated age of Bamburi juveniles at the start of moult is c. 5 months, similar to that for migratory populations of American Purple Gallinule *P. martinica* (Ripley 1977, Cramp & Simmons 1980). Adults apparently moult all remiges shortly after breeding (Cramp & Simmons 1980); as no flightless birds were seen at Bamburi, adults may have moulted before arrival.

Turning over *Nymphaea* leaf edges when feeding was described by Fry (1966), but feeding on *Nymphaea* seedheads has not previously been described. It was also frequently observed in Zambia. The lack of aggressive encounters with Moorhens, African Jacanas and Purple Gallinules suggests that Allen's Gallinule was not in competition with them for food at the dam. African Jacanas fed largely on insects, Moorhens chiefly on plant material while swimming, and Purple Gallinules mainly on roots, stems and leaves of the larger emergent plants, especially *Typha*. Allen's Gallinules appeared to be more catholic in their choice of food and in their feeding methods than were the other species.

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SUMMARY

Field observations were made of a nonbreeding migratory population of Allen's Gallinule *Porphyrio alleni* at Bamburi, Mombasa, Kenya, throughout 1981. Habitat requirements, migrations, behaviour, food, voice, moult and breeding are described, population density is given and some comparison made with four other water bird species sharing the habitat. The migrations and breeding areas of rallids in coastal East Africa are discussed.

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