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# Notes on Black Crakes *Amaurornis flavirostra* 1: Breeding, plumages, and social structure

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## Summary

Records from a family of Black Crakes on a small dam include 16 nestings between September 1985 and February 1995, with results from laying to disappearance of fledged young tabulated. Successionally downy hatchling, juvenile, immature, and adult plumages are described with timing. Unexpectedly, there appeared to be two alternate plumages—'grey' or 'sooty'—in the third immature stage, with a possibility of the latter having previously been mistaken as a 'non-breeding' adult dress. Need for further research to confirm is stressed. Moults from 'breeding' plumage directly into new 'breeding' plumage were observed, but no moult from a 'breeding' into a 'non-breeding' dress was seen. Juveniles and immatures helped care for the young of up to four subsequent clutches, the fluctuating family membership contained between one and seven age classes and a maximum of 12 individuals on two occasions.

**Keywords** Co-operative breeding, plumages

## Introduction

These notes were made at a small dam (Fig. 1) created in 1985 in Nairobi's Langata suburb (E 36°44′ 25.5″, S 1°22′58.5″, 1720 m). Introduced plants were a 25 $m^2$ clump of the lily *Pontedaria cordata*, two stands of papyrus *Cyperus papyrus* totalling *c.* 50 $m^2$, a 50-$m^2$ clump of reed mace *Typha domingensis* and 15 $m^2$ of reeds *Phragmites communis*. Waterlilies *Nymphae nuchalis* grew in a discontinuous peripheral band that varied seasonally between one and four metres in width. The dam's twin purposes were scenic and for culturing tilapia *Oreochromis andersoni*. These records did not start as planned, methodical research, but from notes made as personal memoirs. Yet as they accumulated, we were urged by ornithologists who visited the dam to assemble and publish them because they contained original material, despite an unavoidable anecdotal element.

The first record of a Black Crake *Amourornis flavirostra* at the dam was in September 1988. Within three weeks, typical Black Crake 'singing' (Huxley & Wilkinson 1979) was heard, suggesting that more than one individual was present, but a second individual was not seen until October 1988. Although no deliberate attempt was made to tame the pair, their initial shyness gave way to habituation by daily human activity around the dam until, scavenging for fish-feed pellets, they became tame enough to take food from the hand, walk between, on our feet, or on us as we sat beside the water, eventually getting in the way when we were netting fish.

This selective close tolerance was exhibited only towards us, our gardener and our two dogs, but not in the same degree towards visitors. Strikingly, the appearance of a strange dog—even if it was a Jack Russel terrier as were ours—elicited loud alarm calls and a rush for cover. The lynch pin of our certitude that these records pertain to a single family derived from this founding pair was the degree of their habituation. It is improbable that a new immigrant would immediately exhibit the same selective tolerance and recognition of human individuals and two dogs. Almost as improbable was that the presence of a shy alien arriving at the dam would have escaped our notice. While colour banding would have greatly enhanced our recognition of individuals and might be essential with completely wild birds, we point out that recognizing individuals without such aids was illustrated by, among many, the late Leslie Brown's studies of raptors (e.g., Brown 1972). Such ability is routinely demonstrated by farmers dealing with massed domesticated animals.

**Figure 1.** The dam in Nairobi's Langata suburb where Black Crake observations were made.

Irregularly, between September 1988 and February 1996, notes were made of the crakes and their 46 descendants from >2400 observations (varying between 5 min to 6.8 h) over 2423 d. In this time, the crakes laid 16 clutches. From their extreme tameness and age-based plumages, we could relate individuals to their natal clutches, but not always separate siblings within a clutch. Size differences between the breeding adults were obvious when they were together, but not otherwise and we assumed the smaller of the two was the female, as noted by Urban *et al.* 1986.

With normal foraging augmented by access to fish pellets, food was available to them *ad lib.* Such nutritional abundance may be rare but not unknown in nature. Pitman (1929) described an islet in Lake Victoria "…which literally swarms with these Rails …Their nests are everywhere in the bushes." The superabundance of chironomid lake flies would have provided Pitman's crakes with similarly abundant food.

We use the term hatchling for the immediate post-hatching bird, juvenile for those in their first feathered stage, immature for those in the following plumage, and adult for those in full black plumages.

## Nests

As recorded by Urban *et.al.* (*loc. cit.*) and others, the Black Crakes made two types of nest: one for resting and the other for breeding. The former were shallow-cupped platforms where they rested, preened, and slept. Several such nests were in use simultaneously, the most at any one time being eight. Such resting nests were built by juveniles, immatures and adults. Breeding nests were more substantial and deeply cupped (diameter ± 20 cm, depth of cup *c.* 10 cm). No juvenile birds were seen contributing nesting material to breeding nests. Both types of nests were placed in emergent vegetation over water.

The construction of two breeding nests observed from beginning to completed clutch laid, were made by the breeding pair helped by an 'extra' adult, and an immature in one case; and in the other, by the breeding pair and an immature. In both cases, all birds brought and placed nesting material on the structure, but the immature bird also passed material to an adult which then positioned it. Gravity kept the loose mass of plant parts in place. In the second nest, a first egg was laid when the cup was still shallow, but it had become much deeper by the time the fifth and last egg of that clutch was laid.

One breeding nest (Fig. 2) was analysed when no longer in use. It was in papyrus and made of only three materials: sections of *Typha* leaf, fronds from papyrus heads and bits of grass stem and leaf from *Panicum repens.* The dry mass weighed 250 g from which a sample of 45 g containing 169 plant parts was analysed. Extrapolated, the whole nest would have contained 939 items. Plant parts were identified to species in four length classes (< 11 cm; 11–20 cm, 21–30 cm and > 30 cm) as shown in Table 1. Structurally, papyrus fronds and grass contributed little to the nest, being mainly cup lining, with the bulk of the nest made from *Typha* leaf. All pieces > 11 cm long were folded back on themselves, the longest being folded four times. All the nest materials had come from within the contiguous papyrus and *Typha* beds or from their edges.

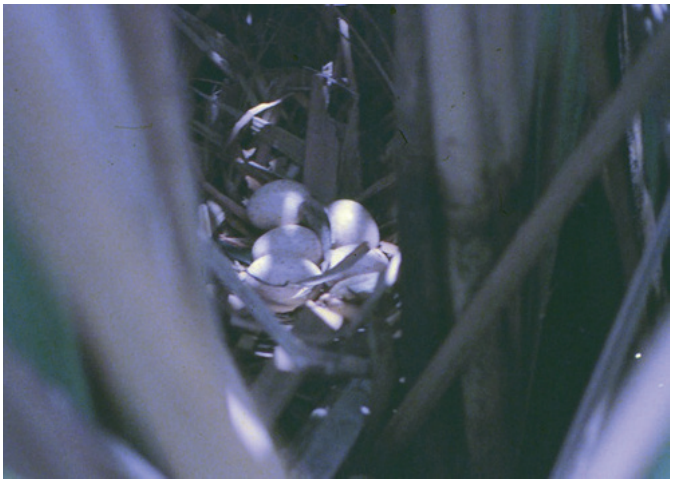

**Figure 2.** A typical Black Crake nest with a clutch of five eggs located in a patch of papyrus.

**Table 1.** The contents of a Black Crake nest, with proportions of the plant species used and the length of plant parts (n = 169) in four classes.

| Plant species | Proportion (%) of Plant Pieces in Length Classes | | | | |
|---|---|---|---|---|---|
| | < 11 cm | 11–20 cm | 21–30 cm | > 30 cm | Total |
| *Typha* | 38 | 9 | 2 | 3 | 52 |
| Papyrus frond | 21 | 10 | 4 | 5 | 40 |
| *Panicum repens* | 4 | 2 | 1 | 1 | 8 |
| Total | 63 | 21 | 7 | 9 | 100 |

One breeding nest and two resting platforms in *Pontederia* lilies were made from large fragments of that plant's stem and leaf, indicating that nesting material was selected from what was most closely available.

## Clutches laid, hatched and hatchling survival in the first four weeks

*Laying*

Laying took place in the months of June, July, September, November, January, February, March, and May as noted in Table 2., and also in April 1995, after the study ended. The longest period between breeding attempts was 330 d, and the shortest 45 d, excluding *c.* 15 d (see below), the spacing between January, when a clutch was lost, followed by quick re-laying in February 1995, and the average time between clutches laid was 144 d (4.8 months).

**Table 2.** Number of breeding attempts, eggs laid, chicks hatched and survivourship in the first four weeks post-hatching. ? = eggs not seen but proof of hatching from seeing adults carrying food into cover or hatchlings emerged. 0 = egg or chick seen but disappeared.

| Clutch # | Month | Eggs laid | End 1st week | End 2nd week | End 3rd week | End 4th week |
|---|---|---|---|---|---|---|
| c1 | Jul 89 | ? | ? | 0 | 0 | 0 |
| c2 | Jun 90 | ? | 2 | 0 | 0 | 0 |
| c3 | Jun 91 | ? | 3 | 1 | 1 | 1 |
| c4 | Sep 91 | ? | 3 | 3 | 3 | 3 |
| c5 | Jun 92 | 4 | 3 | 3 | 3 | 3 |
| c6 | Nov 92 | ? | 3 | 1 | 1 | 1 |
| c7 | Feb 93 | 4 | 3 | 3 | 3 | 3 |
| c8 | May 93 | 3 | 3 | 3 | 3 | 3 |
| c9 | Sep 93 | 4 | 4 | 3 | 3 | 3 |
| c10 | Nov 93 | ? | ? | 4 | 2 | 2 |
| c11 | Mar 94 | 3 | 2 | 2 | 2 | 2 |
| c12 | May 94 | 5 | 4 | 4 | 4 | 4 |
| c13 | Sep 94 | ? | 4 | 4 | 4 | 4 |
| c14 | Nov 94 | 4 | 4 | 4 | 4 | 4 |
| c15 | Jan 95 | 5 | 0 | 0 | 0 | 0 |
| c16 | Feb 95 | 5 | 4 | 4 | study | ended |

Sixteen clutches numbered c1–c16 were laid. Eggs of c1, c2, c3, c4, c6, c10 and c13 were not seen. No hatchling from c1 was seen, but its (their) presence was deduced from seeing both adults carrying insects into thick cover and subsequently finding a used breeding nest. In the other six nests where eggs were not seen, hatchling appearance could be used to set at least a minimum clutch size.

Both c8 and c12 were closely observed from first laying to hatching. Eggs in c8 were laid consecutively on 5, 6 and 7 May, partial incubation started on 8 May and was full time on 9 May. All three eggs were chipping on 26 May, 18 days after incubation started and all three chicks had hatched on 27 May. In c12, the first egg was laid on 10 May and the last on 14 May. Incubation began on 15 May. On 1 June, i.e. 16 days later, two chicks had hatched, and all were out of their shells by 4 June, hatching being attenuated over three days. Both these complete clutches thus hatched successfully.

Assuming eggs in clutches c5 (4), c7 (4), c9 (4), c11 (3), c14 (4), c15 (5), c16 (5) had suffered no loss when first seen and were complete, and including c8 and c12, the average clutch size was 4.1 eggs (n = 9 clutches, 37 eggs). Of 37 eggs seen, 31 (83.8%) produced hatchlings that survived to the end of their first week. Other than the eggs of c15, which disappeared one night, it is not known whether the other five losses were as eggs or hatchlings. Table 3 summarizes losses of hatchlings from the end of their first week to the end of the fourth week. Hatchling ages were deduced from bill markings (see below).

**Table 3.** Hatchling survival between the first and fourth weeks.

| | 1st week | 2nd week | 3rd week | 4th week |
|---|---|---|---|---|
| Number surviving | 42 | 39 | 33 | 33 |
| % as a proportion of preceding column | - | 92.9 | 84.6 | 100 |

From 42 hatchlings seen, 33 were alive at the end of their fourth week—an overall loss of 21.4%. As hatchlings were unable to fly and unlikely to have left their natal dam at so early an age, we assume disappearances were due to mortality. Once able to fly in the juvenile stage, we were unable to ascribe disappearance from the dam to any cause.

## Incubation and hatchling care

Crakes in both adult, or grey-breasted immature plumage, were seen incubating. In the short period between hatching and leaving the natal nest, a juvenile in brown plumage was once seen brooding newly hatched hatchlings.

Hatchlings were well coordinated and mobile within an hour of emerging from the egg. A hand placed within 30 cm of the nest of c14 to move a leaf to allow photography caused the adult 1 m away to give a gentle "kwep" sound. Two hatchlings clambered over the edge of the nest. The hand was withdrawn, the adult stopped calling and the two hatchlings returned into the nest bowl. This was the only case in which hatchlings were seen returning to a natal nest. Clutch c8 hatched on 27 May and hatchlings left the nest on 30th. In c12, hatchlings left the nest on the third day after the first egg hatched. In this case the last to hatch left the nest < 24 h after hatching. Within 24 h of c14 starting to hatch, crakes in juvenile brown plumage had brought food to the nest, but passed it to the brooding bird, which then re-presented it to the hatchlings.

On 23 November, at 11:40 an immature brooding c14 was relieved by an adult which at 12:15 began calling a gentle "kwep". After a few calls it walked off the nest and stood a metre away, still calling—each call separated by one to several seconds. All four young suddenly clambered off the nest and followed the adult across floating rush leaves into dense *Panicum repens* at the water's edge.

Food had been brought to the nest by all members of the family regardless of plumage, including sooty immatures.

New hatchlings initially stayed, not as a group, but separated in thick cover in the same general area as their nest. During this first week a hatchling usually had an older bird (juvenile, immature or adult) close by. After a week, hatchlings were left alone while all members of the family foraged. From this point on they wandered between clumps of taller vegetation around the dam's periphery, though initially spending very little time in the open intervening spaces. Rarely, they swam between these points across open water (Fig. 3).

**Figure 3.** A Black Crake chick four days off its natal nest crossing *c.* 15 m of open water between clumps of riparian cover, apparently of its own volition (photo: Jem Anderson).

Out of the nest, hatchlings were fed directly by all members of the family—juveniles, immatures and adults—who both brought food and brooded them. This was on a 'one-on-one' basis, a juvenile, immature or adult bird settling with a hatchling where it was.

Clutch c10 hatched only 45 d after c9 when juveniles from the latter still had downy tails and crown stripes and were themselves actively soliciting and receiving food from all older birds. Even so, these c9s fed the c10s both with items that they had foraged or solicited from a senior and which they then passed on to c9s. Thus, birds with some down in their plumage helped feed hatchlings of the next clutch, while still being fed by their elders.

The returning forager offered food by lowering its bill to the hatchling's level. The hatchling pecked at the bearer's bill and removed the offering. When more than one item was offered at once (up to three guppies *Poecilia* or meal worms *Tenebrio* sp. often being brought as a bill-load), releasing one might cause the others to drop. These were immediately picked up by the bringer and re-presented. As hatchlings grew, the bringer tended to drop items on the ground for the hatchling to pick up for itself. Hungry hatchlings solicited any approaching older bird by crouching—tail up, breast down, head and bill pointed upward—and waving their wings. In this, the wings were not moved in synchrony, but alternately in a rowing rather than flapping action. Once hatchlings were feathered, this 'alternate wing-rowing' was abandoned, but the begging bird still put the anterior point of the sternum almost on the ground and inclined neck, head and bill upward at an angle of around 45% from the horizontal. Supplicants adopting this posture did so from any angle, and even from behind, with the begging bird's head thrusting up from between its target's legs.

Hatchlings solicited adults for food into their 14th week although at a progressively declining frequency. A four-month-old c7 immature lost three toes to a catfish

(*Clarias gariepinus*) and, partially incapacitated, reverted to vigorously begging for food from all older birds. While none of the older crakes solicited presented food as they would to hatchlings, neither did any refuse to yield whatever they were carrying to the damaged bird. Despite its injuries, this individual still occasionally fed the newest hatchlings—either with food it had caught or begged from another.

Allo-preening was observed between the family's founding pair, between one of this pair (the larger = male?) and a downy black hatchling, between siblings in brown plumage and, on one occasion, in a communal session that involved the two founding parents, an immature in sooty plumage, a grey-breasted immature and a downy hatchling, all grooming one another.

## Plumages

*Hatchling – Downy Black*

As described in all the references quoted above, hatchling crake plumage was black down, which in some light has an oily green sheen. At distances >1 m, iris, unfeathered tibia, tarsus and toes appeared equally black. In the hand, however, the iris was very dark brown. Black down unrelieved by obvious feathering persisted for *c.* 21 days. By day 28 the field impression was no longer of a wholly fluffy chick as dark feathers on head and body were growing out from the down. On some birds, the tips of remiges were just visible. The iris was now perceptibly very dark brown and legs dark slate.

A useful indicator of age was the changing dimensions of the crake's bill length relative to the overall size of its head. Relief in the hatchling's blackness was a short, bright pink bill. On emerging from the egg, this pink was interrupted by a thin dark mark across the maxilla just anterior to the nostril (Fig. 4). This grew larger, changing its position relative to the bird's bill as the latter grew. By days three and four post-hatching, the dark mark across the maxilla had widened to *c* 1 mm. At day seven and with bill growth, the mark had 'moved' further from the head and by day 14 it was a band around both mandibles as a 'shadow stripe' halfway along the bill (Fig. 5). By day 21 the dark band was perceptibly wider (Fig. 6). By day 28 the dark bill band had broadened asymmetrically making the central third of the bill blackish, the tip pale horn with some pink only visible on some parts of its basal third (Fig. 7). Throughout the first 28 days, the bill's initial bright pink had been fading in intensity. Indices of the changing relationship between bill length and the bird's head were derived from bill lengths divided by the distance between the anterior edge of eyes and the bill base.

These measurements were taken from photographs of individuals hatched from the same clutch and all were of the same age. Table 4. documents these indices which changed from 2.3 at hatching to 4.5 at 60 weeks as the bill grew progressively longer relative to the rest of the head.

**Figure 4.** Three hatchlings two days old.

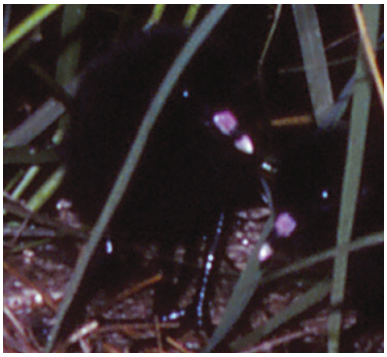

**Figure 5.** The hatchlings' bill bands at day 14.

**Figure 6.** The bill band at *c.* 21 days old, remiges just appearing.

**Figure 7.** At *c.* 28 days, now no longer a downy hatchling.

**Table 4.** An index of bill length relative to the outline of the head, being culmen length divided by the distance between eye and base of bill.

| Age in weeks | 0 | 4 | 10 | 26 | 43 | 60 |
|---|---|---|---|---|---|---|
| Bill index | 2.3 | 2.8 | 3.5 | 3.9 | 4.2 | 4.5 |

*Juvenile Plumage – Warm Brown*

In the fifth week, head and breast were feathered dark brown from which all down had been lost and remiges were one-third grown. Some individuals retained their head down giving a fuzzy crown outline. The iris was still dark brown with legs and feet still dark slate. The maxilla was now dark horn—occasionally with a vestigial pale tip and the basal third very pale pinkish shading to dirty white.

By week six the field impression was of a warm umber brown crake with some vestigial down on the rectrice tips. Down retained on the head on either side of the central line, produced two distinct crown-edge stripes (Fig. 8), giving the impression of a double-Mohican human haircut. Remiges were half-grown, the iris more clearly brown and the legs slaty. The bill was now dark horn or black with a pale patch in the basal quarter of the maxilla that might still have had the merest suggestion of pink.

From week seven onward, all down had gone from the body except as vestigial fluff on the crown stripes, which were gone altogether by week eight. Remiges were three-quarter grown, reaching full length in week eight when the chicks could fly. The

pale patch on the basal maxilla had shrunk to little more than an outline around each nostril, and in some to a very thin line around the base of the bill, and the bird was now wholly brown (Fig. 9).

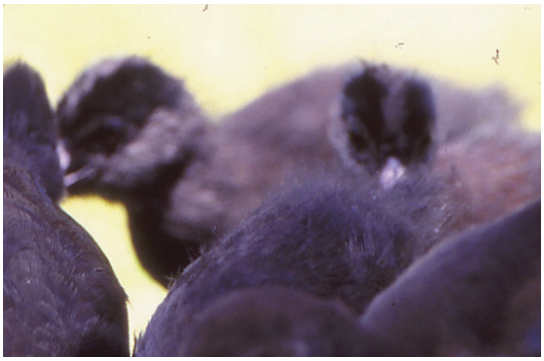

**Figure 8.** Among the last down to be lost is that on the head that stands up on either side of the centre line, as in the human Mohican haircut.

**Figure 9.** Bird at front in juvenile brown plumage.

*Immature plumages – Grey-breasted or Sooty-black*

Brown siblings from the same clutch became either grey-breasted or, at a distance, sooty-black, but close to, a very dark slate (hereafter 'sooty') – a phenomenon not hitherto reported. Moulting into either was gradual, though the onset is more readily apparent with the former because grey contrasts more with the juvenile umber brown than the dark sooty. Some emerging grey feathers were detectable as early as week eight (Fig. 10), but most birds were still predominantly brown until weeks 10 to 12. By week 14 moulting was sufficiently advanced for the grey morphs to be distinct from their sooty siblings of the same clutch (Fig. 11). Fig. 12 shows the sooty colour, in Fig. 11, wing-stretching, and illustrates the degree of blackness at this age.

**Figure 10.** Juvenile with hints of grey on cheeks.

**Figure 11.** The two immature plumages, grey-breasted left, sooty right, from the same clutch.

**Figure 12.** The bird on the right in Fig. 11 wing-stretching and emphasizing blackness.

**Figure 13.** A grey-breasted immature, for comparison with the (slightly younger) black morph in Fig. 12.

The most obvious change in the grey morph was a distinct paling on the sides of the head and, even more, the throat (Fig.13), which should be contrasted with Fig. 10, although the bird in the latter photo is slightly younger than that in Fig. 13. This progressed until with some, but not all birds, there were flecks of white on the throat. No wholly white throats, as described by Schmitt (1975) and Urban *et al.* (*loc. cit.*) from crakes in southern Africa, or even the heavier white 'splashes' on the throat of an Ethiopian specimen in the Nairobi National Museum, were observed.

Eventually the forehead, sides of head, throat, breast and belly were a grey that was the cleanest and palest on the sides of head and throat, but less clear on the breast. Shades of grey varied somewhat between individuals. Back, wings and tail feathers became olivaceous brown. In certain lights some birds imparted a false impression of faintly barred flanks and back (Fig. 14).

**Figure 14.** The same late grey morph bird in 4c displaying emerging black feathering on the side of head and how at certain angles the flank plumage can create a faint, but false, field impression of barring.

In the sooty morphs, the juvenile brown colour gave way to blackness or at close quarters a very dark charcoal grey on the throat, head, neck, breast, wing feathers and underparts. The 'blackness' was less intense than in adult plumages, but apparent from the middle and lower back, wings, tail coverts and the tail stayed brown.

Acquisition of the full immature grey plumage was not complete until week 24 (six months) and lasted until week 36 (nine months). At the onset of developing immature plumages—either grey or sooty—the irises were brown, there were no obvious eye rings and the exposed leg, foot and toes were still slaty or verging on a dark flesh brown. Bill colour was brownish-horn with vestigial pale areas about the nostrils, around the base or the basal third of the lower mandible. Between weeks 24 and 36 these pale bill areas expanded, replacing the brownish-horn through dirty greenish horn to bright greenish yellow similar to, but not as intense as, the adult Black Crake's. By week 36 (only four grey phases were seen beyond this

age) the irises were ruby-red, with orange to coral red fleshy eye rings and the exposed tibia, tarsi and toes were bright orange to coral red.

All immature sooties had disappeared from the dam before week 36, but not before some had acquired the iris, eye ring and foot colours seen in their grey-phase peers (Fig. 15).

**Figure 15.** Left, a 'breeding' plumage, right, a black morph immature about the same age as the grey morph in Figs. 13 & 14. Is this what may have been deemed an adult 'non-breeding' plumage?

*Adult Black Plumage*

As early as week 20, some grey morph immature crakes had a few black feathers changing into their grey plumage. This was more obvious by week 28 and apparent in four grey morphs by week 32. These black feathers were initially concentrated on the head, but also occurred elsewhere on the body. Their appearance was irregular and without symmetry between right and left sides. Thus, a black patch developed low on a left breast and another high on the same bird's right. Such patches expanded and coalesced. By week 36 the four grey-plumaged birds that stayed past this point rapidly become black and from a distance were difficult to differentiate from the two breeding adults. When together, their blackness seemed less intense.

*Moults*

We never saw either of the founding Black Crake pair switch between a non-breeding and breeding plumage—even when they only bred once in each of their first two years at the dam. Accepting that we may have missed the changes in subsequent years when they produced three then four clutches in a year, we never saw them other than in the same black plumage. Thus, we had no evidence of seasonal changes between putatively 'breeding' and 'non-breeding' plumages from these obviously breeding adults.

That is not to say we saw no evidence of moult while in adult plumages. In September 1992 the larger, presumed male, of the family's founding pair lost all remiges and rectrices simultaneously (as reported by Schmitt, *loc. cit*.). Two weeks later the smaller of the two followed suit. Both were flightless for not less than ten days, but possibly longer, and spent most of their time in dense cover. Both breeding birds underwent similar flightless moults a year later in the last week of September 1993.

In both cases of flightless moult, the birds appeared to go into it and came out of it in the same plumage. In November 1993, the individual of c5 that was recorded 'hiding' and keeping to cover, just prior to replacing one parent. The behaviour was similar to the earlier two moults observed and it may have also been moulting, but we could not confirm this. We had no evidence that remiges and rectrices were moulted simultaneously or that flightlessness occurred during the pre-adult plumage changes, and we assume these took place gradually.

## Family dynamics over seven years

Other than for the original two adults, no other Black Crakes were recorded arriving on the dam between 1988 and 1995. As stated in the introduction, had any done so their behaviour is likely to have contrasted strongly with the residents' tolerance of people, and would have made them obvious.

In this study, out of 12 clutches, young of the preceding 11 (91.7%) helped their parents care for the next generation, while those from eight clutches (66.7%) helped look after two succeeding generations, and those from four (33.3%) helped with the following three, and some from three clutches (25%) helped with four successive sets. The average length of time that the offspring from 13 clutches (failures c1, c2 & c15 excluded) stayed with the breeding pair was 10.2 months (range 2–33). A single bird that stayed 33 months replaced the smaller (presumed female) of the founding pair after 17 months and for the remaining 16 months of the study, and mated with its parent, produced 12 clutches. Discarding that individual's record as anomalous, the average time young stayed as part of the breeding group was 8.2 months (range 2–15). Of the four birds that stayed on the dam into black plumage, two (one from c6 and one from c8) disappeared after about 1 month. One from c4 spent about two months while the fourth was present for three months, co-existing with its parents before replacing one of them. The first was fully black when it replaced a parent in the breeding pair. Table 5 tabulates the structure of the Black Crake family over time.

**Table 5.** Structure of the Black Crake family over time. Observations made over seven years are colour-coded to show the family structure based on their respective clutches. Hatchlings are grey, brown juveniles are brown/pink, immatures are blue, non-breeding adults are green, while breeding adults are yellow. X indicates c15's loss soon after laying. Also given are total individuals and generations present. All data are arbitrarily related to a monthly time scale.

| Year | Month | Ads | c1 | c2 | c3 | c4 | c5 | c6 | c7 | c8 | c9 | c10 | c11 | c12 | c13 | c14 | c15 | c16 | All | Gen |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1988 | Sep | 2 | | | | | | | | | | | | | | | | | 2 | 1 |
| 1989 | Jul | 2 | ? | | | | | | | | | | | | | | | | 2 | 1 |
| 1990 | Jun | 2 | | 2 | | | | | | | | | | | | | | | 4 | 2 |
| 1990 | Jul | 2 | | | | | | | | | | | | | | | | | 2 | 1 |
| 1991 | Jun | 2 | | | 3 | | | | | | | | | | | | | | 5 | 2 |
| | Jul | 2 | | | 1 | | | | | | | | | | | | | | 3 | 2 |
| | Aug | 2 | | | 1 | | | | | | | | | | | | | | 3 | 2 |
| | Sep | 2 | | | 1 | 3 | | | | | | | | | | | | | 6 | 3 |
| | Oct | 2 | | | 1 | 3 | | | | | | | | | | | | | 6 | 3 |
| | Nov | 2 | | | 1 | 3 | | | | | | | | | | | | | 6 | 3 |
| | Dec | 2 | | | 1 | 3 | | | | | | | | | | | | | 6 | 3 |
| 1992 | Jan | 2 | | | 1 | 3 | | | | | | | | | | | | | 6 | 3 |
| | Feb | 2 | | | 1 | 2 | | | | | | | | | | | | | 5 | 3 |
| | Mar | 2 | | | 1 | 1 | | | | | | | | | | | | | 5 | 3 |
| | Apr | 2 | | | | 1 | | | | | | | | | | | | | 5 | 3 |
| | May | 2 | | | | 1 | | | | | | | | | | | | | 4 | 2 |
| | Jun | 2 | | | | 1 | 4 | | | | | | | | | | | | 8 | 3 |
| | Jul | 2 | | | | 1 | 3 | | | | | | | | | | | | 7 | 2 |
| | Aug | 2 | | | | 1 | 3 | | | | | | | | | | | | 6 | 3 |
| | Sep | 2 | | | | 1 | 3 | | | | | | | | | | | | 6 | 3 |
| | Oct | 2 | | | | 1 | 3 | | | | | | | | | | | | 6 | 3 |
| | Nov | 2 | | | | 1 | 3 | 3 | | | | | | | | | | | 8 | 3 |
| | Dec | 2 | | | | 1 | 3 | 1 | | | | | | | | | | | 6 | 3 |
| 1993 | Jan | 2 | | | | | 1 | 1 | | | | | | | | | | | 4 | 3 |
| | Feb | 2 | | | | | 1 | 1 | 4 | | | | | | | | | | 8 | 4 |
| | Mar | 2 | | | | | 1 | 1 | 3 | | | | | | | | | | 7 | 4 |
| | Apr | 2 | | | | | 1 | 1 | 3 | | | | | | | | | | 7 | 4 |
| | May | 2 | | | | | 1 | 1 | 3 | 3 | | | | | | | | | 10 | 4 |
| | Jun | 2 | | | | | 1 | 1 | 3 | 3 | | | | | | | | | 10 | 4 |
| | Jul | 2 | | | | | 1 | 1 | 1 | 2 | | | | | | | | | 7 | 4 |
| | Aug | 2 | | | | | 1 | 1 | 1 | 2 | | | | | | | | | 7 | 4 |
| | Sep | 2 | | | | | 1 | 1 | 1 | 2 | 4 | | | | | | | | 11 | 6 |
| | Oct | 2 | | | | | 1 | 1 | 1 | 2 | 3 | | | | | | | | 10 | 6 |
| | Nov | 1 | | | | | 1 | 1 | 1 | 2 | 2 | 4 | | | | | | | 12 | 7 |
| | Dec | 1 | | | | | 1 | 1 | 1 | 1 | 2 | 3 | | | | | | | 10 | 7 |
| 1994 | Jan | 1 | | | | | 1 | 1 | 1 | 1 | 2 | 3 | | | | | | | 10 | 7 |
| | Feb | 1 | | | | | 1 | | | 1 | 2 | 3 | | | | | | | 7 | 5 |
| | Mar | 1 | | | | | 1 | | | 1 | | 3 | 3 | | | | | | 8 | 5 |
| | Apr | 1 | | | | | 1 | | | 1 | | 3 | 2 | | | | | | 7 | 5 |
| | Mam | 1 | | | | | 1 | | | 1 | | 3 | | | | | | | 5 | 4 |
| | Jun | 1 | | | | | 1 | | | 1 | | | | 5 | | | | | 8 | 4 |
| | Jul | 1 | | | | | 1 | | | 1 | | | | 4 | | | | | 7 | 4 |
| | Aug | 1 | | | | | 1 | | | | | | | 4 | | | | | 6 | 3 |
| | Sep | 1 | | | | | 1 | | | | | | | 4 | 4 | | | | 10 | 4 |
| | Oct | 1 | | | | | 1 | | | | | | | 4 | 4 | | | | 10 | 4 |
| | Nov | 1 | | | | | 1 | | | | | | | 1 | 4 | 4 | | | 11 | 5 |
| | Dec | 1 | | | | | 1 | | | | | | | | 4 | 3 | | | 9 | 4 |
| 1995 | Jan | 1 | | | | | 1 | | | | | | | | 4 | 3 | X | | 9 | 4 |
| | Feb | 1 | | | | | 1 | | | | | | | | 2 | 3 | | 5 | 12 | 4 |

## Comments

These observations add detail to earlier reports (e.g. Urban *et al. loc. cit.* and Hoyo *et al.* 1996) that a pair of Black Crakes can produce more than one clutch in a year. Juvenile and immature offspring remain with the breeding pair and assist with nesting, and the raising of subsequent generations. This contrasts with Schmitt (*loc. cit.*) who found the "young of the first brood are forced to leave their birth place as soon as a second breeding season starts." We suggest Schmitt's (*loc. cit.*) findings in the South African highveld of parents chasing young of a first clutch from their natal area with the onset of a second breeding, reflects flexible reproductive and social behaviour mediated by nutritional and climatic conditions.

With one exception, our notes on plumages differ in minor detail, but are in general agreement with descriptions by, for example Schmitt (*loc. cit.*), Urban *et al. loc. cit.*, Hoyo *et al. loc. cit.* and Taylor & van Perlo 1998. They all noted white throats on Phase 3 immatures, which we did not see, though they confirm Zimmerman *et al.*'s 1995 observation that this white may be absent or vestigial on some Kenyan birds as noted here. This feature is thus locally variable or a family idiosyncrasy.

The exception was our observation distinguishing two immature plumages in which a sooty alternative to the immature grey-breasted colour phase does not appear to have been reported before. Occurrence of dichromatism in immatures that is absent in adults seemed very improbable, but is illustrated photographically in Fig. 11. Behavioural differences between the two forms were slight: sooty morphs had left the family before week 36 whereas four grey-breasted morphs stayed on into adult plumage for varying periods. No sooty morph brought nesting material to a breeding nest—or incubated eggs—though they fed hatchlings.

It is possible that 'non-breeding' black dresses reported by others have, in fact, been immature sooties. We note that in the Los Angeles County Museum collection, Black Crake specimens 77053, 77054, 77055, 77056 and 77057 were all collected at a dam on the same Kenyan site between 12 and 16 February 1971. Similarly, in Pittsburg's Carnegie Museum of Natural History, their Black Crakes P139609, P139613 and P139700 were taken within two days in June 1960 from the east shore of Kenya's Lake Naivasha. In the light of our observations, collections from the same sites at the same time could represent a family with its succession of age classes in which greater or lesser intensity of blackness might reflect reproductive condition, but also be immature sooties. Because an alternative grey immature plumage was obvious, it might have predisposed field collectors to assume black plumage, *per se*, proved adulthood, and if dull, simply a non-breeding bird, as occurs with many species (e.g. Cattle Egret *Bubulcus ibis*), which have distinct breeding and non-breeding plumages. Further, unless examined carefully, an assumption of non-breeding condition would be bolstered by gonad states, small in both immatures and regressed breeding adults, being overlooked.

To check whether the difference between sooty and grey immatures was sexually determined, the sex of all grey-breasted Black Crake study skins was sought from the collections in Durban (12), Bulawayo (23), Nairobi (1) and the British Museum. Photographs of the Durban and Bulawayo specimens showed no specimens as grey breasted as that in Fig. 13. Specimens in the British Museum showed both female and male grey-breasted specimens (H. van Gouw, pers. comm.). The single Nairobi grey-breasted skin was a female. As pointed out by van Gouw, collectors may have made mistakes identifying gonads when preparing skins.

In South Africa, where temperate zone summer breeding and winter non-breeding seasons are well defined, avian reproductive behaviours tend to reflect this seasonality. Schmitt's (*loc. cit.*) and Taylor & van Perlo (*loc. cit.*) do report Black Crakes exhibiting two plumages—breeding and non-breeding. In tropical East Africa, annual seasons are less well defined than in South Africa. Brown & Britton (1980) recorded Black Crakes breeding in all months of the year in Uganda, their region B, and in all but one month in their region D, which included both equable Kenyan highland as well as the country's low arid north. In such circumstances, without a clear-cut non-breeding season, and some Black Crakes nesting in most months of the year, population changes between breeding and non-breeding plumages, would not be synchronous as in South Africa, and not easily detected.

In Uganda—Brown & Britton's Region B—their principal source was Pitman to whose findings we relate high crake densities with nutritional abundance (Pitman *loc. cit.*). In lacustrine Uganda, the climate is relatively warm and humid year-round. At the highland Kenyan dam that we describe, climate was equable year-round, and the crakes were also nutritionally affluent. Year-round breeding, both in our own and the Ugandan records, seems likely to be nutritionally driven and accounts for the pair of birds at the core of our observations nesting four times within a year. Despite annual moults, they did not display a non-breeding plumage, but changed back into a new 'breeding' dress.

We posit that astride the equator and in year-round equable climates with abundant nutrition, the Black Crakes can skip non-breeding plumages. More than one generation of helpers (six for four hatchlings on our dam in November 1993) may so free the breeding pair from tending young that they can breed faster.

The presence in the family of third adults of c4, c5, c6 and c8 (Table 3) raises the possibility of two birds laying in the same nest (Pitman *loc.* cit. suspected such an instance). The adult of c4 could have contributed to c6, but we discount it given the small clutch size (3). That of c5 could have contributed to c9, but although it went on to breed all clutches from c10 onward, we discount the likelihood given that c9 was only 4 eggs. If the adult of c8 was able to lay in its last month as an immature, it could have added to c12 whose five eggs varied in colouring, shapes, and sizes (in mm: 34.0 x 24.0; 32.5 x 24.0; 32.5 x 24.0; 30.0 x 23.0 and 30.0 x 23.0).The first of these eggs was truly oval, the second and third were conventionally ovoid, being broader toward one end, the last pair were more spherical than ovoid. All had creamy backgrounds, finely and densely flecked with grey, reddish and mauve. The first three had, in addition, a few larger irregular red brown freckles that the last round pair did not have. These differences are, at best, only inconclusive hints that two birds may have laid, as is c12's attenuated hatching period.

Given our very small data set, we draw no conclusions and are still puzzled by the apparent two phases of immature plumage. Yet incomplete as our data may be, they invite further research into the questions that have arisen. Given their small size, catholic diet, social flexibility and ease of habituation, the Black Crake may be a prime candidate for aviary research.

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# Notes on Black Crakes *Amaurornis flavirostra* 2: Vocalizations, feeding and interactions with other species

I.S.C. and A.C. Parker

## Summary

Black Crake vocalizations are described and compared to previous published records, as are observations of dietary items and interactions with other birds in the same habitat. An instance of site fidelity in extreme circumstances is given, together with an appendix of potential Black Crake predators sharing the same environment.

**Keywords** calls, diet, inter-specific behaviour, site fidelity

## Introduction

The following miscellaneous notes on Black Crakes were recorded at the dam described in Parker & Parker 2019 as additions of detail and comment to what is already known about this species.

## Vocalizations

Various calls were noted:

(i) Hatchling soft mews: either uttered singly or strung together; initially very softly, becoming louder as the bird grew, and enabled tending members of the family to locate the caller.

(ii) Hatchling 'lost' call: a louder, plaintive, extended mew given at two or three second intervals and often for several minutes at a time, uttered by an isolated hatchling.

(iii) Crakes with food approaching hatchlings, gave a low, fast, guttural "grr-grr-grr-grr", only audible to humans within 5 m.

(iv) Adults, sub-adults, immatures, and juveniles all give a gentle "kwep" of variable volume when minding hatchlings, in the vicinity of hatchlings on the close approach of people, dogs, mongooses, etc., entering the nesting vegetation. Incubating birds uttered it on several occasions before getting off their nest, and by adults apparently inducing hatchlings to leave the natal nest. Though not loud, it could be heard by humans at distances of up to at least 20 m. Overall, we associated it with alertness and low to medium levels of tension.

(v) Alarm, at the sudden appearance of a raptor, strange dogs, and danger: was a very loud and explosive "pew", accompanied by a rush for cover from whence it continued calling.

(vi) Black Crake 'singing' (if the components are not antiphonal, see Huxley & Wilkinson 1979) often indicates their presence before the birds are seen. It has been transcribed variously thus:

Mackworth-Praed & Grant (1952), "A shrill craking 'rr-rr-rr' which ends in a resonant croak"

Smitt (1975), "rrü–rrü–rrü."

Taylor & van Perlo (1998), one bird "a harsh repeated chatter 'krrok–krraaa', the other, a softer almost dove-like purring or crooning call which may comprise single notes 'crrooo' or a phrase such as 'coo-crr-ooo."

Urban *et al.* (1986), "Bird 1 'krrrok-krraaaa-krrrok-krrraaa.', Bird 2 ' krrooo-krrooo'

Zimmerman *et al.* (1996), "A throaty 'coo-crr-chrooo' and a rippling 'weet, eet, eet, eet, eet."

Such variation of a call all recognized in the field aurally, infers the recorders' different aural acuities, senses of musicality and linguistic ability to transcribe sound to paper. Consequently, we have reservations, including our own, about committing bird sound to writing down.

Black Crake calling was described as a 'duet' (in which contributions are antiphonal) by Urban *et al.* (*loc. cit*.) and Taylor & van Perlo (*loc. cit*.). Yet the term was inappropriate if it was performed occasionally by trios, quartets or even quintets, as Taylor & van Perlo's (*loc. cit*.) and our own observations of families singing together indicated. In such cases, birds of different ages all congregated within $<1\,m^2$ that made it difficult to recognize which individuals were singing. This was even more so as Taylor & van Perlo (*loc. cit*.) found the song's dual components could be uttered by adults of either sex as well as by juveniles and immatures.

On all but one occasion duetting/singing was only heard from within the family's favourite patch of *Typha* or contiguous *Papyrus*, the two places where all but two breeding nests occurred (the exceptions were in *Pontedaria*, before the *Typha* and *Papyrus* were established). We never saw it performed without at least one adult taking part. Usually, but not always, both adults of the family were present. It was commonly given when an adult flew in to join others in the *Typha.* However, on one occasion an adult of the breeding pair, and a grey-breasted immature, performed the song without others present when the latter had just left the nest after a stint of incubating. It often followed sudden disturbances and also (but not invariably), when birds changed incubation shifts. It seemed an obligatory response to a tape recording of Black Crake calls recorded elsewhere and played within the family's hearing.

We heard calling at all times of the year, subjectively seeming more frequent just before and during egg-laying and incubation. In South Africa, Schmitt (*loc. cit*.) noted that it was seasonal and not uttered in winter between April and August. No such silent period was observed in the family reported upon in keeping with the year-round breeding in Kenya and seasonal breeding in South Africa (Parker & Parker *op. cit*.).

The calling seems to have two components: spaced musical 'growl notes' with higher 'trill notes' placed between the growls. We believe when one bird growls, another trills in response. Yet, subjectively, when there were more than two crakes present in a 'singing party', we could not tell whether only a pair or more members of it were calling.

In the same vein, we were unable to resolve whether such Black Crake calling is always antiphonal, one component following the other, or with some overlap between the two components. We suggest that when only two birds call, it is antiphonal, but that when more are involved this precision is lost and there is overlap.

(vii) On the day before it disappeared from the family, a crake in late grey-breasted

immature dress that lost toes to a catfish *Clarius gariepinus* (see Parker & Parker 2019), gave a series of squeaks while crouching and fluttering its wings when approached by any other crake, juveniles, immatures or adults, but not downy young.

(vii) Inside the *Typha* bed the founding female crake was seen with plumage fluffed out, wings akimbo and head down like a defensive domestic hen with chicks, pecking repeatedly at an agitated, metre-long, cobra's tail *Naja nigricollis*. The accompanying sound was similar to that made by a defensive hen, though 'in miniature'.

## Feeding

Black Crakes' diet is widely described in the literature, e.g. Urban *et al.* (*loc. cit.*), and can be summed as most forms of animal life that it can subdue, but principally arthropods and a wide range of plant parts. We witnessed scavenging on a dead 6-kg catfish as well as other smaller fishes. So wide was this omnivorous habit, that it is easier to list items rejected. These included bees (which were abundant, drinking at the water's edge, but never seen taken), water scorpions *Nepa* sp., tadpoles of toads *Bufo* sp. and the aquatic clawed toads *Xenopus* sp. With the last two, inexperienced birds seized them, but dropped them and vigorously wiped their bills. In contrast, frogs, tadpoles and adults (*Rana* and *Pixicephalus*), were taken readily. Tadpoles, and small fish *Poecelia* and *Oreochromis*, were usually taken in water < 3 cm deep, but several lunges to the length of the neck were observed to catch small tilapia damaged by netting. On a single occasion an adult crake dived to 40 cm to retrieve a handful of *Tenebrio* larvae thrown in for a Little Grebe *Tachybaptus ruficollis*. It had to bring one to the surface before swallowing.

The crakes showed specialized searching for tiny water-lily *Nymphaea nuchalis* seeds. When the plant's flower dies, its attached seed capsule sinks to develop under water. When ripe, the sunken capsule's casing rots, releasing seeds that, encased in an aril, float back to the surface. Many become trapped under the rafts of lily pads typical of *N. nuchalis.* Anything slightly submerging a leaf, as under a crake's weight, allows seeds to float round its edge on to the leaf surface to become stranded when the crake's weight is removed. The birds then gleaned them from on top of the leaves. Walking back and forth over lily beds, crakes searched for leaves above a rotting seed capsule-discharging seeds. Concentrating around such a site, their movements alternately submerging and letting the leaves resurface, produced a harvest of seeds. On Lake Naivasha, other rallids (Purple Swamphen *Porphyrio porphyrio,* Common Moorhen *Gallinula chloropus* and Red-knobbed Coots *Fulica cristata*) were also observed eating water lily seeds, but by opening the unripe capsules before they sank and the seeds were still clumped. They did not pick up individual seeds as Black Crakes did. Presumably the Black Crakes' smaller size makes their strategy economical, which might not be the case with larger species.

In 2005, Black Crakes feeding on moribund frogs *Rana, Pixicephalus*, and clawed toads (the toads uncharacteristically out of water) around the dam, drew attention to an outbreak of the chytrid fungal disease *Batrachochytrium dendrobatidis* that was causing conservation concern on other continents. Identified in tissue samples sent to Australia, this was among the earliest, if not the first, instance recorded in Africa (L. Berger, pers. comm.).

## Interactions with other species

Reaction to animals other than prey varied. In dense cover, Black Crakes were bold and confiding. Even before habituated to people in the open, they approached to within a metre of a person or mammal inside the *Typha* patch. Any large bird suddenly appearing < 20 m overhead elicited alarm calls and diving for cover. Some raptors (e.g., Black Kite *Milvus migrans* and African Harrier Hawk *Polyboroides typus*) elicited no alarm if higher than 20 m. The Accipitrines, African Goshawk *Accipiter tachiro,* Great Sparrowhawk *A. melanoleucus,* Shrika *A. badius,* and Little Sparrowhawk *A. minullus* all caused alarm regardless of distance.

No crake was seen within *c.* 5 m of any heron (Grey *Ardea cinerea,* Black-headed *A. melanocephala,* Purple *A. pupurea*, or Squacco *Ardeola ralloides*), but tolerated Hamerkops *Scopus umbretta*, Egyptian Goose *Alopochen aegyptiaca*, and domestic ducks, within 1 m.

Tolerance of smaller birds was illustrated when four weaver species, Grosbeak *Amblyospiza albifrons* (10 nests), Holub's Golden *Ploceus xanthops* (4 nests), Baglafecht *P. baglafecht* (2 nests) and Spectacled *P. ocularis* (1 nest), a Tawny-flanked Prinia *Prinia subflava* and a Black-faced Waxbill *Estrilda erythronotus* were nesting simultaneously within 5 m of incubating crakes. Individual adult Grosbeak Weavers were observed within a metre of an incubating crake, and one Spectacled Weaver collected nest fibre within 50 cm of it, the crake not reacting in either case.

On 30 March 1994 a mongoose *Herpestes sanguineus* entered the *Typha* bed where there were two downy crake chicks. The five fledged members of the family present gathered round it at distances of 0.75 to 1.5 m, all giving the low volume alarm or tension call—a relatively gentle, single note—'kwep'. The crakes kept up with the mongoose as it moved and while they went no closer than *c.* 0.75 m, in the face of this escorting behaviour the predator did not forage, but moved quickly away from the dam.

On two occasions a Black Crake seized a newly fledged Grosbeak Weaver that had emerged from a nest in the crakes' favoured clump of reed mace, and killed it by a combination of pecking, harassing and eventual drowning. It was not clear if these attacks were a feeding behaviour or an interspecific interaction whose outcome was secondarily food.

Predators capable of taking Black Crakes or eggs seen in the vicinity of the dam during the period covered by these notes are listed in Appendix 1.

## Site fidelity

In January 1997, the dam dried out completely through lack of rain run-off and all the riparian vegetation was lost. The process was gradual with the family dwindling until only two adults were left. The last cover to go was a stand of papyrus. Before it was completely gone a loose tangle of dead brush (approximately 1 x 1 x 1 m in dimensions), mainly small branches measuring between 0.75 and 1 m long and not more than 2.5 cm thick, was put next to the papyrus as substitute cover. Before the dam was completely dry, we placed an enamel basin of 0.75 m diameter next to this brush, filled it daily with water and supplied commercial poultry pellets as feed. The crakes stayed but spent much time in the fringing woodland thicket of *Euclea divinorum* and *Eleodendrum buchananii* (see Fig. 1, Parker & Parker 2019). Despite being free to depart, as the rest of the family presumably had, these two adult Black Crakes adopted a pile

of dry wood, a tin basin of water and feed in lieu of their normal habitat, and stayed thus until the dam refilled in April, and riparian vegetation was replanted. They laid a clutch of four eggs in November 1997 and once again a family of Black Crakes occupied the dam and was present until at least 2011, when we left Kenya. The dam drying resulted in an unusual demonstration of site fidelity.

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## Appendix 1

Between 1967 and 2010 predators capable of taking a Black Crake or its eggs recorded on the Langata property cited in Parker & Parker 2019.

## Birds

*Herons*

Grey *Ardea cinerea*, Black-necked *A. melanocephala*, Purple *A. pupurea*, Black-crowned Night *Nycticorax nycticorax.*

*Raptors*

African Harrier Hawk *Polyboroides typus*, African Fish Eagle *Haliaeetus vocifer*, Common Buzzard *Buteo b. vulpinus*, African Goshawk *Accipiter tachiro,* Great Sparrowhawk *A. melanoleucus,* Shrika *A. badius,* Little Sparrowhawk *A. minullus*, Black Kite *Milvus migrans.*

*Owls*

Barn *Tyto alba,* Spotted Eagle *Bubo africanus* and African Wood *Strix woodfordii.*

*Coucals*

White-browed *Centropus superciliosus*

## Mammals

Domestic dogs *Canis familiaris*, cats *Felis sylvestris*, genets *Geneta tigrina*, mongooses *Herpestes sanguineus.*

## Reptiles

*Snakes*

An immature python *Python sebae*, cobras *Naja nigricollis*, and egg-eaters *Dasypeltis scabra.*

*Turtle*

Helmeted terrapin *Pelomedusa subrufa.* As a predator on waterside birds, this terrapin may be significant (Spawls *et al.* 2002). On the dam mentioned in this paper, 11 newly hatched ducklings were reduced to five between 08:00 and 13:00 one day, all only partially consumed.

## Fishes

Largemouth Bass *Micropterus salmoides*, Sharp-toothed Catfish *Clarias gariepinus.* The former could take swimming hatchlings and the latter was observed on one occasion at the dam seizing a crake by the foot, and on another lunging at drinking weavers (D. Richardson, pers. comm.). The same species of catfish caught on Kenya's southern Uaso Nyiro River had seven *Quelea* sp. in its stomach (A. Archer, pers. comm.).