African Crane Conservation Programme

Photo: Rhett Butler. www.mongabay.com
PROJECT THEMES

All of the African Crane Conservation Programme activities fall within four Project Themes:

1. Cranes and Agriculture
Agricultural landscapes are a key driver in the population dynamics of cranes. Across Africa, cranes are found in agricultural landscapes most often for the food that they provide in the form of planted crops, waste grain and plant and animal pests that they harbour. Unfortunately, cranes do cause a degree of damage to crops and hence often come into conflict with farmers. There is a need to fully understand the utilisation of the agricultural landscape both temporally and spatially, forming the basis of the development and testing of crop deterrents that are both efficient and cost effective for both the commercial and subsistence farmer.

2. African Crane Trade Project
Grey Crowned, Black Crowned, Blue and Wattled Cranes are traded both within and outside of Africa. They are taken from the wild for food and traditional use, but mostly for local domestication and the international trade markets, which impacts significantly on wild populations. The African Crane Trade Project aims to develop a program to reduce the impact of the captive crane trade on wild crane populations.

3. Cranes, Wetlands and Communities
Acknowledging that people use the same wetlands and water that cranes depend on, it is critical that key crane wetlands and surrounding areas are secured. Working across East and Southern Africa, contributions are made to improving wetland and catchment policy and management; awareness is created and good relationships developed with local communities to improve the opportunities for the acceptance of conservation action and relevant habitat management.

4. Research and Conservation Planning
Using a science based approach of applied research and monitoring, provides the opportunity for credible and objective input into conservation planning and prioritisation. Outcomes of research and monitoring will be used to guide action or to develop a project further, either falling within one of the three African based projects or becoming a project on its own if necessary.

The African Crane Conservation Programme (an ICF/EWT Partnership) aims to provide the latest on research and conservation activities on all aspects of our cranes. Contributions to the Crane Journal are invited, with all relevant material welcome. See “Guidelines for Authors” at the end of this document.

Please submit articles to the Editor:
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ABSTRACT

Wattled (Grus carunculatus), Black Crowned (Balearica pavonina) and Eurasian Cranes (Grus grus) respectively occur at Lake Tana, Ethiopia. However, information on the breeding sites and season of Black Crowned (BCC) and Wattled Crane (WC); roosting sites and feeding ecology of the migratory Eurasian Crane (EC); and distribution and population status of all these crane species are poorly known. Here we report on the results of two years of survey (2008-2009) in five sites covering the southern, northern and eastern parts of Lake Tana. Only Chimba wetland is used for breeding ground of WC. BCC however uses Chimba, Yiganda, Gorgora and parts of Bahir Dar wetland. One, two, and three clutch size and two types of egg color of BCC were observed. And two color of egg of BCC were observed. Active nests of both species were from September to December. mostly fed on rice and millet crops and are known pests of crop, whereas BCC fed on ‘teff’ and millet crop during non-breeding. WC mostly uses wetlands in breeding and non-breeding time. The major roosting site of EC is Shesher where 21,000 cranes were recorded. Comparing the successive years of the survey, a total of 27,919 and 21,400 of WC, BCC and EC respectively, has been recorded. The threat assessment indicates that destruction of breeding and feeding habitats due to the shrinkage, and conversion of wetlands into agriculture and grazing were the main threats of all cranes.

Keywords: Breeding site, cranes, feeding ecology, roosting, season of nesting

INTRODUCTION

Cranes constitute one of the world’s most endangered families of birds. They are often serve as “umbrella” and “flagship” species in conserving wetlands and grasslands around the world. As such, they drew attention to, and provide protection for, a broad array of species and ecosystem (Schoff, 1991 cited by Meine and Archibald, 1996).

The annual cycle of cranes can be divided into a 3-5 months nesting period (time of egg-laying) and a longer non-breeding period. Eurasian Cranes (Grus grus) migrate hundreds, or even thousands, of kilometers between breeding and wintering grounds. Except for Wattled Cranes (Grus carunculatus), (Tarboton, 1984) and Sarus Cranes (Sundar, 2009), which remain on breeding territories throughout the year, other species of cranes are largely gregarious during the non-breeding period and migrate.

Successful breeding depends on securing a compatible mate and a breeding territory (Nesbitt, 1989), and appropriate conditions during nesting and chick-rearing (Sundar, 2009). The breeding season of birds in Africa however, though still imperfectly understood, it is more likely to be affected by the alternation of wet and dry seasons (Fishpool and Evans, 2001). Cranes clutch size varies from 2-3 eggs for Crowned Cranes, but in some cases 2-5 eggs, reported by Hoyo et al. (1996); two eggs for most other species and usually one egg for Wattled Cranes (Walkinshaw, 1965; Archibald and Lewis, 2006).

The Eurasian Crane is the third most abundant species after the Sandhill (Grus canadensis) and Demoiselle Cranes (Anthropoides virgo). The total population of Eurasian Cranes was estimated at 220,000-250,000, is probably increasing, although some populations are declining (Meine and Archibald, 1996). The current estimate is about 400,000 birds (unpublished data).

The Black Crowned Crane (Balearica pavonina) inhibits the Sahel and Sudan Savanna region of Africa from the
Atlantic coast to the upper Nile River basin. Two subspecies are recognized. *B. p. pavonina* (the West African Crowned Crane) and the *B. p. ceciliae* (the Sudan Crowned Crane) occur in eastern Africa including Ethiopia (Meine and Archibald, 1996). Currently the species is classified as Near Threatened under the revised IUCN Red List criteria (BirdLife International 2008). Black Crowned Cranes use both wet and dry open habitats, but prefer a mixture of shallow wetlands and grasslands (especially flooded lowlands in the sub-Saharan savanna) and dry farm land; whereas, the Wattled Crane is more dependent on aquatic habitats throughout the year and not just during the breeding season. However, Wattled Crane in Ethiopia may make greater use of drier habitats during the non-breeding season. Nesting pairs of WC establish large (often >1km$^2$) territories, generally in shallow wetlands with minimal human disturbance (Urban and Gichuki, 1991 cited in Meine and Archibald, 1996). BCCs are known to be resident throughout the western highlands, the western part of the country and in the Rift Valley lakes and rivers of Ethiopia (Nowald *et al*., 2007). Of 1171 individuals in 38 flocks counted, about 94% of the *B. p. ceciliae* were sighted at Lake Tana. So Lake Tana can be considered as the most important wintering sites of the species.

Even though the breeding biology of WCs in some parts of Africa had been studied (Tarboton, 1984; Johnson and Barnes, 1991), and few studies on BCCs (Walkinshaw, 1964), information from Ethiopia is sparse.

BCC primarily feed in uplands during the non-breeding season but during the breeding season, they use both uplands and wetlands; however WCs primarily feed in wetlands during both seasons but the Ethiopian birds may make greater use of drier habitats during the non-breeding season (Urban and Gichuki, 1991 cited in Meine and Archibald, 1996). In the case of EC, during migration or wintering, they prefer to forage in agricultural fields, pastures, and meadows, and roost in shallow lakes, bogs, rivers, along the edges of reservoirs, and in other wetlands (Alonso and Alonso, 1990; Xu *et al*., 1991 cited by Archibald and Lewis, 1996; Nowald, 1996).

The major threat facing Cranes (BCCs, ECs and WCs) in Africa generally, are the loss, transformation, and degradation of its habitat, first of all wetlands (Tamboton, 1984; Treca, 1996; Nowald *et al*., 2007; Aynalem and Bekele, 2008a and 2008b). Behind this threat lies a combination of causal factors: expanding human populations, and population pressure; intensive agricultural development and expansion, and wetland conversion for agriculture, and draining and irrigation projects (Fry, 1987; Daddy and Ayeni, 1996; Aynalem and Bekele, 2008a and 2008b).

The three species of cranes (WC, EC and BCC) occur in different sites of the Lake area (Francis and Aynalem, 2007; Nowald *et al*., 2007). Chimba, Yiganda and Gorgora wetlands and Fogera wetland plain are the major ones. Though these sites are known for breeding, feeding sites of BCC and WC and only for roosting and feeding sites of EC, no information have ever been withdrawn; therefore, this paper is initiated to fill these gaps. We conducted a survey in and around Lake Tana with the following objectives in mind:

1. To observe and identify the breeding ground, and time of nesting of BCC and WC,
2. To identify the night roosting site, distribution and feeding ecology of EC, BCC and WC,
3. To assess the population of BCC, WC, and EC,
4. To identify the threats to the breeding and feeding habitats of these species.

**METHODS**

**Study areas**

What makes Lake Tana different from the rest of the Rift valley lakes is Lake Tana is the largest Lake in Ethiopia, and the fourth-largest in Africa being c.68 km wide and c.73 km long, but only a maximum of 14 m deep with a catchment area of 150,000 km$^2$ (Nagelkerke, 1997; Fishpool and Evans, 2001). Over 60 rivers and streams flowing from the Simen Mountains to the north, the large central plateau to the east and the gentler sloping land to the west feed the lake. The major rivers are Gelgel Abay, Megech, Gumara and Rib. The water level of the lake rises gradually during the rainy season, after which it slowly falls to reach its minimum water...
level during the dry season (EWNHS 1996). The population of water birds around Lake Tana is likely to exceed 100,000 seasonally, of which 83 are wetland species (Francis and Aynalem, 2007).

The study was conducted in the specific sites of Yiganda, Chimba, Gorgora wetlands and Shesher-Wallala flood plains and some parts of Bahir Dar (Figure 1). The two areas, Yiganda and Chimba located to the southern part of Lake Tana with the geographical coordinates of 11°41’ 58.05” Northing (N), 37°18’ 37.98” Easting (E); and 11°42’ 16.51” N, 37° 11’ 51.35’” E respectively. The former wetlands are found adjacent to the Lake whereas the latter adjacent to ‘Gelgel Abay’ River. Gorgora wetland is found at the northern extreme point of the Lake with the geographical coordinates of 12°16’34.56” N, and 40.63” E. This area is known for roosting and feeding places of palaearctic migratory birds and also used for BCCs to breed. This site is 75 to 80 km away from the southern shore of the Lake. Shesher and Wallala, in Fogera plain, geographically they are located: 11°57’ 57.6” N, 37° 37’ 53.5” E, 1787 m asl; 11°59’ 29.1” N, 37° 30’47.2” E, 1784 (m. asl) respectively. The area is situated 4 to 5 km away from the Lake eastern shore. The land feature is plane and a pan like where flood accumulates during high rainy season.

All areas are not protected, and cultivation is carried out when the water level recedes. The littoral region of the eastern and southern part of the lake in particular is dominated by papyrus reed (Cyperus papyrus), bulrush (Typha latifolia) and common reed (Phragmites karaka); whereas Persicaria senegalensis, hippo grass (Vossia spp.), bull rush (Scirpus spp.) and Nymphaea lotus are also common (Muluneh, 2005). In the open water of the inshore zone Ceratophyllum demersum and Vallisneria spiralis are the most abundant species.

The mean annual rainfall of the area is 1651 millimeter (mm) and the pattern of rainfall distribution is uni-modal with a long rainy season between June and September.
The minimum and maximum mean temperatures of the study area are 11°C and 28°C (Aynalem, 2007).

SURVEYS

The survey sites were selected based on the information of Crane occurrence. The locations of sites are so remote apart that make data collection hardly frequent.

The survey sites majorly divided in to three: the southern part of the Lake (Chimba, Yiganda and Bahir Dar); the northern part (Gorgora); and the eastern part (Fogera plain). However, seventy field observations were carried out from August 2008 to December 2009, which the frequency of visiting of each site, period, and the effort throughout the survey period was variable that depends on the season of occurrence, site preference, and accessibility of the survey areas.

The sampling sites were specific areas, marked based on the distribution of cranes. The coordinates of each closest position were taken to specify the exact study areas. To carry on the survey, physical markings were used. Depending on the habitat type (open crop fields, wetlands breeding ground, roosting sites etc.) a transect techniques of 500 m to 1000 m transect length were practical depending on the openness and closeness of the site (Southerland, 1996; Lloyd et al., 1998). To minimize disturbance during count, a waiting period of 3 to 5 minutes prior to counting was applied particularly for ECs (Southerland, 2000; Hosteler, 2001). The count was accomplished for a period of 3-15 minutes, and rarely 20 minutes, except for roosting ECs. Flock numbers were recorded using direct observation using binoculars and scopes. The counting was made by dividing the flocks in groups of 100s based on the take off flight directions such as south, north, and east of Shesher for ECs in particular. 10x50 Binocular and 25 x 50 scope, and Garmin GPS equipments were used during the survey; besides measuring tape was also used to measure the length, width of nest and eggs of BCCs. Local papyrus boat was used to access the breeding areas of BCCs and eye spotting for WCs during the wet season.

Data collection for the breeding biology of BCC and WC had been conducted on weekly bases particularly at the peak of the breeding time. However, feeding ecology and population assessment was carried out on monthly bases including EC during the migratory period. The population assessments of cranes were made based on the maximum number of individuals observed in the area for the season though multiple visits have been made. For ECs, even though a number of records were
taken starting from the arrival of the species in the area, only the maximum population number was considered at the major roosting sites of Shesher-Wallala when other small roosting sites were dried up. However movement of BCCs and WCs from the southern part to the eastern part of the Lake could happen during wet and dry season respectively.

Limitation of the study- the study is purely observational lacking details. We suggest these results be regarded tentative until a more thorough study can be undertaken.

RESULTS

Breeding habitat and time of nesting of BCC and WC
Starting from September 2008, the breeding status of BCCs and WCs has been supervised. Though all the survey sites could not be explored thoroughly, a total of 62 BCC nests were recorded. Of these, 20 nests were at Yiganda, 31 at Chimba, 5 around Bahir Dar and 6 at Gorgora. Nonetheless, all the nest and fledging success were not documented because of inaccessibility. All the nesting sites of BCCs were built inside the wetlands though difficult to take all measurements of each nest. However only three representative nests were measured and followed until all of them hatched (see Table 1). In each nest one, two, and three eggs were recorded (Figure 3, 4, and 5). The number of eggs in each nest was remaining the same. After following the incubation period all of them were finally hatched. During 2008, a total of 10 WCs has been counted of which eight were from Chimba and two from Yiganda. Of these, only two pairs were nesting in Chimba in November and during the same season in January, 2009 two immature (Imm) WCs have been registered. However, one extra juvenile chick was killed by children (cow keepers) on 19 October 2008. During the same year a non-breeding group of 154 BCCs had been counted at Chimba in wet season (October), but 500 BCCs and 13 WCs in dry season (January 2009). The average range of active breeding time of both BCCs

Table 1: Breeding measurements recorded at Yiganda wetland for BCC

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<tr>
<th>Date of nest spotting</th>
<th>Nesting water depth (cm)</th>
<th>Nest size (cm)</th>
<th>Nest thickness in cm</th>
<th>Diameter of the open surface (cm)</th>
<th>Clutch size</th>
<th>Egg average length in cm</th>
<th>Egg average width in cm</th>
<th>Egg color</th>
</tr>
</thead>
<tbody>
<tr>
<td>02 10 08</td>
<td>175</td>
<td>70x80</td>
<td>5-10</td>
<td>140-150</td>
<td>1</td>
<td>8.00</td>
<td>5.2</td>
<td>white</td>
</tr>
<tr>
<td>02 10 08</td>
<td>140</td>
<td>40x40</td>
<td>10</td>
<td>170-200</td>
<td>2</td>
<td>8.50</td>
<td>5.2</td>
<td>brown</td>
</tr>
<tr>
<td>09 10 08</td>
<td>147</td>
<td>60x60</td>
<td>12</td>
<td>260</td>
<td>3</td>
<td>7.13</td>
<td>5.0</td>
<td>white</td>
</tr>
</tbody>
</table>

Figure 3: The first egg ever recorded at Yiganda wetland. (Photo: Shimelis Aynalem 2008).

Figure 4: The 2nd nest with 2 eggs and unique brownish eggs of BCC (Photo: Shimelis Aynalem, 2008).
and WC are supposed to be from September to December. Nevertheless, we found a pair of juvenile BCCs at February 17, 2009.

Distribution, feeding ecology, and roosting site

Distribution- ECs are only restricted to Gorgora and Dembia plain to the north and Fogera plain to the east of Lake Tana (see Figure 6); whereas BCs in all parts and WCs restricted only to the southern part and sometimes to the eastern shore of the Lake (during the dry season). The occurrence of ECs, in Fogera plain, was recorded from October to the first week of March.

Feeding ecology- ECs are mostly feeding on rice fields and millet crops because during the time of cranes arrival most parts of the plain are entirely covered with field crops. Trampling by cranes and untimely rainfall during harvesting time contributes rice crop to shatter; in addition, local farmers used to harvest all crops traditionally all this mechanism contributes cranes to benefit from the fallen crop. However, ECs do have little chance to get shattered rice seeds for long time due to the immediate cultivation of the land for another crop. This event made cranes to wander and use fallen crops shifting themselves from one farm to another before the second plowing time occurs. ECs were observed to feed in groups. The group could be a family of one or 3-5, in that one or two juvenile birds are usually observed in a single family (5-7 individuals). Flocks with more than three families, sometimes fight against each other. Immature ECs are commonly occurring in flocks. A total of 61 juvenile ECs had been counted in a total of 265 individuals (23% of the entire population).

ECs and BCCs in big numbers could damage crops, particularly during the second time of cultivation, they can wreak a mess. They were observed to pull out the immature crop such as chickpea during the early time of emergence; whereas BCCs used to feed ‘teff’ and millet crop during the non-breeding time. However WCs mostly stay in wetlands all the times. During the dry time (January to March, 2009) most of the cranes were found congregating in isolated water fields. But after ECs left the area, 281 BCCs were recorded feeding in the “teff” crop, which was cultivated by draining the roosting sites Shesher.

Roosting sites of EC- different roosting sites of ECs at Lake Tana were registered; however these sites didn’t seem to support large number of ECs. But Shesh–Walla was investigated as one of and the best roosting night site of ECs (Figure 6). Here, about 21000 ECs (more than one third of the whole wintering EC wintering population of Ethiopia, compare Nowald et al., 2007) were recorded in one take-off. West direction movement was not observed. The roosting time was recorded by spending two nights camping. The roosting of ECs lasts for about an hour (6:00 PM to 7:05 PM). It was very difficult to count during the roosting night time; rather we use the morning time. Before the beginning of takeoff, a sort of restless and calling behavior were observed. Immediately after the first group or family of cranes takes-off, all the birds left the roost within 20 minutes (6:40 AM to 7:00 AM).

Population assessment of BCC, WC, and EC

The population assessments were carried out during the field survey time (see Table 2). In April, 2009, a total of 27 WCs, (23 from Wallala and 4 from Chimba) have been recorded. Of which three WCs were immature. The incidence of 23 WCs at Wallala particularly was incredible; because no record have ever been documented ever since any research type has begun.
Threat of cranes habitats (breeding, feeding and roosting sites)

One of the major factors for the threat of cranes is the destruction of breeding and feeding habitats due to the shrinkage, and conversion of wetlands into agriculture and grazing. Killing of chicks and exposing eggs of cranes by children were also observed. Cutting of wetland grass during the wet season and grazing pressure by livestock (300-500 cattle per hectare of land) are also the main threat for all wetlands because cattle are allowed to be let immediately after the water level of the wetland subsides down during which, it is the active breeding time of many types of birds. The total cultivation of the cropping land also contributes for the absence of open and grazing land for cattle, which this in turn put pressure on communal wetlands. Cutting grass is also exercising in rural areas for different purposes such as making of rope; in town, for coffee ceremony and decoration making; however, the impact of such activates to the breeding interference of BCCs and WCs has not yet evaluated.

Human induced pressure will remain the most threat for Cranes in general. The breeding sites for WC and BCC at Chimba and Yiganda wetlands are the main threatening part of the wetland ecosystem. Peoples are setting fire to the stem and roots of the papyrus plants. Particularly when the root is set by fire, the fire can migrate internally and stay for long period of time until the next rain season comes. This phenomenon would destroy the papyrus vegetation permanently. By doing so, the proportion of the papyrus vegetation cover to the total land cover becomes less and less.

<table>
<thead>
<tr>
<th>SITES</th>
<th>BCC</th>
<th>WC</th>
<th>EC</th>
</tr>
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<tbody>
<tr>
<td>Chimba</td>
<td>450</td>
<td>500</td>
<td>10</td>
</tr>
<tr>
<td>Yiganda</td>
<td>70</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>Fogera plain</td>
<td>2</td>
<td>719</td>
<td>-</td>
</tr>
<tr>
<td>Gorgora</td>
<td>30</td>
<td>150</td>
<td>-</td>
</tr>
<tr>
<td>Others</td>
<td>20</td>
<td>40</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total sum</strong></td>
<td>1102*</td>
<td>572</td>
<td>1619A</td>
</tr>
</tbody>
</table>

Note: * Crane monitoring data (Nowald, et al. 2007); ** at Walala Marsh and Fogera plain; *** the actual count at May, 2009 is 27. But 13 WC at Yiganda were counted in January. ?? No available data. A: the maximum population of the dry season only was 909 to avoid double counting of the wet season.
DISCUSSION

Breeding ground and time of nesting of BCC and WC

Of the total population of 572 BCCs in 2008, 62 BCC breeding nests were recorded in Chimba, Yiganda, Gorgora and other some parts of the wetland. However, the presence of high papyrus vegetation cover that hold back to observe open areas in the middle; the inaccessibility and the limited position available to view the majority area of the breeding wetlands could underestimate the number of breeding nests recorded and also the number of juveniles as well. Only 12 Imm BCCs and 4 Imm WCs were recorded. The skulking and secretive nature of cranes could be accounted for the less number of counts accomplished in the survey. However, the death rate might be maximum particularly those cranes which incubate eggs lately and nests in shallow water adjacent to the nearby dry land. The record of Imm WCs on the same nesting can be related with record of breeding nests during the wet season; we can’t say therefore, Imm WCs comes from other areas because WCs requires a large territory (Urban and Gichuki, 1991 cited in Meine and Archibald, 1996)

Cranes need undisturbed nesting sites except the Indian race (Sarus crane) which is highly tolerant of the human activity. Wild cranes generally nest in isolated (privacy) places where the risk of predation is minimal (Archibald and Meine, 1996; Claire et al., 1996; Bento et al., 2007; Sundra, 2009); but studies carried out in nest success of Greater Sandhill Cranes at Malheur National Wildlife Refuge, Oregon showed that nest concealment has no relationship with nest success (Ivey, 2007). However, the breeding grounds of cranes at Lake Tana, as we observed, all nests were built in secure and inaccessible places, which supports the above scholars’ findings except Ivey (2007). Besides the breeding nesting sites have been repeatedly used by similar/different pairs of cranes in 2008 and 2009. This indicates that WCs are loyal to their nesting sites. Nesting site consistency has been also reported by Bento et al. (2007) in the Marromeu complex of the Zambezi Delta, unless they are disturbed. The water depth in which the nest built could be different from species to species and from area to area. But in Lake Tana, different water depth had been measured (see Table 1). However, the observation of BCC nests of different clutch size could be related to the genetic makeup of the species; season of nesting, water depth, and age of maturity of parents (Ivey, 2007). The finding of unique egg color of the 2nd nest, which is more of brown, unlike the usual color of the egg of the species need further study. However, the average length and width of the BCC egg of the eastern sub-species were 7.88 cm and 5.13 cm respectively (n= 6).

The extended time of breeding season could be related with the suitability of the breeding environment (Nesbitt, 1989; Walkinshaw, 1965; Archibald and Lewis, 2006; Bento et al., 2007). For example, when the inundation or the level of water increases in the wetlands due to high and prolonged rain fall, water stays in the wetlands for extended time. Then the interference of people and livestock will be minimized then Cranes will use this opportunity for breeding.

Grey Crowned Cranes in East Africa and South Africa, breed during the wet seasons where there are wide expanses of wetlands and dense wetland vegetation. In sharp contrast, Wattled Cranes in South Africa and in Malawi and probably in the Bale Mountains of Ethiopia, nest in winter when wetlands are reduced and it’s quite cold. In South Africa, Grey Crowned Cranes and Blue Cranes that inhabit the same regions as Wattled Cranes, gather in flocks during the cold winter months.

On the vast floodplains of Botswana, the Wattled Cranes typically nest in winter when the flood levels from inflows from Angola, peak in July-August. The high water levels in July-August in Botswana are attributed to rains in Angola in February-March; nesting when water levels peak minimizes the risk of drowned nests (Bento et al., 2007). At Lake Tana however the high water levels are likely correlated with local rainfall and inflow from rivers and streams effected by local and not far-away rainfall as in Botswana (see rainfall distribution in Figure 2). This likely leads to synchronous nesting of Black Crowned
and Wattled cranes.

**Distribution, feeding ecology, and roosting site**
The restricted occurrence of the ECs only in the Fogera plain and some parts of the Gorgora and Dembia-plain needs further investigation (Fogera plain is probably the only place at Lake Tana with a high food availability for a huge number of ECs); however, the presence of reliable feed stuffs, land topography, extensive crop farming area along with different water points and roosting sites could be accounted for high distribution of the species. Fogera plain is a potential area for feeding sites of other species as well. During the dry season Shesher alone, about 91,000 wetland birds have been counted, which the majorities were migratory. It is difficult to single out the dominant feed stuff that ECs usually feeds on, and also difficult to measure or quantify the extent of crop damage. Therefore it requires further research though farmers are still complaining on cranes the damage the cause.

It was reported that ECs, during migration, resting and wintering prefer to forage in agricultural fields, pastures, and meadows, and roost in shallow lakes, bogs, rivers, along the edges of reservoirs, and in other wetlands. The widely scattered wintering grounds include a wide spectrum of upland and wetland habitats (Alonso and Alonso, 1990; Xu et al., 1991 cited by Archibald and Meine, 1996; Nowald et al., 2007). But BCCs and WCs were distributed in south, east and north part of the study area, unlike ECs. Therefore, the range of feeding habits during the breeding and non-breeding time of BCCs and WCs could be accounted for a wide range of distribution in the study area (Urban and Gichuki, 1991 cited in Meine and Archibald, 1996); however BCCs were mostly depend on wetlands during the non-breeding time, though distributed in different parts of the study area.

Rice production has begun recently as a result of intensive agricultural extension program made by the Government. Hence, farmers are able to grow crop twice a year. Therefore, ECs would not have the chance to exploit or feed the left over seeds efficiently. However, cranes were frequently observed to move from one farm to another before the second plowing time starts, because shattered seeds will be buried in the soil. However, plowing the whole area at the same time is unlikely to happen; it is because of the land tenure system that made farmers to possess fragmented plot of land. This circumstance favors cranes to some extent to feed adjacent farm lands that are not yet cultivated.

The occurrence of significant number of Imm ECs (23% of the 265 population) in the area indicates that the survival and replacing potential of the species is high. This result could be related with the availability of favorable and improved breeding ground in NE Europe and Asia. Nowald et al. (2007) also reported a high juvenile percentage for ECs in Ethiopia (16, 3 % of 4,366 ECs).

The record of 21,000 ECs at the night roosting sites could be related with the availability of vast and favorable shallow water area (around 1.5 km$^2$) as compared to others. In addition, the location of the roosting sites is more ideal to colonize Fogera plain to get enough amounts of feed sources in every direction. However, it was hardly possible to count the Imm ECs during takeoff and landing; this was because of a multitude number and poor light intensity we face early in the morning and late in the evening.

**Population assessment of BCCs, WCs, and ECs**

The population of cranes during the field survey time in all seasons was variable. From the result we can't withdraw year to year trend because the counting time, period, duration, the effort made and places were inconsistent. However, the occurrence of large number of ECs in the area might be due to the destruction of feeding and roosting sites in other part of their migratory flyway. These phenomena could lead the species to navigate and search for suitable winter grounds like Fogera Plain. Had there been retrospective and consecutive and consistent data on the species; we could have been able to see the trend of the population in the area.
The record of ECs population at Lake Tana, which was 21400 is the total sum of two separate sites recorded (21000 at Shesher and 400 in Gorgora) during the same month and week of the year 2009. Here individuals are supposed to roost in the respective sites because the count has been made within three days gap and only the maximum number record were taken but not sum up of different records of the season. Where, as in case of BCCs, individual recorded in a certain month of the year of a site could be counted again in another site of different season; therefore, the total sum of the year could not indicate the total population of the species. But, in 2009, we can add the count made at Chimba and Yiganda and others together, because both maximum records were taken during the same week of the wet season; however, the count made at Shesher and Gorgora were during the dry season when most of the wetlands of Chimba, Yiganda and others are deteriorated. Therefore a shift movement of BCCs to Shesher could be happen. However, the count made at Shesher and Gorgora were a single effort, which only the maximum record was considered during the same week of the season. Therefore the total number of BCCs recorded could be around 919. Again the total number of WCs recorded during the season does not tell us the total population of the species because the count made in all sites there could there be movement of individuals from one site to the other. But the maximum number of WCs counted were 23 at Shesher-Wallala in May and 4 breeding individuals with 2 chicks at Chimba of the same month could be sum up a total of 27.

The record of unusual number of WCs in Fogera plain during the end of the dry season at Walla could be an indicator that there are areas still uninvestigated breeding grounds sites along the Shore of Ggel Abay River or remote shore lake areas which we didn't and have to be explore. Secondly, the absence of BCC around Chimba during this season in 2009 is also due to grazing pressure; shrinkage and dry up of swamps, and shortage of food sources. This situation could enable them to move to suitable sites and other areas (Bento et al., 2007).

**Threat of cranes habitats (breeding, feeding and roosting sites)**

One of the major factors for the threat of cranes is the destruction of breeding and feeding habitats due to the shrinkage and conversion of wetlands in to agriculture (Fry, 1987; Green and Hirons, 1991; Meyer and Turner, 1992; Archibald and Meine, 1996; Dady and Ayeni, 1996; Bento et al., 2007). The effect of livestock pressure, on the breeding activities of cranes however, has showed little significance in different studies (Ivey, 2007); but in our cases the effect could be the opposite; therefore further study is required to justifying the effect. Scaring cranes in the study area could be accounted a minimum factor, because cranes were observed to feed close to the farmers; and it was also strange to undertake and carrying on survey close to them, unlike many countries in the world. This could be an indication of harmonization of peoples to cranes; though some bad act is being exercised by some children unknowingly.

In conclusion Lake Tana area can be considered as the most important wintering site for Black Crowned Cranes in Ethiopia. About one third of the Eurasian Crane population is wintering here as well as an important part of the Ethiopian Wattled Crane population is all year round (including successful reproduction) in that area. Accordingly, the conservation status for this area should be upgraded.
ACKNOWLEDGEMENTS

The research was supported by Crane Conservation Germany (Kranichschutz Deutschland, working group of NABU, WWF and Lufthansa), - BirdLife Germany (NABU), and Lufthansa. Our great thanks also go to Ethiopian Wildlife and Natural History Society (EWNHS), which follows and facilitating the project by creating good working environment. We would like also to thank Dr. George Archibald for encouraging us, his valuable comments and reviewing this paper.

REFERENCES


ABSTRACT
The annual crane aerial survey in KwaZulu-Natal has been performed over the past 17 years censusing all three crane species. During 2009 the aerial survey was conducted over a 5 day period in mid July totalling 23.2 hours of flying. A total of 653 Blue Cranes, 2 592 Grey Crowned Cranes and 211 Wattled Cranes were observed. Additional species sightings included 65 Oribi, 68 Denham’s Bustards, 307 Bald Ibis and 7 Secretary Birds. The 653 Blue Cranes sighted during the 2009 aerial survey is the highest count through the past 9 years, while the 2 592 Grey Crowned Cranes counted during the 2009 survey is the third highest over the last 9 years. The 211 Wattled Crane counted compares well with the last 9 years indicating a stable population. Sixty-six of the 70 known Wattled Crane breeding pairs in KwaZulu-Natal were located during the 2009 survey. Twenty pairs had nests, with 7 pairs having a clutch of 1 egg, 10 with a clutch size of 2 eggs and 3 unknown clutch sizes. Sixteen pairs of Wattled Crane had unfledged chicks, all less than 10 weeks old, while 2 pairs still had last year’s youngster with them on the breeding territory.

INTRODUCTION
As part of the annual monitoring programme in KwaZulu-Natal, the aerial surveys with Ezemvelo KwaZulu-Natal Wildlife have given us useful information regarding population trends of cranes over the years. It is important in any conservation programme to regularly monitor the population trends so as to determine whether your conservation actions are being effective. For this reason an annual crane aerial census is performed throughout KwaZulu-Natal, as this covers one of the most important crane regions in the country for all three species of crane, the Grey Crowned Crane (Balearica regulorum), the Blue Crane (Anthropoides paradiseus) and the Wattled Crane (Bugeranus carunculatus). Since 2005, other species have also been included in the survey, which included Oribi antelope (Ourebia Ourebi), Denham’s Bustards (Neotis denhami), Bald Ibis (Geronticus calvus) and Secretary Birds (Sagittarius serpentarius). The benefits of an aerial as opposed to a ground census are obvious as a far larger area can be censused in a shorter period of time. This is very important, as these birds are capable of flying over large distances, potentially leading to duplications of counts the longer the time over which the count is performed. In addition, the survey was used to identify any illegal or potentially illegal agricultural developments.

METHODS
This aerial census has been performed over the past 17 years censusing all three crane species in all key crane regions from Wakkerstroom and the Slang river catchment in the north through to Kokstad and the Cedarville flats in the south (see Figure 1 showing the regions covered during each of the survey days). During 2009 the aerial surveys were conducted over 5 days (see Table 1) censusing all the key regions (see Figure 1 for coverage) for the above mentioned species throughout KwaZulu-Natal during July, totalling 23.2 hours of flying.

The aims of the aerial surveys are to:
- Determine the total number of Wattled Cranes in the province;
- Determine the status of Wattled Crane breeding activity;
- Determine the population trends for Grey Crowned Crane in the province;
- Locate as many Blue Crane flocks as possible for future follow-up on the ground by landowners.
- Locate populations of Oribi, Denham’s Bustard, Bald Ibis and Secretary Birds.

The same areas of the province have been covered over the previous 9 years over a five day period, with each
flight lasting an average of five hours, as indicated in Figure 1. An attempt was made to keep all recorders and observers the same, to remain as standard as possible (see table 1). The survey was carried out during the winter months between the middle of June and July, and followed the following protocol:

On each survey day, a set route was followed between all known active and historic Wattled Crane breeding sites within the demarcated area for that survey flight (refer to Figure 1 for these demarcated areas). This allowed every Wattled Crane breeding site to be assessed and the determination of a minimum population number for Wattled Cranes.

Along these set routes, specific blocks were flown intensively to determine the number of all cranes (especially Grey Crowned Cranes) within the block. This allowed the determination of a density value for Grey Crowned Crane (the area of each block was determined, allowing the density value to be calculated). Furthermore, over time, trends within the crane population can be determined, assisting conservation biologists in making more informed conservation decisions. The specific blocks flown intensively are shown in Figure 2.

Table 1: Technical details of the July 2009 aerial survey in KwaZulu-Natal

<table>
<thead>
<tr>
<th>Aircraft type</th>
<th>Cessna 182 (high wing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average speed</td>
<td>90 km/hour</td>
</tr>
<tr>
<td>Average height</td>
<td>100m</td>
</tr>
<tr>
<td>Pilot</td>
<td>Greg Nanni (KZN Wildlife)</td>
</tr>
<tr>
<td>Navigator</td>
<td>Andre Rossouw / Kevin McCann</td>
</tr>
</tbody>
</table>

Day 1 – (21/07/09) Midlands (east – Greytown) 4 hours
Observers  John Craigie / Brent Coverdale
Day 2 – (22/07/09) Midlands (west – Mooi River/Nottingham Rd) 5 hours
Observers  John Craigie / Brent Coverdale
Day 3 – (24/07/09) Himeville / Underberg 4.6 hours
Observers  John Craigie / Richard Schutte
Day 4 (25/07/09) – Kokstad / Cedarville 4.9 hours
Observers  John Craigie / Richard Schutte
Day 5 – (28/07/09) – northern KZN 4.7 hours
Observers  John Craigie / Bill Smith

Blue Crane pairs, family groups and flocks found along the route or within the blocks were also recorded.
Figure 2: Map of KwaZulu-Natal showing the flight track log for all five days during the 2009 survey, as well as the flight blocks (yellow polygons).
Figure 3 shows the location of all the species sighted during the 2009 census.
Additional species recorded:
Several additional species were also recorded during the aerial survey, which included Oribi, Denham’s Bustards, Bald Ibis and Secretary Birds. For every crane or other species observed, the following information was recorded:

- **Species**
- **Number of individuals (age class if possible)**
- **Activity (e.g. breeding, nest, foraging, etc.)**
- **Type of habitat**
- **GPS coordinate**

This information was stored on a laptop, allowing background maps and set routes to be followed. Data was logged in real-time, allowing the prevention of duplicate counting (Figure 2 shows the flight track for the 2009 survey). The detail route followed during each of the survey sessions was determined and plotted using the Garmin GPS track log function. This allowed the standardisation of all future survey routes in each demarcated area throughout the province.

**RESULTS**

1. Population Numbers, Structure and Distribution

The aerial survey in KwaZulu-Natal consisted of a minimum count, 653 Blue Cranes, 2 592 Grey Crowned Cranes and 211 Wattled Cranes were sighted during the aerial survey in July 2009 forming the minimum population numbers for the province. Additional species sightings included 65 Oribi, 68 Denham’s Bustards, 307 Bald Ibis and 7 Secretary Birds. Figure 4 shows the distribution of the cranes between the different regions flown.

![Figure 4: The number of Blue, Grey Crowned and Wattled Cranes seen during the different survey days covering different regions of the province](image)

Table 2: The numbers of Blue Cranes seen during the different survey flights throughout KwaZulu-Natal, showing the relative population structure.

<table>
<thead>
<tr>
<th>Region</th>
<th>Singles</th>
<th>Pairs</th>
<th>Pair + 1 juvenile</th>
<th>Pair + 2 juveniles</th>
<th>Flocks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midlands (east) - Greytown</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Himeville / Underberg</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>94</td>
<td>94</td>
</tr>
<tr>
<td>Kokstad / Cedarville</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>218</td>
<td>226</td>
</tr>
<tr>
<td>Midlands (west) - Mooi River/ Nott Rd</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>70</td>
<td>75</td>
</tr>
<tr>
<td>Northern KZN</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>245</td>
<td>254</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2</strong></td>
<td><strong>10</strong></td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>627</strong></td>
<td><strong>653</strong></td>
</tr>
</tbody>
</table>
1.1 Blue Crane -

The following Tables 2 and 3 show the numbers of Blue Cranes sighted during the aerial survey, together with a breakdown of the population structure.

A total of 653 Blue Cranes were sighted during the 2009 aerial survey. This has been the highest count through the past 9 years (figure 5), compared to the 2008 count of 564, 2007 count of 453, 2006 count of 298, 2005 count of 415, 2004 count of 325, the 2003 count of 311, and the 2002 and the 2001 aerial survey results of 364 and 363 Blue Cranes respectively.

These birds showed a strong tendency to be found in

Table 3: Frequency of observed group sizes of Blue Cranes in KwaZulu-Natal, July 2009.

<table>
<thead>
<tr>
<th>Group size</th>
<th>Frequency of Observation</th>
<th>Sum of birds in group</th>
<th>% of population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (singleton)</td>
<td>2</td>
<td>2</td>
<td>0.31%</td>
</tr>
<tr>
<td>2 (pair)</td>
<td>10</td>
<td>20</td>
<td>3.06%</td>
</tr>
<tr>
<td>3 (pair + juv)</td>
<td>0</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>4 (pair+ 2juv)</td>
<td>1</td>
<td>4</td>
<td>0.61%</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>12</td>
<td>1.84%</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>14</td>
<td>2.14%</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>16</td>
<td>2.45%</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
<td>26</td>
<td>3.98%</td>
</tr>
<tr>
<td>49</td>
<td>1</td>
<td>49</td>
<td>7.50%</td>
</tr>
<tr>
<td>54</td>
<td>1</td>
<td>54</td>
<td>8.27%</td>
</tr>
<tr>
<td>56</td>
<td>1</td>
<td>56</td>
<td>8.58%</td>
</tr>
<tr>
<td>73</td>
<td>1</td>
<td>73</td>
<td>11.18%</td>
</tr>
<tr>
<td>131</td>
<td>1</td>
<td>131</td>
<td>20.06%</td>
</tr>
<tr>
<td>196</td>
<td>1</td>
<td>196</td>
<td>30.02%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>653</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
Figure 6: The distribution of Blue Crane sightings during the 2009 crane aerial survey in KwaZulu-Natal.
flocks of larger than 20 individuals (89.59% of individuals were found in these large flocks). A total of 96.02% of the population was located in non-breeding flocks, compared with 96.09% in 2008, 94% in 2007, 98.6% in 2006, 90.8% in 2005, 92.1% in 2004, 90.0% in 2003, 94.5% in 2002 and 89.5% during 2001. This is understandable due to their nature of forming large flocks during the winter months and moving between traditional foraging areas. This portion of the Blue Crane population was characterised by a few, large flocks (11 flocks contributing 96.09% of the KwaZulu-Natal population).

### 1.2 Grey Crowned Crane

The following tables 4 and 5 show the numbers of Grey Crowned Cranes sighted during the aerial survey, together with a breakdown of the population structure.

A total of 2 592 Grey Crowned Crane were sighted during the 2009 aerial survey, compared to the 2637, 2293, 1929, 2128, 1932 and 1950 sighted respectively during the 2008, 2007, 2006, 2005, 2004, 2003, 2002 and 2001 surveys, covering the same areas as the last 6 years (figure 7).

Only 7.80% of the population were found in pairs or family groups outside of non-breeding flocks, compared with 6.75%, 5%, 6.6%, 11.1%, 12.8%, 11.4%, 13.5% and 10% during 2008, 2007, 2006, 2005, 2004, 2003, 2002 and 2001 respectively. The remainder of the population was found in 35 separate flocks throughout the province, numbering between 6 and 217 individuals. The average flock size was 68 individuals, which is higher than previous years, e.g. 2006 the average flock size was 59, in 2005 average flock size of 58 and 2004 average flock size of 45 but similar to the 2007 and 2008 average flock sizes of 65 and 66 respectively. The southern regions of the province, covering the Himeville / Underberg regions and the Kokstad / Cedarville regions appear to be the most important regions in the province for Grey Crowned Cranes.

### 1.3 Wattled Crane

The following tables 6 and 7 show the numbers of Wattled Cranes sighted during the aerial survey, together with a breakdown of the population structure.

A total of 211 adult Wattled Crane were sighted during the 2009 aerial survey, compared to 206, 201, 221, 224, 202, 208, 188 and 183 during the 2008, 2007, 2006, 2005, 2004, 2003, 2002 and 2001 surveys respectively (figure 9).

Therefore, the Wattled Crane population has remained relatively stable over the past 9 years (figure 9). Due to the winter months being the main breeding period of the Wattled Crane, it is not surprising that 66.83% of the

<table>
<thead>
<tr>
<th>Region</th>
<th>Singles</th>
<th>Pairs</th>
<th>Pair + 1</th>
<th>Pair + 2</th>
<th>Pair + 3</th>
<th>Flocks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midlands (east) - Greytown</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>115 (3)</td>
<td>135</td>
</tr>
<tr>
<td>Himeville / Underberg</td>
<td>1</td>
<td>8</td>
<td>9</td>
<td>5</td>
<td>1</td>
<td>550 (7)</td>
<td>619</td>
</tr>
<tr>
<td>Kokstad / Cedarville</td>
<td>0</td>
<td>10</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>1 294 (19)</td>
<td>1 350</td>
</tr>
<tr>
<td>Midlands (west) - Mooi River/ Nott Rd</td>
<td>1</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>197 (4)</td>
<td>234</td>
</tr>
<tr>
<td>Northern KZN</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>234 (2)</td>
<td>254</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2</td>
<td>48</td>
<td>15</td>
<td>11</td>
<td>3</td>
<td>2 390</td>
<td>2 592</td>
</tr>
</tbody>
</table>
Table 5: Frequency of observed group sizes of Grey Crowned Cranes in KwaZulu-Natal, July 2009.

<table>
<thead>
<tr>
<th>Group size</th>
<th>Frequency of Observation</th>
<th>Sum of birds in group</th>
<th>% of population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0.08%</td>
</tr>
<tr>
<td>2</td>
<td>48</td>
<td>96</td>
<td>3.70%</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>45</td>
<td>1.74%</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>44</td>
<td>1.70%</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>15</td>
<td>0.58%</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>12</td>
<td>0.46%</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>7</td>
<td>0.27%</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>8</td>
<td>0.31%</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>10</td>
<td>0.39%</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>15</td>
<td>0.58%</td>
</tr>
<tr>
<td>18</td>
<td>1</td>
<td>18</td>
<td>0.69%</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>24</td>
<td>0.93%</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>25</td>
<td>0.96%</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>30</td>
<td>1.16%</td>
</tr>
<tr>
<td>35</td>
<td>1</td>
<td>35</td>
<td>1.35%</td>
</tr>
<tr>
<td>38</td>
<td>1</td>
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</tr>
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<td>53</td>
<td>1</td>
<td>53</td>
<td>2.04%</td>
</tr>
<tr>
<td>61</td>
<td>1</td>
<td>61</td>
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</tr>
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<td>67</td>
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</tr>
<tr>
<td>70</td>
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</tr>
<tr>
<td>73</td>
<td>1</td>
<td>73</td>
<td>2.82%</td>
</tr>
<tr>
<td>76</td>
<td>1</td>
<td>76</td>
<td>2.93%</td>
</tr>
<tr>
<td>85</td>
<td>1</td>
<td>85</td>
<td>3.28%</td>
</tr>
<tr>
<td>88</td>
<td>1</td>
<td>88</td>
<td>3.40%</td>
</tr>
<tr>
<td>98</td>
<td>1</td>
<td>98</td>
<td>3.78%</td>
</tr>
<tr>
<td>102</td>
<td>1</td>
<td>102</td>
<td>3.94%</td>
</tr>
<tr>
<td>107</td>
<td>1</td>
<td>107</td>
<td>4.13%</td>
</tr>
<tr>
<td>114</td>
<td>1</td>
<td>114</td>
<td>4.40%</td>
</tr>
<tr>
<td>124</td>
<td>1</td>
<td>124</td>
<td>4.78%</td>
</tr>
<tr>
<td>127</td>
<td>1</td>
<td>127</td>
<td>4.90%</td>
</tr>
<tr>
<td>129</td>
<td>1</td>
<td>129</td>
<td>4.98%</td>
</tr>
<tr>
<td>140</td>
<td>1</td>
<td>140</td>
<td>5.40%</td>
</tr>
<tr>
<td>190</td>
<td>1</td>
<td>190</td>
<td>7.33%</td>
</tr>
<tr>
<td>217</td>
<td>1</td>
<td>217</td>
<td>8.37%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 592</td>
<td>100%</td>
</tr>
</tbody>
</table>
population were found in pairs or were breeding (either had a nest or unfledged chick) or still had their fledged youngster from the last breeding season. This is slightly lower compared to 2007, which was 68.1%. However, it is marginally higher or similar compared with the previous 6 years which was 65.05% in 2008, 52.4% in 2006, 65.6% in 2005, 55.5% in 2004, 51.4% in 2003, and 64.4% in 2002. A lower proportion of the population compared to the last five years was located in non-breeding flocks, i.e. 33.17% in 2009 compared to 45.3% in 2006, 34.4% during 2005, 36.6% during 2004, 36.9% during 2003 and 35.6% during the 2002 survey, consisting of only 3 separate flocks in 2009. This was however slightly higher compared to the 31.9% and 31.07% in 2007 and 2008 respectively. This is the second lowest number of non-breeding flocks compared to the 5 separate flocks from 2002 -2007. Only 2008 had fewer flocks totalling 2 separate flocks. The largest flock of Wattled Crane sighted during the 2009 survey consisted of 33 individuals and was seen in the Mooi River district.

2. Assessment of Wattled Crane Breeding Activity
Sixty-six of the 70 known breeding pairs in KwaZulu-Natal were located during the 2009 survey, compared to 63 during 2008, 60 during 2007, 54 during 2006, 64 during 2005, 56 in 2004, 57 in 2003, 53 in 2002, 58 located in 2001 and only 46 during 2000. A slightly lower proportion of pairs (40%) in their breeding territories, but not yet breeding, were found compared to 2008 45.6%, 43.3% in 2007, 53.7% in 2006, 42% in 2005 and 43% in 2004. This is however higher than the 2003 and 2002 surveys of 28.8% and 25.5% respectively. Twenty pairs had nests, with 7 pairs having a clutch of 1 egg, 10 with a clutch size of 2 eggs and 3 unknown clutch sizes. Sixteen pairs of Wattled Crane had unfledged chicks, all less than 10 weeks old, while 2 pairs still had last year’s youngster with them on the breeding territory.

3. Trends in Crane populations
Previous surveys (prior to 2005) determined total count information, with information available on the exact flight path and thus the exact same area coverage, and therefore trends in populations could not be determined. From 2005 onwards specific blocks were flown allowing the determination of densities for prescribed areas of the province. Table 9 indicates the densities of both Blue and Grey Crowned Cranes for each block (note that these densities are per 1000 hectares).
Figure 8: The distribution of Grey Crowned Crane sightings during the 2009 crane aerial survey in KwaZulu-Natal.
In terms of Blue Crane densities, only 3 blocks produce higher densities than most, which included the Fearnley, Colenso and Nooitgedacht blocks. The Grey Crowned Crane was far more evenly distributed throughout the province, with 14 blocks having densities higher than 10 cranes per 1000 hectares. The 2008 and 2009 Grey Crowned Crane densities compare relatively well with one another as indicated in figure 8. In only four blocks Baynesfield, Fort Nottingham, Himeville and Ideal View there is a significant difference between the densities for 2008 and 2009. In three blocks, namely Fort Nottingham, Himeville and Ideal View the density for 2009 is notably higher compared to 2008. In one block, Baynesfield the density for 2008 is notably higher compared to 2009.

**Table 7: Frequency of observed group sizes of Wattled Cranes in KwaZulu-Natal, July 2009**

<table>
<thead>
<tr>
<th>Region</th>
<th>Singles</th>
<th>Pairs</th>
<th>Pr + Nest</th>
<th>Pr + chick</th>
<th>Pr + fledged</th>
<th>Flocks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midlands (east) – Greytown</td>
<td>2</td>
<td>8</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td>Himeville / Underberg</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Kokstad / Cedarville</td>
<td>1</td>
<td>10</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>21(1)</td>
<td>52</td>
</tr>
<tr>
<td>Midlands (west) - Mooi River/ Nott Rd</td>
<td>5</td>
<td>9</td>
<td>12</td>
<td>6</td>
<td>1</td>
<td>49(2)</td>
<td>110</td>
</tr>
<tr>
<td>Northern KZN</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>9</strong></td>
<td><strong>28</strong></td>
<td><strong>20</strong></td>
<td><strong>16</strong></td>
<td><strong>2</strong></td>
<td><strong>70</strong></td>
<td><strong>211</strong></td>
</tr>
</tbody>
</table>

4. Other Species

Additional species located and recorded during the 2008 aerial survey included Oribi antelope, Secretary Birds, Bald Ibis and Denham’s Bustards. Figure 12 indicates the location of these species during the 2008 survey, while Table 10 shows the distribution of records throughout the different regions flown.
Figure 9: The number of Wattled Cranes sighted in the aerial surveys from 2001 – 2009.

ACKNOWLEDGEMENTS

We would like to thank Ezemvelo KZN Wildlife and in particular Greg Nanni (pilot) for their generous support of this valuable conservation monitoring project in KwaZulu-Natal, and the use of the Cessna plane. We would also like to thank all the counters for their time in assisting with this project. Lastly we would like to thank ESKOM for their generous support of this valuable conservation project.
Figure 10: The distribution of Wattled Crane sightings during the 2009 crane aerial survey in KwaZulu-Natal.
Table 9: Densities of Blue and Grey Crowned Crane for each prescribed block flown during the 2009 aerial survey (represented as cranes per 1000 hectares).

<table>
<thead>
<tr>
<th>Region</th>
<th>Block no.</th>
<th>Block Name</th>
<th>Block size (ha)</th>
<th>No. BC</th>
<th>BC densities</th>
<th>No. GCC</th>
<th>GCC densities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greytown</td>
<td>Block 1</td>
<td>Karkloof</td>
<td>4762.9</td>
<td>0</td>
<td>0</td>
<td>55</td>
<td>11.55</td>
</tr>
<tr>
<td></td>
<td>Block 2</td>
<td>Umvoti Vlei</td>
<td>4217.4</td>
<td>0</td>
<td>0</td>
<td>125</td>
<td>29.64</td>
</tr>
<tr>
<td></td>
<td>Block 3</td>
<td>Pi Delta</td>
<td>2773.2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>Block 4</td>
<td>Fordoun</td>
<td>2705.2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Midlands</td>
<td>Block 1</td>
<td>Baynesfield</td>
<td>1944.8</td>
<td>0</td>
<td>0</td>
<td>45</td>
<td>23.14</td>
</tr>
<tr>
<td></td>
<td>Block 2</td>
<td>Boston</td>
<td>4632.3</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>4.32</td>
</tr>
<tr>
<td></td>
<td>Block 3</td>
<td>Umgeni Vlei</td>
<td>8806.8</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>0.91</td>
</tr>
<tr>
<td></td>
<td>Block 4</td>
<td>Fort Nottingham</td>
<td>7256.6</td>
<td>0</td>
<td>0</td>
<td>79</td>
<td>10.89</td>
</tr>
<tr>
<td></td>
<td>Block 5</td>
<td>Mearns</td>
<td>7714.4</td>
<td>19</td>
<td>2.46</td>
<td>84</td>
<td>10.89</td>
</tr>
<tr>
<td>Underberg</td>
<td>Block 1</td>
<td>Himeville</td>
<td>4606.7</td>
<td>0</td>
<td>0</td>
<td>112</td>
<td>24.31</td>
</tr>
<tr>
<td></td>
<td>Block 2</td>
<td>Clovelly</td>
<td>2875.3</td>
<td>0</td>
<td>0</td>
<td>40</td>
<td>13.91</td>
</tr>
<tr>
<td></td>
<td>Block 3</td>
<td>Riverlea</td>
<td>4993.1</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>1.60</td>
</tr>
<tr>
<td></td>
<td>Block 4</td>
<td>Ideal View</td>
<td>4968.8</td>
<td>0</td>
<td>0</td>
<td>135</td>
<td>27.17</td>
</tr>
<tr>
<td></td>
<td>Block 5</td>
<td>Fearnley</td>
<td>9989.8</td>
<td>124</td>
<td>12.41</td>
<td>315</td>
<td>31.53</td>
</tr>
<tr>
<td>Kokstad</td>
<td>Block 1</td>
<td>Franklin</td>
<td>7929</td>
<td>0</td>
<td>0</td>
<td>262</td>
<td>33.04</td>
</tr>
<tr>
<td></td>
<td>Block 2</td>
<td>Kokstad W</td>
<td>12124.8</td>
<td>20</td>
<td>1.65</td>
<td>310</td>
<td>25.57</td>
</tr>
<tr>
<td></td>
<td>Block 3</td>
<td>Cedarville</td>
<td>8454.9</td>
<td>73</td>
<td>8.63</td>
<td>258</td>
<td>30.51</td>
</tr>
<tr>
<td></td>
<td>Block 4</td>
<td>New Amalfi</td>
<td>13767.1</td>
<td>131</td>
<td>9.52</td>
<td>350</td>
<td>25.42</td>
</tr>
<tr>
<td>N KZN</td>
<td>Block 1</td>
<td>Winterton</td>
<td>18935.2</td>
<td>6</td>
<td>0.32</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Block 2</td>
<td>Colenso</td>
<td>4051.6</td>
<td>49</td>
<td>12.09</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Block 3</td>
<td>Ravensdale</td>
<td>1235.5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Block 4</td>
<td>Besters</td>
<td>5015.7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Block 5</td>
<td>Chelmsford</td>
<td>8706.9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Block 6</td>
<td>Nooitgedacht</td>
<td>2221.8</td>
<td>196</td>
<td>22.51</td>
<td>2</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>Block 7</td>
<td>Blood River Vlei</td>
<td>4940.7</td>
<td>0</td>
<td>0</td>
<td>196</td>
<td>39.67</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>159630.5</td>
<td>618</td>
<td>3.87</td>
<td>15.07</td>
<td>2406</td>
</tr>
</tbody>
</table>
Figure 11: A comparison of the densities for Grey Crowned Crane in the different blocks for the 2008 and 2009 aerial survey.

Table 10: Numbers of Oribi, Secretary Birds and Denham’s Bustards and Bald Ibis recorded during the 2009 aerial survey.

<table>
<thead>
<tr>
<th>Region</th>
<th>Oribi</th>
<th>Secretary Birds</th>
<th>Denham’s Bustard</th>
<th>Bald Ibis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern KZN</td>
<td>11</td>
<td>0</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Himeville / Underberg</td>
<td>3</td>
<td>2</td>
<td>37</td>
<td>6</td>
</tr>
<tr>
<td>Kokstad / Cedarville</td>
<td>7</td>
<td>5</td>
<td>14</td>
<td>284</td>
</tr>
<tr>
<td>Midlands (west) - Mooi River/ NR</td>
<td>24</td>
<td>0</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Midlands (east) – Greytown</td>
<td>20</td>
<td>0</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>TOTAL</td>
<td>65</td>
<td>7</td>
<td>68</td>
<td>307</td>
</tr>
</tbody>
</table>
Figure 12: Map of KwaZulu-Natal showing the location of Oribi, Secretary Bird, Bald Ibis and Denham’s Bustard records for the 2009 aerial survey.
STATUS OF THE BLACK CROWNED CRANE *BALEARICA PAVONINA* IN NORTHERN NIGERIA.

L.G. Tursha and M.G. Boyi

Figure 1: Areas visited during the survey: Kalamurdo village (left) and Mboro lake (right)

**ABSTRACT**

The Black Crowned Crane *Balearica pavonina* survey was conducted at selected sites in north eastern Nigeria in December 2007. Nine potential sites thought to host Black Crowned Crane were visited. Direct and indirect methods of bird census were used to register bird species composition of all the sites visited. No sightings of Black Crowned Cranes were made in all the sites visited at the time of this survey. However, there were speculations that the bird was sighted during the peak of the wet season. A total of 43 waterbirds of 14 families were recorded during this survey. There was evidence of trade in the Black Crowned Crane, as exemplified by a report from Ngala and Zannari. Adequate habitat and species protection is the much-needed solution to restore the population of the Black Crowned Crane in Nigeria. This should be strengthened by an integrated community conservation initiative within the bordering communities with the Black Crowned Crane as the flagship species.

**INTRODUCTION**

Africa is home to six species of cranes, including the resident Black Crowned *Balearica pavonina*, Grey Crowned *Balearica regulorum*, Watted *Grus carunculatus* and Blue *Anthropoides paradisea*, and the migratory Eurasian *Grus grus* and Demoiselle *Anthropoides virgo* cranes.

Black Crowned Crane. Joseph G Holland.
The Black Crowned Crane *Balearica pavonina* is designated as near threatened (NT) by BirdLife International. It is a non-passeriforme belonging to the family Gruidae and subfamily Balearicinae (del Hoyo *et al.*, 1996). The Black Crowned Crane is found in the Sahel and Sudan savanna region of Africa, from Senegal and Gambia on the Atlantic coast to the upper Nile River Basin in Sudan and Ethiopia. The West African Crowned Crane (estimated population 15,000) occupies the western part of this range from Senegal to Chad in north central Africa, and is divided into eight or more disjoint populations (Williams *et al.*, 2003, www.savingcranes.org/conservation/index.cfm). There are two subspecies: the West African Crowned Crane *Balearica pavonina* pavonina, which occupies the western part of this range from Senegal to Chad, and the Sudan Crowned Crane *B.p. ceciliae* in eastern Africa with its largest concentration in Sudan. Black Crowned Cranes use both wet and dry open habitats, but prefer a mixture of shallow wetlands and grasslands (especially seasonally flooded lowlands in the Sahelian savannas). They can be considered as year-round residents and local migrants, flocking together during the dry (non-breeding) season and moving from large permanent wetlands to smaller temporary wetlands formed during the rainy season.

Historically, the Black Crowned Crane was abundant and widely distributed within its range. During the past years, however, the species has been decreasing across much of its range, and its distribution in West Africa is now fragmented into eight or more isolated populations. The West African Crowned Crane has declined dramatically over the past 25 years. It was estimated that there were more than 10,000 birds in Nigeria until the 1970s. Today, probably fewer than 25 remain in Nigeria, and the species is on the verge of local extirpation. This threatened bird in Nigeria is referred to in many ornithological literature sources as the country’s national bird (Stopford, 1986; Daddy and Ayeni, 1996; Garba, 1996). Although the factors responsible for the species’ decline are not fully known, they are most likely linked to a number of threats including: prolonged drought, dams and diversions, deforestation, large irrigation schemes, indiscriminate use of pesticides, and other problems (www.savingcranes.org/conservation/index.cfm). The live trade is probably a major causal factor. For example, Boyi (2001) reported that although the crane is by now very rare in northern Nigeria, there is still a demand both for live birds and for body parts as seen from eleven captured birds observed for sale and export in Kano, a major trade route for cranes in northern Nigeria. A trader in Kano market could expect a single crane to make about 15,000 naira (US $150) from one bird (Boyi, 2001).

Mustapha and Durbunde (1992) reported that the population of the bird dropped from 15,000 in the early 1970’s to just a few non-breeding individuals, and attributed the decline to poaching and habitat loss. Boyi (2001) indicated that Black Crowned Crane trade attracts local hunters, businessmen and exporters for some good money, and this resulted in high demand and exploitation of the species. The only recent information on the species in Nigeria was established by Ezealor & Boyi (2001); since then there has been no comprehensive survey to determine the status of the bird in Nigeria. On this account therefore, a survey of the species was conducted under the auspices of the Nigerian Conservation Foundation (NCF) and the A.P. Leventis Ornithological Research Institute (APLORI), University of Jos.

The objective of this study was to count Black Crowned Cranes at sites where sightings were made in previous years particularly in the year 2000, and undertake Rapid Rural Appraisals (RRAs) in selected communities where sightings were made in the past.

**MATERIALS AND METHODS**

**Study sites**

A survey of the Black Crowned Crane was conducted in and around communities in Borno State (N 11° 51’ E 13° 03’), northeastern Nigeria (Figure 1). Sites where sightings of Black Crowned Cranes were reported in 2000 were revisited including new sites
where the species possibly occurs. The sites visited include the Chingurmi-Duguma sector of the Chad Basin National Park located in the Gulumba district (southeast Maiduguri, near Waza National Park in Cameroon). A large part of the park is flooded by waters from the Dorma river during the wet season, creating floodplain wetlands, such as the Kutula fadama (riparian forests and woodlands of the Nigerian savanna), which attracts waterbirds and other wildlife (Ezealor, 2002). These areas are protected, including Rama and Mboro, while the remaining areas visited are unprotected, namely Kalamurdo, Zannarri, Dikwa floodplains, Kalamurdo, Zannari and Arinna Chiki. The park is important as it is a restricted species assemblage biome known or thought to hold a significant component of a group of species whose distributions are largely or wholly confined to one biome (Ezealor, 2002). The sites visited are presented in Appendix 1.

The vegetation in the park is typical Sudan-Guinea Savanna, except in the most northerly part of the park where it takes on a more Sahelian form as a result of human activities. Common tree and shrub species include Acacia spp., Calotropis procera, Anogeissus leiocarpus, Valanites aegyptiaca Mitragyna sp and Sterculia setigera (Ezealor, 2002).

Survey design
In each of the sites visited, number of waterbirds were estimated using direct and indirect methods as described in Bibby et al. (2001). This was used to establish waterbird species present in the various sites.

Interviews were also held with the local communities and government officials to generate information about the existence of the species in the area. This include the protection staff of the Chad Basin National Park and the forestry staff of the concerned Local Government Areas.
RESULTS
There were no sightings of Black Crowned Crane at any of the sites visited during the survey. See appendix for records of other bird species.

Account of the sites visited
1. Kalamurdo (N 11° 28’, E 14° 28’) (unprotected)
It was gathered from the local people (Bulama Adam) near Kalamurdo (Figure 1) and communities bordering the Chad Basin National Park and the adjacent Waza National Park that the bird visits the area when the wet season is about to set in or when it is fully established. They suggested that a visit in August will offer higher chances of sighting the bird. They reported that during the dry season, the cranes often migrate to the adjacent Waza National Park in the Democratic Republic of Cameroon where they enjoy adequate water availability and protection (see Appendix 1).

2. Arin Na Chiki (N 12° 38’, E 13° 59’) and Zannari (unprotected areas)
At Zannari and Arin na Chiki (Appendix 1), it was gathered that the species usually visits the area in the months of January until March or April, i.e. just before the wet season sets in. We were also told that the trade in Black Crowned Crane in these areas is still ongoing. For example, at Ngala a man bought one bird for 5,000 naira and kept it in his house for reasons unknown to us. By the time we arrived the house, we were told that the bird had died. The local people at Zannari assured us that trade in the Black Crowned Crane is common in Doron Baga (a border community between Nigeria and Chad). Fishing and irrigation activities were recorded in this site.

3. Mboro dam (N 11° 33’, E 14° 32’), Bashkur (N 11° 40’, E 14° 30’), and River Kutila (N 11° 32’, E 14° 32’) (protected areas)
At Mboro (Figure 1) we came across a patrol team of the National Park Service Rangers (Figure 3) led by Abacha Mohammed who informed us of a flock of eight Black Crowned Crane at Mboro and Bashkur dams a day before we arrived. Usman Audu Kimbian, our guide and a Ranger of the Chad Basin National Park expressed his fear that we might not see the bird by the time we arrived (8th November 2007) and claimed that he had also sighted a flock (8-10 pairs) of Black Crowned Cranes in August 2007. He is of the opinion that the best time to visit areas utilised by the cranes is between August and early October, at the time that water levels in the dams and river are high.

It was observed that a number of flocks may not only use the waters in these areas as stop over sites to other sites, but may use them as a temporary habitat/refuge, although, there was not enough support to that assertion either by the rangers or the local people that are familiar with these sites.

Rural Rapid Appraisals (RRAs)
RRAs were conducted at Kalamurdo, Zannari and Arin na Chiki (Appendix 1) because information from the local people and the National park Service Rangers suggested that these areas could potentially contain cranes. The communities at these locations are concerned about the decline of the population of the Black Crowned Crane and are interested to support efforts to enhance its conservation status in the area. All (8 persons) the local
people spoken to reported a sudden decline in the number of species. Kalomurdo holds great potential for the species’ protection in view of its close proximity to adjacent Waza National Park. Reports by the local people indicate that the bird often comes into the Chad Basin National Park seasonally. The local people in these areas are curious and enthusiastic about getting involved in any programmes geared towards the crane’s protection. For example, a trader at Arin na Chiki area offered to send us information as soon as the cranes were sighted. Others were curious about our mission on the crane (Figure 4).

The village head of Kalamurdo “Bulama Adam” (Figure 5) outlined that his communities are ready and willing to support programmes that are targeted on the conservation of Black Crowned Cranes, but emphasized the need to raise community awareness and sensitisation.

One fisherman (Abdullahi Audu Mohammed) from Arin na Chiki informed us that there are other sites where cranes can be found, namely Kichimari in New Marte Local Government Area (LGA) and Yorokura and Kirta in Ngala LGA. A total of 43 bird species were recorded and counted in the area (Appendix 1).

**DISCUSSION AND CONCLUSION**

From discussions with the local communities, it was deduced that Black Crowned Cranes migrate between sites in Nigeria and neighbouring sites in Cameroon and Chad, which seem to be preferred by the cranes. This is perhaps associated to habitat availability and security. At the time of our visit five of the potential areas that were thought to be good habitats for the birds were at the verge of drying out while three were completely without water. This explains why the birds visit the sites during the peak of the wet season at the time when water level is high as claimed by the Chad Basin National Park Service Rangers and the local communities in these sites.

Another factor affecting the bird is lack of protection at all the sites visited except those within Chad Basin National Park. Poaching (bird trapping) was common evident by 31 local traps recorded. Birds may be trapped for sale in the market as source of protein, pets, ornamental, ritual or medicinal purposes. A number of local people at Arin na Chiki and Zannarri mistook us for buyers of cranes and suggested that we go to the Chadian shore (Doron Baga) where there were more cranes available for sale. This information possibly points out that the greatest threat to the conservation of the crane is trade between the three neighbouring countries, namely Chad Republic, the Democratic Republic of Cameroon and Nigeria. It will be paramount therefore to determine the extent and nature of this illegal market within these
three countries. An integrated survey involving researchers from the three countries may be useful in an effort to curtail further trade, at the same time providing a network of interest groups who will facilitate and implement mitigation plans for the Black Crowned Crane. We further observed that irrigation and fishing activities in areas inhabited by the bird may also contribute to their absence.

In conclusion, there were no sightings of Black Crowned Cranes at the locations visited for the survey. However, it was established from the communities and the Chad Basin National Park Service Rangers that the birds migrate between sites in Nigeria, the Cameroon and Chad Republic. In sites visited, habitat loss as a result of long-term and seasonal drying out of lakes and other wetlands including trading in the species are the major threats causing population decline in Nigeria. The following recommendations were made in order to ensure effective protection and conservation of the species.

RECOMMENDATIONS

i. Embark on awareness campaign programmes to educate and sensitize communities on the importance of and the need to protect Black Crowned Cranes. Local people should be clear that it is illegal to kill or trade in cranes. Debunk the cultural superstitious ideas of the local people that the crane is a source of good ritual and medicinal remedies, by providing alternatives where possible.

ii. Combat trade in cranes through effective monitoring of boarders between Nigeria, Chad and Cameroon by establishing stringent laws and prosecuting defaulters.

iii. Ensure adequate protection at entry and exit points such as the airports, border towns and cities, by strengthening effective patrol system with the cooperation of bordering communities. An integrated community security and conservation strategies should be adopted.

iv. Carry out a more extensive survey of potential areas inhabited by the crane in Nigeria, especially during the wet season. Establish clearly all areas used by cranes, and the status of the birds within each area.

v. Local support for the cranes could be strengthened through a community-based project in which the provision of alternative sources of livelihood could be included, e.g. by way of permanent or temporary employment or provisioning of some basic community amenities such as boreholes and irrigation facilities to strengthen dry season farming. Funds could be sourced both within and outside Nigeria for this purpose.
ACKNOWLEDGEMENTS
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REFERENCES
HABITAT UTILIZATION BY GREY CROWNED CRANE FLOCKS DURING SUMMER AND WINTER SEASONS IN THE NORTH EASTERN CAPE OVER THE LAST 10 YEARS

Tanya Smith

ABSTRACT
In the North Eastern Cape in winter, Grey Crowned Crane flocks tend to be seen on agricultural lands more frequently than in natural habitat. However, it was unknown whether or not the non-breeding floater flocks of Grey Crowned Cranes were more likely to utilize natural habitat over agricultural lands in summer. The aim of this analysis is to determine the extent to which Grey Crowned Crane flocks utilize different habitat types in terms of the percentage of flock sightings within each habitat type in both summer and winter. The percentage of flock sightings in each habitat types were based on 311 and 312 recorded sightings for both summer and winter respectively. In winter 73% of flock sightings are of flocks on agricultural land, compared to 62% in summer. Whilst 27% of flock sightings in winter are on natural habitat compared with 38% in summer. Grey Crowned Crane flocks tend to utilize agricultural lands more so than natural habitat, in both summer and winter, with ‘pastures’ being the most preferred habitat type in both summer and winter. The other habitat types most commonly utilized were maize crops (both seedling and stubble), grasslands and wetlands. In winter, utilization of agricultural lands by flocks increases slightly, thereby showing the importance of agricultural lands as a food source in winter.

INTRODUCTION
In summer in the North Eastern Cape Grey Crowned Crane pairs are found on their breeding territories and the small ‘non-breeding’ floater flocks of various sizes move extensively, utilizing different habitats and farms. In winter the breeding pairs return to these flocks with their chicks and the flocks can grow up to nearly 300 birds, but the flocks will vary in size. In summer the pairs and their chicks tend to utilize natural habitat, namely wetlands and grasslands and may only move into agricultural lands once the chicks have fledged. However, in summer it was unknown whether or not the non-breeding floater flocks preferred natural habitat over agricultural lands. In winter, the flocks tend to be seen on agricultural lands more frequently than in natural habitat. This is generally due to the fact that the North Eastern Cape is dominated by maize crops that are harvested in winter and ‘winter green feed’ or pastures. The maize crops are harvested between May and July.
Figure 1: Percentage habitat utilization by Grey Crowned Crane flocks in the North Eastern Cape in both summer (blue) and winter (red).

Figure 2: Percentage utilization of agricultural lands and natural habitat by Grey Crowned Crane flocks in the North Eastern Cape.
and results in a large amount of ‘dropped maize’ that is available to a variety of birds, wildlife and livestock. According to some of the local farmers, up to a ton of maize is left after harvesting as crop residue for livestock feeding (Dave Moore, pers. Comms). There is a huge variety of pastures ranging from tropical pastures like Kikuyu to legume pastures like Lucerne, however in the North Eastern Cape pastures are mainly kikuyu (Pennisetum clandestinum), oats (Avena sativa) and ryegrass (Lolium sp.); with the other crops being wheat, sorghum and timber plantations. In summer the area will be dominated by maize which is planted between October and November depending on the arrival of the first spring rains and is vulnerable to damage by birds, including Grey Crowned Cranes, for the first 2-3 weeks after germination. Therefore due to the staggered nature of maize planting in the area the flocks can be seen on seedling maize crops up until early December, after which the maize is too tall and the lands become unsuitable for feeding. The flocks then utilize pastures or newly planted wheat and natural habitats for the remainder of summer. The aim of this analysis is to determine the extent to which Grey Crowned Crane flocks utilize different habitat types in terms of the percentage of flock sightings within each habitat type in both summer and winter.

RESULTS
The percentage of flock sightings in each habitat types were based on 311 and 312 recorded sightings for both summer and winter respectively. In summer, 23 % of flock sightings were of flocks in pastures, with 15%, 13% and 12% of sightings occurring in grassland, maize crop and wetland respectively (Figure 1). In winter, 44% of flocks are sighted in pastures, with 13%, 12% and 11% of flocks sighted in stubble fields, grassland and wetland respectively (Figure 1).

Figure 2 shows the comparison between flock sightings on ‘agricultural lands’ versus ‘natural habitats’ in both summer and winter. In winter 73% of flock sightings are of flocks on agricultural land, compared to 62% in summer, whilst 27% of flock sightings in winter are on natural habitat compared with 38% in summer. This shows a slight increase in the preference by Grey Crowned Crane flocks for agricultural lands in winter, namely pastures and maize stubble fields.

DISCUSSION
The results above clearly show that the majority of flock sightings, in summer and winter, are of flocks on pastures, with maize crops (both seedling and stubble), grasslands and wetlands being the other preferred habitats for Grey Crowned Crane flocks. Figure 2 shows that Grey Crowned Crane flocks tend to utilize agricultural lands more so than natural habitat, in both summer and winter. This is in line with the results from CAR (Coordinated Avifaunal Roadcounts) as most Grey Crowned Crane sightings in the North Eastern Cape precinct occur in crops or agricultural lands, with approximately 52% in summer and 47% in winter (www.car.adu.org.za/data). These figures are lower than the results shown in Figure 2 but this would be attributed to the fact that these results include sightings of pairs, families and single birds which tend to utilize natural habitat more so than flocks.

It is interesting to see that percentage flock sightings in wetlands and grasslands are similar in both summer and winter, indicating that there is no specific preference by flocks for these habitats in either season. In summer, breeding pairs will defend their territories from other pairs.
as well as possible the ‘non-breeding’ floater flocks. This may explain why the percentage of flock sightings in grasslands and wetlands in summer is quite similar to that of flock sightings in the same habitat in winter. In summer the flocks could potentially be kept off natural habitat by breeding pairs however the interaction between the non-breeding flocks and breeding pairs in summer needs more research.

Young (2003) has shown that large terrestrial birds like Grey Crowned Cranes do better in areas of mixed farming, but particularly in areas where neighboring farmers work together to protect natural vegetation and biodiversity. This is often the case in the North Eastern Cape as many of the Grey Crowned Crane flocks are found on the same farms year after year, and it’s these farms and the farms in the immediate vicinity that tend to have a mosaic of habitats, thereby supplying the needs of the flocks.

**CONCLUSION**

From this preliminary analysis it is clear that Grey Crowned Crane flocks in the North Eastern Cape tend to be located on agricultural lands, namely pastures and maize lands (harvested and seedling) more often than natural habitat. In winter, utilization of agricultural lands by flocks increases slightly, thereby showing the importance of agricultural lands as a food source in winter. It is positive to see that majority of flocks are sighted in pastures (kikuyu, oats or ryegrass) as opposed to maize lands in that there is little damage caused by Grey Crowned Cranes to pastures, perceived or otherwise. However it is undeniable that Grey Crowned Crane flocks can cause some damage to maize crops either as seedling or post-harvest, the extent will however differ from farm to farm (van Niekerk, unpublished). So it is important to try and better understand how and why maize lands, and often the same lands, are utilized in both winter and in summer so we can try and address the issue of maize crop damage.

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Dave Moore. Personal Communications. Mondamin Farm, Maclear.
ABSTRACT
A total of 344 Blue Crane (Anthropoides paradiseus) mortalities have been documented in the Karoo region in the central part of South Africa between March 2005 and December 2009. Collisions with power lines were responsible for the largest numbers of mortalities (265 of the 344 documented mortalities). The majority of power line mortalities have occurred as a result of colliding with distribution power lines (147 in total) when compared to transmission power lines (118). The other causes of mortalities documented in the Karoo include poisonings (22), fence entanglements (23), reservoir drowning (3), injuries (2), collisions with vehicles (2), collisions with phone lines (5) and unknown causes (22).

INTRODUCTION
The Blue Crane (Anthropoides paradiseus) is found in three sub-populations in South Africa, namely the grasslands region (found in Mpumalanga, the north-eastern Free State KwaZulu Natal and the north-eastern parts of the Eastern Cape), the south Western Cape and the central Karoo (Allan, 1993). The Karoo is a semi-arid area where rainfall mainly falls in the summer months (Desmet and Cowling, 1999) and this is where the largest population of Blue Cranes are found within natural habitat.

STUDY AREA
The Blue Cranes in the Karoo region are monitored in the districts of Graaff-Reinet, Middelburg, Steynsburg and Cradock in the Eastern Cape and the districts of De Aar, Philipstown, Hanover, Richmond, Noupoort and Colesberg of the Northern Cape Province. Farms are visited and information is obtained from the farmers and farm workers on the farms or when monitoring cranes in the area.

METHODS
Farmers and farm workers are encouraged to report Blue Crane mortalities on their farms and these mortalities are recorded when the farms are visited. These records of mortalities have been recorded since March 2005.

In addition, a transmission power line monitoring project was initiated in 2008, where four sections of transmission power lines are monitored three to four times a year in the De Aar/Hanover districts of the Northern Cape. This is done to gather information regarding the hotspots of crane collisions as well as seasonal information of incidents occurring under the transmission power lines. This has also resulted in more power line mortalities being recorded. If bones of cranes were found on a farm, the mortality has not been recorded in this data, as a date could not be established (such as bones found under a power line) and are thus considered historic cases.
In many cases where birds are assumed to have been poisoned, only one or two birds were sent for testing for poisons. If the test results indicated that the cause of death was poisons, then it was assumed that the other cranes found in the area were also poisoned.

If it was not possible to establish the cause of mortality, they have been listed as “unknown” (in some cases they were found close to a fence, but could not be confirmed that fence entanglement was the cause of death or the carcass was too old to be send for toxicology to confirm for poisoning).

RESULTS
A total of 344 mortalities have been recorded since March 2005 until December 2009 and the causes are shown in Figure 1. The highest cause of mortalities resulted from collisions with power lines, namely 265 mortalities in total. These have been separated into collisions with distribution power lines (147 in total) and transmission power lines (118 in total). In terms of poisonings, the highest case in one poisoning incident was 7 mortalities out of the total of 22 mortalities. Two mortalities occurred when vehicles collided with Blue Cranes (one was on a district road and the other on a farm road).

DISCUSSION
McCann (2000) stated in the Eskom Red Data Book for Birds of South Africa, Lesotho and Swaziland that power lines were the biggest threat to Blue Cranes in the Karoo. This can be confirmed by the data collected over this reporting period showing that a total of 265 Blue Cranes were killed by collisions with power lines.

When investigating poisoning cases, there is usually a small group of birds that are poisoned at one time. This is due to the fact that the culprit will usually put out a number of maize seeds at a time. The birds will then flock there and eat the maize. Poisoning in most cases is deliberate, where people specifically target water birds and cranes using poisoned feed. This is confirmed by results from toxicology reports. A further indication that
deliberate poisoning has taken place is that the poisoned feed has been found away from areas where it is grown and has usually been found near water or feeding areas of cranes. These areas are monitored for further incidents and provincial authorities also help to educate the farm workers and obtain poison samples. There have been no deliberate high number mortalities of cranes caused by poisons.

**Mitigation**

When a power line collision in reported, the area is visited and the cause of the mortality is investigated. A report is then drafted and sent to the Endangered Wildlife Trust’s Wildlife and Energy Programme. Recommendations are then given to the electricity supplier in South Africa, namely Eskom. These power lines can be fitted with bird flight diverters, such as the commonly known “flappers” that are fitted to smaller power lines, to prevent further incidents. This is done through the local Eskom Technical Service Centres. Nearly all of the distribution power lines that have had incidents affecting Blue Cranes have had flappers fitted to them. However the majority of transmission and some larger distribution such as 88 kV power lines have not been fitted with bird flight devices in the Karoo.

Telephone lines where collision incidents have occurred have also been fitted with plastic piping in order to make them more visible. This is done through the telephone company Telkom who fit the piping following a report of an incident. This has also helped to prevent further incidences from occurring, as no more collisions have been reported under the marked phone lines.

Some plastic piping has also been placed on some fences in the Karoo where cranes have very often been entangled and there have been no further entanglements.

In most areas where poisonings have occurred, the farm workers on the farm (or nearby farms) are often spoken to about poisoning cases and the consequences if they are found guilty for using poisons.

Farmers are encouraged to place rocks or cement blocks in the reservoirs to allow the cranes to get out, to prevent them from drowning. As seen in the graph above drowning in reservoirs was not a big threat, but can be prevented.

**CONCLUSION**

It is always important to record the mortalities of Blue Cranes in order to mitigate the causes where possible and understand the reasons for mortalities.

It is also anticipated that marking power lines with bird flight diverters will prevent further incidents. However, there have been re-collisions with power lines surrounding dams where Blue Cranes roost. In the future, different devices are planned to be placed near some critical roost sites.

Information about the causes of poisoning cases is sometimes also received by speaking to the farm workers. Farm workers are always a great help in providing more information about mortalities on the farms where they work in addition to the farmers who often report such cases.

**REFERENCES**


Three and a half years after a research project was initiated on Namibia’s isolated population of Blue Cranes, we still do not have all the answers about the seasonal movements of these charismatic yet elusive birds. The good rain season during summer 2006 and flood conditions at Etosha Pan in 2008 and 2009 have further complicated our efforts at arriving at any conclusive findings.

The Blue Crane is rated as globally Vulnerable, and Critically Endangered in Namibia. The isolation of the small subpopulation and its survival in an arid, predator-rich environment within Etosha and the Lake Oponono wetlands to the north pose a conservation enigma. In 1992, the Namibian population of Blue Cranes was estimated at 80 (Brown, 1992) with an apparent decline to 60 in 1994 (Simmons et al. 1996). The Namibia Blue Crane Project was initiated in March 2006, as part of the Namibia Action Plan. The findings of the project will be used as a basis for compiling a species management plan for Blue Cranes in Namibia.

One of our main findings to date is that since a count of 67 in April 2006, total numbers have not reached more than 35 birds (Fig. 1). This could be related to good rains at Etosha and/or within the Cuvelai catchment in 2006, 2008 and 2009. A combined aerial/ground survey in March 2009 (Fig. 2) yielded only 12 adults and seven chicks; and no Blue Cranes at the flooded Lake Oponono.

We believed that there may be a “floating” population of non-breeding birds that may have found (temporarily) suitable habitat elsewhere – hopefully in a crane-friendly area. From June/July to October 2009, however, as conditions became drier, a group of 35 Blue Cranes was consistently recorded at Andoni, in the north-east of the Park (Fig. 2) and this now appears to be the total population in Namibia. Time will tell, as we continue to monitor their numbers and movements!

Despite these relatively low numbers, successful breeding is continuing with one chick in 2007 and seven chicks each in 2006, 2008 and 2009; chick production and survival appear to be directly related to rainfall. Since April 2006, 14 of the 22 chicks recorded have been marked with uniquely coded rings. Our intrepid ringing team has braved many odds, included having to pursue a crane group on foot through cold water and slippery, ankle-deep mud for considerable distances on Etosha Pan, with 15 lions lurking just around the corner! When predators threaten, the adult cranes take the chicks straight out into the water as an escape route. Based on resighting data, chick survival is presently estimated at a relatively high 43%. The first crane ringed as a chick (in April 2006) took up a breeding site in March 2009 although no offspring were produced.

A large subadult Blue Crane was captured in April 2007 and fitted with a radio transmitter, and movements of 50-120 km were noted over seven months. An adult crane was captured and fitted with a satellite PTT on 8/4/08, which transmitted successfully until 26/4/08. This adult was observed at Andoni on 22/9/08 with the antennae correctly in place (although no longer transmitting). In 2009 two more birds were captured and fitted with radio telemetry. Ongoing signals received from the March 2009 juvenile have enabled our team to keep close contact with the group of cranes at Andoni, and to arrive at the present population estimate. A second young adult was also fitted with telemetry in November 2009. Other project activities are outlined on our website (see below).

To date almost R20 000 of the allocated funding (R35 000) has been used for surveys/field work/equipment. Over the next year we hope to continue with these activities, especially fitting two more radio transmitters and one satellite transmitter to cranes. The proposed second flight over the south-eastern part of Angola has
been put on hold, until satellite/radio tracking provides a better indication of possible movements.

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Figure 1: Counts of Blue Cranes at Etosha National Park and Lake Oponono, 1992-2009.

1. Radio tracking the cranes from the air over the flooded Lake Oponono area in March 2009 (photo Ann Scott).

Figure 2: Combined aerial/ground count of cranes over Etosha National Park and Lake Oponono in March 2009, showing flight paths and sightings of Blue Crane = yellow dot; Wattled Crane = white cross; Crowned Crane = green star (map Holger Kolberg, MET Directorate of Scientific Services)

3. A rare and privileged view of newly hatched Blue Crane chicks at the Chudop Triangle, 14/2/09 (photo Sunday Nelenge).

4. & 5. Ringing and measuring the chicks from Chudop Triangle, 40 days after above photo 3 was taken: top (L) Wilferd Versveld & Holger Kolberg (photos Chantel Louw).
5. Hanjo Böhme ringing and measuring the chicks from Chudop Triangle.

6. Thirty-five Blue Cranes were consistently recorded in the area of the Andoni gravel pit from June-October 2009, during the dry season; photographed here on 3/9/09 together with hundreds of teal (photo Wilferd Versfeld).

7. Two Blue Cranes are watched by a spotted hyaena at Nebrownii waterhole, shortly before one of the cranes was successfully captured and fitted with a radio transmitter on 18/11/09 (photo Wilferd Versfeld).
Wattled Cranes. Gunther Nowald
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Submission of an article is understood to imply that the article is original and is not being considered for publication elsewhere.

All contributions must be in English and sent to the Editor in electronic format, either on a disk or via email. The first page should contain the title of the paper and author(s) name(s) and address(es), including the person to whom correspondence should be addressed. Number pages consecutively.

Full papers/articles should follow the normal organization of other journals, including an abstract. A minimum of 5 key words should also be included after the abstract. Tables should be simple, vertical lines should not be used to separate columns. Figures and tables should have brief and self-explanatory titles. The text should include reference to the figures and tables.

Photos or illustrations may be included in article. These must be sent electronically and should be of quality 300dpi or better.

Cite reference in the conventional manner (refer to the journal Ostrich), in alphabetical order by author’s name.

All measurements should be metric. First mention of a species should be in the English vernacular followed by the scientific binomial.

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