



FitzPatrick Institute of
African Ornithology



UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

APNR Southern Ground-Hornbill Research & Conservation Project

QUARTERLY REPORT

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A P N R
**GROUND
HORNBILL
PROJECT**

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ABOUT US

The APNR Southern Ground-Hornbill Project is dedicated to the research and conservation of Southern Ground-Hornbills in the Greater Kruger region of South Africa. Researchers from the FitzPatrick Institute of African Ornithology, UCT, have been at the forefront of critical research that informs conservation efforts by understanding the habitat use, reproductive success, and behaviour of these iconic birds. The project installs and monitors artificial nests which are vital to enhance their breeding success and allows for comprehensive studies of the birds in their natural environment.



BREEDING SUMMARY FOR 2025/26 SEASON

The current breeding season began earlier than expected, with two groups laying eggs at the beginning of October. The last time eggs were laid this early was in 2017, although in earlier years this timing was more typical. In recent seasons, breeding has tended to begin later. The earlier start this year may indicate more favourable conditions, such as good rainfall during the 2024/25 breeding season and a cooler winter than previous years.

Other groups began breeding later, mainly in November, and one group laid as late as January, resulting in a very spread-out breeding season (Fig 3). In total, 15 groups attempted to breed, and at the time of writing, 12 groups are still breeding. Given the long period between laying and fledging (around four months), this breeding season could extend into April. We suspect there's a breeding group on Ingwelala, in a new natural nest close to camp (still to be located).

The recent devastating floods that hit the area may have affected some of these breeding attempts, but access to most nests has been impossible, making it difficult to assess breeding outcomes at this point.



Fig.1. One day old chick with second egg still to hatch.



Fig.2. Causeway uncrossable after relentless rainfall, leaving the team stuck at home for two weeks.

1) Thornybush
(Thornybush)
2) Blatherwick
(Timbavati)
3) Birmingham
(Timbavati)
4) Klaseriemond
(Klaserie)

5) Pitlochry
(Klaserie)
6) Copenhagen
(Klaserie)
7) Yankee Dam
(Umbabat)
8) N'tsiri
(Umbabat)
9) Olifants North
(Balule)
10) Karan Khaya
(Timbavati)
11) York
(Balule)
12) Lornay
(Timbavati)
13) Caroline
(Timbavati)

14) Ntoma
(Klaserie)

15) Buchner
(Umbabat)



OCTOBER NOVEMBER DECEMBER JANUARY

Fig.3. Nests in which eggs were laid and the month of laying.

Interesting Nesting Insights – 2025/26 Season

Blatherwick: A previously unknown group of six birds has taken over this nest. The group includes two unringed juveniles from past years, indicating they bred in an unknown site. During winter, they were regularly spotted on the Timbavati/Thornybush cutline, and this year they moved into the Blatherwick nest on Timbavati.

Birmingham: This was the first breeding attempt by the group since we provided an artificial nest in 2018 to replace their collapsed natural nest. Unfortunately, their eggs failed to hatch.

Karan Khaya: The long-standing female, likely well over 30 years old, appears no longer present. A new, younger female joined the group and laid eggs but abandoned the nest during a storm, possibly due to inexperience. The old female had raised 17 chicks to fledging, making this the most successful group in the APNR, and possibly in the country.

Buchner: This is the first breeding attempt by this group since we installed a nest for them in 2024; they were previously thought to breed in Kruger. They laid very late in the season, and success is still to be determined.

Lornay: The female in this group was predated by a leopard while incubating (the first recorded adult predation at a nest; Fig.3). She had previously raised seven chicks to fledging since 2010. A subadult female remains in the group, and it will be interesting to see whether she becomes the new alpha female in the coming years.



Fig.3. Leopard caught on camera trap preying Lornay female while incubating her eggs.

RESEARCH UPDATE



Carrie completed her write up and submitted her PhD thesis for examination in January 2026.

Her thesis “**Impacts of hot weather on behaviour and reproduction in a long-lived cooperative breeder**” contributes to understanding species vulnerability to climate warming and informs conservation strategies and habitat management in warming savannas.

Key Outcomes:



With reduced shade availability, winter conditions were hotter than summer at matched air temperatures. These hot conditions increased thermal challenges for ground-hornbills. Riparian habitats may provide critical thermal refuge for wildlife during winter in savanna landscapes. In the APNR, riparian habitats are frequently developed for roads, lodging, and recreation, therefore, these areas should be developed sensitively and woody vegetation protected to preserve thermal refuges for wildlife.



Ground-hornbill females have two distinct investment strategies in the two eggs laid in the same clutch. They only raise a single chick but lay two eggs. The size of first-laid eggs (more likely the chick that survives) was not influenced by environmental or social factors (the number of individuals in a group). However, the size of second-laid “insurance” eggs are more sensitive to environmental conditions and decrease in size when laid later in the season.



High temperatures during nestling development have lasting negative impacts on ground-hornbills. High temperatures reduced nestling growth rates. Nestlings that experienced hotter nests and subsequent hot conditions over winter, once they had fledged, were less likely to survive the year. This is worrying for population persistence, since they have very low breeding rates. Thermally buffered nests and the preservation of shade in the landscape are therefore an important conservation strategy.



Hotter nests during incubation were linked to longer telomeres (a measure of cellular physiological condition) in nestlings just before they fledged, but also to faster telomere shortening. Telomeres are protective caps at the ends of chromosomes. They naturally shorten with age, but faster telomere loss early in life can be associated with stress and shorter lifespan in birds. These results suggest that heat exposure experienced early in life may have delayed effects that later reduce survival in ground-hornbills.



Fig.4. Painting by artist Jemima Sargent specially created for Carrie's thesis title page.

NEW RESEARCH



Fig.5. Perch scale installed.

Excitingly, in collaboration with the engineering department at the University of Cape Town, the first ever automatic perch scale was developed to passively record the body mass of ground-hornbills in the wild.

So far, four perch scales have been installed at the nests of different groups (Fig.5). Each scale automatically logs the bird's weight, along with the time and date, when a bird lands on the perch, which is then matched to camera trap footage. Fig.6 shows a world-first: the first-ever passive weighing of a wild ground-hornbill. This will allow us to track the weight of individual birds throughout the year and assess relationships between environmental conditions, breeding attempts, and individual fitness. While it has been successful, challenges remain, particularly in making the scales robust enough to withstand the birds' destructive behaviour. These improvements are planned over the coming months

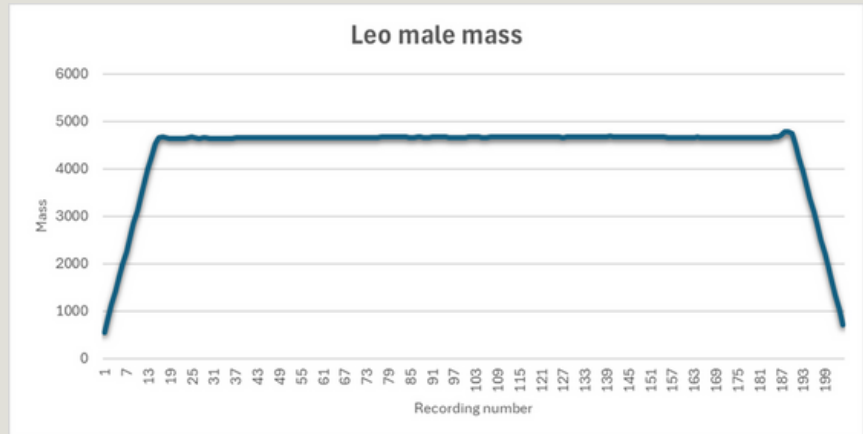


Fig.6. Camera trap footage of an adult male ground-hornbill standing on the perch scale (left). The data collected at the time the camera trap photograph was taken, indicating that this individual's weight was approximately 4.66kg.

Scientific Publications

Published:

- Middleton, K.-M., Hickman, C., Spottiswoode, C.N., Rybak, F. & Covas, R. in press. Hot-dry weather is associated with worse reproductive outcomes regardless of group composition in a long-lived cooperative breeder. *The American Naturalist*.
- Ben Mocha, Y., Middleton, K.-M., Covas, R., et al., 2025. An integrative, peer-reviewed and updatable Cooperative-Breeding Database (Co-Breed). *Journal of Animal Ecology*.

Submitted:

- Hickman, C., Middleton, K.M., Covas, R., Cunningham, S.J. More Heat, Less Shade: rising winter temperatures, animal behaviour and thermal vulnerability under climate change. *Global Change Biology*.

In preparation:

- Middleton, K.-M., Covas, R., Hickman, C., Spottiswoode, C., Rybak, F. Non-breeding benefits of group size in a large cooperative breeder: territorial defence in southern ground-hornbills.
- Middleton, K.-M., Covas, R., Huetz, C., Hickman, C., Spottiswoode, C., Rybak, F. Singing within the group: females produce individually distinct melodies within the chorus of a cooperatively breeding bird.
- Middleton, K.-M., Hickman, C., Rybak, F., Spottiswoode, C., Covas, R. High temperatures and carers' age influence nest attendance in a slow developing cooperative breeder, the southern ground-hornbill *Bucorvus leadbeateri*.
- Hickman, C., Middleton, K.-M., Covas, R., Cunningham, S.J. A long-lived cooperative breeder has dual investment strategies in same-clutch eggs with different survival probabilities.
- Middleton, K.-M., Covas, R., Forbes, R., Hickman, C. Nest shifts, prospecting and group takeovers in the cooperatively breeding southern ground hornbill (*Bucorvus leadbeateri*).
- Meillier, S., Middleton, K.-M., Rybak, F. Provisioning vocalisations of male southern ground-hornbills: advertising their catch.

Hot Birds Research Project Workshop

In September, the ground-hornbill project participated in the biennial Hot Birds Research Group workshop, held at the Royal Malewane Conservation and Research Centre in Thornybush Private Nature Reserve. The Hot Birds Research Project is a collaborative network of researchers focussing on understanding how increasing temperatures affect birds to predict their responses to ongoing climate change.

Carrie and Kyle presented their research findings on ground-hornbills, while Susie Cunningham and Rita Covas (APNR Ground-Hornbill Project coordinators) presented on their broader research topics. The workshop was attended by 25 participants, including students, postdoctoral researchers, and lecturers from the University of Pretoria, the FitzPatrick Institute at the University of Cape Town, Wits University, and Rhodes University, providing an opportunity to share findings and strengthen collaboration across institutions.



Fig.7. Participants at the Hot Birds Workshop in Thornybush. Photo: Marc Freeman

Learn the Birds Webinar

Kyle presented about the projects recent research findings on the impacts of climate change and what he is up to with his post-doctoral research on Learn The Birds webinar with Derek Keats. You can watch this talk on YouTube via this link: [Heat, Habitat and Ground-Hornbills](#)

Heat, Habitat & Ground Hornbills: Tracking Behaviour and Chick Growth in a Warming Landscape



NEW NESTS

Kyle unfortunately broke his leg and required surgery in August, which put many of the nest installations on hold. We did however manage to replace York's nest on Balule in July, with nest donors the Vada family from Norway. We also installed a new nest on Ingwelala (donated by Igwelala members) with the help of Ruan du Preez who stepped in as a fantastic nest installer. Thanks to all who donated nest boxes last year, these will be prioritised this coming year once things have settled from the floods and all nests have been assessed.



Fig.8. Nest installations on York (left) and Ingwelala (right).

HARVESTED CHICKS

During the season, second-hatched chicks from the Yankee Dam (Umbabat), Caroline (Timbavati), and Copenhagen (Klaserie) nests were removed and transferred to the Mabula Ground Hornbill Project's rearing facility at Loskop Dam. These chicks act as an insurance in case the first egg fails to hatch, but because they hatch several days later, they are much smaller than the first-hatched chick. In the wild, adults focus their care on the older chick, and the second-hatched chick starves and dies within a few days. At the Mabula facility, these chicks are hand-reared under the care of Michelle van Stittert and prepared for later release as part of Mabula's reintroduction programme, contributing to the recovery of ground-hornbill populations in areas where they have declined.



Fig.9. Chicks at the rearing facility from the Yankee Dam (left), Caroline (middle), and Copenhagen (right) nests, pictured with an older bird delivering food to the youngster. The mesh allows other captive hornbills to come into close proximity with the chick without the risk of injury, enabling safe social interaction. *Photos: Michelle van Stittert*

SUPPORT US

Funding for ecology and conservation research is becoming increasingly hard to obtain, even as the critical need for these activities increases. This means that every donation to our research and conservation project is enormously welcomed and makes a positive impact on the conservation of the species.



How to donate:

Visit our website: <https://www.apnrgroundhornbillproject.com/> or click on our [PayPal link](#)

Long-term ecological research projects are rare in southern Africa, making the APNR Ground-Hornbill Project particularly valuable. With more than 25 years of continuous data, it provides a record of how a long-lived species responds to environmental change over time, in a continent warming at twice the global average. Research of this kind remains limited in the Global South, particularly in tropical and subtropical systems that support most of the world's biodiversity, highlighting why this work matters.

What we need help with:



STUDENT BURSARY

R220,000 funds one year of a PhD student bursary on the project (PhDs typically take 3-4 years). This support helps maintain the project's research standing and long-term continuity.



CAMERA TRAPS

R6,000 covers the cost of a new camera trap + SD card. These are used to monitor nests and chick activity without disturbing the birds. R200 can pay for a pack of batteries to power camera traps.



TRACKING TECH

R11,500 covers one tracking ring + receiver + data costs (for one year), allowing us to monitor fledgling movements. These are specially designed, GPS-enabled rings.



OPERATIONAL COSTS

R1,800 can pay for a tank of fuel for us to carry out nest checks. We also require funds for vehicle maintenance.



ID and SAMPLING

R800 can pay for one aluminium colour ring to ID an individual. R1,000 covers sampling equipment and laboratory costs to process DNA for one chick.

SUPPORT US

By purchasing one of our exclusive Ground-Hornbill paintings by renowned South African artist **Mark Middleton**, you not only acquire a beautiful piece of artwork, but also contribute directly to our research and conservation efforts. Prints are available in A1 or A3 (watermarked for display)

In addition, we offer Ground-Hornbill caps made especially for our project by **ellie & may**.

If you would like to purchase any of these items or are interested in stocking them at lodges or curio shops, please contact us for more information: info@apnrhornbill.com



ellie & may ground-hornbill project caps



ground-hornbill print by artist Mark Middleton

Lodges - book a talk or contact us about guest experiences

Guests and guides can learn about the innovative research we are conducting, including the use of tracking devices and monitoring techniques, alongside the critical conservation actions such as artificial nest installations and habitat management. These talks add depth and insight from conservation experts to the safari experience, while directly supporting ongoing research and the conservation of this vulnerable species in the APNR.

Contact us: info@apnrhornbill.com



Photo: Royal Malewane

HELP OUR RESEARCH

SUBMIT SIGHTINGS


We have set up WhatsApp groups for members of the APNR (guides, wardens, managers etc.) to log sightings of ground-hornbills.



This is an effective way to gather information on group movements and we encourage anyone who is interested in joining an already established WhatsApp group or would like to set one up for their area to get in touch with us.



Alternatively you can email sightings to: info@apnrhornbill.com or WhatsApp (+27) 72 345 6584 or submit on our website: apnrgroundhornbillproject.com


Info we require:

1. Location details, coordinates/ WhatsApp pin drop
2. Date and time of the sighting.
3. Group details; numbers, ages, sexes.
4. Photos/videos

**Southern Ground-Hornbill ID**
Submit sightings to: (+27) 072 345 6584


ADULT FEMALE: Facial skin red with violet below bill ADULT MALE: Facial skin entirely red


SUB-ADULT: Transitioning - facial skin yellow/red JUVENILE: Pale facial skin


Left: ADULT FEMALE, Middle: ADULT MALE, Right: JUVENILE
Photos: Jannie Nikola, Chad Cocking & Thiago de Paula Oliveira



Map of the APNR with all of the current viable known nesting site locations.

Balule PNR - 6 nests
Klaserie PNR - 11 nests
Thornybush NR - 2 nests
Timbavati PNR - 13 nests
Umbabat PNR - 5 nests

2025 ACKNOWLEDGEMENTS

We thank the APNR for their continued support, funding, and permission to research the ground-hornbill groups on their properties.

Thanks to Wild Wonderful World, John Solomon & Caroline Buckway, Bruce and Judy Neill, The Royal Portfolio Foundation, Hoedspruit Rotary Club, Mesker Park Zoo and Botanic Garden, The Rufford Foundation, The Timothy Hancock Charitable Trust, Marc Solomon, Janovsky family, Tanda Tula Safari Camp, Casey Cole, Frame the Wild, Ingwelala members, Warren Cary Wildlife Gallery, Rodrick Sparks, and Wild in Africa for their generous donations and funding which supports the continuation of this long-term project.

Thanks to Wild Wonderful World, René Vromans, Ingwelala, and the Vada family for nest box donations.

Thanks to Timbavati, Klaserie, N'tsiri, Tanda Tula Safari Camp, Ndlopfu, and Peter Smelting for their ongoing support in fuel donations.

Thanks to JJ's Bones Of The Earth for designing and constructing artificial research nests, and ellie & may for providing branded caps. Thanks to GKEPF for assisting with data collection from the tracking devices.

Thanks to all APNR members and staff who have been of great help, both logistically and by reporting ground-hornbill sightings.



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