FINAL PROJECT REPORT

Community-Led Avi-Tourism for White-necked Picathartes Conservation: Addressing Nest Predation in Ghana

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African Bird Club
Working for birds and conservation in Africa

By

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Acknowledgements

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1 Project summary

The The White-necked Picathartes (Picathartes gymnocephalus) is a globally threatened species endemic to the Upper Guinea Forest. In Ghana, several important nesting colonies occur in forest reserves that also attract birdwatchers, raising questions about nest predation and human disturbance may influence breeding success. With support from the African Bird Club, we carried out a camera-trap study to investigate nest predation dynamics, identify possible predators, evaluate nest success rates, and strengthen community-led tourism practices that support conservation of the species in southern Ghana. The work focused on two forest reserves that are 15km apart and experience similar climatic conditions as well as vegetation in the Ashanti Region. First of which is the Nyamibe Bepo Forest Reserve, a well-known avitourism site, and second, the Nkrabea Forest Reserve, which experiences little or no organised tourism. Seven camera traps were deployed to monitor 18 nests simultaneously in the forest reserves from June to November 2025. Within this period, a total of 14 eggs were laid across the two reserves, with an overall fledging success of 55.6%. Nest predation occurred at night in both reserves, primarily during the second and third weeks after hatching. However, predator identification was limited due to the low nighttime battery performance of the cameras. Similarly, egg loss resulting from multiple individuals trying to use the same nest was recorded in both sites. In addition to ecological monitoring, the project also placed strong emphasis on community engagement and capacity building. Entry meetings and conservation awareness campaigns were held with forest-fringe communities, and a training workshop was organised for local tour guides. The training improved participants' understanding of Picathartes ecology and promoted ethical birdwatching practices, including maintaining appropriate distances from nests and limiting visitor numbers during sensitive breeding periods. Although the camera traps did not appear to affect nesting behaviour, the study documented instances of tourists sheltering beneath nesting rocks during rainfall. This shows

the need for clearer site-level guidelines. Based on these findings, the project recommends improved visitor management, mandatory guiding at nesting sites, seasonal access restrictions, continued community involvement to reduce disturbance and, if possible, the installation of bird-view hideouts (camouflaged shelters or blinds) at selected nesting sites to restrict visitors-birds interactions.

2 Introduction

White-necked Picathartes *Picathartes gymnocephalus* is a globally threatened bird species endemic to the Upper Guinea Forest. Its distribution is confined to the lowland forests of Guinea, Sierra Leone, Liberia, Côte d'Ivoire, and Ghana, with a highly fragmented distribution (BirdLife International, 2018). Predominantly inhabiting rocky forested areas at higher altitudes, these birds are renowned for communal nesting in rock overhangs and caves, hence their alternative name, rockfowl. Due to habitat destruction and dwindling populations, the species is classified as Vulnerable by the IUCN and is fully protected under Schedule 1 of Ghana's Wildlife Resource Management Act, 2023 (Act 115).

In Ghana, populations have been under pressure from forest loss, agricultural expansion, logging, and human disturbance (Afrifa et al., 2025). Although a national action plan (2004) established protective measures around nesting cliffs, recent observations suggest that nest failures and chick mortality remain significant conservation concerns. Reports of nest predation and suspected infanticide further highlight gaps in our understanding of reproductive success and threats. This knowledge, if available, can guide our understanding of factors that affect breeding success and whether assisting breeding by constructing nests or rebuilding destroyed nests could be a way to restore the population of the species.

Additionally, the expansion of community-based tourism around Picathartes nesting sites has introduced new pressures. Many newly recruited local guides lack proper training in ethical birdwatching practices, occasionally allowing tourists too close to nests, leading to disturbance and increased vulnerability of eggs or chicks.

This project was designed to investigate the ecological and anthropogenic drivers of nest failure and also to simultaneously build capacity among local guides to promote sustainable avitourism.

3 Aim and Objectives

This study aims to investigate nest predation dynamics, nest success, and factors contributing to nest failure in the White-necked Picathartes in Ghana and also strengthen local capacity for ethical, community-led avi-tourism.

To achieve this, we:

1. Deploy camera traps at active nest sites to identify predator species and determine the timing and frequency of predation events.
2. Compare nest predation rates between forest reserves with high tourism activity and reserves with minimal tourist presence.
3. Identify strategies for mitigating nest predation and enhancing nesting success.
4. Raise awareness among local communities about the ecological importance and threatened status of Picathartes.
5. Train local tour guides on bird identification, ethical birdwatching, and best practices around nesting colonies.

4 Methods

4.1 Study Area

The study was carried out in the Nyamibe Bepo and Nkrabea Forest Reserve, both in the Ashanti region of Ghana (Fig. 1).

The Nyamibe Bepo Forest Reserve is situated in the New Edubiase area of the Ashanti Region of Ghana. Characterised by a semi-deciduous forest ecosystem, the reserve contains rugged terrain with numerous inselbergs, rock outcrops, and steep slopes, features that provide ideal nesting habitats for the White-necked Picathartes. The forest experiences a bimodal rainfall pattern, with peak rainy seasons occurring from March to July and September to November. This reserve is one of the well-known sites for avitourism in Ghana, attracting both local and international birdwatchers. The presence of established visitor trails and frequent human activity means that nesting colonies in this reserve are more exposed to potential disturbance. Nonetheless, the area supports multiple active Picathartes colonies (Afrifa et al., 2025), with rocky overhangs and cave-like nesting structures distributed across the forest.

The Nkrabea Forest Reserve, on the other hand, lies south-west of New Edubiase and is about 15 km from Nyamibe Bepo. Although the reserve is porous, with illegal chainsaw activities being common, unlike Nyamibe Bepo, Nkrabea is a quieter forest with little or no organised tourism activity, providing a relatively undisturbed baseline for comparison. Both reserves are

characterised by a mix of moist semi-deciduous forest and secondary regrowth resulting from historical logging. Despite this, both reserves retain significant stretches of intact canopy, dense understory vegetation, and an abundance of rocky escarpments suitable for Picathartes nesting.

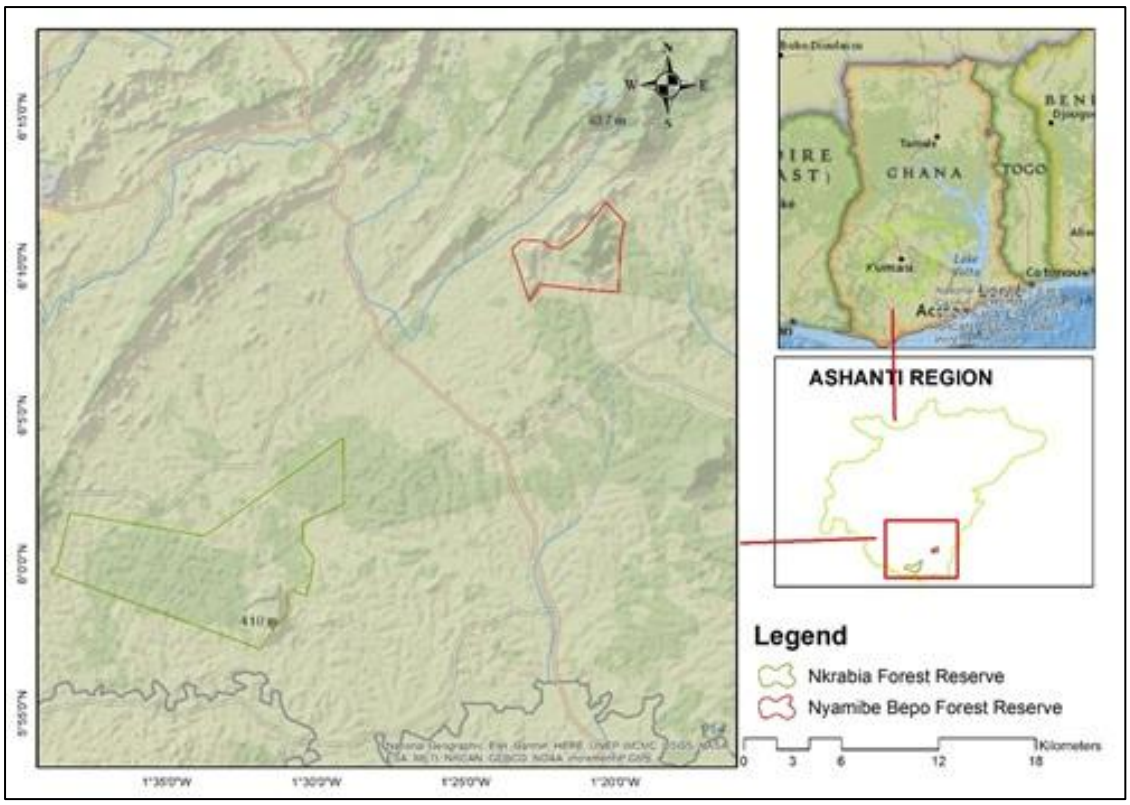

Figure 1. Map showing the locations of the Nyamibe Bepo and Nkrabea Forest Reserves within the Ashanti Region, Ghana, where nesting colonies of the White-necked Picathartes were monitored.

4.2 Community Entry and Engagement

Engagement meetings were held in six forest-fringe communities: Bonkro, Breku, Aslivi, Fumso Ketewa, New Attetem, and Dotom Camp. These activities introduced the project, secured community support for camera installations, and raised awareness on the importance of minimising nest disturbance. Although the initial project design was to work in three forest reserves, the visit to Atetem, a community fringing the Bosomtwe range forest reserve, showed a high level of illegal mining (galamsey) activity at the site, with so much noise coming from the heavy machinery. This noise, although it was not in the forest, was so intense and high that we could not find active nests in this area and also for the security of the team and the devices, we decided not to set camera traps in the area.

4.3 Field Survey and Camera Deployment

We strategically selected three rock faces (with varying numbers of nests) from each of the two forest reserves. The minimum distance between rockfaces was 49 m, while the maximum distance was 509 m. Rockface selection was based on the fact that nests should be showing signs of recent activity during the survey to ensure representation across both reserves.

Solar-powered Solaris Weapon Trail Cameras were mounted 2–4 meters from the nests at angles providing full visibility of each nest cup. Trail cameras were set to record 10-second videos once triggered by motion. Time, date, and temperature stamps were allowed in the camera settings to aid in the analysis of the data from the captured images. Within the Nyamibe Bepo Forest, one rock-face had two cameras monitoring six nests, one camera monitoring three nests and a camera monitoring one nest. While in Nkrabea, one camera was monitoring three nests, and the other two were monitoring two nests each, as shown in Table 1. Since the Solaris Camera has a solar-powered inbuilt extra battery, once mounted in June, the cameras were visited three times (once in August, September and November). The data from the cameras was then downloaded for analysis in November, when there were no signs of breeding activity at each of the sites.

Table 1: The viewshed of cameras monitoring nests at the Nkrabea and Nyamibe Bepo forest reserves in Ghana

Rock face	Camera setup in Nkrabea Forest Reserve	Camera setup in Nyamibe Bepo Forest Reserve
1		
2		
3		
4		

4.4 Data Analysis

We watched all camera trap videos to document nest visitation, predation events, and breeding outcomes. We used a chi-square to test for differences in nest predation and egg loss between the two reserves and graphically represented the results. All analyses were done using R software.

5 Results

5.1 Nest Monitoring Overview

We monitored 18 nests using seven camera traps in two forest reserves, Nkrabea and Nyamibe Bepo, from June 6 to November 14. At the start of the monitoring period, 12 nests were active (five in Nkrabea and nine in Nyamibe Bepo), although this number fluctuated over the course of the season. We did not observe any clear avoidance or aversion behaviour by the birds following camera installation. In all monitored colonies, adults resumed normal nesting activities, including incubation and chick provisioning, shortly after the camera was placed. Based on our observations, camera presence did not appear to negatively affect nesting behaviour. During the monitoring period, we recorded a total of 3,557 10-second videos, with 2,375 videos from Nkrabea and 1,182 videos from Nyamibe Bepo.

5.2 Breeding Success

A total of 14 eggs were laid in the two reserves, with four eggs laid in Nkrabea and 10 eggs laid in Nyamibe Bepo. The number of eggs hatched and chicks fledged varied between the two reserves, as shown in Table 2.

Table 2: Number of eggs laid, eggs hatched, and chicks fledged between Nkrabea forest reserve and Nyamibe Bepo forest reserves.

Forest Reserve	**Nest monitored**	**Eggs Laid**	**Eggs Hatched**	**Chicks Fledged**
Nkrabea	7	4	2	0
Nyamibe bepo	11	10	7	5
Total	18	14	9	5

5.3 Nest Success in the White-necked Rockfowl

In Nyamibe Bepo, out of the total eggs laid, 70% hatched, and 71% of the hatched eggs successfully fledged a chick. Within the Nkrabea forest, 50% of eggs hatched, but none of the chicks fledged due to predation. Overall, only 55.6% of eggs laid in the two reserves successfully fledged chicks (Fig. 2).

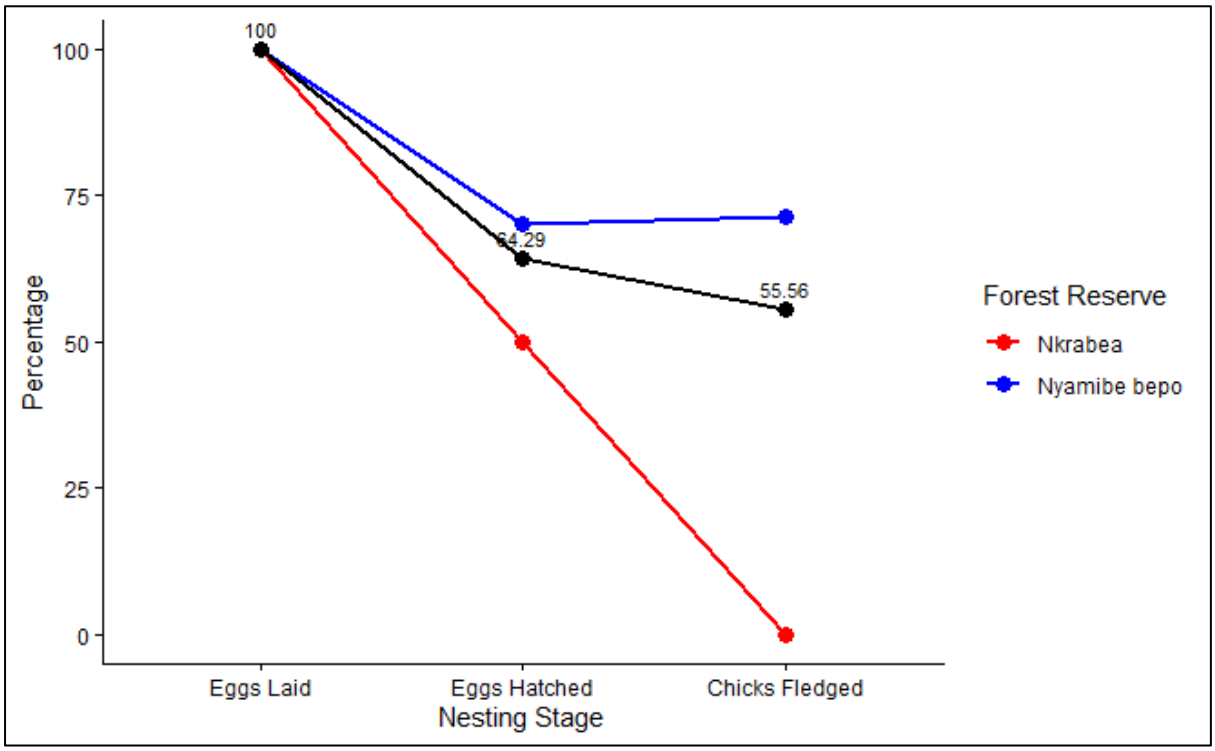

Figure 1: Percentage of White-necked Picathartes eggs laid, eggs hatched, and chicks fledged across nesting colonies in the Nkrabea and Nyamibe Bepo Forest Reserves.

5.4 Timing and Frequency of Nest Predation

We observed nest predation in two nests, one from each reserve. The camera trap footage revealed that the predation events occurred at night, within a 12-hour window between 18:00 and 06:00 hours when the cameras were not active due to low battery power. Nest predation was more frequent during the second and third weeks after hatching. The absence of blood in or around the nest suggests that the predator may have been a non-mammalian species, such as a reptile or bird of prey.

5.5 Causes of Egg Loss

In addition to predation, egg loss during the laying and incubation stages was attributed to intraspecific competition for nests. Out of the 14 eggs laid, five eggs (two in Nkrabea and 3 in Nyamibe Bepo) were broken during the incubation and laying stages. Eggs were displaced from the nest mostly by other individuals trying to secure the nest for themselves, or sometimes,

when parents try to fly out of the nest, their sharp claws get entangled in the inner lining of the nest, which pushes the eggs out of the nest. In one instance, two parents laid three eggs in the same nest and fought over incubation duties, resulting in an egg being dislodged from the nest.

5.6 Variation in Nest Predation and Egg Loss

A chi-square test revealed no significant difference in nest predation and egg loss between the two reserves ($\chi^2 = 0.32$, $p = 0.56$).

6 Discussion

This study investigated nest predation, nest success, and factors contributing to nest failure in the White-necked Picathartes in two forest reserves in Ghana. Although the majority of the data from the camera is yet to be analysed, our results showed that nest predation was a major cause of nest failure, with two nests being preyed upon by an unknown species. The camera trap footage revealed that the predation events occurred at night, suggesting that nocturnal predators may be the main culprits.

6.1 Nest Predation and Predator Identification

The finding that nest predation is a major cause of nest failure is consistent with previous studies in Sierra Leone, which reported a 22% nesting success rate, with predation accounting for the majority of nest failures in the species (Thompson, 1998, 2004). Additionally, despite our interest in this possibility, we did not record any direct evidence of infanticide during the monitoring period. While some nest failures could not be conclusively attributed to predation, particularly at night, this meant that we are unable to confidently distinguish between infanticide and other causes of nest loss. The inability to identify the predators due to the cameras being inactive during the predation events shows the challenges of studying nocturnal predation. Future studies could consider using cameras with longer battery life or alternative methods, such as two cameras with one being active at night and the other being active during the day.

6.2 Timing and Frequency of Nest Predation

The observation that nest predation occurred during the second and third weeks after hatching and at night is inconsistent with previous studies that have shown that tropical nest predation generally occurs during daytime hours (Libsch et al., 2008). It is therefore critical to implement mitigation strategies that target this stage of the breeding cycle.

6.3 Comparison of Predation Frequency and Timing between Forest Reserves

Although our study did not find a significant difference in nest predation and egg loss between the two forest reserves, the sample size was small, and further studies with larger sample sizes are needed to confirm this finding. Nevertheless, the observation that nest predation occurred in both reserves suggests that it is a widespread threat to the species.

6.4 Strategies for Mitigating Nest Predation

Based on our findings, strategies for mitigating nest predation could include reducing human disturbance around nests, especially during the critical stages of breeding, and using nest protection devices such as hideouts for tourists to reduce tourists' direct interference with breeding birds. Additionally, educating local communities about the importance of conservation and involving them in birdwatching activities could help reduce nest disturbance and promote sustainable birdwatching practices.

6.5 Awareness Creation and Training of Local Tour Guides

A training workshop was held for eight local tour guides (Fig. 3), three from communities around Nkrabea and five from communities around Nyamibe Bepo. The training covered species ecology, ethical birdwatching, visitor management, and practical field activities. Pre- and post-training assessments showed significant improvements in participants' knowledge. Also, informal discussions with community members helped reinforce responsible tourism practices and raised awareness among members.

Training session with local tour guides

Practical training session with local tour guides

Figure 3: Training sessions with local Tour guides from forest fringe communities

7 Challenges and limitations

Tourists visiting the colonies, especially those not accompanied by trained guides, sometimes tampered with the cameras out of curiosity, which resulted in repositioned cameras which disrupted monitoring angles and reduced data quality. Other technical challenges included technical malfunctions of the cameras, which included equipment failure due to low sun penetration at the forest floor, leading to quick battery drainage and also sensor or lens fogging due to the humidity.

8 Conclusions

This project provides insights into the breeding biology and nest predation dynamics of the White-necked Picathartes in Ghana. Further research is needed to identify the main predators and develop effective strategies for mitigating nest predation. By working with local communities and promoting sustainable birdwatching practices, we can help conserve this species and its habitat.

This project successfully achieved all its stated objectives and provides the most detailed assessment to date of nest predation, breeding outcomes, and human disturbance affecting the White-necked Picathartes (Picathartes gymnocephalus) in southern Ghana. Through the deployment of camera traps across nesting colonies in both tourism-active and relatively undisturbed forest reserves, the study has generated valuable ecological data that clarify the role of predation and disturbance in shaping reproductive success in the species.

Nest predation and egg loss were found to be the principal causes of breeding failure across study sites, with evidence pointing to a combination of non-mammalian and reptilian predators. Although direct observation of all predation events was limited by technical and logistical constraints, the patterns documented strongly suggest that disturbance, particularly at tourism-

active sites, may increase nest vulnerability. These findings show the need for carefully managed avi-tourism practices at Picathartes nesting sites.

Equally important were the project's capacity-building and community engagement outcomes. The successful training of local tour guides, coupled with sustained community sensitisation, represents a significant step toward reducing human disturbance at nesting colonies. Improved guide knowledge and behaviour are expected to have lasting conservation benefits beyond the project period, especially at sites where tourism pressure is likely to continue or increase.

Overall, this project has strengthened the scientific basis for Picathartes conservation in Ghana while directly contributing to improved site-level management and local stewardship. The findings will be used to inform and guide future monitoring efforts, guide the development of site-specific tourism guidelines, and support updates to national and regional conservation strategies for this globally Vulnerable species. Continued investment in long-term monitoring and community-led conservation will be essential to ensure the sustained protection of White-necked Picathartes populations and their forest habitats.

9 Recommendations

Based on these findings, the project recommends improved visitor management, mandatory guiding at nesting sites, seasonal access restrictions, continued community involvement to reduce disturbance and, if possible, the installation of bird-view hideouts (camouflaged shelters or blinds) at selected nesting sites to restrict visitors-birds interactions.

10 References

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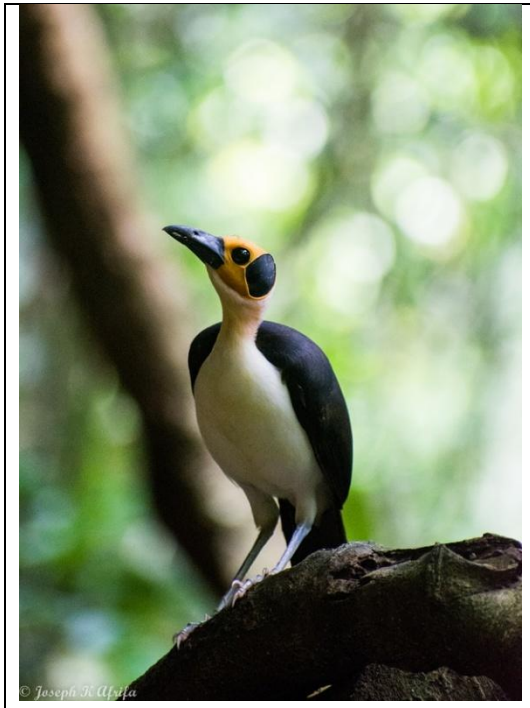
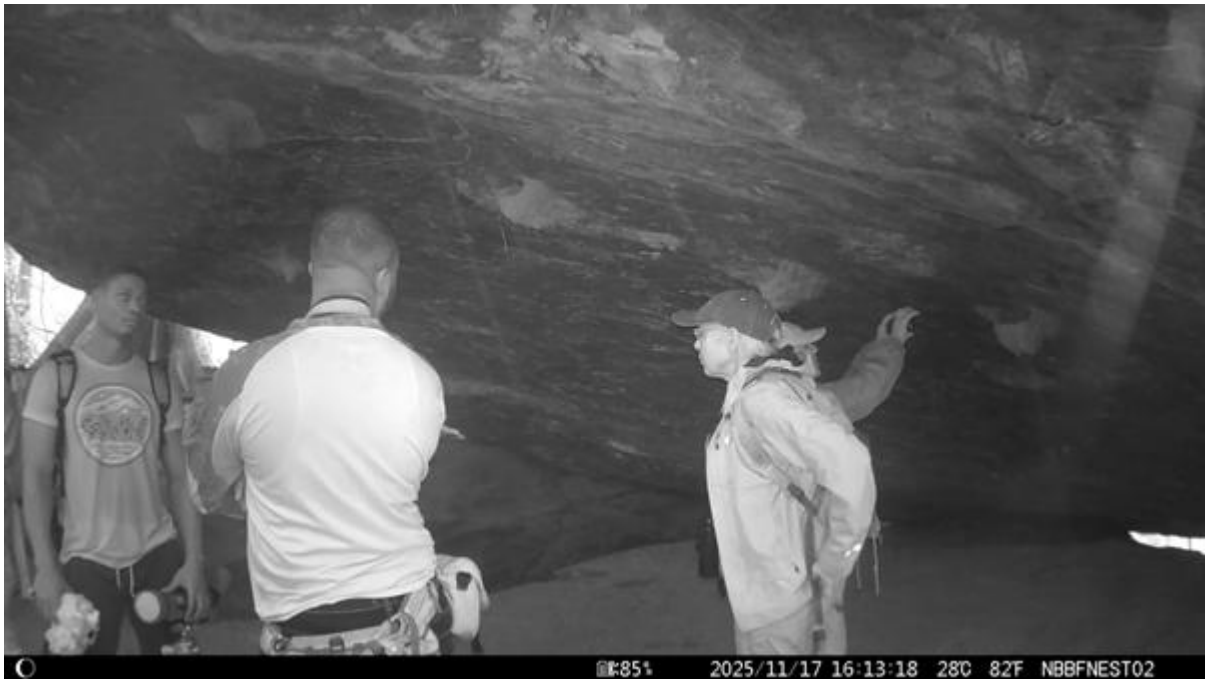
Photo Gallery



Photos of the Rockfowl taken during fieldwork



Camera trap image capturing tourists seeking shelter under an active White-necked Picathartes nesting rock during rainfall at the Nyamibe Bepo Forest Reserve, which highlights potential disturbance at nesting sites.

A camera trap image of two White-necked Picathartes bringing a prey item to chicks.

Eggs of White-necked Rockfowl

Chicks of White-necked Rockfowl

Two Fledglings with an adult White-necked Rockfowl