

Southern African Tree Nesting Vulture Survey Protocol



By Kerri Wolter, Margaret Hirschauer, Caroline Grace Hannweg, Ryno Kemp



Introduction

The crisis facing African vultures is severe and some populations have declined by over 80% in the last three decades. This collapse is fueled by escalating threats, including widespread poisoning, fatal collisions with energy infrastructure, and poaching driven by traditional practices.

Vultures are vital keystone scavengers and provide an indispensable service by quickly removing carrion, which neutralizes pathogens and prevents the spread of disease. However, their naturally slow reproductive rate makes them critically vulnerable to any disturbance, hindering their ability to recover from these high mortality rates.

To implement effective conservation strategies, efforts must be driven by robust, long-term data. Recognizing this need, Vulpro has been committed since 2010 to actively monitoring breeding activity, identifying population hotspots, and analyzing threats across southern Africa to supply the essential data for targeted, high-impact interventions.

Vulpro initiated tree nesting vulture surveys throughout southern Africa in 2013. Throughout the years we have refined our process to achieve the highest level of accuracy and productivity whilst out in the field. It is of utmost importance that step by step protocols are followed to make sure results are comparable between observers and sites so that trends can be monitored and analyzed yearly. What follows is the protocol refined by Vulpro over the years of undertaking vulture tree nesting surveys. Vulpro still follows this practice to date.

This protocol uses walking surveys, vehicle based surveys and drone surveys.

Walking surveys are preferred as aerial surveys (including drones) can cause serious disturbance to breeding vultures and their nestlings if not done correctly and sensitively.

From our experience, walking surveys are preferable when compared to road transects where the survey can bias the study towards road accessible areas only. Furthermore, non-walking surveys, for example from a vehicle or a drone, make it very difficult to view hidden nests within the tree canopy and tree forks (hooded vulture nests, for example). Therefore, walking surveys are recommended as they maximize the accuracy of each site's survey results, but this is of course only possible in reasonably sized land.

Some road and drone surveys must be conducted if an area is too large or terrain too rough to navigate on foot. Other factors such as high temperatures and dangerous wildlife may also create a need for drone or vehicle based surveys.

All surveys should be done with a minimum of two individuals and never alone for the safety of field workers. Surveys can be dangerous with regards to other wildlife and the remoteness of certain field sites. It is thus important to always have at least one extra person in the field in case of emergencies.

In game reserves, we recommend having a tracker and/or guard accompany field workers in 'Big 5' territory. The terrain and climate at these field sites can be extreme; one should enter the field prepared with the correct equipment and mindset.

Equipment needed

- Handheld GPS device specific to the site
- Spare batteries for the handheld GPS device
- Good binoculars
- Rangefinder
- Camera
- Spare batteries for camera
- Clipboard, data sheets and pens
- Bags for collecting egg shell fragments or carcass remains
- Cell phone for communication
- Phone charger or portable phone charger for extended battery life
- Backpack for carrying equipment
- Water and backup water as field sites are located in areas where temperatures regularly reach 40 degree Celsius
- Snacks and food to eat on the go, including fruit, energy bars, and a source of protein (biltong, nuts, etc.) for sustained energy
- Comfortable walking clothes and shoes
- Hat and sun cream
- Small drone equipped with camera
- Spare charged drone batteries
- Please ensure cars fuel is topped up



Figure 1: An African White-backed Vulture nest with a chick in Botswana, 2020

Methodology

Vulture breeding sites are found by engaging with landowners where vultures roost, feed or have been seen breeding. Once you are aware of one or several nests in the area, assess the land before going out into the field to create a survey route that will allow you to visually cover the entire area. Use a map or virtual map software to assess topography and property ownership boundaries.

Surveys are walked, often along river courses, along the river beds and banks of rivers, to document all nests. Not every vulture chooses to breed along rivers and thus, there could be clusters of nests more “in-land” and these regions also need to be explored. Each field site will differ with regards to starting and ending points of walking transects, but one should try to follow the same route each survey and each year to avoid missing nests and duplicating regions or nests.

Every nest that is found, either through the landowner’s knowledge or through a walking survey, must be logged on a handheld GPS device. As more surveys are conducted, more nests will be discovered at various times of the year and across years. New nests should be recorded and each should be given an individualized identification number.

Record each nest’s GPS location directly underneath the nest along with the variables discussed below.

You may find two nests in one tree and this needs to be documented with both nests given their own GPS co-ordinates and an explanation. For example, ‘Nest N02 is located in the same tree, 2 m below nest N03’.

Survey date and survey number must also be recorded. From our experience, it is easier to have one device per survey site to avoid potential issues or faults recording nests. As the land use of survey sites vary greatly, from protected nature reserves and game farms to private lands, hunting farms, piggeries and mining, all survey site variables need to be recorded and taken into consideration. Including land use and whether the area is protected or non-protected to each data sheet.

Annual tree nesting surveys are conducted three times a year, specifically in 1) May, 2) July/August, and 3) September/October. If three surveys are not possible, we recommend undertaking the first survey slightly later i.e June, followed by the third survey in September/October. If possible, keep survey dates for each field site consistent across years.

The following should be recorded at each nest site:

- 1) tree species;
- 2) height of the tree and height of the nest within the tree using the rangefinder
- 3) accessibility of the nest (is the tree climbable to process the fledgling?)
- 4) vegetation type in the area
- 5) species of vulture or occupant
- 6) activity of the nest and/or parents.

The first survey is conducted during the early breeding season and documents the number of breeding pairs. A nest is considered an occupied territory with an active breeding pair only when an adult is found tenanted at the nest, preferably with its mate, the pair is seen copulating, the pair or individual bird is seen working i.e building and refurbishing its nest or an adult is seen incubating.

Codes for activities are summarized in Table 1. It is also important to note inactive nests, as many nests that have been active in previous years may become inactive.

These codes and behaviours are the same as those used in our cliff nesting vulture breeding surveys.

Table 1: Standardised coding for tree nesting vulture activities at nest sites

Code	Meaning
IN	In Nest. Adult at the nest.
VNN	Vulture Near Nest. Adult vulture near nest but not inside it
NNIT	No Nest In Tree. No nest in the tree at specified location.
ON	Old Nest. Old nest in tree but no longer in use.
DT	Dead Tree. Nest in a dead tree.
FT	Fallen tree. The tree no longer present where the tree nest once stood.
D	Drone. The nest was observed using a drone.
R	Road. The nest was observed from a vehicle.
F	Foot. The nest was observed from foot.
-	Nest not monitored due to restricted access
?	Nest not monitored due to incorrect information, e.g. GPS coordinates
L	Nest Lost.
I	Incubating. Vultures are seen incubating an egg.
T	Tenanted. Vultures actively build or work on nests.
B	Brooding. Brooding behaviour is observed.
C	Chick. A chick is seen in the nest.
F	Fledgeling. A fledgeling is seen in the nest.

The same survey transect and observation process should be conducted for the second and third surveys.

The second survey records the number of nestlings that have survived so far, documenting mid-season breeding success.

The third survey records the number of fledglings or larger chicks that have survived, documenting final or annual breeding success.

Nests and nest sites that are not active but which have been previously active, should still be monitored and noted during each survey despite their inactivity. Vultures, either the original pair or a new pair, may occupy the nesting site and refurbish the nest again for breeding. If a tree with a nest has been destroyed for whatever reason, this too needs to be recorded and the surrounding area still needs to be monitored repeatedly in case the birds return to a neighbouring tree.

A note should be made if another species is occupying a nest, such as an owl or goose.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Tree nesting monitoring				Year: 2025		Gate coordinates:									
2																
3																
4	Region:				Survey 1 date:				INSTRUCTIONS – READ ME (please follow alphabetical order):							
5	Farm:				Surveyors:				Observed from:		Tree condition:		Notes:			
6	Land use:								D – Drone		DT – Dead tree		IN – In nest ON - Old nest			
7	Manager:				Survey 2 date:				F – On foot		FT – Fallen tree		NNIT – No nest in tree			
8	Cell:				Surveyors:				R – Road (from car)				VNN – Vulture near nest			
9																
10	GPS No.	Latitude	Longitude	Species	Tree species	Tree cond.?	Surv.1	Surv.2	Exact pin?	Area description	Notes_old	Obs_old	Notes_S1	Obs_1	Notes_S2	Obs_2
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																
21																
22																
23																
24																
25																
26																
27																
28																
29																

Figure 6: Example of Vulpro data recording template for tree nesting vulture monitoring.

An important note for these surveys is to remember that human disturbance will sometimes flush adult birds and fledglings. Therefore, one should anticipate coming up to the nests and take care to watch from a distance and observe the birds' behaviours. If no breeding activity is noted, one should approach and check the ground under the tree and nest to document the presence of faeces, egg-shell fragments or dead chicks on the ground to confirm failed breeding attempts.

Some trees are too tall to confirm breeding. In these cases you may send a drone up and can also listen for signs of chick activity under the tree during the second and third survey.

Figure 6: Vulpro Surveyor Juliana Pinto operating drone for tree-nesting monitoring of White-backed vultures in Dwaalboom, 2024

Drone Surveys

Equipment Management & Data:

It is important to make the necessary preparations and ensure the drone is ready for flight and data can be recorded.

- **Battery Management:** Always ensure batteries are charged before and during surveying. With a short flight time (10-15 minutes), a rotational charging system for the three batteries is crucial.
- **Data Storage:** Both the drone and the controller must have their respective SD cards installed to take photos or videos.
- **Maintenance:** Keep the drone clean after every use. Landing should happen on flat, dust-free ground to protect the drone's hardware from damage.

Pre-Flight Safety & Checks

It is essential to prioritise ensuring a safe and legal flight environment.

- **Environmental Checks:** Check the weather, avoid heavy winds that can cause loss of control/signal and rain that can cause water damage to the drone. Always check for obstacles and ensure the flight area is safe. Lastly, it is important to check the surroundings for potential threats like crows or other attacking birds.
- **Legal & Access:** Always get permission from farmers before flying on their land.
- **Visibility:** Always ensure the drone is visible during flight. Do not fly in low visibility conditions.

Wildlife Monitoring Protocol

These critical rules to ensure the well-being of the birds and to minimize disturbance must be strictly maintained at all times when conducting drone surveys.

- **Altitude:** The minimum flight distance above a nest must be 1 to 2 metres, adjusted based on chick visibility.
- **Disturbance Prevention:** Do not fly too close to a nest to prevent excessive disturbance to the chick, egg, or parents. Check that no birds are next to the nest *before* flying, as disturbing parents can endanger the nest contents.
- **Takeoff Procedure:** Do not take off next to the nest. The drone must reach an altitude of 1–2 metres *above the nest* after takeoff before approaching the nest.

Operational Flight Limits

Remember to address managing the physical range of the drone.

- **Range Limit:** While the drone can fly 600–700 metres, be cautious.
- **Signal Management:** Always be prepared to fly back immediately if you see a signal loss warning on the screen to prevent the drone from falling. It is better to be overly cautious than to risk signal loss over a nest site.

Surveys should be thorough, but take care to not spend more than 15 minutes in the region of a nesting tree, to avoid causing lasting disturbance to the breeding pair.

For any further information or additional explanations, please contact: Kerri Wolter
E-mail: kerri@vulpro.com