

Animal numbers for Kruger National Park and background on animal counts

Why count animals?

Certain parameters can be estimated from aerial census and other counts. These include:

- Population estimates – the corrected numbers after counts
- Population demography – age and sex structure (of rhino populations and also rare antelope)
- Population trends - identify species that are declining in numbers
- Population density - by combining the number of animals observed during counts with information about the size of the area surveyed, Kruger management can estimate the population density of mammals in an area.

These are used for:

- GIS spatial analysis to model habitat use
- Which informs game offtakes, dehorning requirements, and reintroductions.
- Provide information towards drafting of species management plans e.g., elephant and rhinos
- Assess habitat quality - the distribution of mammals across a landscape can provide valuable information about the quality of their habitat. For example, if a species is found only in a small area, it may indicate that the remaining habitat is fragmented, degraded or not suited.

The counting of animals requires a lot of work, but it is an important tool for aiding decision making in wildlife conservation and management.



South African
NATIONAL PARKS

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Services

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Accounting for census bias and error

Biases

1. Detectability bias - animals further away are more difficult to see



2. Availability bias - animal under tree is hard to see (up to 30% in Kruger, higher when more vegetation cover)

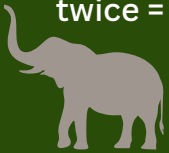


3. Observer bias - animal missed in the open (about 4% in Kruger)



Sampling error

1. Animal counted and then runs in the direction of where counting will still take place will be counted twice = higher numbers than actual



2. Animal running away from where counting will take place may be missed = lower numbers than actual



Precision and detecting change

Precision is represented by a range of numbers with a 95% chance that the 'actual' number is within the range; the narrower the range, the more precise



Hard to detect change when high uncertainty because of high bias and sampling errors - we think we have 100 animals, with a wide spread of 80-120, the previous year the estimated number was 120 (100-140): Is this decrease the result of error?

Year 1
Year 2



Less precise



Easier to detect change when bias and sampling errors low, e.g., we think we have 100 animals, with a narrow spread of 95-105, the previous year the estimated number was 120 (115-125): Certainly seems more probable that decrease is real

Year 1
Year 2



More precise

When counting from the air:

Crocodile and hippos



Rare antelope



Plains game



Elephant and buffalo



Rhinoceros



Correct for:

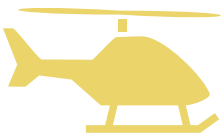
No correction, total count

No correction, minimum number alive

Detection bias and sampling error

Sampling error

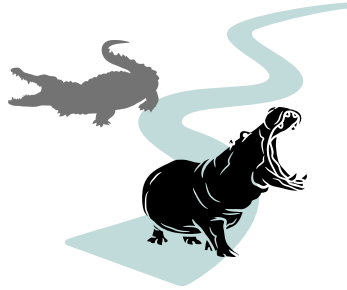
All three biases and sampling error



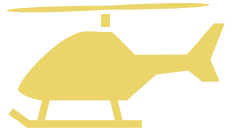
Helicopter census

1. Count crocodile and hippos (yearly)

Includes all perennial rivers as well as relevant man-made dams

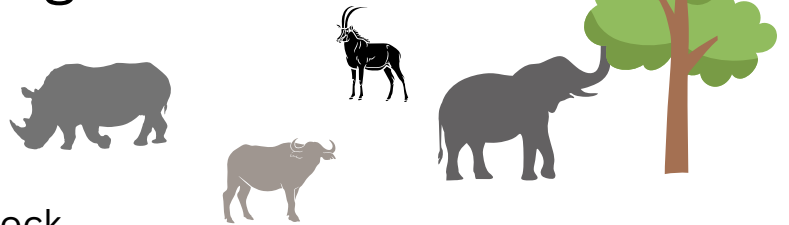


Fly along river, speed of 50 knots, altitude 100m. Record: crocodiles in four size classes: <1m (small) to >4m (very large), all hippopotamus, water birds such as fish eagle, saddle-billed stork and Goliath heron.



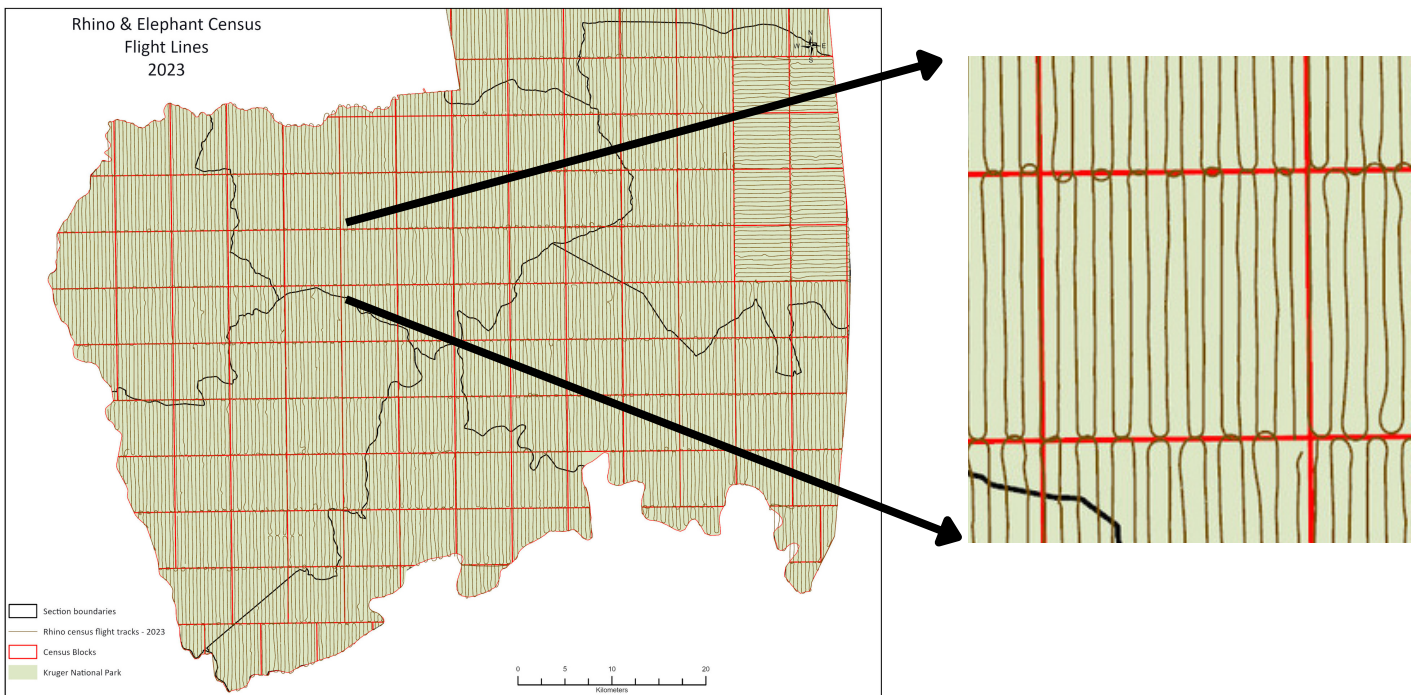
2. Count rhinos, elephants, buffalo and rare antelope (yearly if budget allows)

Two helicopters are used to complete the census.



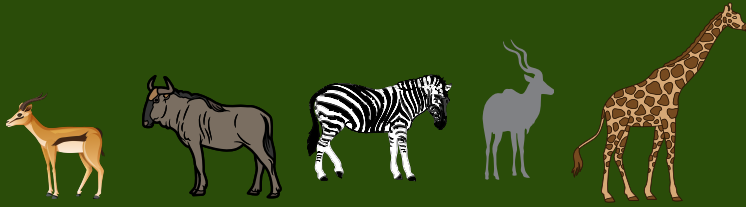
Blocks are 6km x 6km. Within each block, transects are 400m apart with a 200m observation strip on each side of the helicopter. The survey team consists of a pilot, a data recorder and two observers.

Helicopter circles back to allow aging and sexing of rhino where possible and better counting of elephant breeding herds.



Blocks cover the entire southern half of the park, sample blocks are used north of the Olifants River and counts are then adjusted to the total area.

Fixed-wing census



The census includes impala, kudu, giraffe, warthog, waterbuck, wildebeest, zebra.

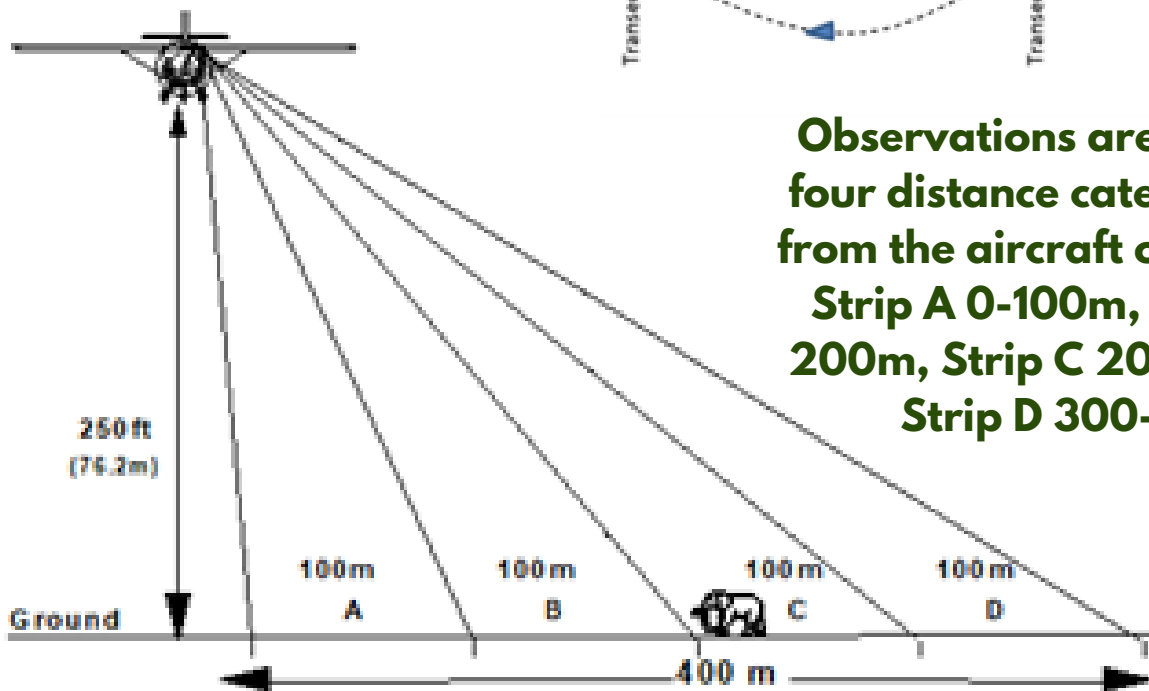
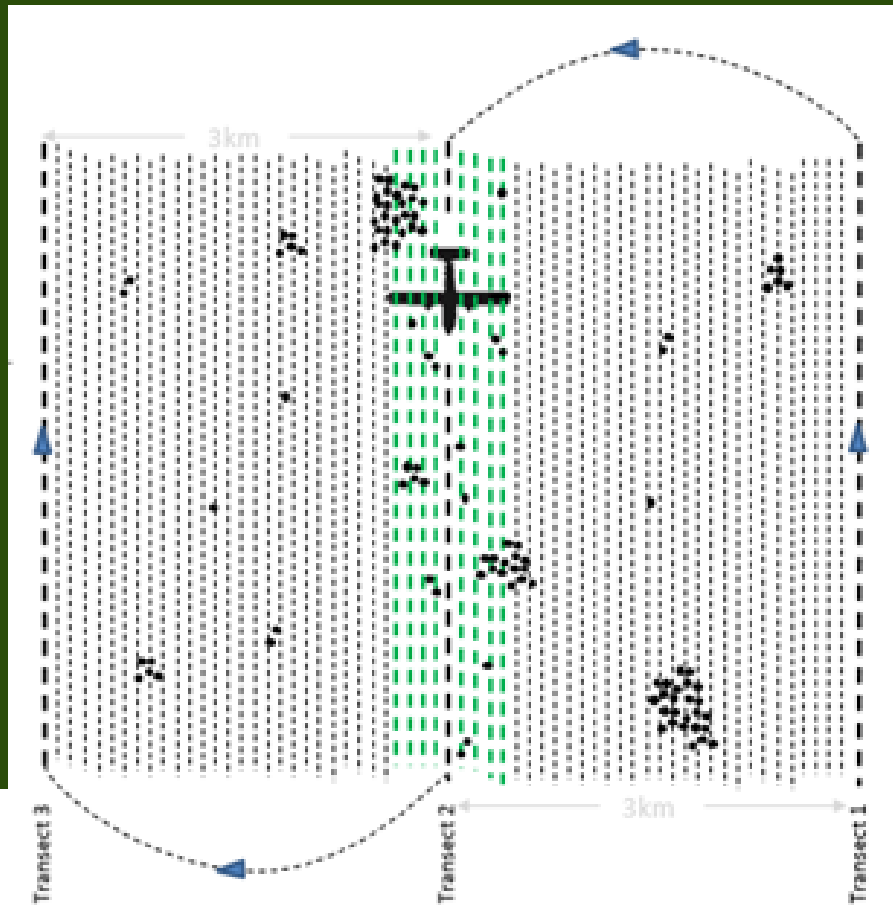
Initiated in the early 1970s.

Transects every **3.0 km** (north of Olifants River) and every **3.75 km** (south of Olifants River)

About every 2 years but depends on funding

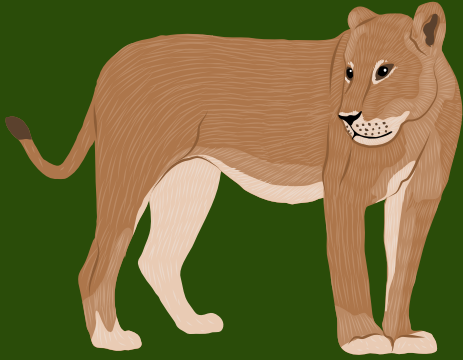
109 east-west transects cover **27%** of total area

The aircraft with 6 observers flies at a height of **250 ft** above ground level and airspeed of **90-100** knots.

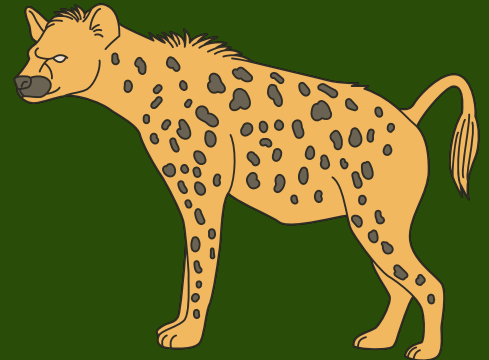


Observations are recorded in four distance categories away from the aircraft on either side:
Strip A 0-100m, Strip B 100-200m, Strip C 200-300m and Strip D 300-400m.

Call-up method



Lions and hyenas
(about every 5
years or as
needed)

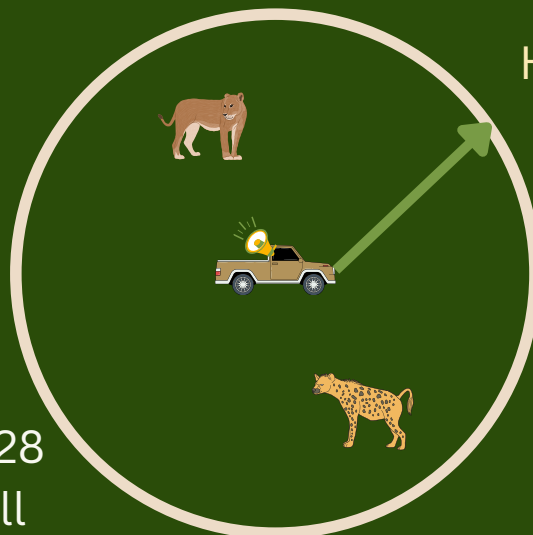


Calls of buffalo calf in distress
played from speaker at night at up to
232 sites across Kruger

Lions within **4.5 km** will
respond

If there are cubs, only 0.28
probability that pride will
respond. With no cubs, 0.78
chance that pride will
respond

If pride shows up, **95%** of
pride members will be
included



Hyenas within
2.1 km will
respond

68% of hyenas will respond

Park is divided into **6**
regions based on prey
biomass

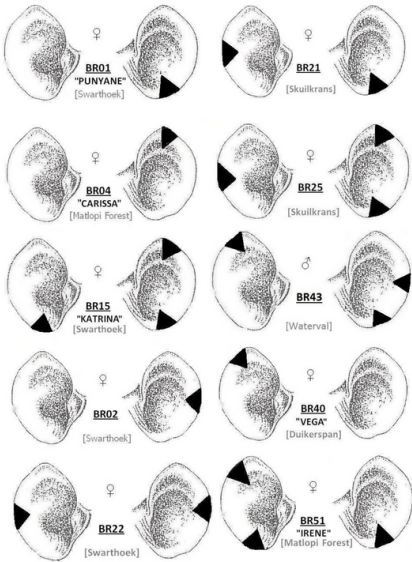


Numbers are corrected for
the area in the 6 regions and
summed for entire park

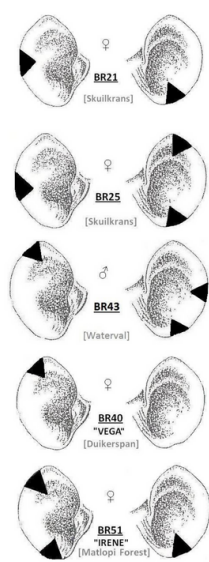
Mark-recapture method

Mark-recapture method

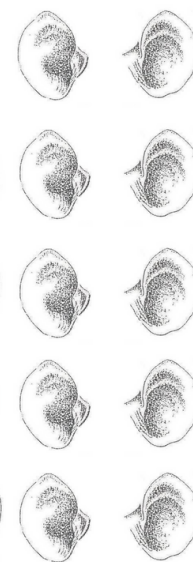
We know there are 10 notched ("known") individuals



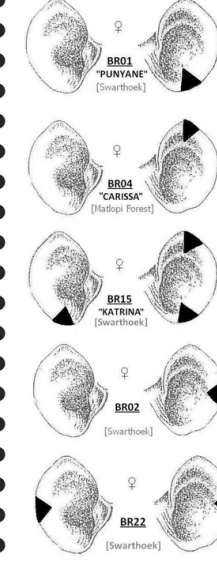
At **census** we see 5



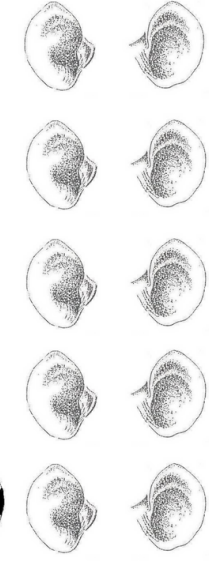
And 5 without notches



We know that there are another 5 with notches



So we probably missed 5 without notches = 20 rhinos total



Cheetah and wild dog (every 5 years): citizen science project where the public takes photos, ID using coat patterns



Leopard: camera trap photos, ID using coat patterns



Black rhino: census photos, ID using ear notches