Factsheet #7 (four-page version)

Ungulate movements across the red-line: A case study

Details on causes and consequences of springbok, kudu and eland moving across the VCF

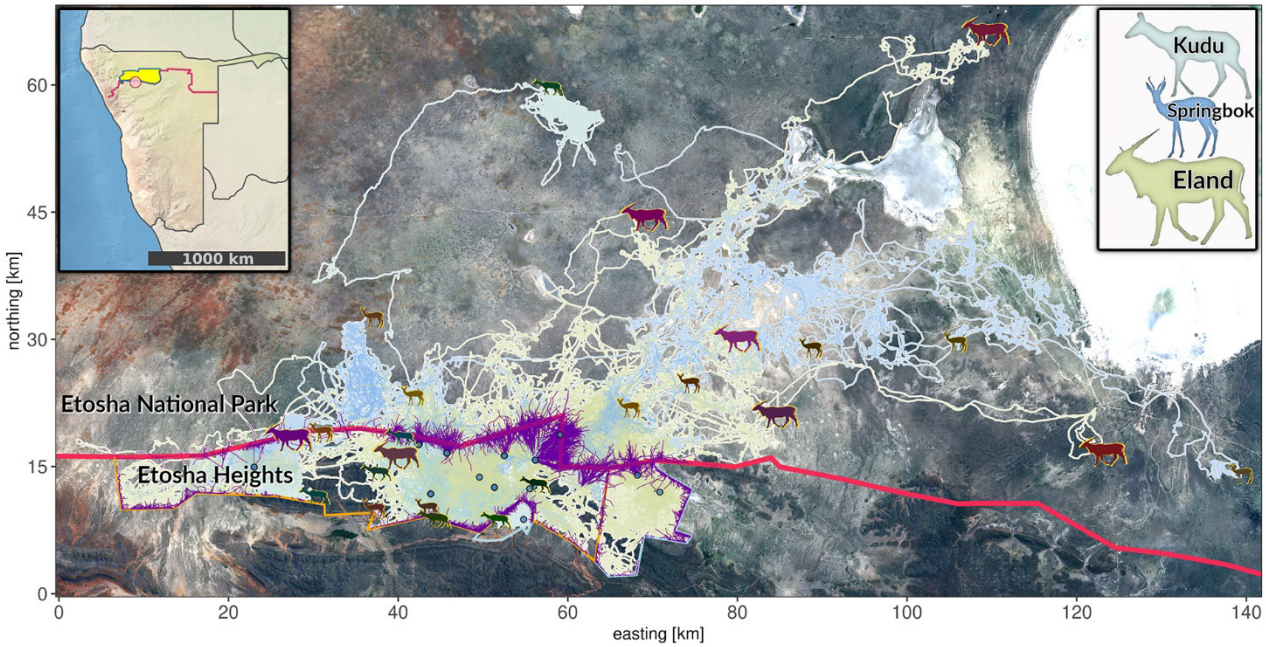
Background

For the ORYCS project, over 30 groups of antelopes were equipped with GPS-collars at a private wildlife reserve. The reserve is separated from Etosha National Park by Namibias Veterinary Cordon Fence (VCF, the Red Line). The collars recorded positions every 5 to 15 minutes which permitted the recording and analysis of exact animal movements. During the 3 year study the VCF was frequently broken by elephant. These openings in the fence provided the opportunity for many of the collared animals and their herds to cross the VCF in both directions. The long study period and precision of movement tracks resulted in accurate information on; when the animals crossed the fence line, how the fence-crossing affected the animal's movement and what was gained from the increased movement range.

Key findings

More than 3,500 fence encounters, with over 2,500 km of tracks along fence lines, were recorded in 2.5 years. The main time for crossing the VCF was the late dry/early wet season when woody species started to flower and produce leaves. Antelope increased their movement speed and energy expenditure along the fence lines. Having crossed the fence antelope fed on up to 40 % greener vegetation (compared to the average found in their movement range).

Every xth day at a fence	3rd	3rd	2nd
Speed increase at fence	30 %	60 %	50 %

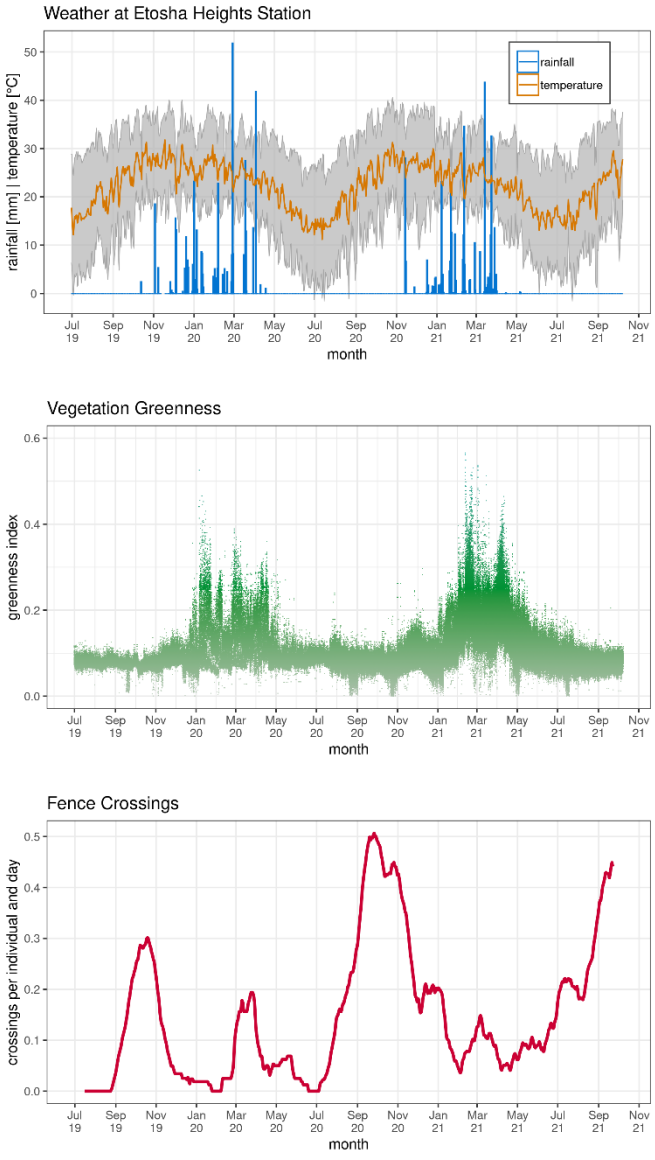


Above: Movement tracks (2019–22) shown in light colors and tracks of fence encounters shown in purple. The Veterinary Cordon Fence is shown by the bold red line. Electrified fence lines shown in orange and game-proof fences in light blue. Blue points show favorite water holes. Position of individuals (kudu, springbok, eland) at locations furthest from the preferred waterhole of each anima.

Cover photo: Robert Hering

Fence crossing season

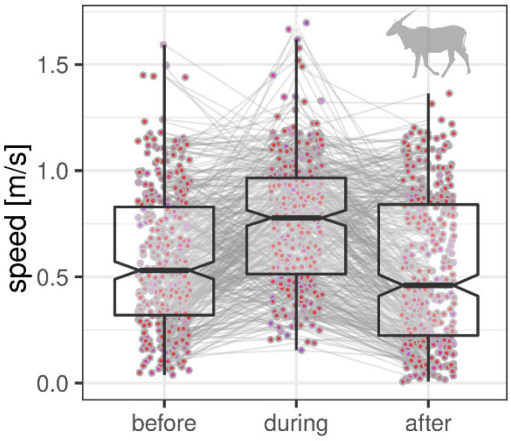
During the peak fence-crossing season in October and November, antelopes fed on the newly in-flower patches of gabbabos *(Catophractes alexandri)* and slapdoring *(Vachellia [Acacia] nebrownii)* within Etosha National Park. However antelope had to regularly return to drink at the waterholes on Etosha Heights, resulting in the numerous recorded VCF crossings.



The graphs illustrate the dynamics during the study period. First rainfall events occurred in November (graph on top) and peaked around January. Vegetation greenness followed that pattern with a slight delay (graph in middle). Notably, fence crossing per observed animal reached peak before the first rainfalls were detected. During this time only very slight increases in vegetation greenness could be detected. This is because the first flush of leaves and flowers of woody plants produce only a slight signal for the satellites recording these dynamics. Nevertheless, the herds moved across the VCF to feed on patches of this first fresh food.

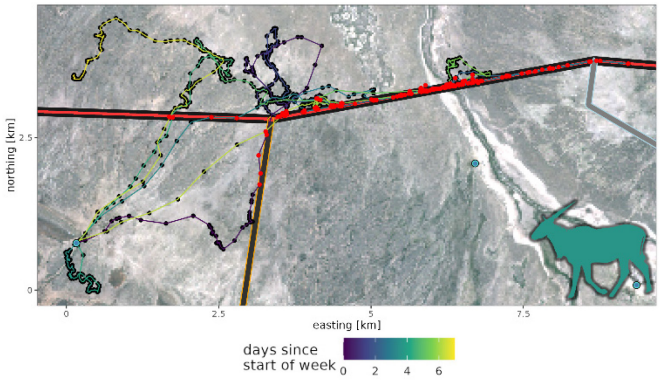
Changes in movement

Looking at the way in which antelope move along or across a fence line reveals that there are differences between the individual species. Eland and springbok often walked directly to a fence opening and crossed the fence without first walking along a fence line, whereas most kudu appeared to travel some distance along the fence before they crossed. On closer examination, however, it could be seen that eland and springbok learned where a specific gap was and tended to walk directly to the gap. This demonstrates that eland and springbok are able to include known gaps into their daily routine.



Comparing movement speeds before, during, and after the animals encountered a fence demonstrated that they move faster at the fence itself. However, once crossed the fence their movement speed slowed to a speed less than one before even encountering the fence. On occasion an antelope would rest at the fence itself. Resting events on the fence line were notably shorter than resting events away from the fence line.

Overall the analysis demonstrates that encountering a fence changes the movement behavior of the antelopes. Since this occurs frequently, fences within home ranges likely reduce energy budgets of the antelopes.



Example tracks of an eland during one week. The eland spend 17 % of time and 37 % of the moved distance only at fences. Colored tracks show day of the week (see legend).

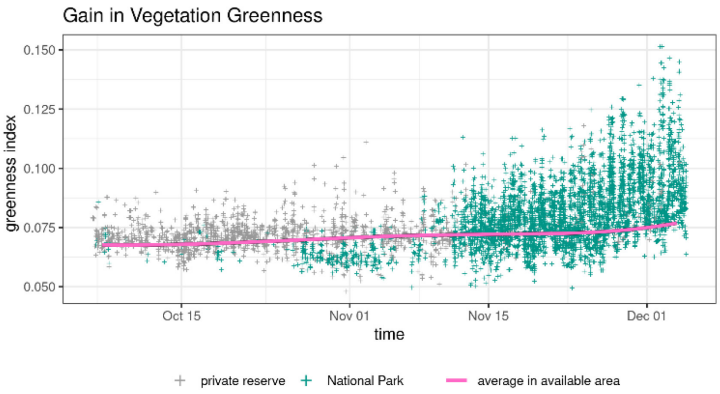
Photos: Robert Hering

Advantage of access to a large area

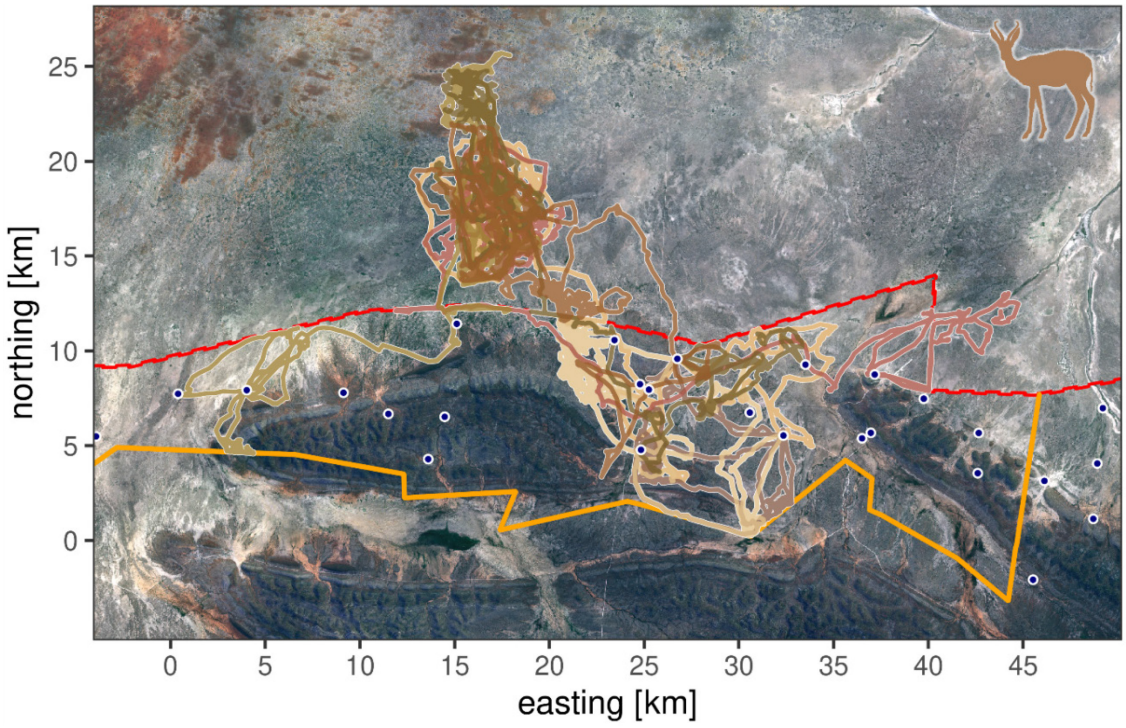
Many of the collared antelopes used patches beyond the VCF during the green season. Analysis of satellite data of these patches showed that the vegetation was of better quality there. While springbok often arrived early on the patches and fed on the rather freshly grown plants, eland arrived a bit later and rather fed on the higher amounts of plants. By travelling from patch to patch some animals were able to extend their “green season” by starting at patches of early green-up and ending at patches of late dry-out.

These findings demonstrate that the antelopes perform best in terms of feeding if they have access to very large areas. Since rainfall in the study area is not evenly distributed, nor is the resultant vegetation greening (especially of grasses and forbs). Having the ability to reach green patches on time can prove crucial for antelopes to survive.

The so-called “resource-tracking” is common in hoofed mammals around the globe. Notably, Namibian antelopes live in a less predictable environment, resulting in migratory movements which largely vary in space and time. For instance, during the drought of 2019 all of the collared springbok groups moved to one patch where a local rainfall led to an early and high green-up. However, the next years they did not go there again. Without the openings in the VCF they would not have been able to benefit from this special green-up on that patch.



Vegetation greenness at locations where springbok went to (05. Oct – 05. Dec 2019). Pink line shows the average greenness within the whole area which was available to the springboks. Grey crosses show greenness at locations within the private reserve. Green crosses show greenness at locations within the National Park. Note that greenness on the patch in the National Park was mainly higher than the average.



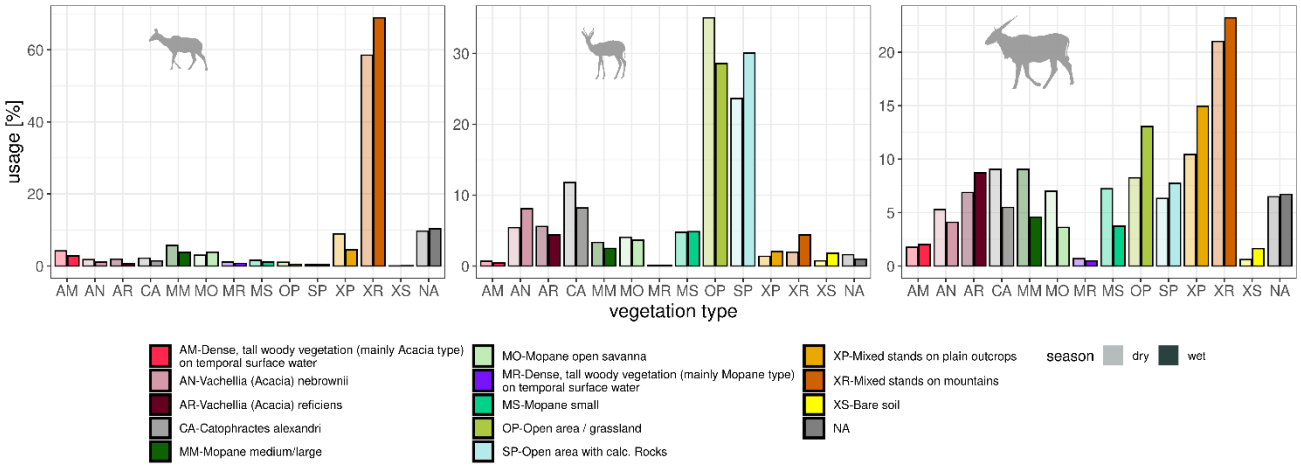
Movement tracks of the seven springbok groups (Nov 2019) in different shades of brown. Blue points show water holes. Red line shows the VCF. Orange line shows electrified fence. Note that all groups gathered together at one patch of a local green-up in the National Park.

Photos: Robert Hering

Use of vegetation

The movement data showed that female kudu are mainly resident and prefer mixed woody vegetation. Springbok were resident or migratory and preferred open patches with grass or small shrubs.

Eland were very mobile and preferred mixed woody vegetation, open grass patches, and patches with small shrubs. Especially springbok and eland needed to cross the VCF to find their preferred vegetation.



Vegetation use of the three collared species (kudu, springbok, eland). Colors show vegetation type (see legend). Shade shows the season (darker – wet season, brighter – dry season). NA means “not available” which occurs on areas not mapped for the study.

References

Hering, R., Hauptfleisch, M., Jago, M., Smith, T., Kramer-Schadt, S., Stiegler, J., Blaum, N. (2022a). Don’t stop me now: Managed fence gaps could allow migratory ungulates to track dynamic resources and reduce fence related energy loss. Frontiers in Ecology and Evolution, 1–18. doi: 10.3389/fevo.2022.907079

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The ORYCS Project

The German-Namibian research project “ORYCS – Options for sustainable land use adaptations in savanna systems” aims to assess the suitability of wildlife management strategies in Namibia as options for adapting land use to climate change in savanna ecosystems.

www.orycs.org

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