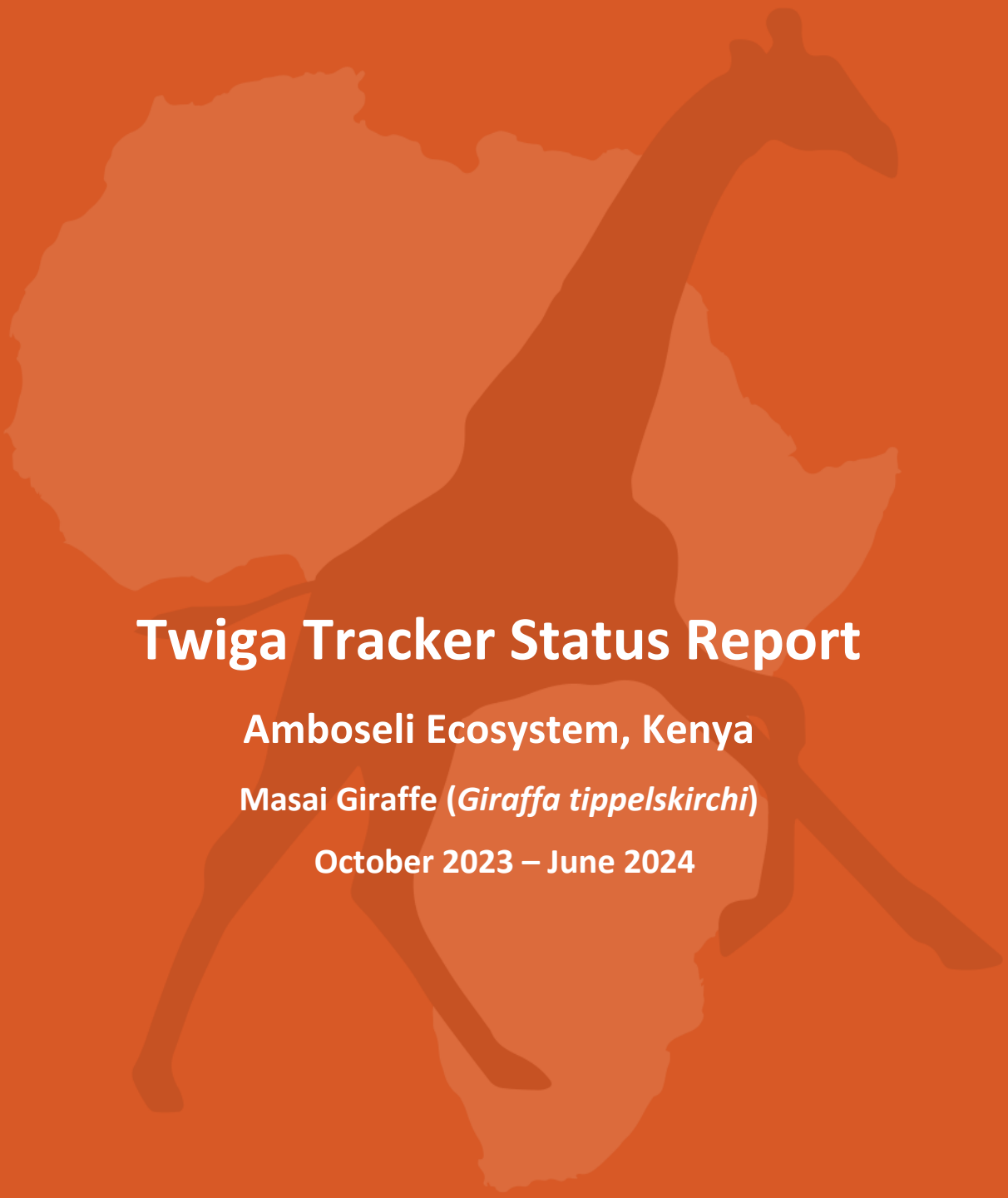

Twiga Tracker Status Report

Amboseli Ecosystem, Kenya

Masai Giraffe (*Giraffa tippelskirchi*)

October 2023 – June 2024

In partnership with:

Movement of Life

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Overview

Habitat loss and fragmentation are among the most severe threats to giraffe conservation throughout their range. In Kenya, the southern rangelands are a stronghold for Masai giraffe (*Giraffa tippelskirchi*) and other ungulates. However, increased fragmentation of the landscape through infrastructure development, land clearing for agriculture and fencing threatens the functional connectivity and ecological viability of the Amboseli Ecosystem and other areas. Fences in particular are a serious threat for giraffe as they can lead to death through entanglements and loss of habitat connectivity. Between16 and 19 October 2023, 14 GPS satellite tail tags were fitted to giraffe to assess their movements in the Amboseli Ecosystem. Here, we provide assessments of the unit performance, preliminary space-use metrics, and recommendations for the conservation and management of this giraffe species. This project is a collaborative effort of the Giraffe Conservation Foundation (GCF), the Smithsonian National Zoo and Conservation Biology Institute (SCBI), the Ramat Wildlife Society (RWS), the Kenya Wildlife Service (KWS), and the Wildlife Research and Training Institute (WRTI).

The specific objectives of this project are to:

- Assess giraffe behavioural responses to fencing and habitat fragmentation.
- Examine giraffe space use patterns and resource selection in the Amboseli Ecosystem.
- Evaluate connectivity in an increasingly fragmented landscape.

Study area

The Amboseli Ecosystem is home to ~6,425 Masai giraffe, which is the largest population in Kenya (Figure 1). In recent years, agricultural activities have intensified around Amboseli National Park (NP), accompanied by upcropping of fences throughout the Greater Amboseli Ecosystem. Recent completion of the tarmacking of the Kajiado-Mashuru Road, a major road connecting Kajiado town to Mombasa Road and the Emali-Oloitoktok Road, has hastened infrastructure development in the area. According to anecdotal reports, more fences have cropped up on the western edge of the ecosystem compared to the northern and eastern edges. As such, initial efforts focused on deploying GPS satellite units in Imbirikani, Selengei, Mailua, Mashuru and Lorngosua areas of the Amboseli Ecosystem (Figure 1).

GPS tracking

We used Kernel Density Estimate (KDE) metrics to analyse the spatial usage patterns of the tagged giraffe in the Amboseli Ecosystem. We defined total utilisation distribution by using the 95% probability contour, while the 50% probability contour was used to define each animal's core area.

Tracking performance diagnostics

Unfortunately, one unit (4508) failed immediately after deployment, and many others did not last for extended periods. Additionally, most of the units collected and transmitted data inconsistently (Figure 2), while others drained their battery at an unusually fast rate. To avoid complete battery discharge, the units were then remotely set to collect only eight (8) points per day, far fewer than the intended 24. This invariably affected the data analysis and interpretation. These changes and battery issues were communicated to KWS and the manufacturer Savannah Tracking (ST). Battery profiles of the units were shared with an independent battery engineer who determined that at least five (5) units exhibited signs of faulty batteries. An ST team went to Amboseli to track the tagged giraffe to determine causes of the units' failures. After finding one of the tagged giraffe, ST hypothesized that partial shading of the solar panels by the straps of the tail units was causing the unit failures and fast discharging. Currently, all units are offline except for unit 4704.

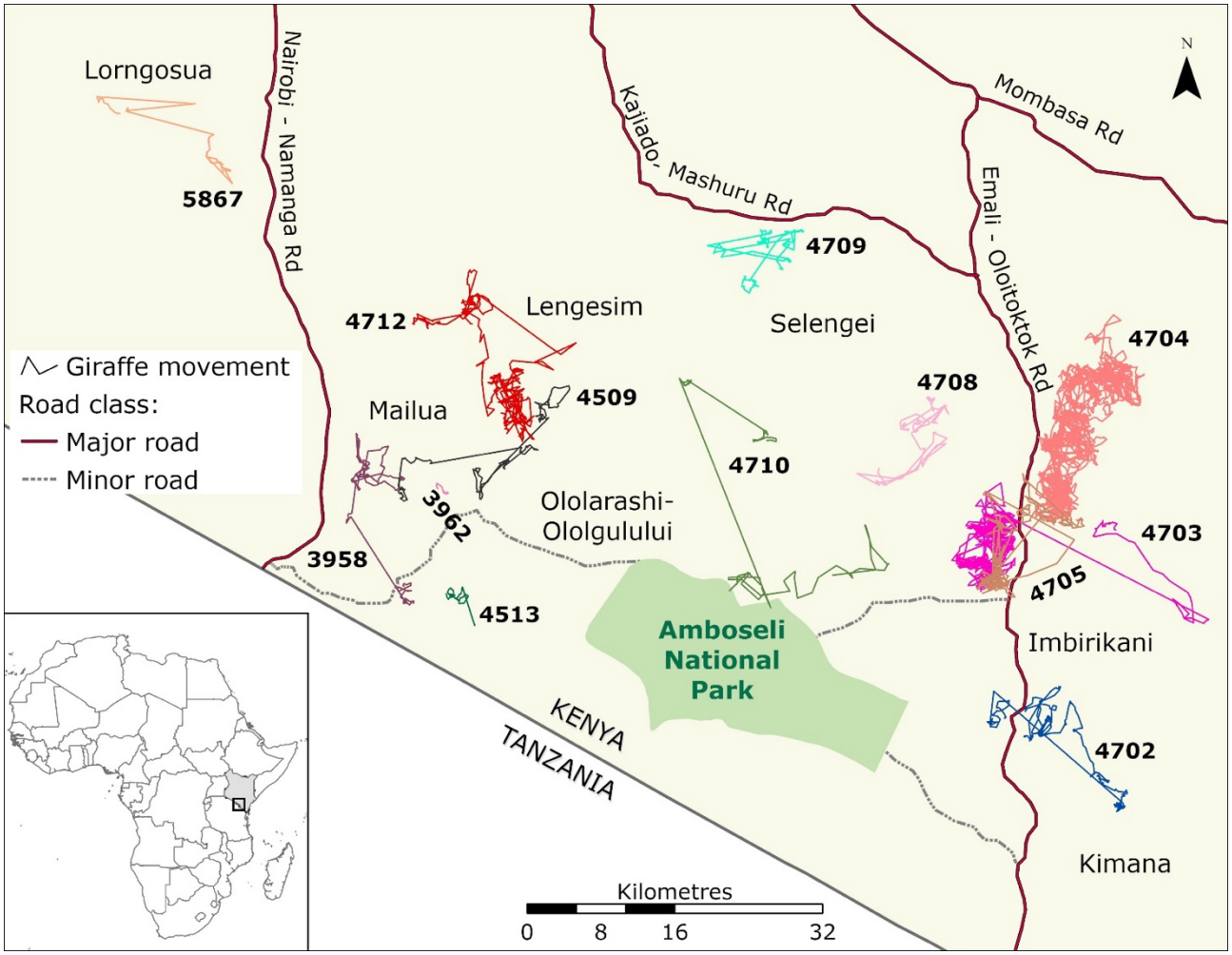

Figure 1: Map of movement patterns of Masai giraffe that were tagged in the Greater Amboseli Ecosystem in October 2023. Movements are depicted from October 2023 to 20 June 2024 for those units that are still functioning.

Giraffe movements

While data were limited due to the tag issues, we observed some notable movement patterns. Units 4702, 4703 and 4705, deployed in the Imbirikani area, showed that giraffe cross the busy Emali-Oloitoktok Road at various points. This is notable because collision with vehicles is one of the major causes of giraffe deaths in the Greater Amboseli Ecosystem. According to the Big Life Foundation (BLF), 51 giraffe died between January 2023 and March 2024, the most mortalities recorded for any species in the Amboseli Ecosystem. The predominant mortality causes included fence entanglement, roadkill, electrocution from powerlines, and poaching. These issues continue to be of concern, especially given the growing human population, agricultural activities, and continued upcropping of fences in the area.

The duration of data obtained from the tags was inconsistent (Figure 2) and thus comparing movement of the different giraffe was challenging, especially for management purposes. For example, the core home range (KDE 50) of giraffe 4704 was ~41.1km^2 but within this relatively small area the female giraffe covered a distance of ~1,384 km. Tagged in an area with suitable woody vegetation within Imbirikani, this giraffe roamed in an area with minimal human activities compared to other areas. Another factor that may impact giraffe movements is the spreading of the invasive morning glory weed (*Ipomoea hildebrandtii*), which now covers ~40% of Kajiado County and has been declared the invasive weed of county disaster, due to its impact on human livelihoods and livestock grazing areas.

Table 1: Summary of Masai giraffe movement data collected in the Greater Amboseli Ecosystem from October 2023 to June 2024.

Giraffe ID	Sex	Start date	Stop date	Duration (days)	Status	Steps (km)	KDE_50 (km^2)	KDE_95 (km^2)
GCF01078-4703	Female	16-Oct-23	02-Mar-24	138	Inactive	519.1	29.1	184.4
GCF01079-4704	Female	16-Oct-23	19-Jun-24	246.9	Active	1,383.6	41.1	151.5
GCF01080-4705	Male	16-Oct-23	27-Feb-24	133.8	Inactive	228.4	24.8	116.7
GCF01081-4702	Female	16-Oct-23	21-Dec-23	65.4	Inactive	171.0	47.5	182.5
GCF01082-4708	Female	17-Oct-23	19-Nov-23	32.7	Inactive	109.1	11.6	63.5
GCF01083-4709	Female	17-Oct-23	01-Mar-24	136	Inactive	94.4	16.7	68.5
GCF01084-4710	Female	17-Oct-23	24-Dec-23	67.5	Inactive	135.4	150.3	679
GCF01085-4712	Male	18-Oct-23	25-Dec-23	68.1	Inactive	289.7	48.6	253.4
GCF01086-4509	Male	18-Oct-23	22-Dec-23	64.8	Inactive	88.6	61.6	237.7
GCF01087-4513	Male	19-Oct-23	20-Oct-23	0.5	Inactive	4.0	1.2	6.5
GCF01088-3962	Male	19-Oct-23	01-Nov-23	12.5	Inactive	5.6	1	4.9
GCF01089-3958	Male	19-Oct-23	01-Dec-23	42.4	Inactive	92.6	36.1	184.5
GCF01090-5867	Male	19-Oct-23	23-Dec-23	64.8	Inactive	63.1	47.3	199.4

The tags deployed in the Mailua and Selengei areas yielded limited data, but these areas remain of interest with future intensive farming projects and proliferation of fences. Preliminary data from the tags showed the giraffe moved between Mailua, Ololarashi-Olgulului, and Lengesim areas.

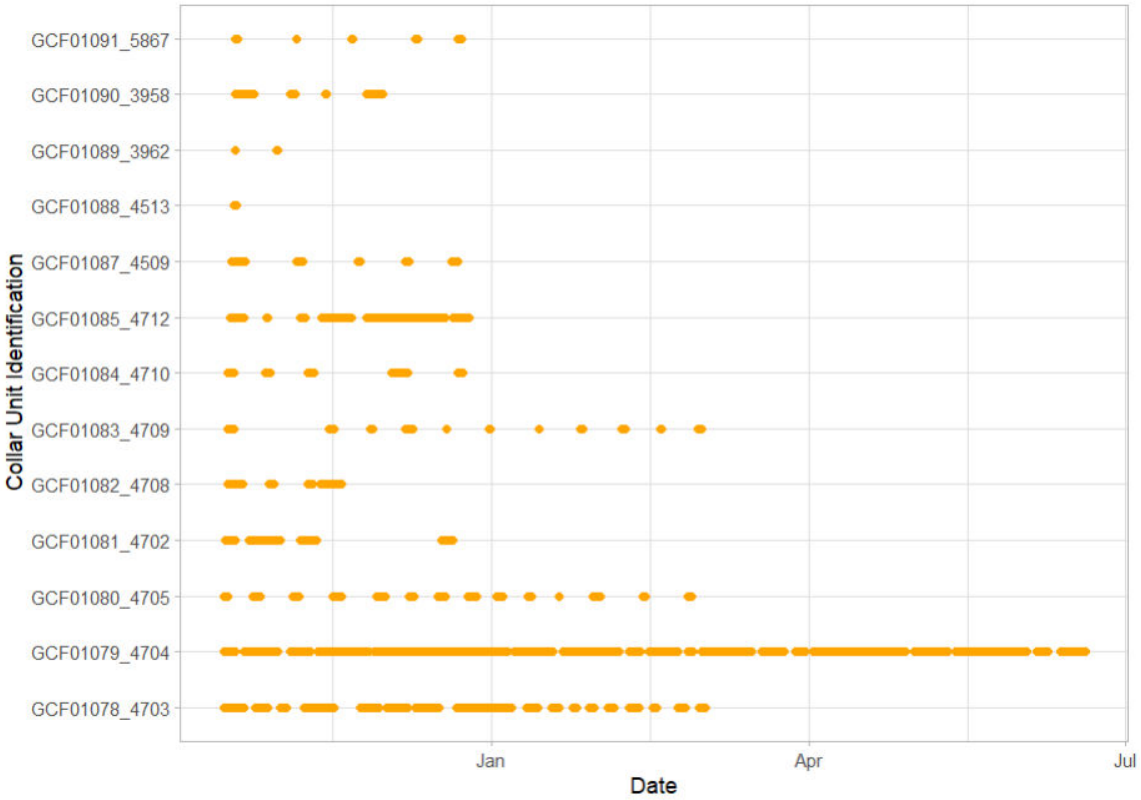

Figure 2: Timeline of GPS data collected for Masai giraffe in the Greater Amboseli Ecosystem from October 2023 to June 2024.

Way forward

The relatively limited data obtained due to the unit failures impacted our ability to provide a detailed understanding of Masai giraffe spatial movements in the Greater Amboseli Ecosystem. Ongoing discussions with KWS and local authorities, coupled with the preliminary data, highlight that there is a need for continued monitoring and documentation of the proliferation of fences and other human activities. As the use of technology is essential to contribute to this endeavour, GCF has been working with other engineers to develop and test alternative tracking devices that can generate robust fine scale data for monitoring giraffe movement. Once these devices have been tested sufficiently, another deployment exercise targeting the same areas should be undertaken. The Greater Amboseli Ecosystem is a key ecosystem for Masai giraffe but is under threat from anthropogenic impacts. With increased data and analysis, management recommendations can be made to safeguard movement corridors and key data for maintaining viable habitats of Masai giraffe.