

Twiga Tracker Status Report

Hwange National Park, Zimbabwe

South African Giraffe (*Giraffa giraffa giraffa*)

June 2022 - April 2025

In partnership with:



@giraffe_conservation



@giraffeconservationfoundation



@Save_Giraffe



Overview

This is a summary report of GPS tracking unit performance and preliminary space-use metrics for South African giraffe (*Giraffa giraffa giraffa*) in Hwange National Park (NP). The project is conducted in partnership between the Giraffe Conservation Foundation (GCF) and Zimbabwe Parks and Wildlife Management Authority (ZimParks) to better understand the spatial ecology, movement patterns, and habitat utilisation of southern giraffe (*G. giraffa*) across protected areas in Zimbabwe. Specifically, this project seeks to:

- Understand movement, habitat utilisation, and spatial ecology of giraffe in Hwange NP.
- Identify areas in the landscape to direct more targeted giraffe monitoring and tracking studies.
- Evaluate post translocation movements.
- Generate recommendations and provide critical insights to inform conservation managers and other stakeholders on long-term management of Zimbabwe's giraffe.

Study Area

Hwange NP is located on the eastern peripheries of Zimbabwe's Kalahari Sands region (Figure 1). It covers approximately 15,000 km² and has a mean annual rainfall of 600 mm with the most rainfall between October and May. The vegetation is characterised as semi-arid deciduous woodland and scrubland with heterogeneous savannah and edaphic grassland. Hwange NP is an open system with only one external fence line separating wildlife and human settlements, a small two-strand cable fence on the eastern boundary, separating the park from the Tsholotsho communal lands. Although many species freely move through this fence, it acts as a barrier to giraffe. The north-eastern park boundary consists of the railway road, connecting Bulawayo and Victoria Falls.

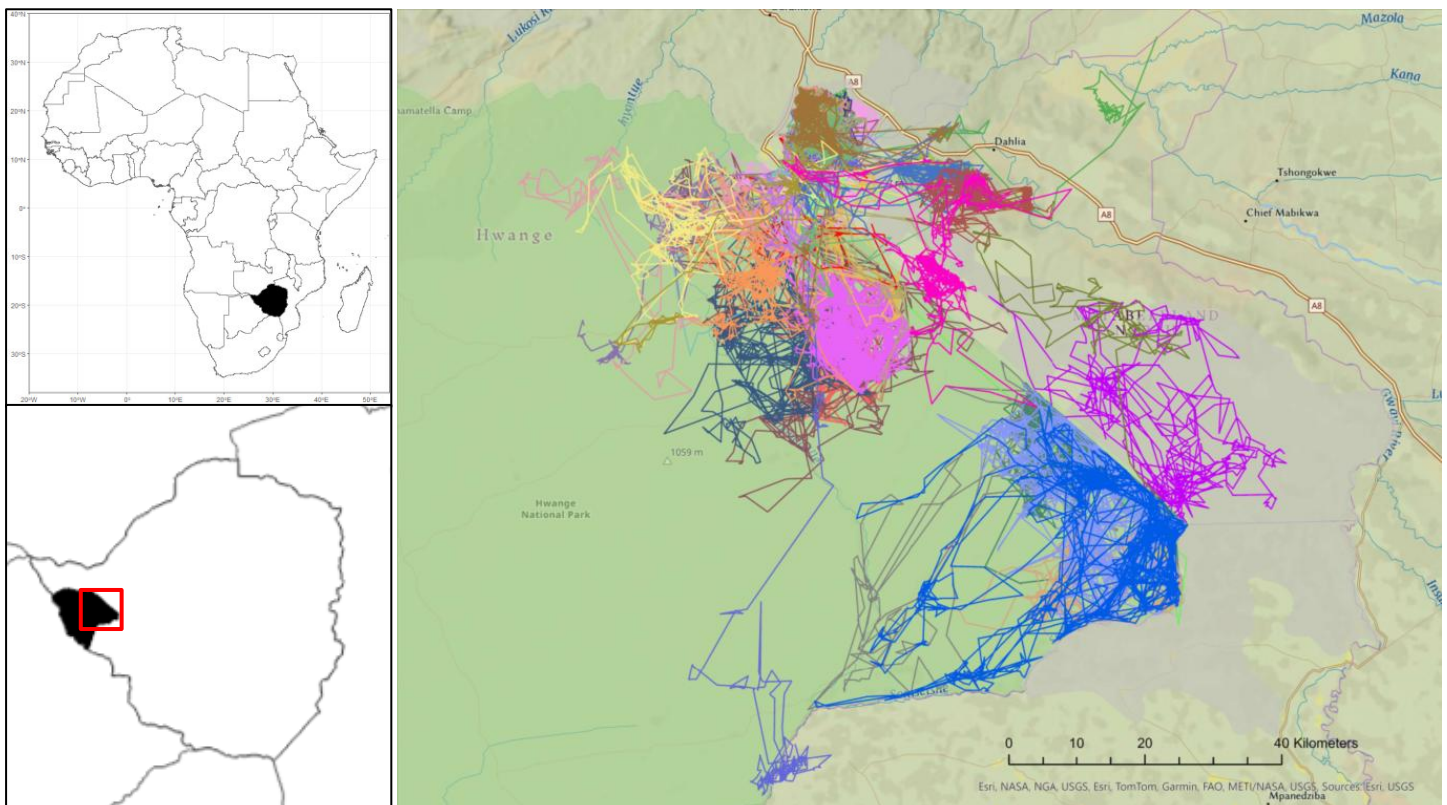


Figure 1: Map of study site and movements of GPS tagged giraffe in Hwange NP.



GPS Tracking

To examine habitat utilisation and spatial ecology of South African giraffe in Hwange NP we deployed Ceres Trace tags. Twelve Ceres Trace tags were deployed in June 2022 and an additional two tags were deployed in November/December 2023. These GPS satellite tracking devices were programmed for 6-hour fix rate with GlobalStar data transfer. Ceres Trace tags were affixed to giraffe ears with a proprietary two-pin cattle tag attachment (Figure 2A). In May/June of 2024, 69 giraffe were successfully translocated from the Nuanetsi Game Ranch to the Sikumi forest areas adjacent to the northeastern periphery of Hwange NP. In total, 30 (43%) of the giraffe were outfitted with a GPS satellite GSat Solar ear tag affixed with one pin (Figure 2B), programmed for 4-hour fix rate with GlobalStar data transfer.

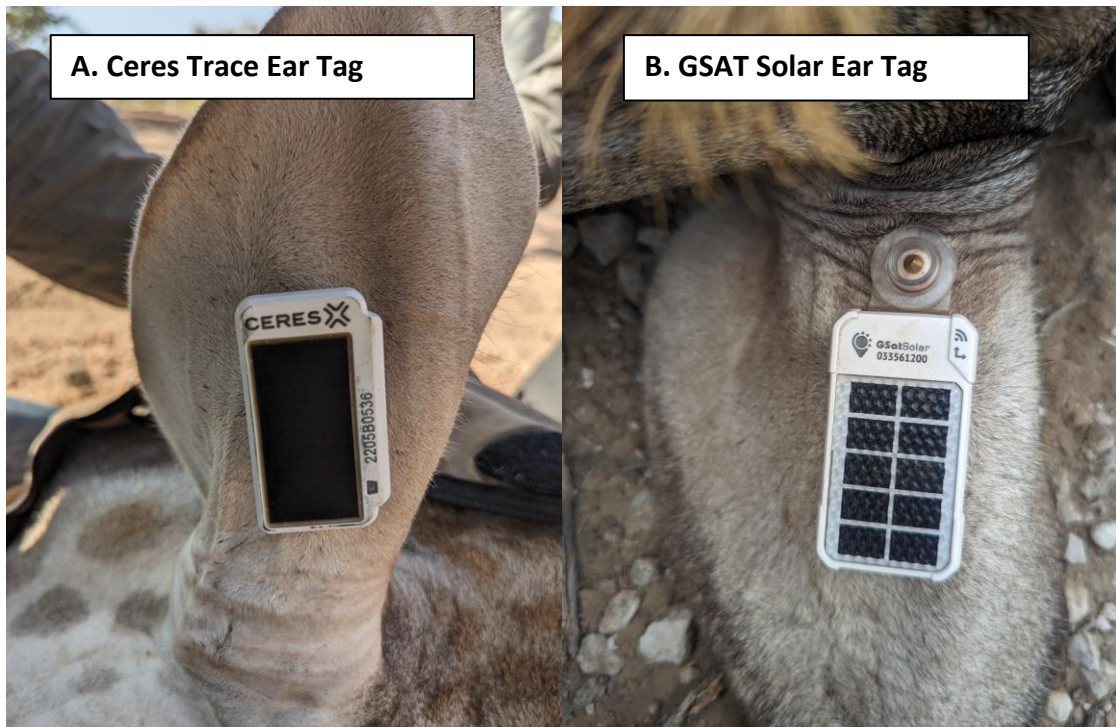


Figure 2: Example of A) Ceres Trace ear tag and B) GSAT Solar ear tag used on South African giraffe in Hwange NP

Occurrence Estimation

We used kernel density estimators (kde) with reference bandwidths as the smoothing parameter to estimate animal occurrence for all tagged individuals. Total utilisation distribution was defined as the 95% probability contour. To quantitatively evaluate areas of concentrated use within the utilisation distributions core areas were defined as the 50% probability contour.

Results

Tracking Performance Diagnostics

Since the deployment of tracking devices in 2022, multiple devices have consistently collected and transmitted over a year of locational data (Figure 3). Two Ceres Trace units are still active after over 1,020 days, one Ceres Trace unit is still active after 850 days, three GSat Solar units are active after 250 days, and two GSat Solar units are active after 270 days. Of the Ceres Trace units that failed ($n = 11$, 78.5 % of deployed units), the mean deployment time was 682.9 days (SD = 333.4). Of the GSat Solar units that failed ($n=26$, 86.7 % of deployed units), the mean deployment time was only 179.9 days (SD = 83.1).



Timeline of GPS Data Collection

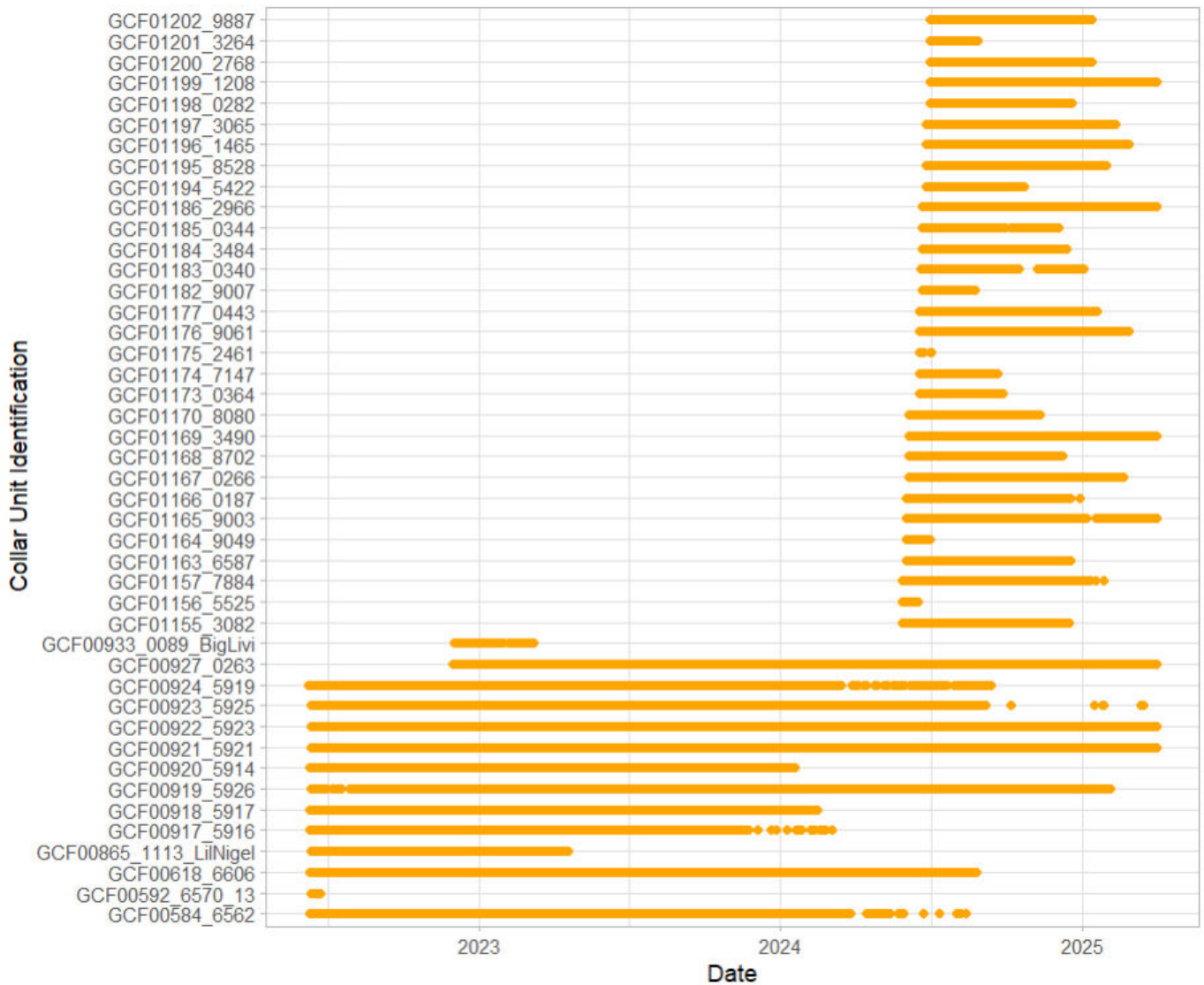


Figure 3: Timeline of GPS telemetry data collection of South African giraffe in Hwange NP.

Descriptive Parameters of the Trajectory

The tagged giraffe in Hwange NP moved considerable distances, with an average cumulative displacement of 1,403.3 km (SD = 1,218.7) (Table 1). In areas where infrastructure (railway) or hard boundaries (rivers) restricted movement, giraffe exhibited more localised movements. However, giraffe occasionally crossed from Hwange NP into neighbouring communal lands and forests.

Occurrence Estimation Models

Giraffe exhibited diverse ranging behaviours across the landscape. The mean 95% kde for giraffe during this period was 502.4 km² (SD = 555.8), and the mean 50% kde was 100.5 km² (SD = 106.4) (Table 1). Protected area boundaries seemed to exert a significant influence on their ranging behavior, with areas of occurrence strongly restricted by edge effects on the park's boundaries. However, giraffe moved regularly between the Hwange NP and the communal lands of the northeast.

Table 1: Summaries of unit performance and space use metrics of tagged giraffe in Hwange NP.

Giraffe ID	Sex	Unit Type	Date_Start	Date_Stop	Fixes	Duration (days)	Distance Traveled (km)	KDE 50 (km ²)	KDE 95 (km ²)
GCF00584_6562	female	Ceres_Trace	6/10/2022	8/12/2024	1317	794.3	2583.4	158.7	1027.7
GCF00592_6570_13	female	Ceres_Trace	6/11/2022	6/23/2022	34	12.1	4.8	1.2	4.3
GCF00618_6606	female	Ceres_Trace	6/9/2022	8/24/2024	2416	807.5	2911.6	88.2	335.6
GCF00865_1113_LilNigel	male	Ceres_Trace	6/11/2022	4/18/2023	579	311.1	1309.5	274.9	1038.8
GCF00917_5916	female	Ceres_Trace	6/9/2022	3/2/2024	1327	632.4	2024.5	32.4	222.8
GCF00918_5917	male	Ceres_Trace	6/9/2022	2/14/2024	1215	615.3	2418.4	437.7	1455.2
GCF00919_5926	female	Ceres_Trace	6/12/2022	2/3/2025	2582	967.6	3932.4	133.9	465.2
GCF00920_5914	female	Ceres_Trace	6/9/2022	1/18/2024	1106	588.3	1753.7	96.7	350.6
GCF00921_5921	female	Ceres_Trace	6/11/2022	Active	2709	1024.4	2912.4	66.9	370
GCF00922_5923	female	Ceres_Trace	6/11/2022	Active	2927	1024.5	4998.7	213	675.2
GCF00923_5925	female	Ceres_Trace	6/11/2022	3/15/2025	1807	1008.1	3528.7	255	1298.2
GCF00924_5919	female	Ceres_Trace	6/9/2022	9/11/2024	1295	825.6	2161.2	157.8	633.5
GCF00927_0263	female	Ceres_Trace	11/29/2022	Active	11918	853.1	5144.3	60	212
GCF00933_0089_BigLivi	male	Ceres_Trace	12/1/2022	3/7/2023	216	96.8	308.1	306.7	1304.9
GCF01155_3082	unknown	GSAT Solar	5/27/2024	12/15/2024	867	202.1	876.6	47.4	226.7
GCF01156_5525	unknown	GSAT Solar	5/27/2024	6/14/2024	98	18.4	119.2	18.7	100.3
GCF01157_7884	unknown	GSAT Solar	5/27/2024	1/25/2025	1118	243	1137.4	49.3	426.8
GCF01163_6587	male	GSAT Solar	6/1/2024	12/16/2024	915	197.7	926.0	57	426.6
GCF01164_9049	female	GSAT Solar	6/1/2024	6/30/2024	162	28.8	218.0	21.4	93.1
GCF01165_9003	male	GSAT Solar	6/1/2024	Active	1126	303.3	1290.1	86.5	527.9
GCF01166_0187	female	GSAT Solar	6/1/2024	12/28/2024	918	209.8	861.7	47.6	277.3
GCF01167_0266	male	GSAT Solar	6/3/2024	2/19/2025	1364	261.1	1376.6	162.8	651.8
GCF01168_8702	female	GSAT Solar	6/3/2024	12/8/2024	1060	187.6	936.4	20.1	110.5
GCF01169_3490	male	GSAT Solar	6/3/2024	Active	1382	301.1	1541.7	159.7	668.4
GCF01170_8080	female	GSAT Solar	6/3/2024	11/10/2024	861	159.8	948.4	39.2	163.9
GCF01173_0364	female	GSAT Solar	6/16/2024	9/26/2024	511	101.6	385.4	16.3	103.2
GCF01174_7147	female	GSAT Solar	6/16/2024	9/19/2024	482	95.3	527.4	38.4	133.5
GCF01175_2461	male	GSAT Solar	6/16/2024	7/1/2024	9	14.7	9.9	5.4	19.7
GCF01176_9061	male	GSAT Solar	6/16/2024	2/25/2025	1155	253.4	1630.7	100.7	988.8
GCF01177_0443	female	GSAT Solar	6/16/2024	1/18/2025	684	216	777.7	24.2	87
GCF01182_9007	female	GSAT Solar	6/19/2024	8/22/2024	299	64	309.3	45.7	188
GCF01183_0340	female	GSAT Solar	6/19/2024	1/2/2025	653	196.9	816.8	62.8	254.9
GCF01184_3484	female	GSAT Solar	6/19/2024	12/12/2024	681	176.4	481.1	13.9	71.7
GCF01185_0344	female	GSAT Solar	6/19/2024	12/2/2024	473	166.4	397.7	16.2	81.6
GCF01186_2966	female	GSAT Solar	6/19/2024	Active	1571	284.8	1729.0	427.7	3093.8
GCF01194_5422	male	GSAT Solar	6/24/2024	10/22/2024	615	120.1	617.8	15.7	79.8
GCF01195_8528	male	GSAT Solar	6/24/2024	1/29/2025	1046	219.4	1355.9	65.4	570.3
GCF01196_1465	female	GSAT Solar	6/24/2024	2/25/2025	1309	246.4	1285.6	22	139.2
GCF01197_3065	female	GSAT Solar	6/24/2024	2/10/2025	959	230.8	1130.8	40.7	298.1
GCF01198_0282	male	GSAT Solar	6/29/2024	12/17/2024	873	171.3	848.7	52.7	286
GCF01199_1208	female	GSAT Solar	6/29/2024	Active	999	275.4	1014.8	21.1	124.7
GCF01200_2768	female	GSAT Solar	6/29/2024	1/11/2025	847	196.4	906.3	190.1	917.2
GCF01201_3264	female	GSAT Solar	6/29/2024	8/26/2024	321	58.2	350.5	200.8	1072.9