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Monthly report of GPS satellite tagged Angolan giraffe (*Giraffa giraffa angolensis*) in northwest Namibia

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In July 2019, Giraffe Conservation Foundation (GCF) and the Skeleton Coast Iona (SCIONA) project fitted seven Angolan giraffe (*Giraffa giraffa angolensis*) across northwest Namibia (fig. 9) with solar-powered GPS satellite transmitters (ossi-units). The ossi-units were designed by Savannah Tracking Kenya with support from GCF and are attached to a giraffe ossicone. One young bull and six cows were tagged. Immobilisation of giraffe and fitting of the ossi-units were conducted by a Namibian registered veterinarian under the careful ethical consideration of GCF who have fitted more than 200 units/collars across Africa. Each unit transmits hourly location and temperature data by satellite. The data is then analysed to assess giraffe's habitat use and spatial ecology in the arid to hyper-arid Kunene Region.

This report provides information on preliminary data from 1-31 March 2020 and a brief comparison with last months finding. Since one ossi-unit fell off in January (KT IRI2016-3223) a female giraffe), only six ossi-units now transmit data. KT's unit was recovered from the field but damaged as described in the last month report (February 2020). Of the six units remaining, five of them successfully transmitted data in March 2020 without any gaps, while the one that belongs to the young bull (Jackson IRI2016-3141) only transmitted data for three days 01-3 March (see table 1).

Malfunctioned unit – Jackson IRI2016-3141

In running the collar diagnostics with the help by Dr Michael, the unit experienced erratic charging profiles, but never reached critically low levels (see fig.1).



Looking at the final fixes of the unit in figure 2, it's difficult to say for certain if the unit was stationary (indicating that it had fallen off), but there were a series of fixes that were very close in proximity. Hopefully, we will get further information to figure out why it failed.

Ossi-Unit Voltage Profile

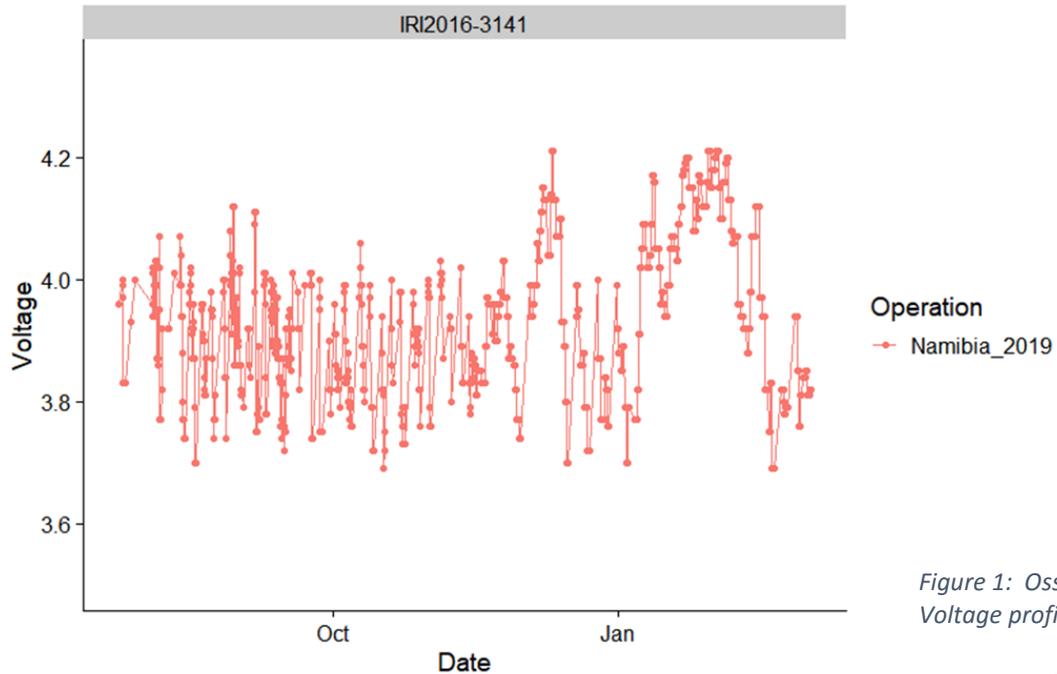


Figure 1: Ossi-Unit IRI2016-3141 Voltage profile

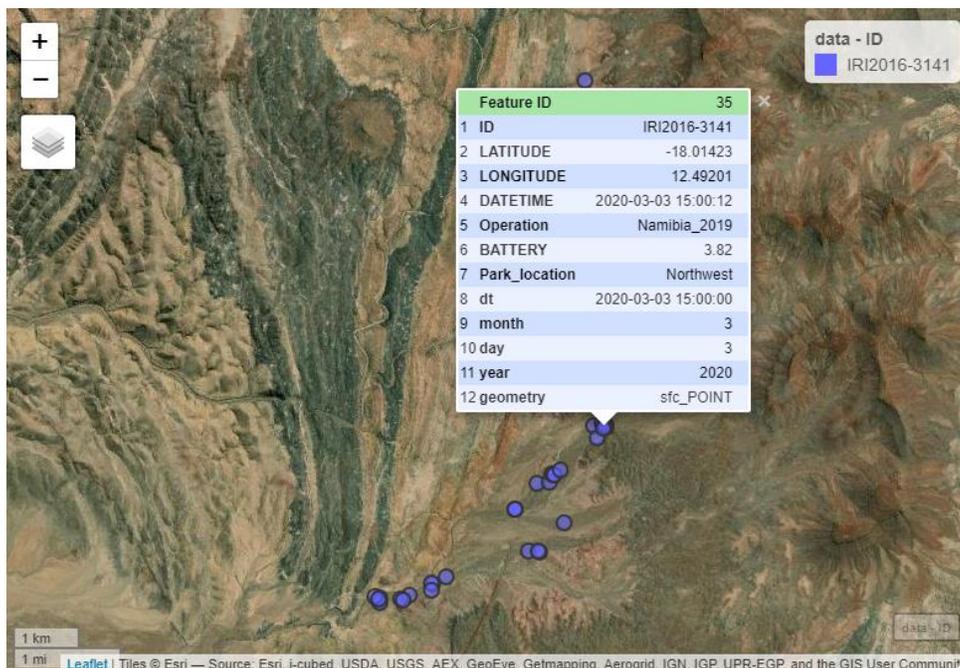


Figure 2: IRI2016-3141 GPS points in March 2020



All data analysis were conducted in QGIS 2.18.28 and QGIS 3.4.4 using the coordinate referencing system WGS84. As depicted in fig. 3, habitat use appears to be a little bit different from the previous month (February 2020, fig. 4). The movement pattern has also changed from eastward to the south and westward apart from the female Tisa (ST2010-2958) which did not show any distinct movement pattern. The majority of giraffe have shown a south or westward movement pattern during the month. The female Ceratops (ST2010-2959) showed the most prominent south westward movement, travelling between the Nadas and Munutum Rivers and then back to the Sechomib River (see fig. 3). The two females in the Khumib River – Supergirl (IRI2016-3220) and Dorothy (IRI2016-3222), the later who gave birth last year, continue to roam up and down the river. Note that the young male Jackson (IRI2016-3141) movement pattern could not be confirmed at this point due to unit malfunctioning and as such not analysis undertaken.

Ceratops (ST2010-2959) moved the furthest, a distance of ~370.7 km from Onjuva village and regularly between the Nadas, Munutum and Sechomib Rivers. Supergirl (IRI2016-3220) moved ~246.7 km along the Khumib riverbed (fig. 3). Tisa (ST2010-2958) travelled only ~91.4 in and around southeast Onjuva. For all giraffe distances travelled during March 2020 see table 2.

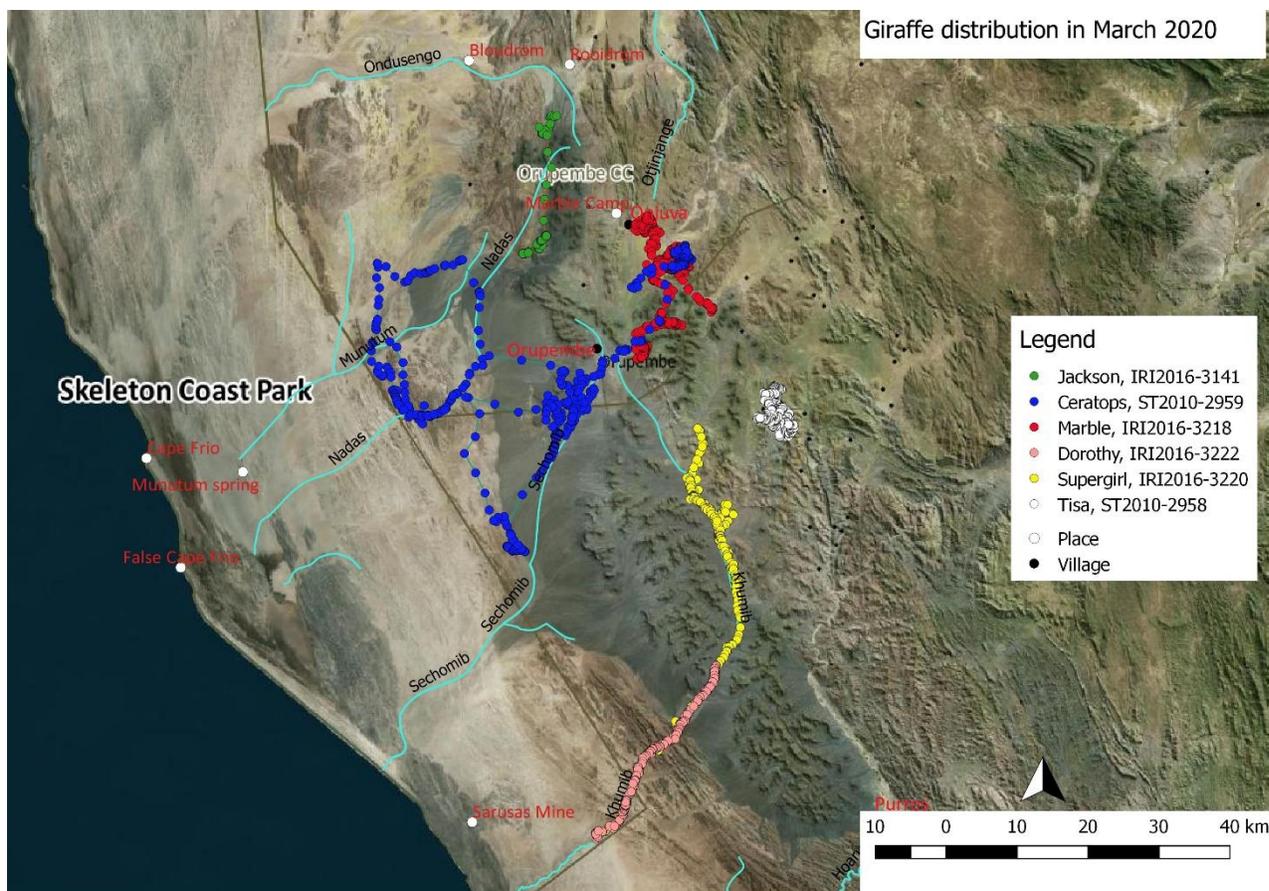


Figure 3: GPS satellite tagged giraffe movements in northwest Namibia during March 2020

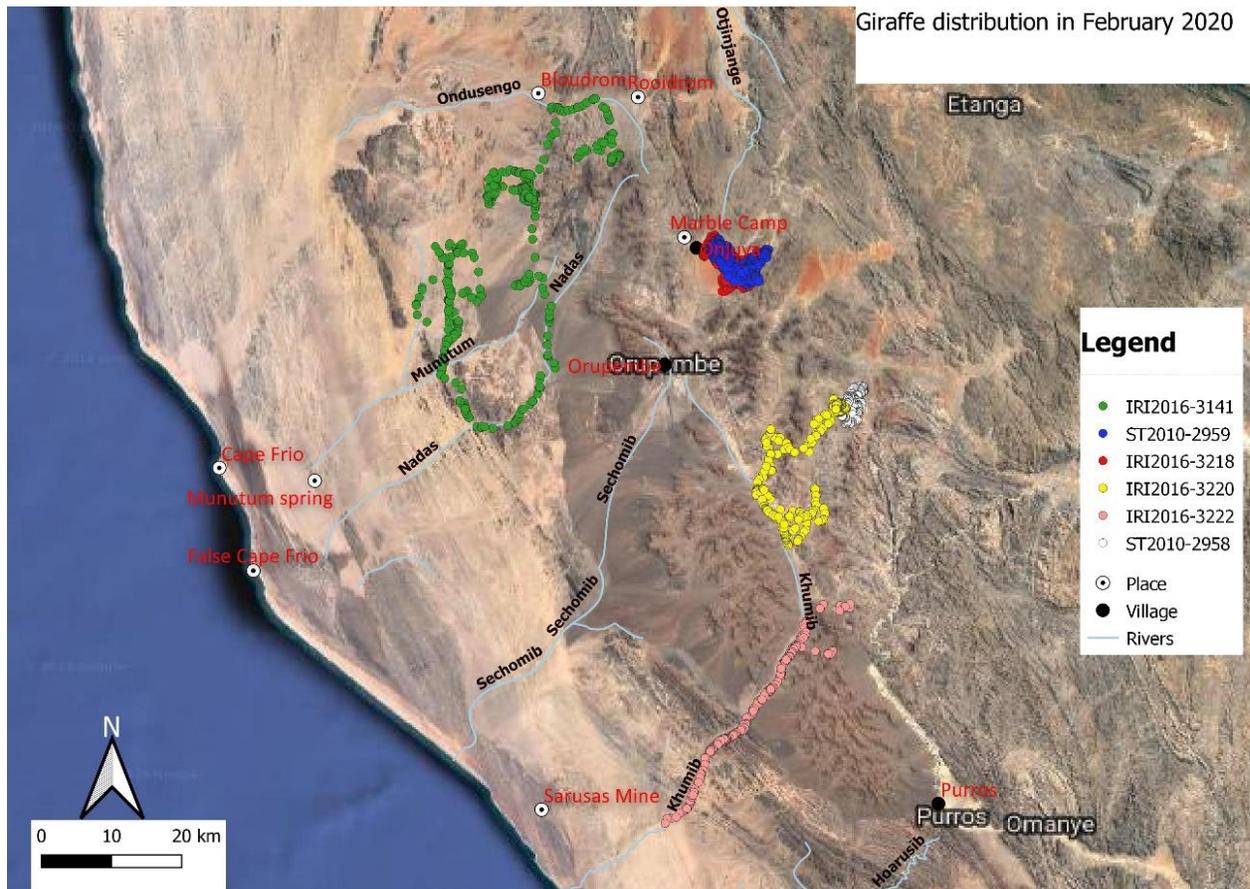


Figure 4: GPS satellite tagged giraffe distribution in northwest Namibia during February 2020

Home Range (HR) preliminary results were estimated using the Animate plugin in QGIS to determine HR at 50% and 95% Minimum Convex Polygon (MCP) for each individual as well as the total population. The 50% MCP provides standard deviation core HR, while 95% provide the average HR. Ceratops (ST2010-2959) 95% MCP in March was estimated at 1,130.9km² followed by Supergirl (IRI2016-3220) at 373.6km² and the least was Tisa (ST2010-2958) at approximately 23.4km². HR overlaps were observed between two tagged giraffe around Onjuva village and another two in the Khumib River (fig. 5). The two giraffe around Onjuva had similar HR overlaps in February 2020 (fig. 6).

All giraffe combined had an average core home range of 1,645.6km² calculated at 50%, and 3,044.3km² at 95% MCP (fig. 7) – this is reasonable in such a large and arid environment with patchy vegetation. For the rest of the HR values see table 2. Home range sizes of giraffe in March were generally larger than in February 2020. Individual HR were not related to distance travelled and vice versa. Some individuals with long distances had small HR, some had big HR with small distances see a graphical presentation in fig. 8.

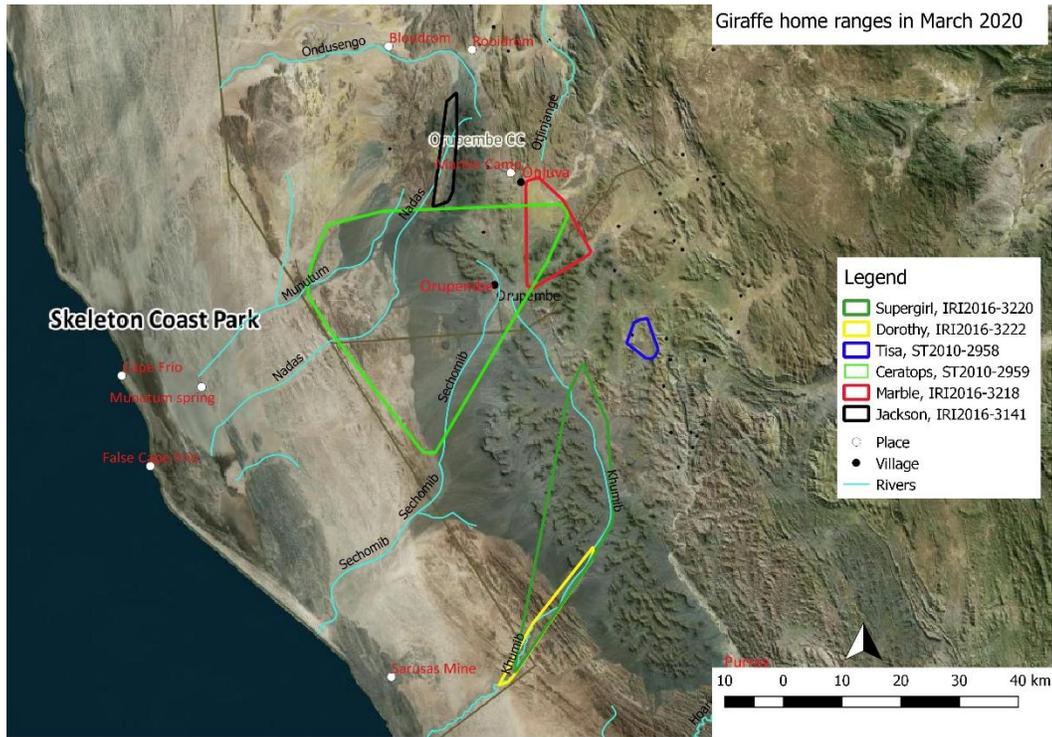


Figure 5: GPS satellite tagged giraffe's individual Home Range using 95% MCP in northwest Namibia during March 2020

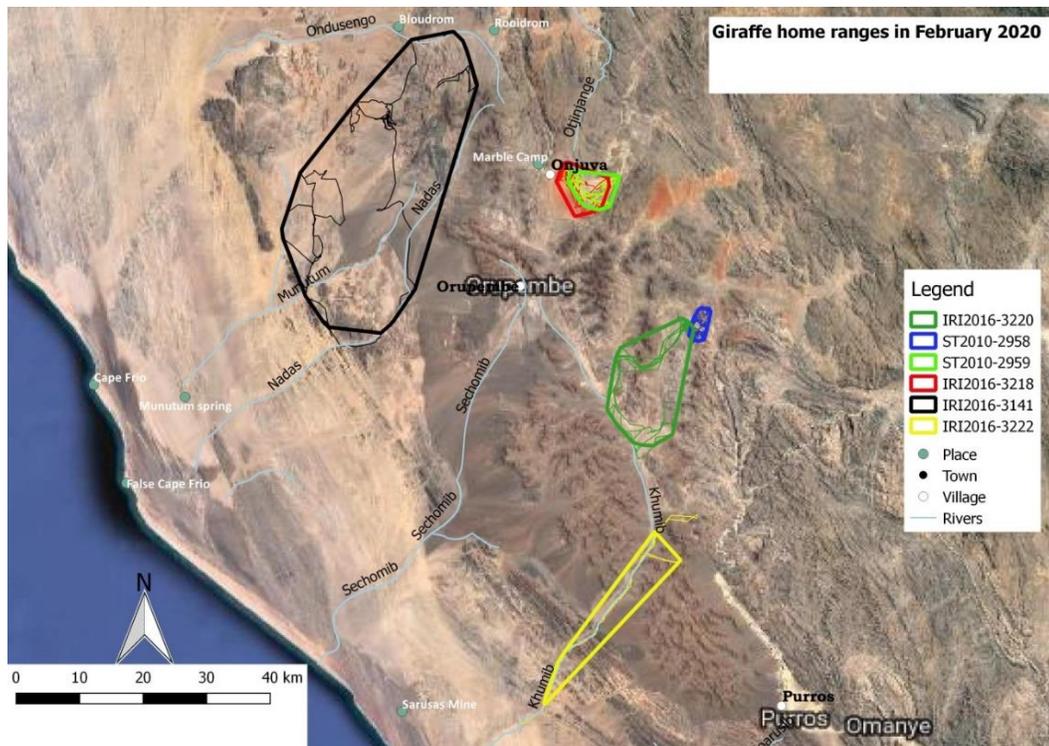


Figure 6: GPS satellite tagged giraffe's individual Home Range using 95% MCP in northwest Namibia during February 2020

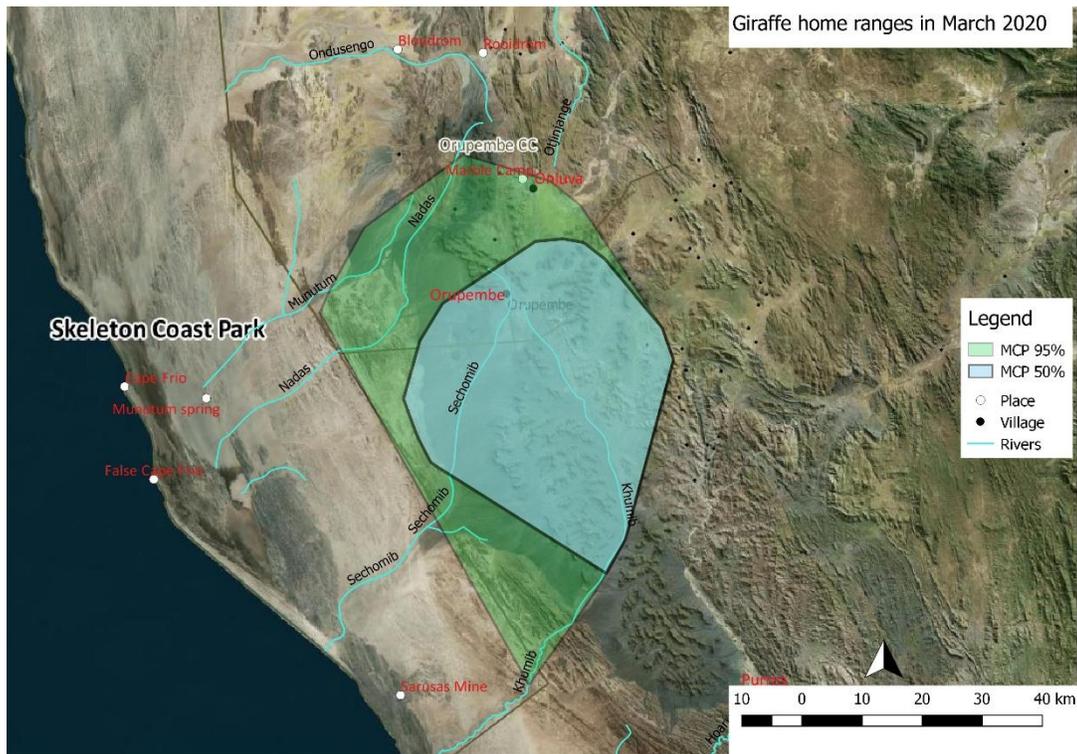


Figure 7: All GPS satellite tagged giraffe's combined Home Range using 50% and 95% MCP in northwest Namibia during March 2020

Home range Vs distance travelled

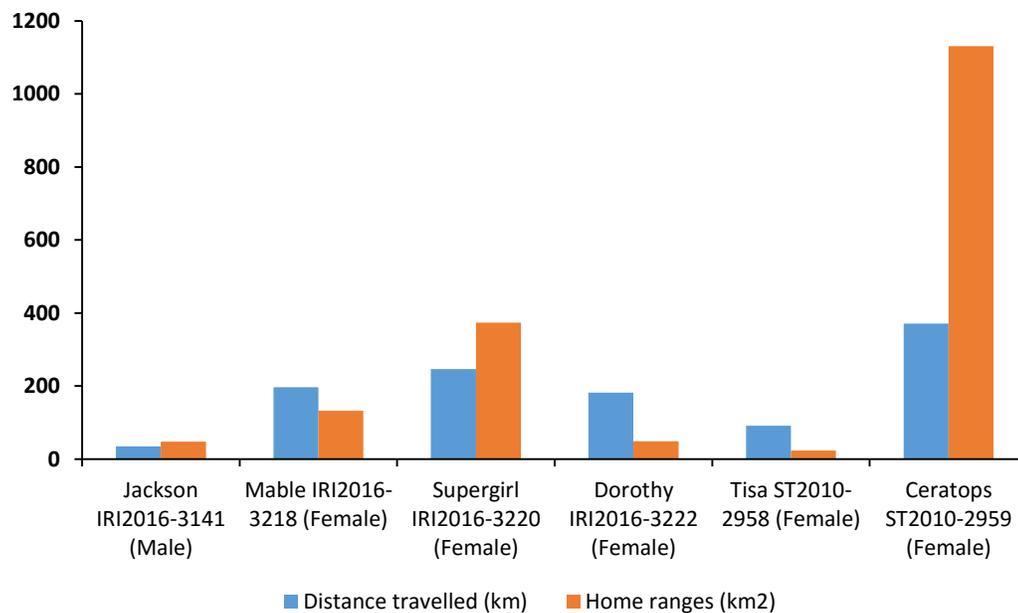


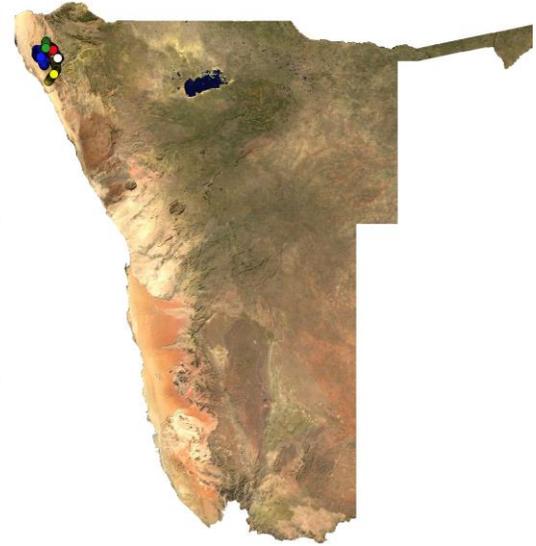
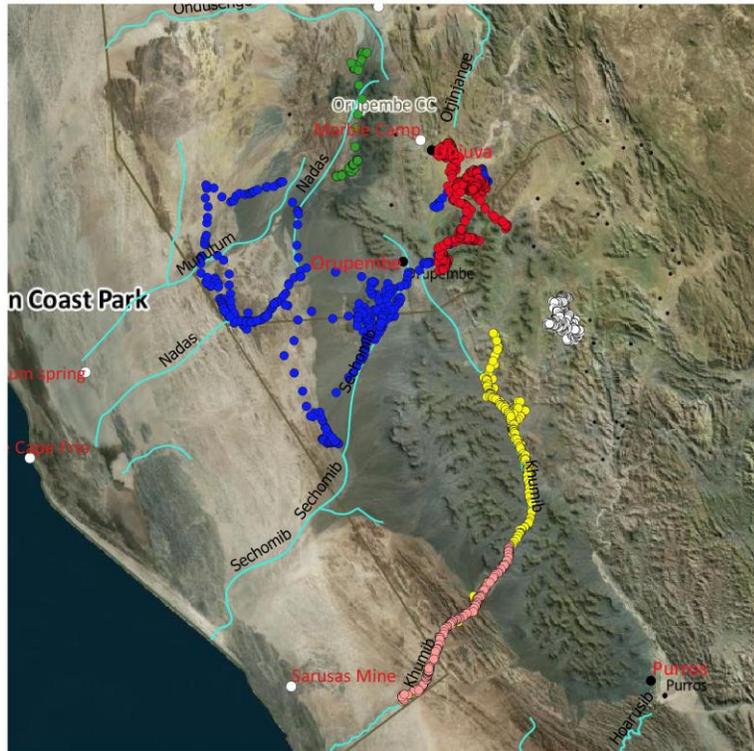
Figure 8: Comparison of HRs with distance travelled by individual giraffe in March 2020



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Legend

- Dorothy, IRI2016-3222
- Tisa, ST2010-2958
- Supergirl, IRI2016-3220
- Jackson, IRI2016-3141
- Marble, IRI2016-3218
- Ceratops, ST2010-2959
- Place
- Village
- Rivers

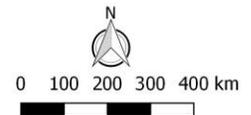


Figure 9: Study area map

Table 1: Data transmission of GPS satellite tagged giraffe in northwest Namibia during March 2020

ID/Date	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Jackson IRI2016-3141 (Male)	✓	✓	✓																											
Marble IRI2016-3218 (Female)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Supergirl IRI2016-3220 (Female)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dorothy IRI2016-3222 (Female)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tisa ST2010- 2958 (Female)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ceratops ST2010-2959 (Female)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



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Table 2: Distance travelled by each GPS satellite tagged giraffe in March 2020

ID/Date	Distance travelled (km)	Home ranges (km ²)
Jackson IRI2016-3141 (Male)	35.0	47.3
Mable IRI2016-3218 (Female)	197.1	132.6
Supergirl IRI2016-3220 (Female)	246.7	373.6
Dorothy IRI2016-3222 (Female)	181.5	48.2
Tisa ST2010-2958 (Female)	91.4	23.4
Ceratops ST2010-2959 (Female)	370.7	1130.9

Acknowledgements

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Appendix

