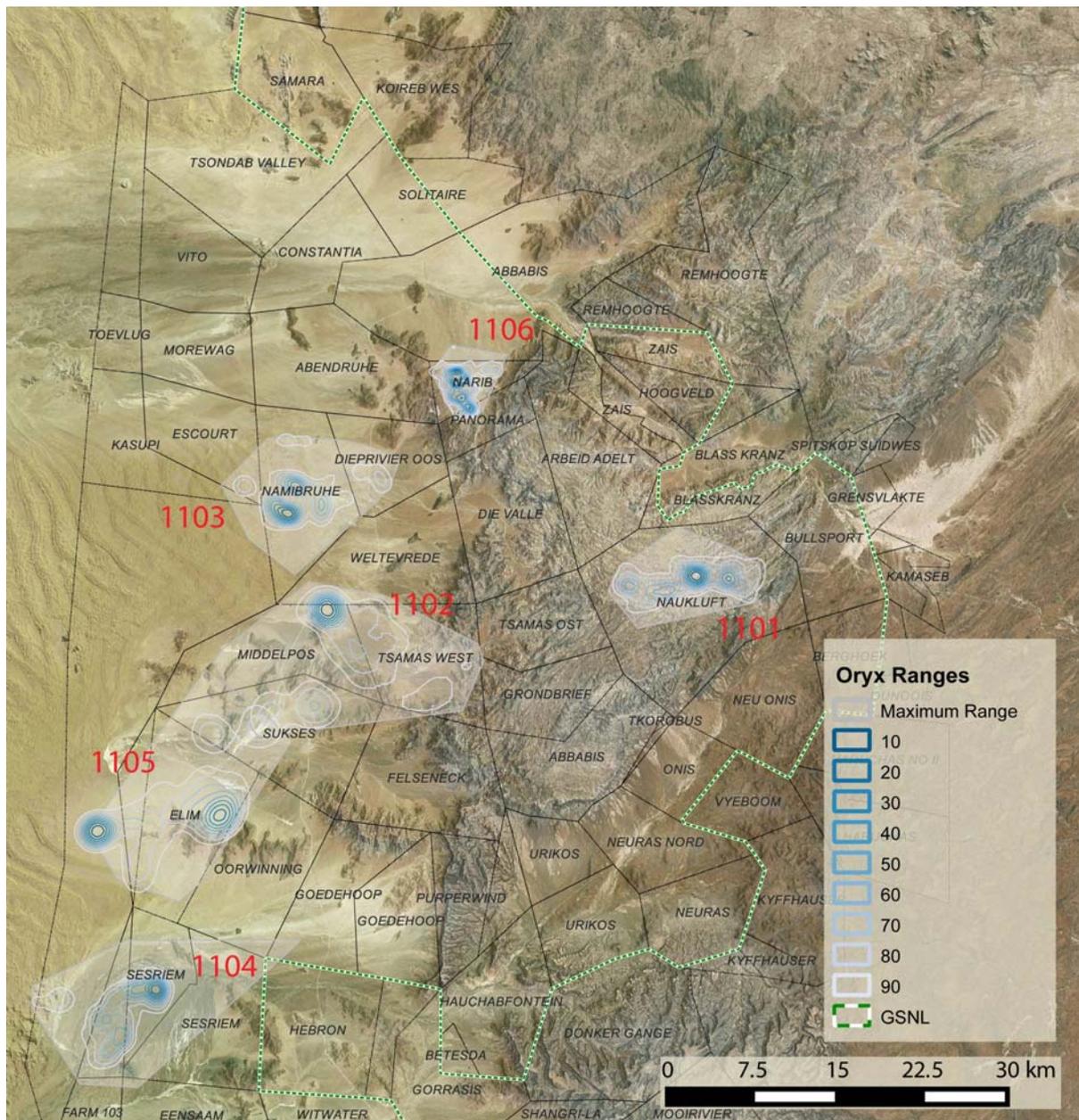


UPDATE – December 2014

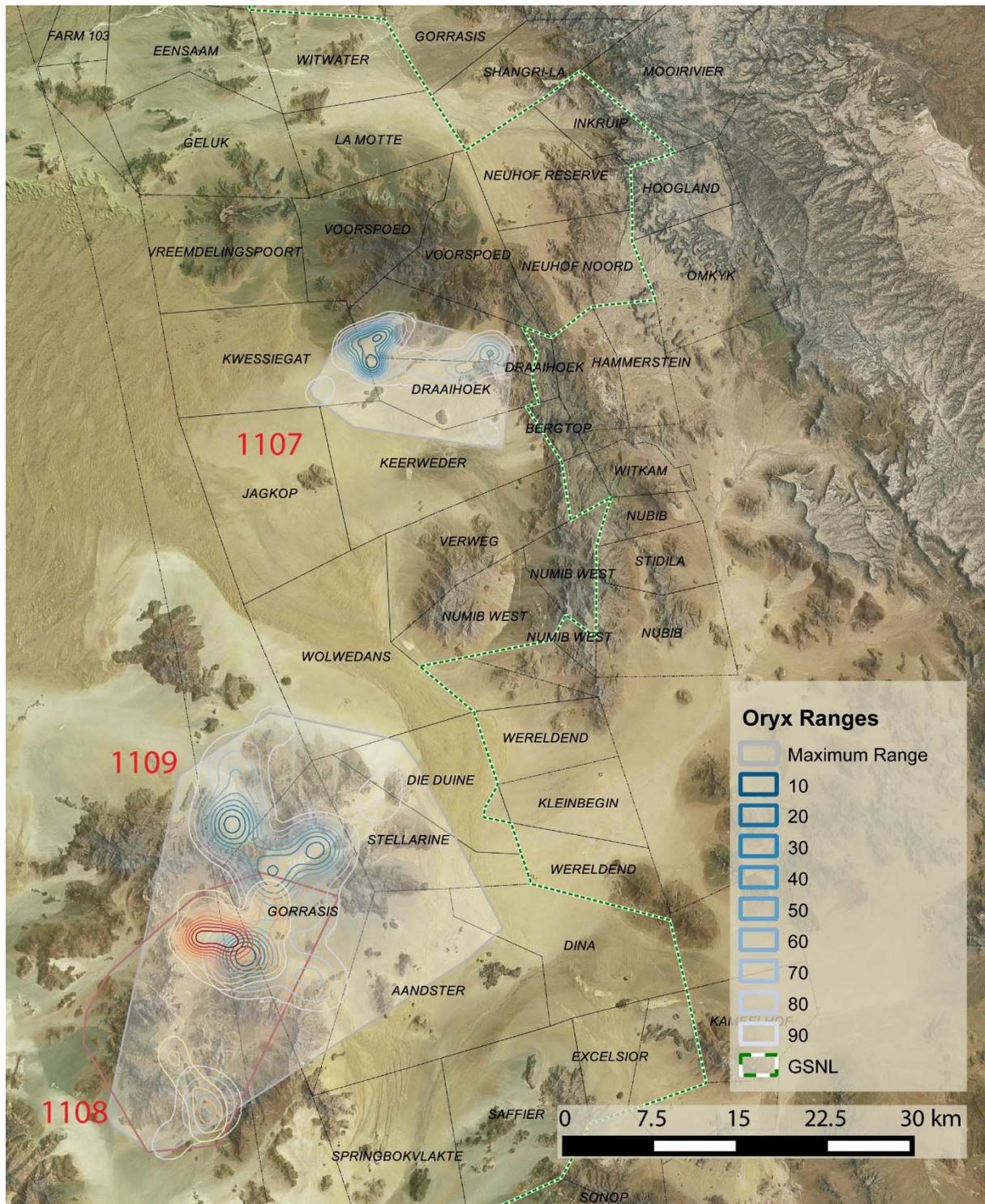
## Observations on the movements and home ranges of Hartmann’s Mountain Zebras and Oryx in the Greater Sossusvlei-Namib Landscape

John Mendelsohn and Martin Mendelsohn (RAISON)

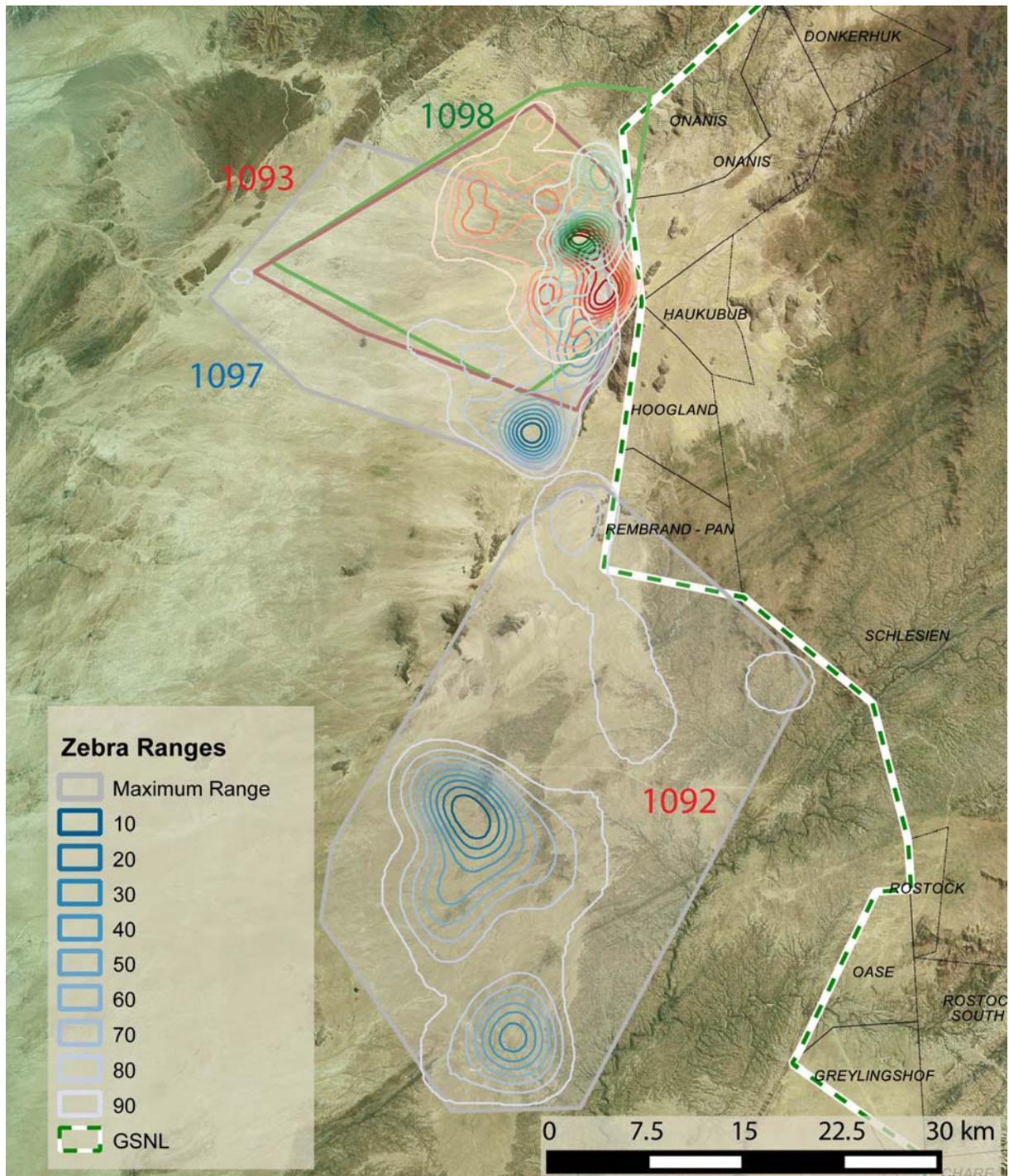
December 2014



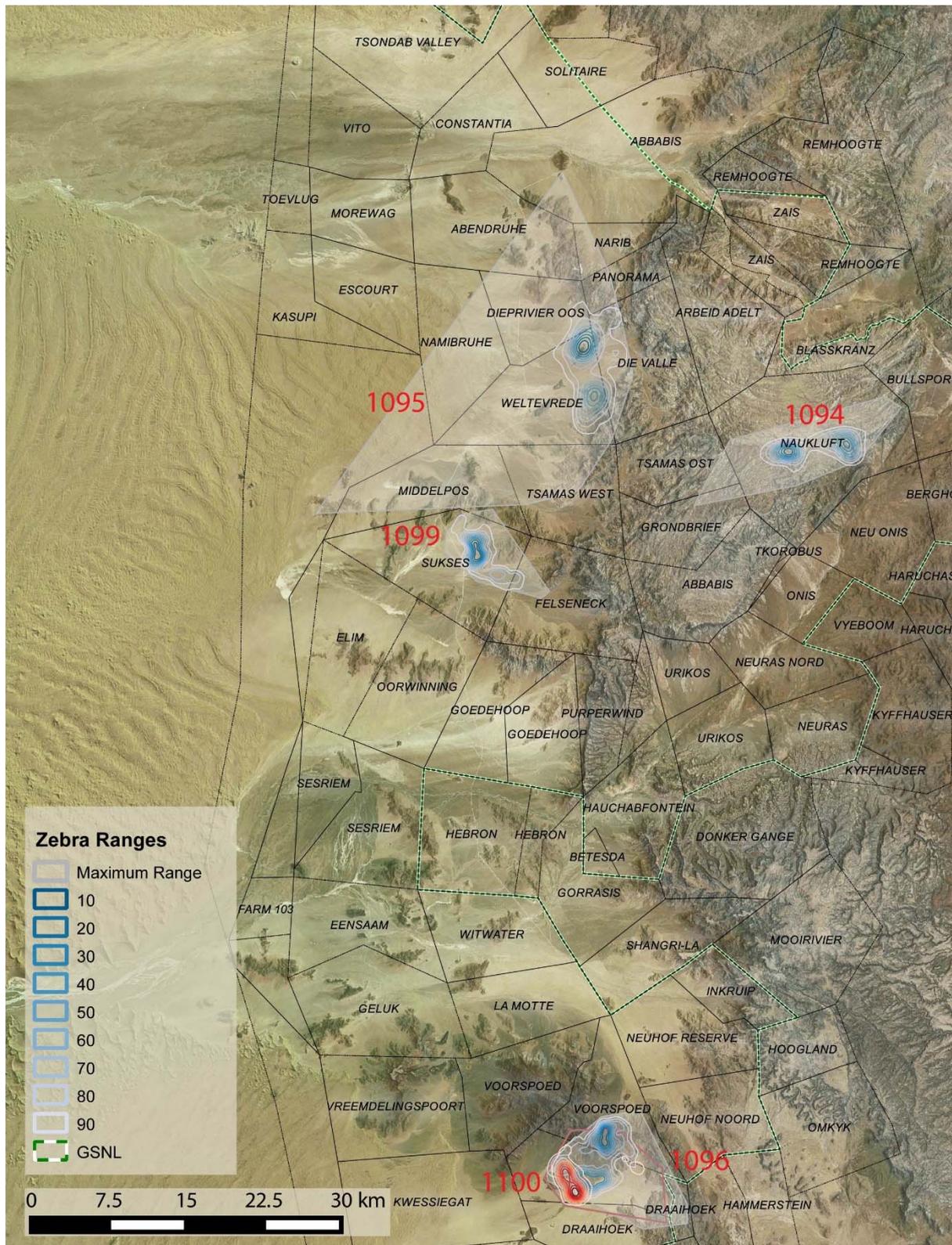
The home ranges and kernel density polygons which encompass between 90 and 10% of the locations of oryx numbers 1101 to 1106



*The home ranges and kernel density polygons which encompass between 90 and 10% of the locations of oryx numbers 1107 to 1100*



*The home ranges and kernel density polygons which encompass between 90 and 10% of the locations of zebra numbers 1092, 1093, 1097 and 1098*



*The home ranges and kernel density polygons which encompass between 90 and 10% of the locations of zebra numbers 1094, 1095, 1096, 1099 and 1100*

This document provides an update of information on the movements and locations of 9 Hartmann's mountain zebra and 9 oryx in the Greater Sossusvlei-Namib Landscape (GSNL). The report covers one year: from the last days of November 2013 when the transmitters were fitted to the end of November 2014. A previous report reviewed data collected during the first 7 months up to the 26<sup>th</sup> of June 2014.

The locations of the animals were recorded every 5 hours up until late July 2014 when the recording frequency was adjusted to one signal per day recorded at approximately 06h00.

Many more locations were thus collected each day during the first 8 months than in the last 4 months. To eliminate bias caused by the different collection frequencies, new sets of data were derived to provide for just one location per day. This was done by calculating the average position recorded each day during the first 8 months and adding these to the single daily locations collected in the last 4 months. As a result, all the data presented here are based on single daily locations or daily averages.

Averaging data collected at different times each day reduced the spread of points and also reduced the size of home ranges, given here as minimum convex polygons (MCPs) that enclose all locations. As a result, the sizes of some MCPs are somewhat smaller than those given in the first report.

Tables 1 and 2 provide information on the size of each animal's home range or MCP. The tables also report the sizes of 90% kernel zones which are areas in which 90% of activity was estimated to occur. Kernel areas for December 2013 to May 2014 and from June to November 2014 are given separately to compare areas used during the wetter summer and autumn seasons and drier winter and spring, respectively.

**Table 1. Summary information for nine Hartmann's mountain zebras**

Transmitter number	Sex	Area	Home range (MCP) (hectares)	90% location density (hectares)	
				December - May	June - November
1092	Female	<i>Ganab</i>	109,898	62,135	17,782
1093	Female	<i>Ganab</i>	38,741	21,256	10,109
1094	Male	<i>Tsondab – Naukluft</i>	9,817	2,430	1,958
1095	Male	<i>Tsondab – Naukluft</i>	52,020	7,031	4,009
1096	Male	<i>Namib Rand Nature Reserve – Chowagas</i>	9,567	4,674	2,832
1097	Male	<i>Ganab</i>	52,162	23,288	9,671
1098	Male	<i>Ganab</i>	40,493	12,546	4,152
1099	Female	<i>Tsondab – Naukluft</i>	4,802	1,649	2,411
1100	Female	<i>Namib Rand Nature Reserve – Chowagas</i>	7,588	2,347	803

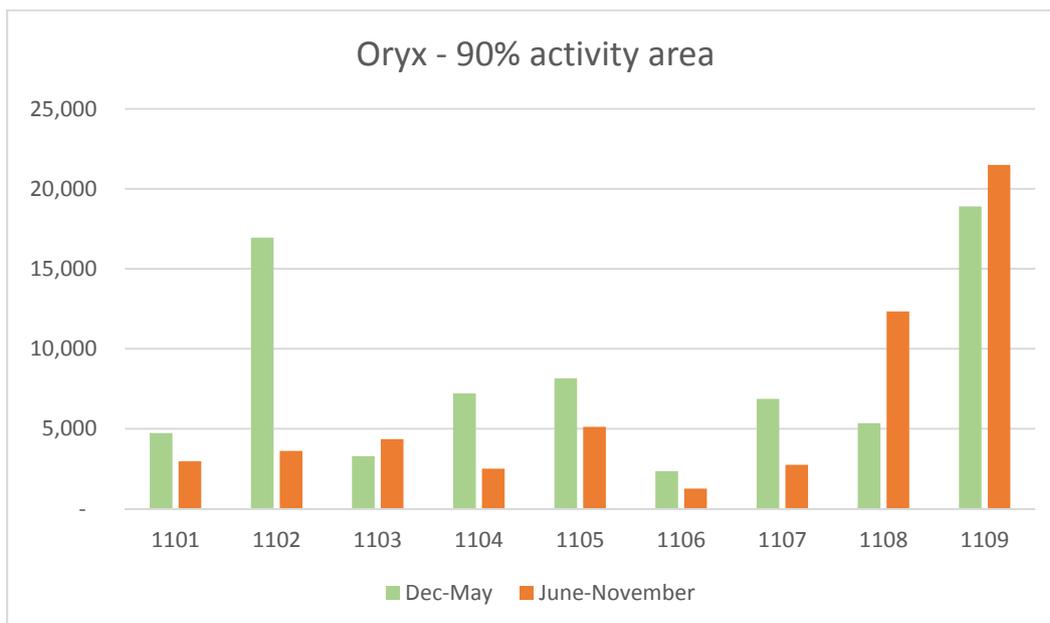
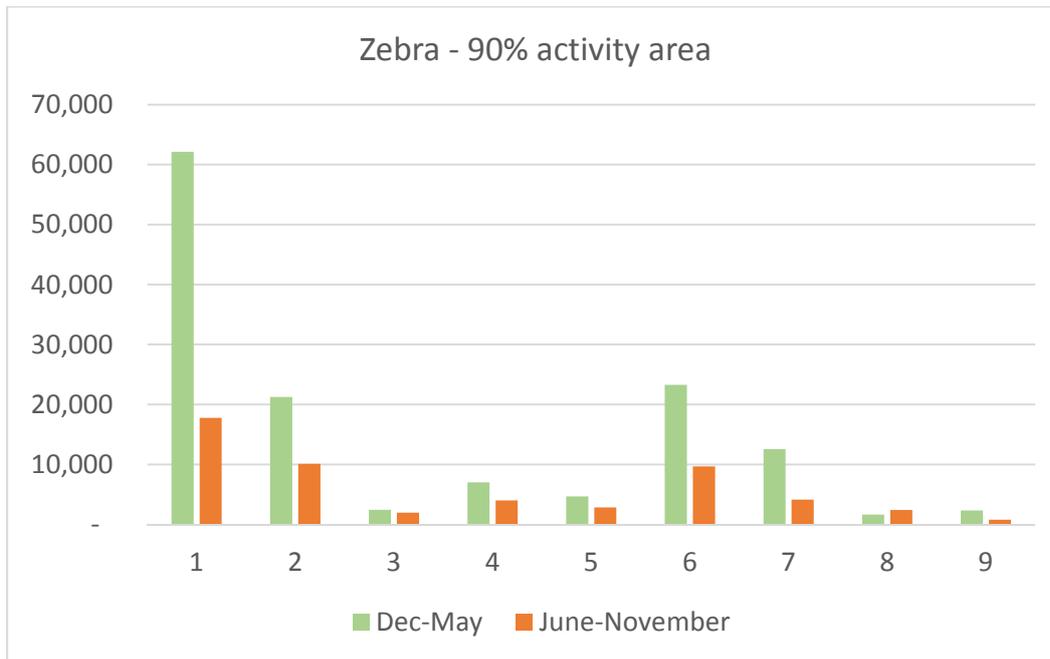
**Table 2. Summary information for nine oryx**

Transmitter number	Sex	Area	Home range (MCP) (hectares)	90% location density (hectares)	
				December - May	June - November
1101	Female	<i>Tsondab – Naukluft</i>	7,828	4,735	2,966
1102	Female	<i>Tsondab – Naukluft</i>	22,444	16,945	3,621
1103	Female	<i>Tsondab – Naukluft</i>	11,997	3,284	4,353
1104	Female	<i>Sesriem-Sossusvlei – Elim</i>	18,407	7,207	2,513
1105	Female	<i>Sesriem-Sossusvlei – Elim</i>	19,309	8,154	5,119
1106	Female	<i>Sesriem-Sossusvlei – Elim</i>	2,786	2,348	1,262
1107	Female	<i>Namib Rand Nature Reserve – Chowagas</i>	14,624	6,874	2,749
1108	Female	<i>Namib Rand Nature Reserve – Chowagas</i>	31,101	5,358	12,333
1109	Female	<i>Namib Rand Nature Reserve – Chowagas</i>	77,360	18,902	21,494

The use of space by most zebra and oryx appeared to change during the year. In the summer and ensuing autumn months following probable rain and new plant growth, most individuals ranged over greater areas than during the driest period between June and November (Figure 1). This was true for 8 of the 9 zebra and 6 of the 9 oryx, and the difference in 90% kernel areas was several-fold for some of the animals. Details in the maps for each individual also show how the seasonal changes in range use occurred.

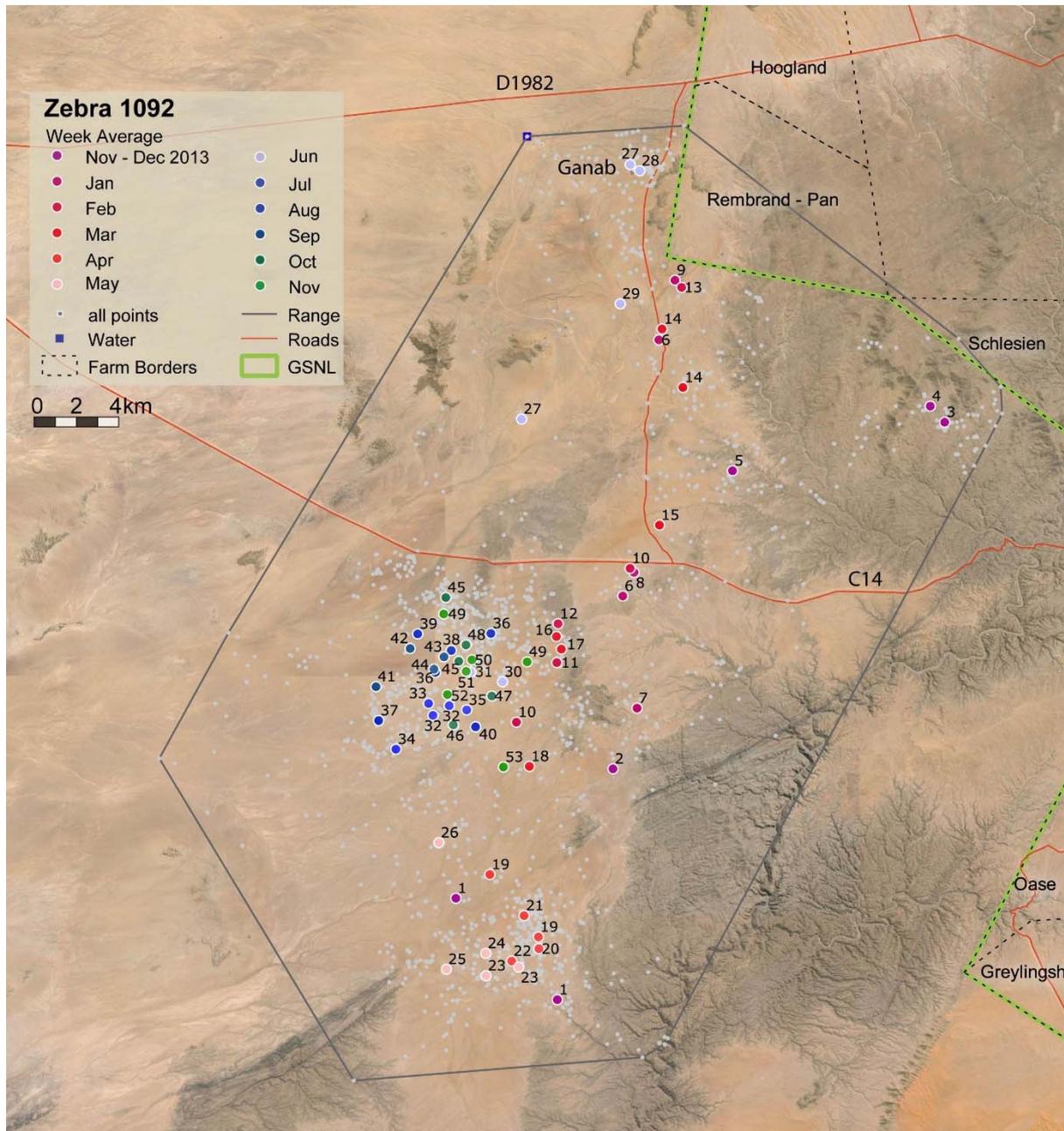
There also appeared to be a difference between zebra and oryx in the way in which their ranging behaviour changed during the year. During the driest months, each zebra tended to concentrate its activity in one relatively small area. Many oryx, by contrast, seemed to focus their activity during the dry months on a number of small separate areas, each individual successively moving from one small area to another. For example, one oryx moved into an area of about 100 hectares which had been burnt the previous year where it perhaps foraged on the margins of perennial grasses that surround fairy circles (see the maps for Oryx 1105).

Figure 1: Sizes in hectares of 90% kernel areas between December and May compared to those from June to November for zebra (top) and oryx (below).

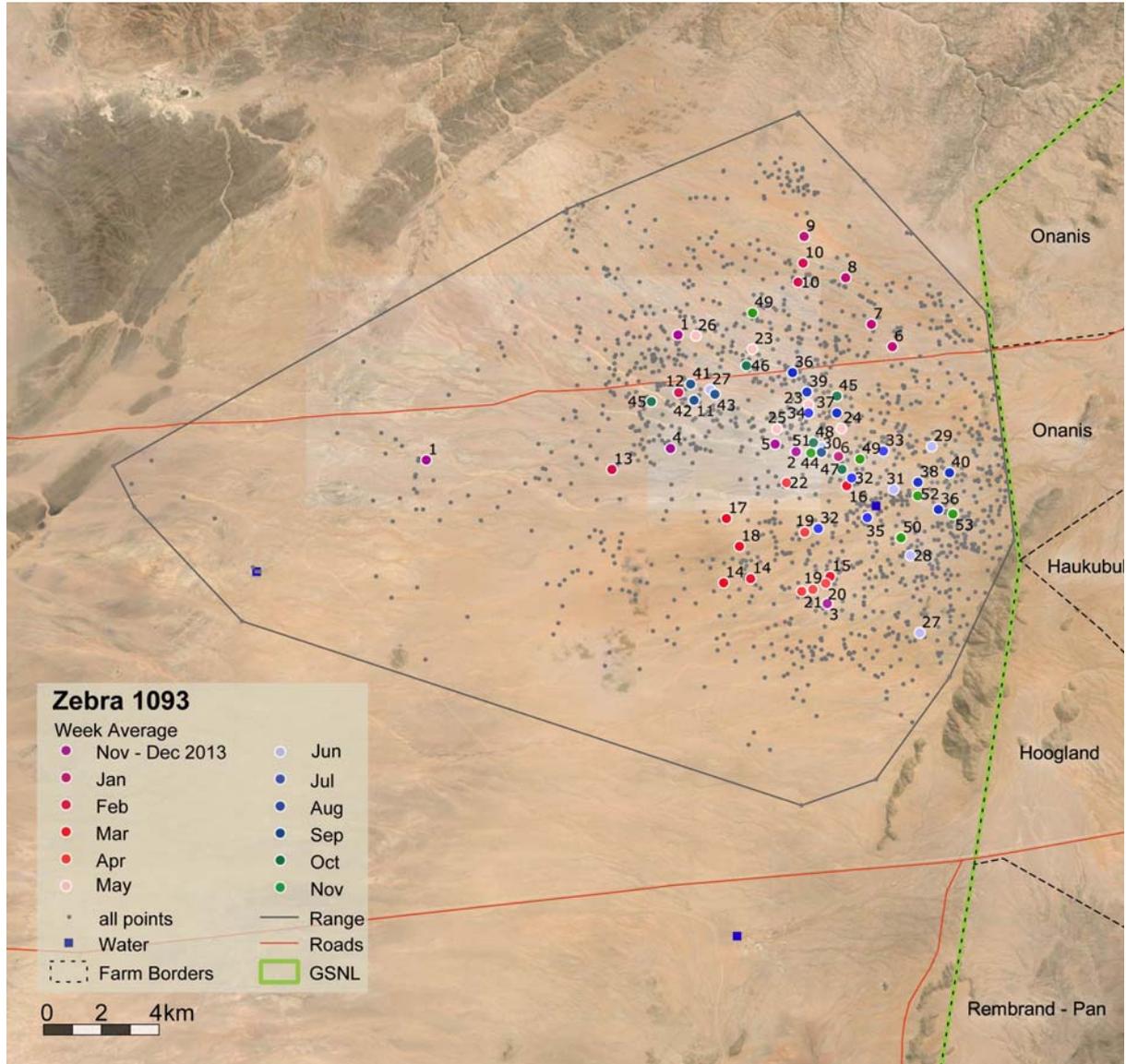


## MAPS OF INDIVIDUAL ZEBRAS

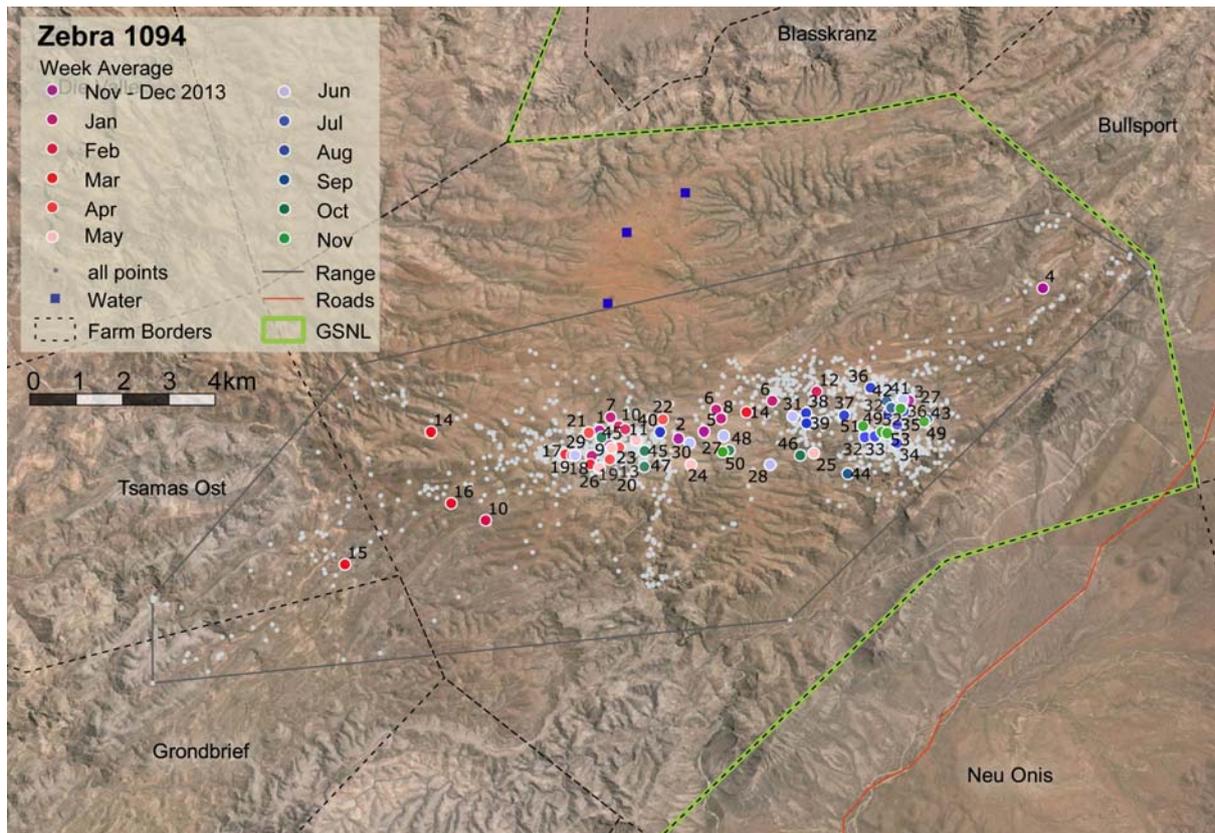
Each location is shown as an individual dot while the average location for each week is shown as a circle coloured per month. The weeks are numbered, 1 being the last week of November 2013 and 53 being the last week of November 2014. 7-day weeks that straddled the end and start of two months are shown as two circles with the same number and colour as the month into which the second half of the week falls.



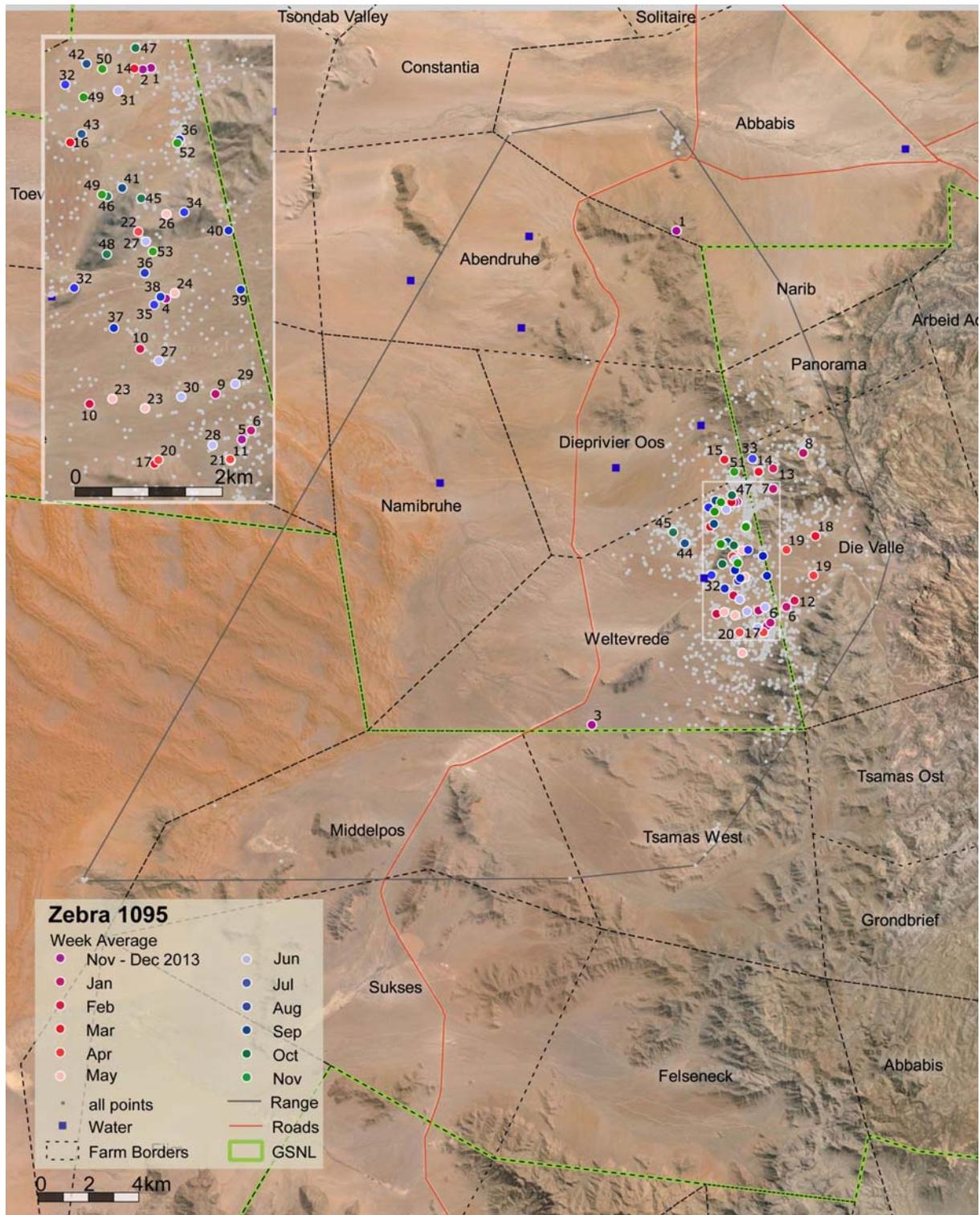
Zebra 1092 has a much larger home range (110 square kilometres) than any zebra or oryx. Its use of that area has also been extensive, with 90% of its activity being spread across 49 square kilometres or 45% of the total home range. From July onwards, the animal focussed its attention on a relatively small area south of the main C14 district road. This was in contrast to its more wide-ranging activity between November and June.



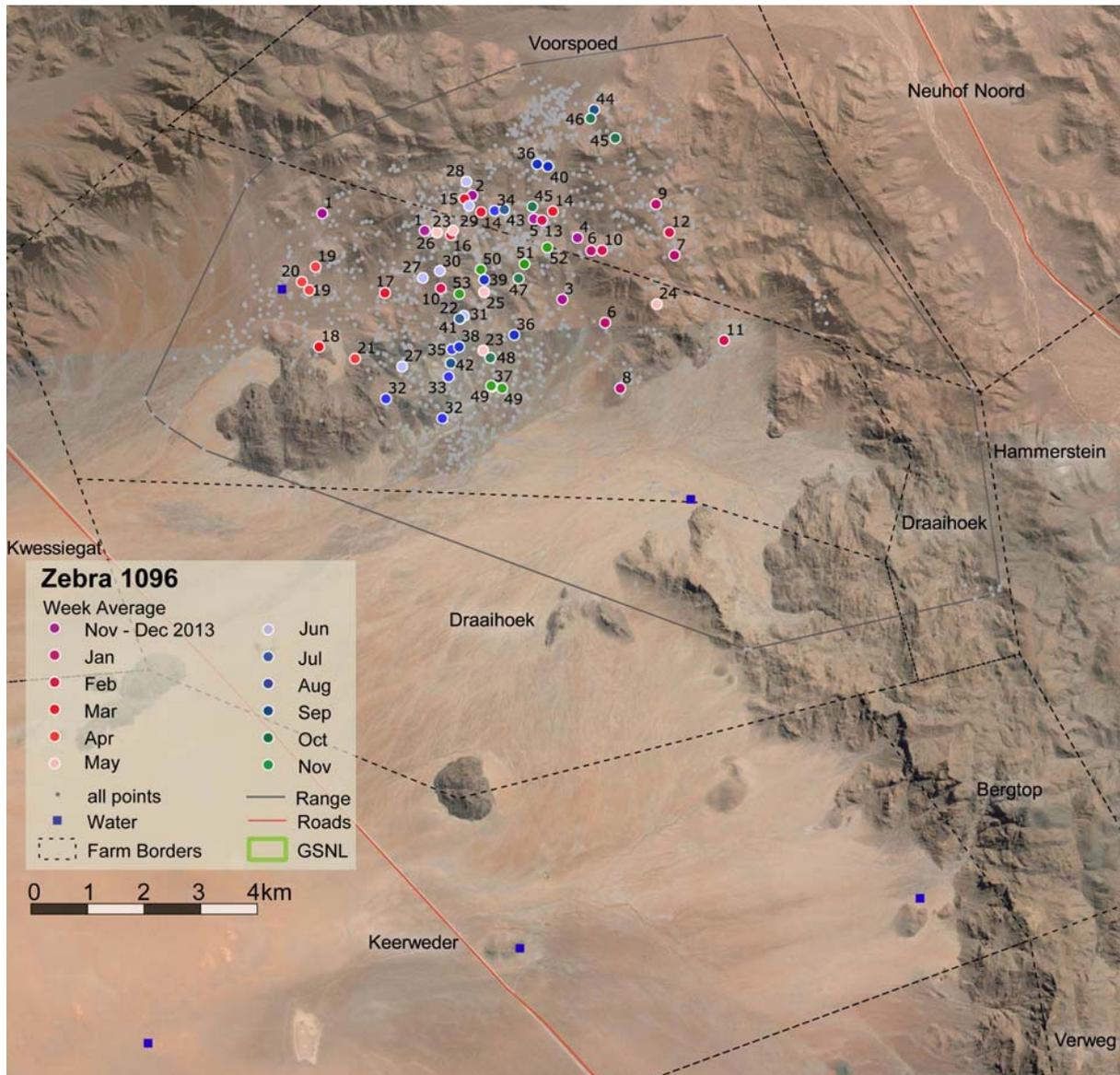
Zebra 1093, 1097 and 1098 occupied much the same area in the eastern gravel plains and north of Ganab. During the past year, none of the three zebras have apparently ever crossed the eastern boundary fence of the Park into the neighbouring farms.



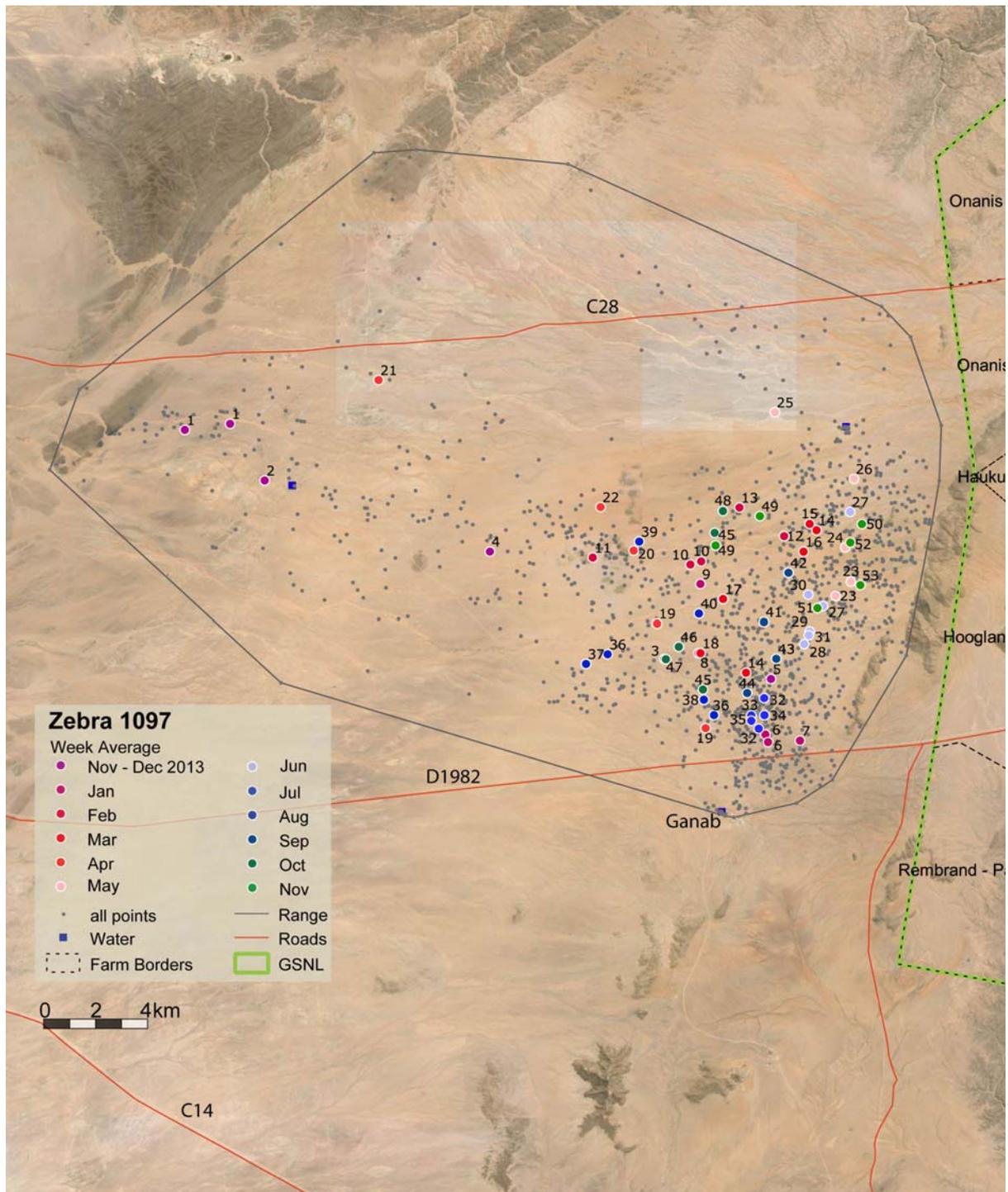
Zebra 1094 (male) occupies a relatively small home range (9.8 square kilometres) within the Naukluft Mountains, and 90% of its activity was concentrated in an even smaller area of about 2.6 square kilometres. Most of the dry months from June to November were spent in the eastern area of its range.



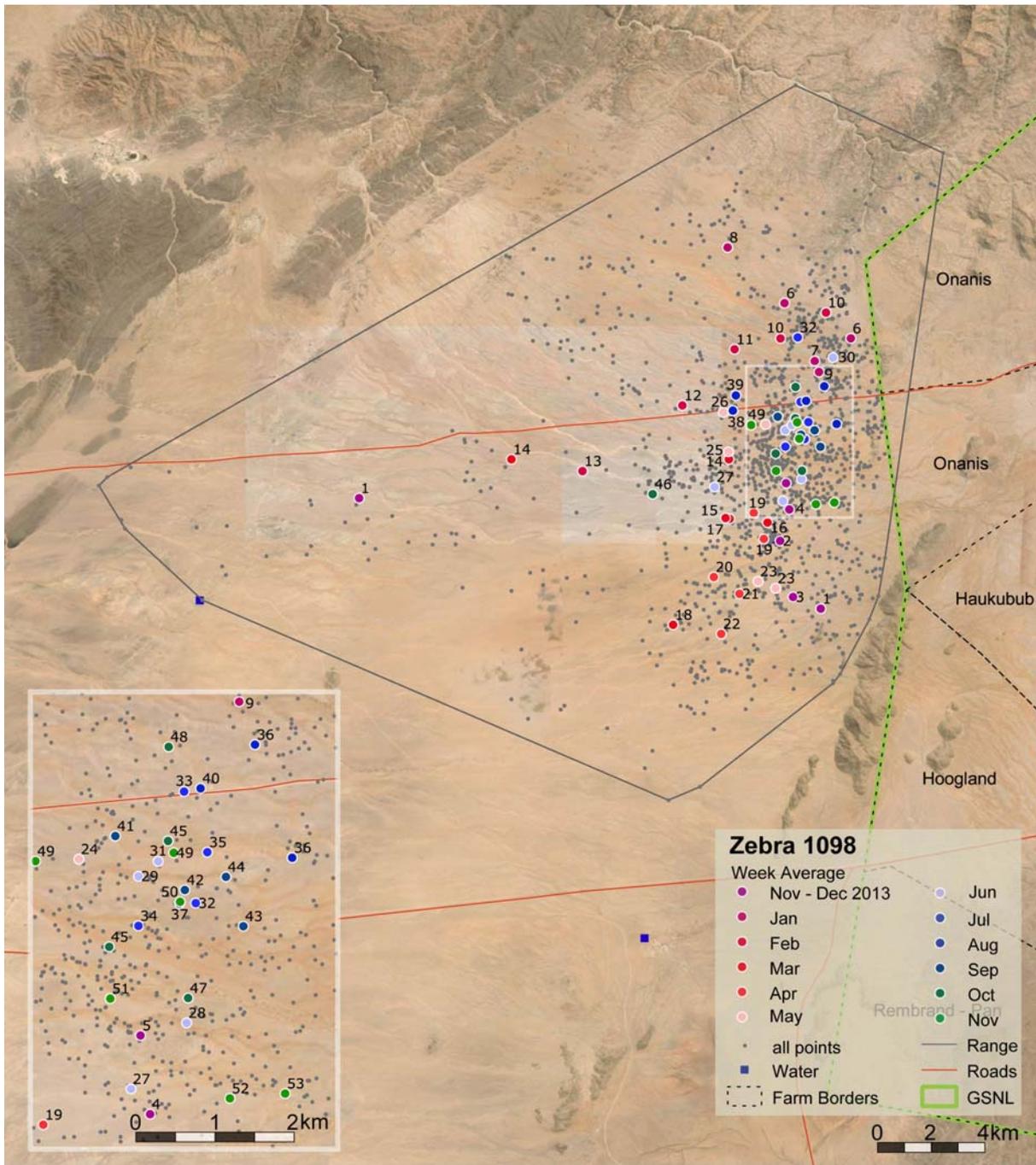
Zebra 1095 (male) seemingly divided most its time between hilly ground and lower lying gravel plains in a rather small area on Die Valle and Weltevrede farms. At times, however, the animal has made extensive movements up to 30 kilometres away from the centre of its range.



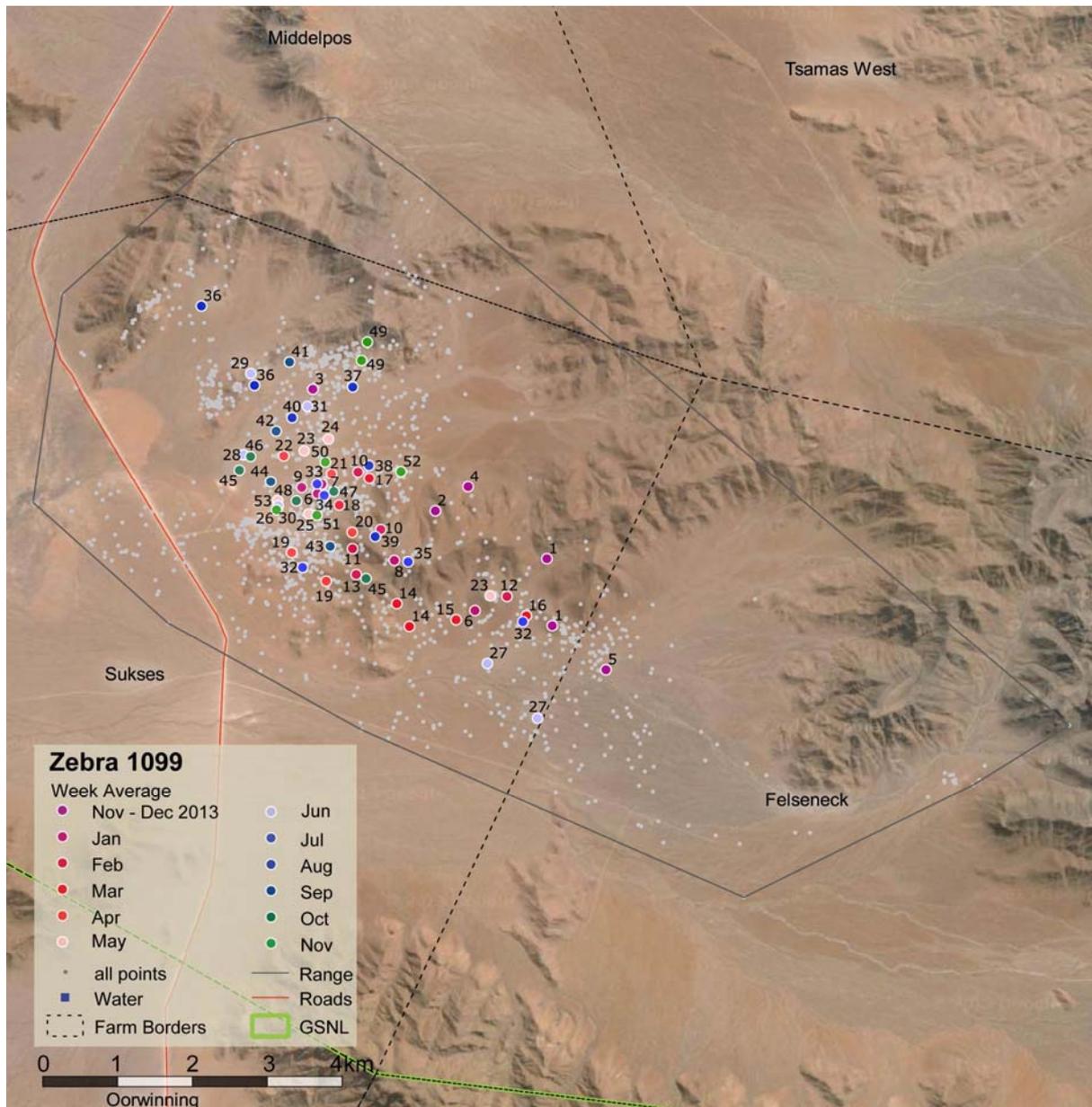
Zebra 1096 (male) occupies an area straddling the escarpment and gravel plains, rather like zebra 1095. However, this animal has seldom ventured out of the hills and has not made any wide ranging movements of the kind made by male 1095.



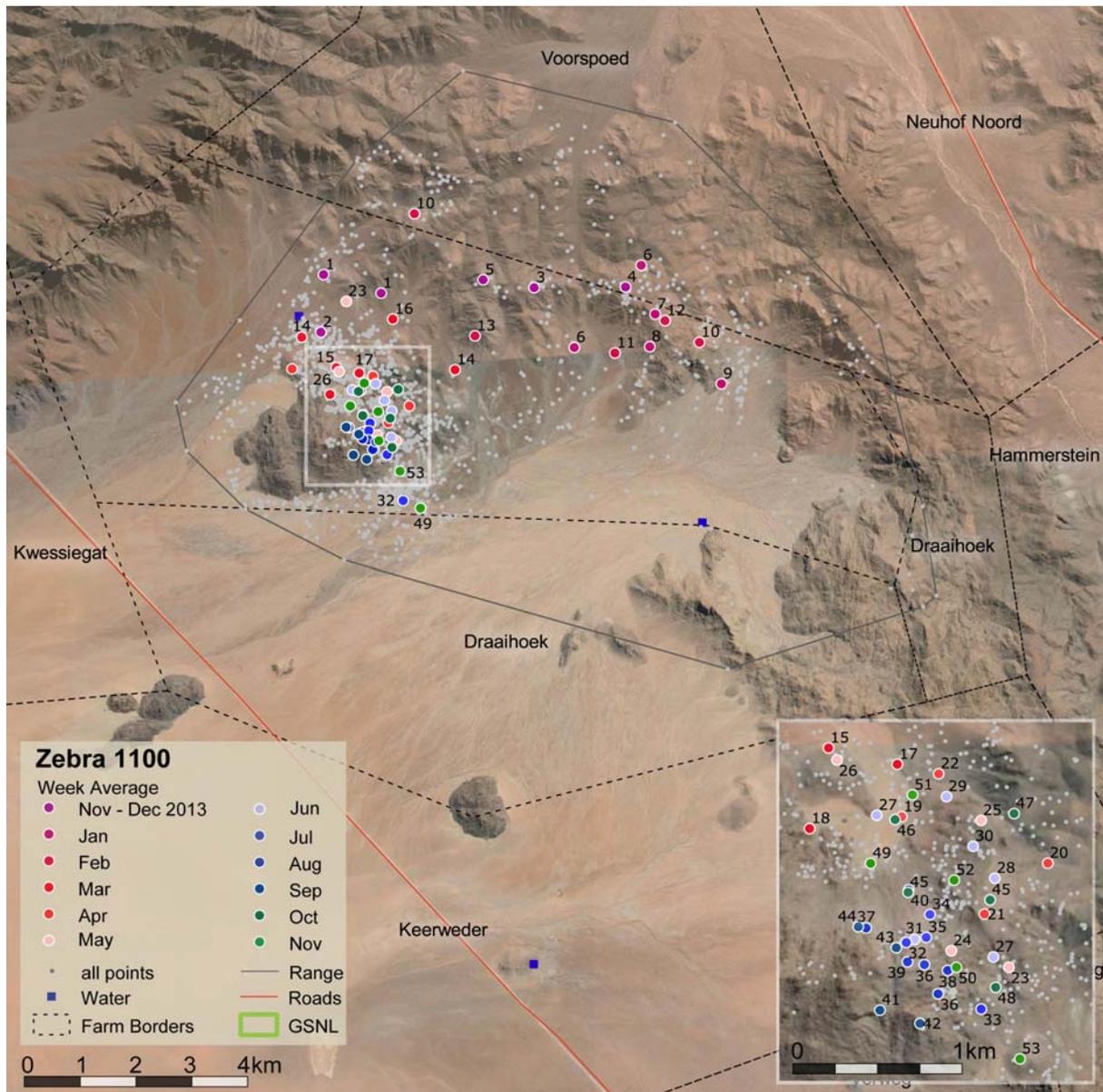
Zebra 1097 (male) is living on the gravel plains generally between the D1928 and C28 district roads. Of its 52 square kilometre home range, about 15 square kilometres or 29% has encompassed 90% of its activity. Any movement to the east appears blocked by the eastern border fence of the Namib Naukluft Park. This animal appears to have visited the water hole at Ganab from time to time.



Zebra 1098 (male), 1097 (male) and 1093 (female) had similar sized home ranges, respectively 40.4, 52.1 and 38.7 square kilometres. The activity of all three has been concentrated in the east of their home ranges, particularly so from June onwards in the winter and autumn months. Prior to that the animals moved more extensively to the west.



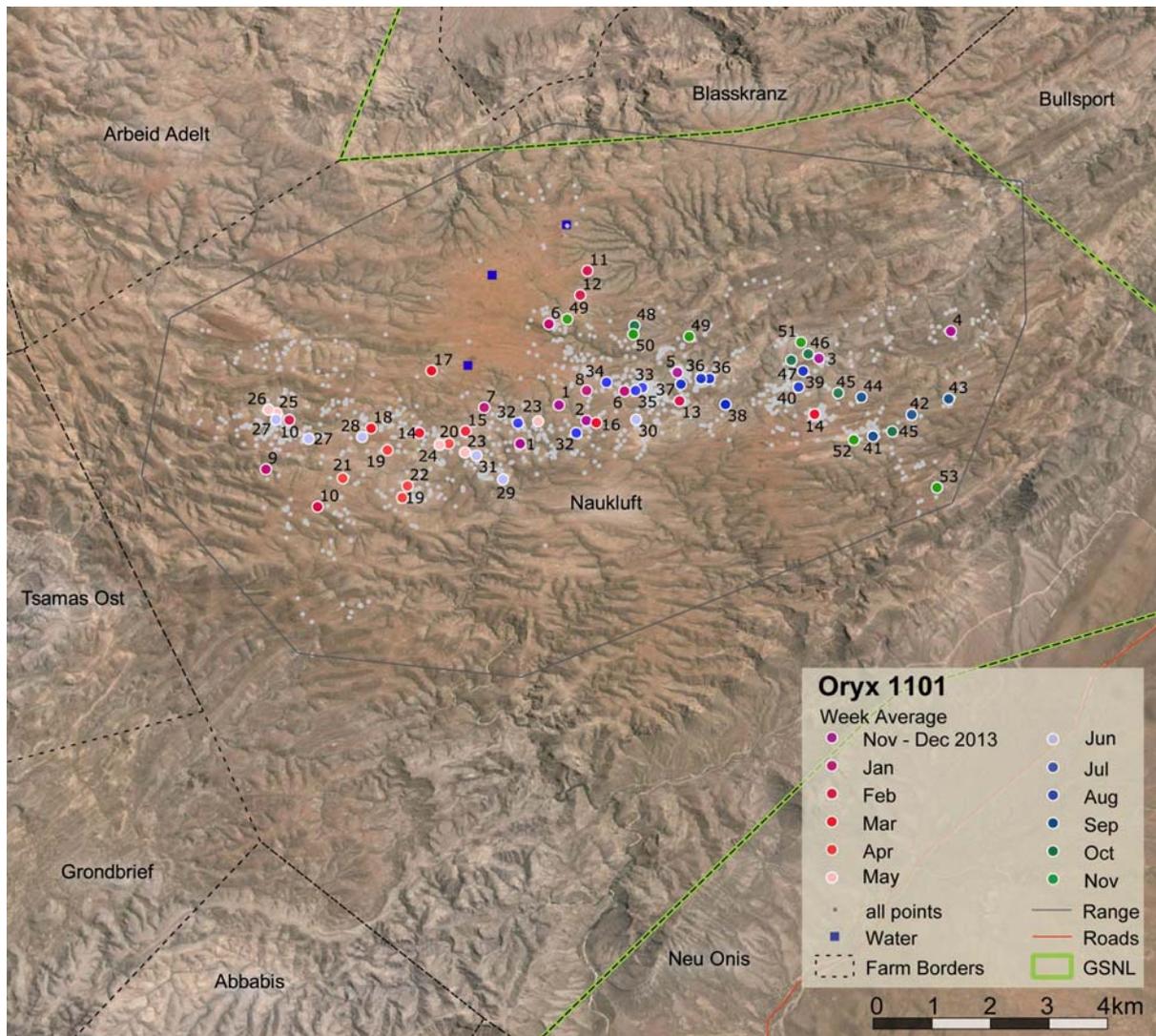
Zebra 1099 (a female) seemingly divides its time between hilly ground and surrounding gravel plains, mainly on the farm Sukses. Its home range of 4.8 square kilometres is much the smallest of the nine zebra, and 23 times smaller than the largest home range of 110 square kilometres used by zebra 1092.



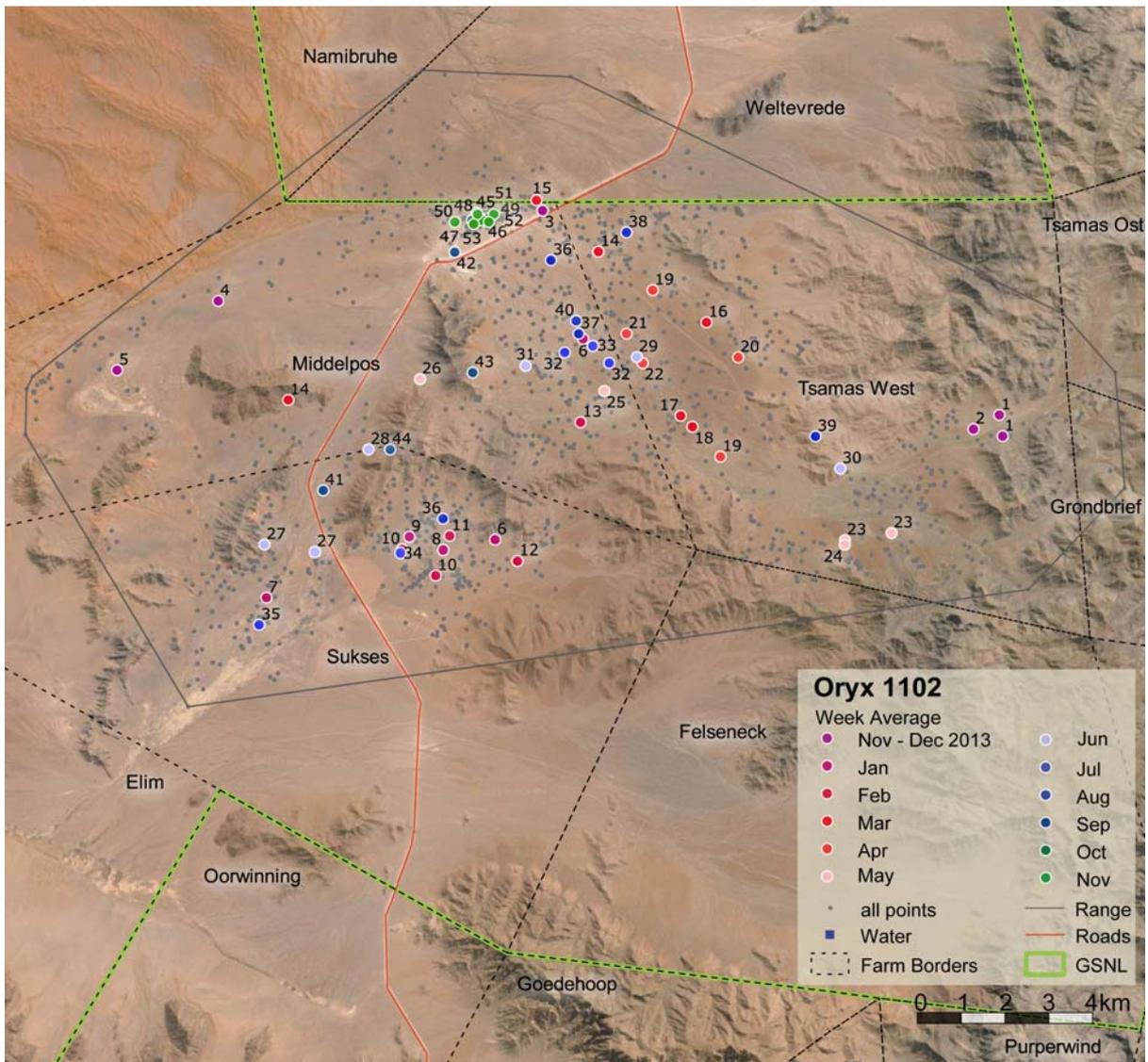
Zebra 1100 (female) and 1096 (male) have occupy very similar home ranges, largely in the hills with only occasional ventures out on to the gravel plains below. During the winter months from June onwards and continuing to November, 1100 has confined its activity to an area many times smaller than in previous months.

## MAPS OF INDIVIDUAL ORYX

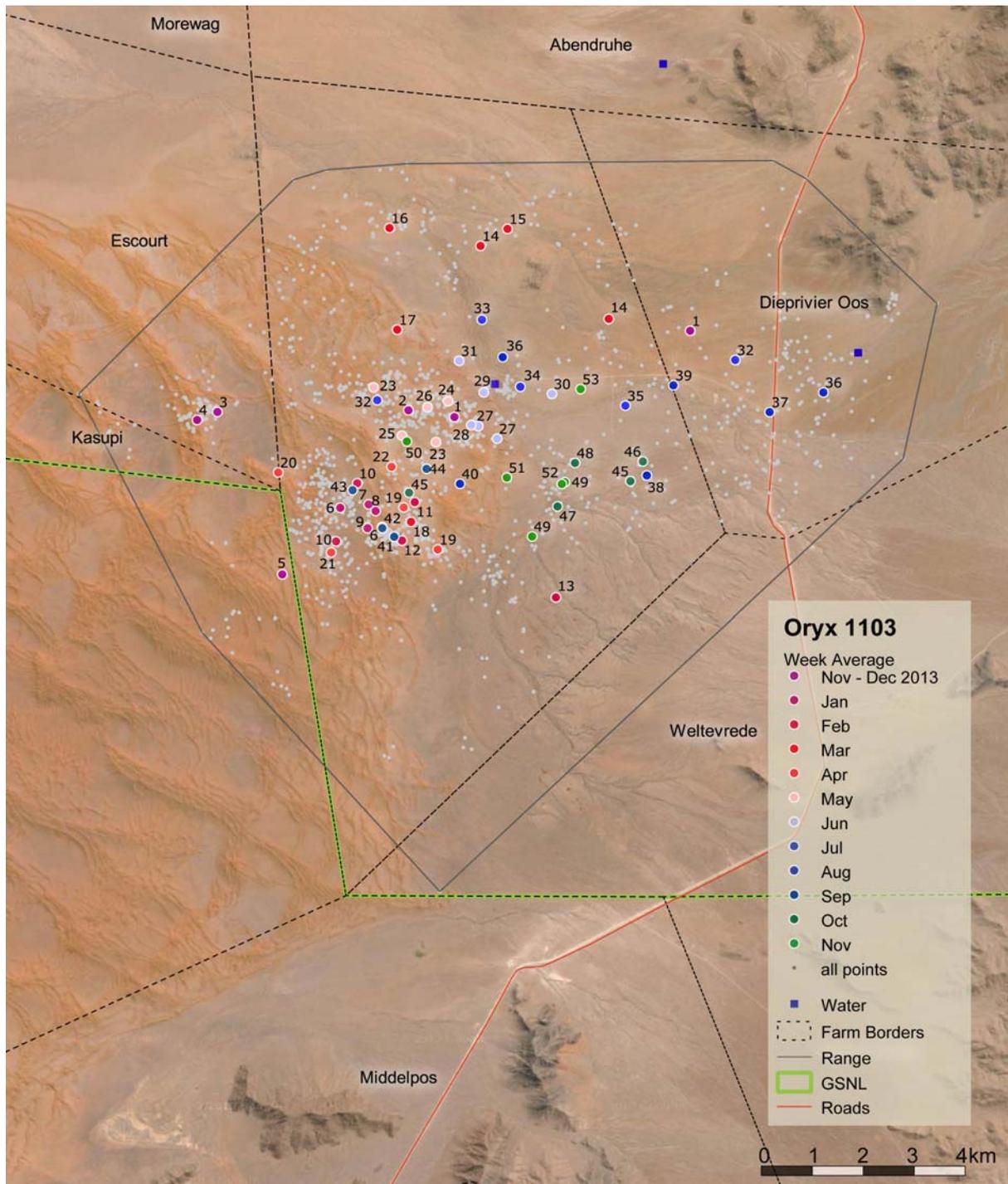
Each location is shown as an individual dot while the average location for each week is shown as a circle coloured per month. The weeks are numbered, 1 being the last week of November 2013 and 53 being the last week of November 2014. 7-day weeks that straddled the end and start of two months are shown as two circles with the same number and colour as the month into which the second half of the week falls.



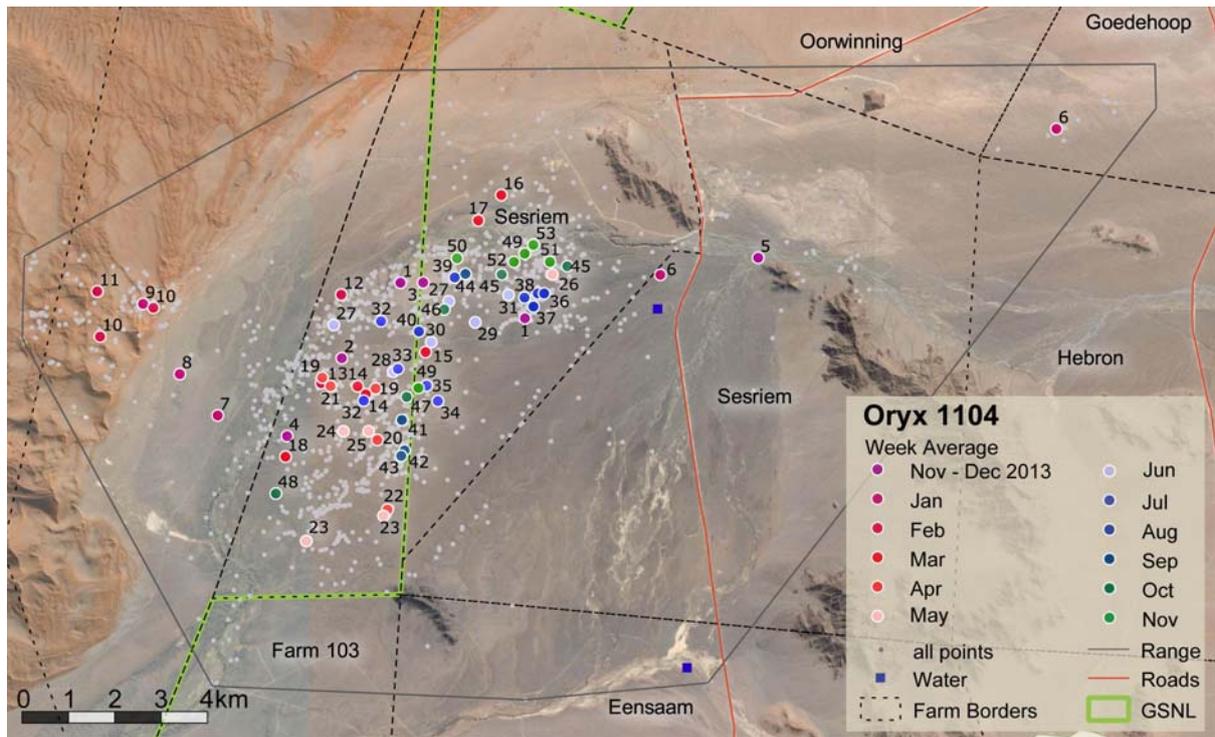
Female Oryx 1101 and Zebra 1094 have occupied virtually the same relatively small area in the Naukluft Mountains west of Bülsport.



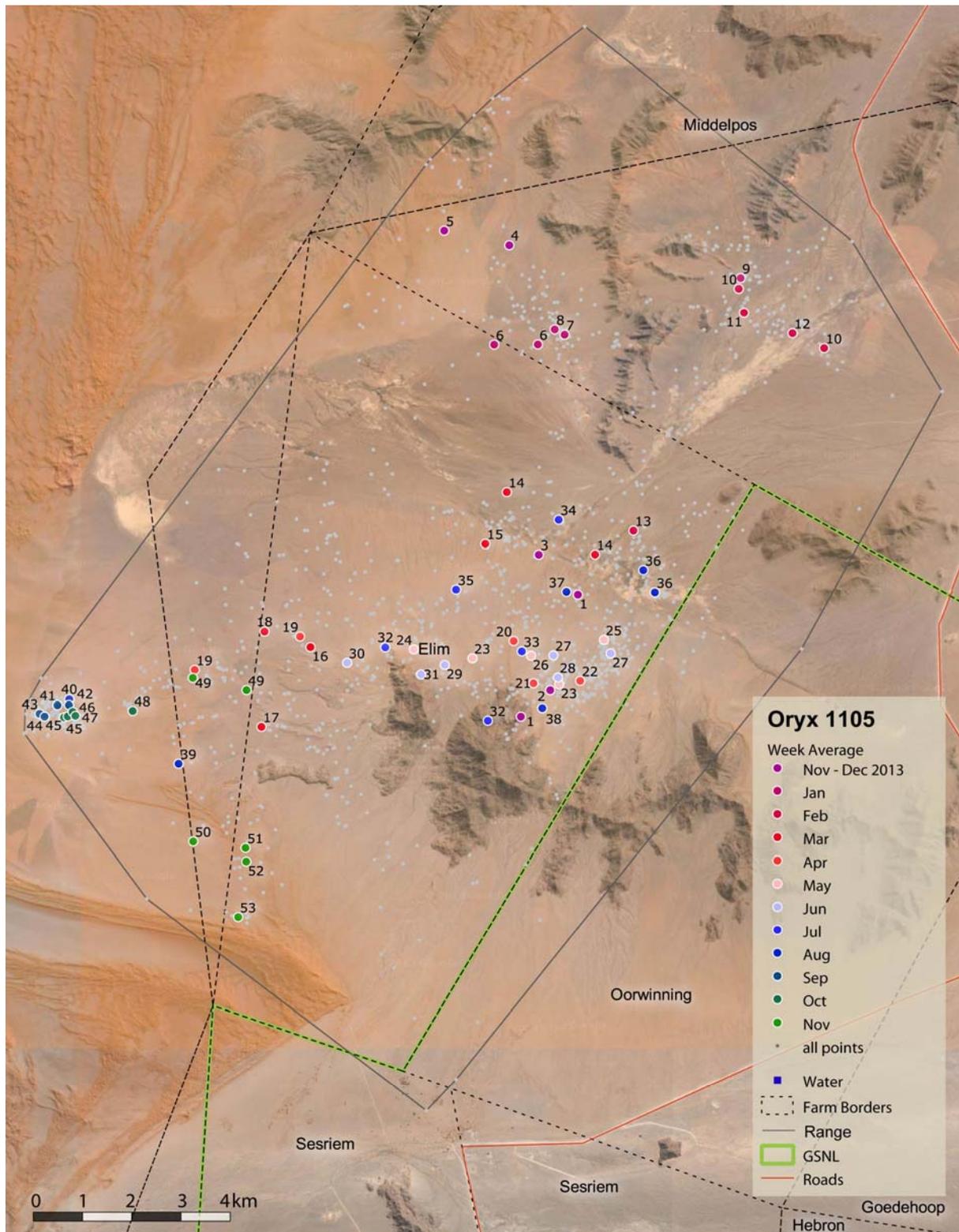
Oryx 1102. The movements of this female have been extensive and have regularly covered much of its home range of about 22,400 hectares, unlike the more concentrated activities of most other animals. The particular concentration of activity in the central northern parts of its range in October and November is a notable exception.



Oryx 1103. From the 6<sup>th</sup> to the 21<sup>st</sup> of December this female focussed all of its activity in a small areas of dunes. Why, perhaps calving? The total home range amounted to about 12,000 hectares in which 90% of its activity was concentrated in 4,200 hectares.



Oryx 1104. This female has spent all its time on the gravel plains south of Sesriem except, interestingly, for about 4 weeks in January and February when it was in the dune field to the east.



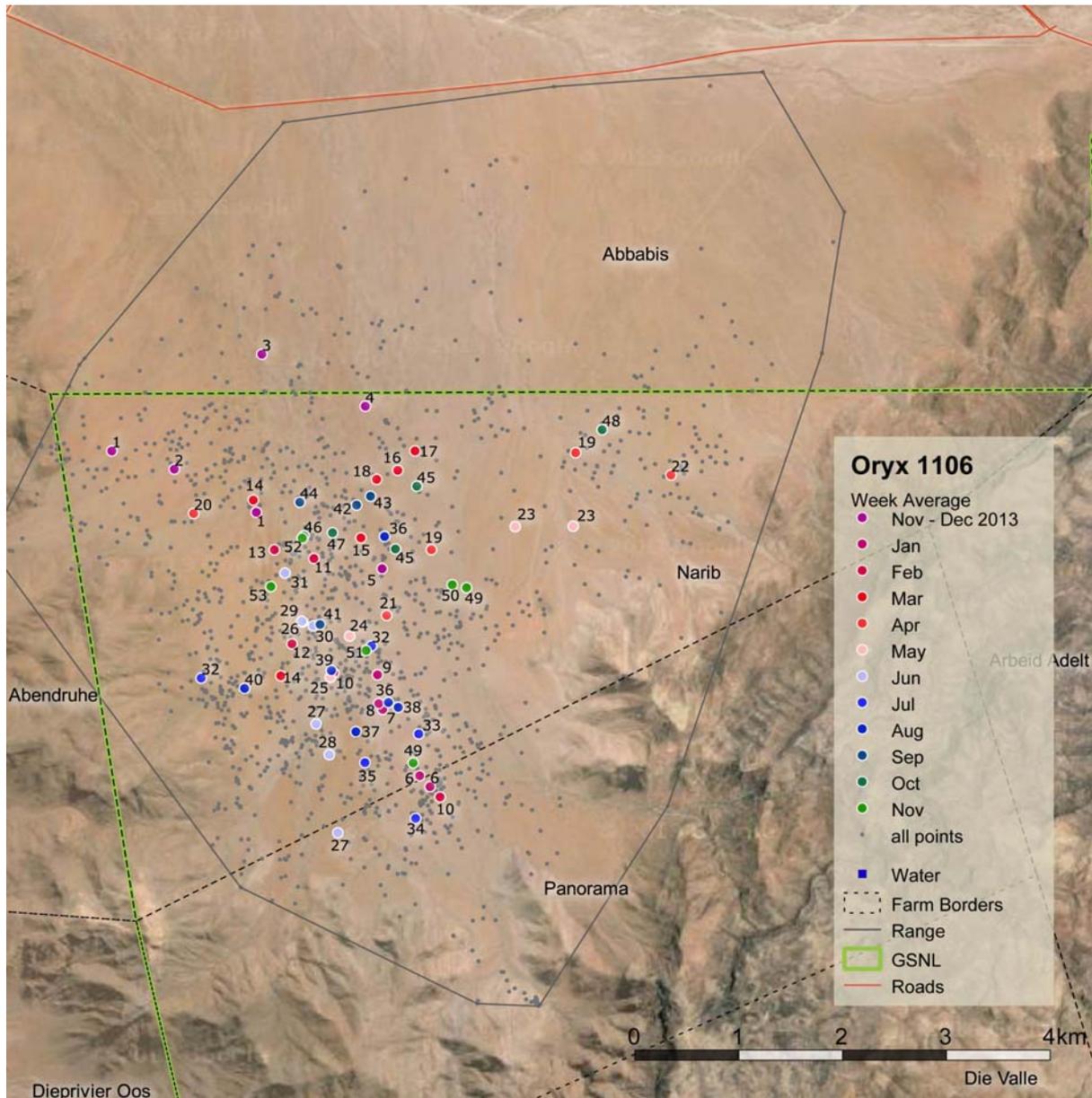
Oryx 1105. This oryx lives north of Sesriem, largely on the farms Middlepos and Elim. Its home range has covered about 19,300 hectares. Between the 3<sup>rd</sup> weeks of August and October 2014 the animal spent all its time clustered in the west of its range. Quite fortuitously, the image available in Google Earth for this area shows that the oryx concentrated its time in an area that had obviously been burnt sometime prior to July 2013, which is when this image was captured. Close inspection of the individual points where the oryx was mapped suggests that its activity was frequently close to the edges of fairy circles, perhaps because it was feeding on perennial grass that had grown after the fire. This is all speculation, of course, but further investigation and experimental testing of associations between fairy circles and the foraging of oryx might be useful.

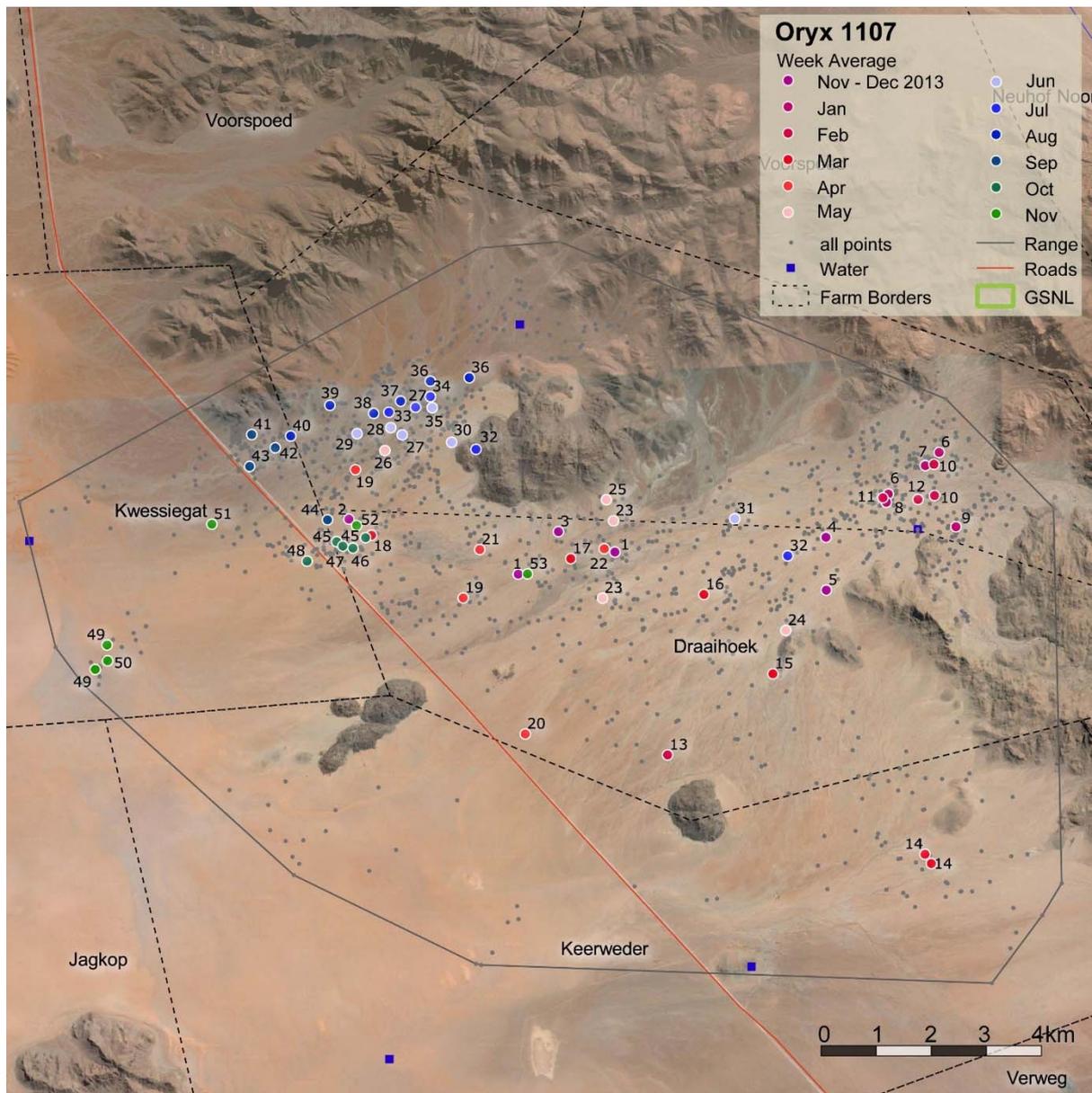


The burnt area (dark) in which oryx 1105 spent most of its time between 23 August and 23 October 2014.

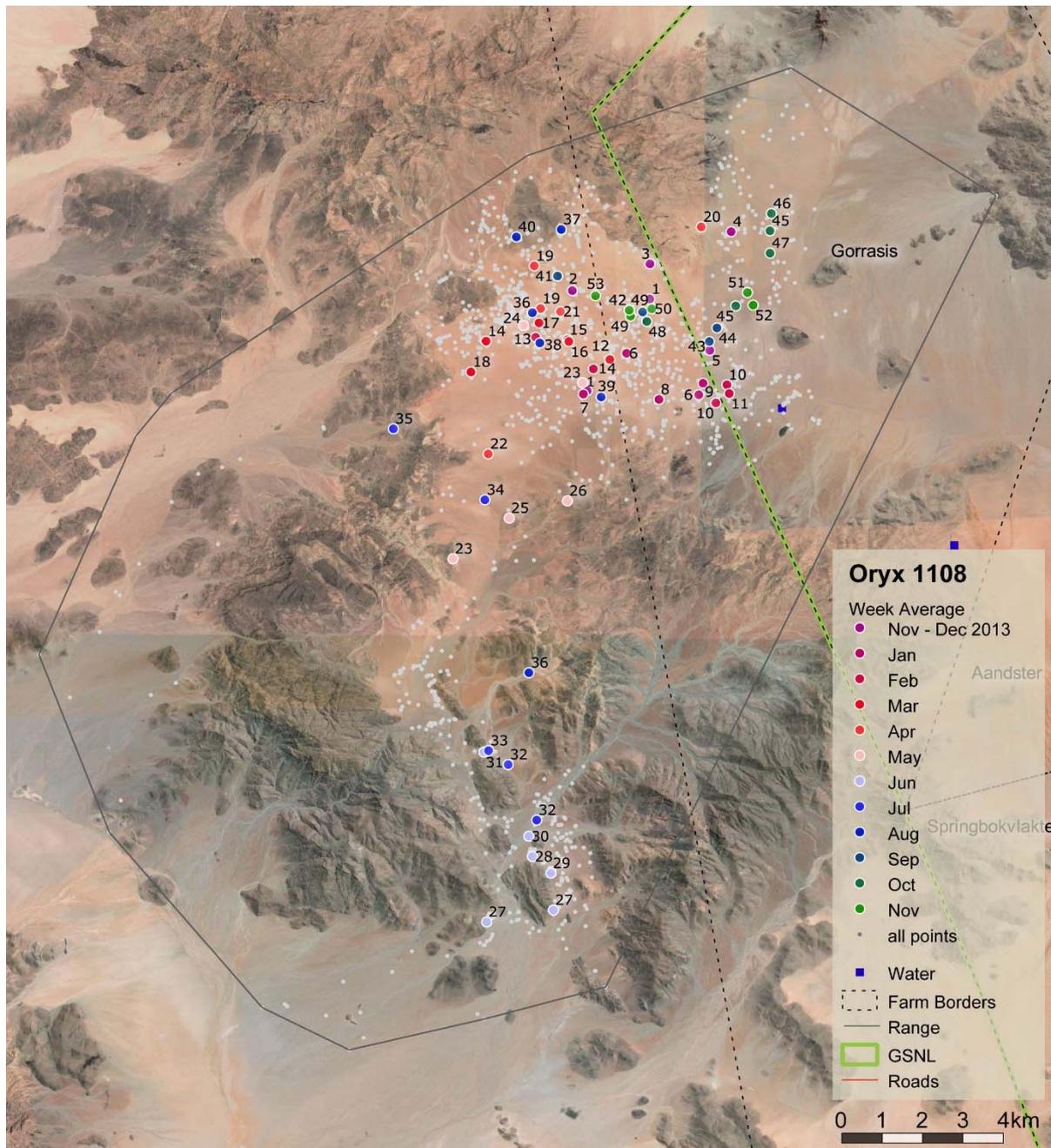


Many of the points (black dots) where oryx 1105 was located were very close to the edges of fairy circles within the burnt area.

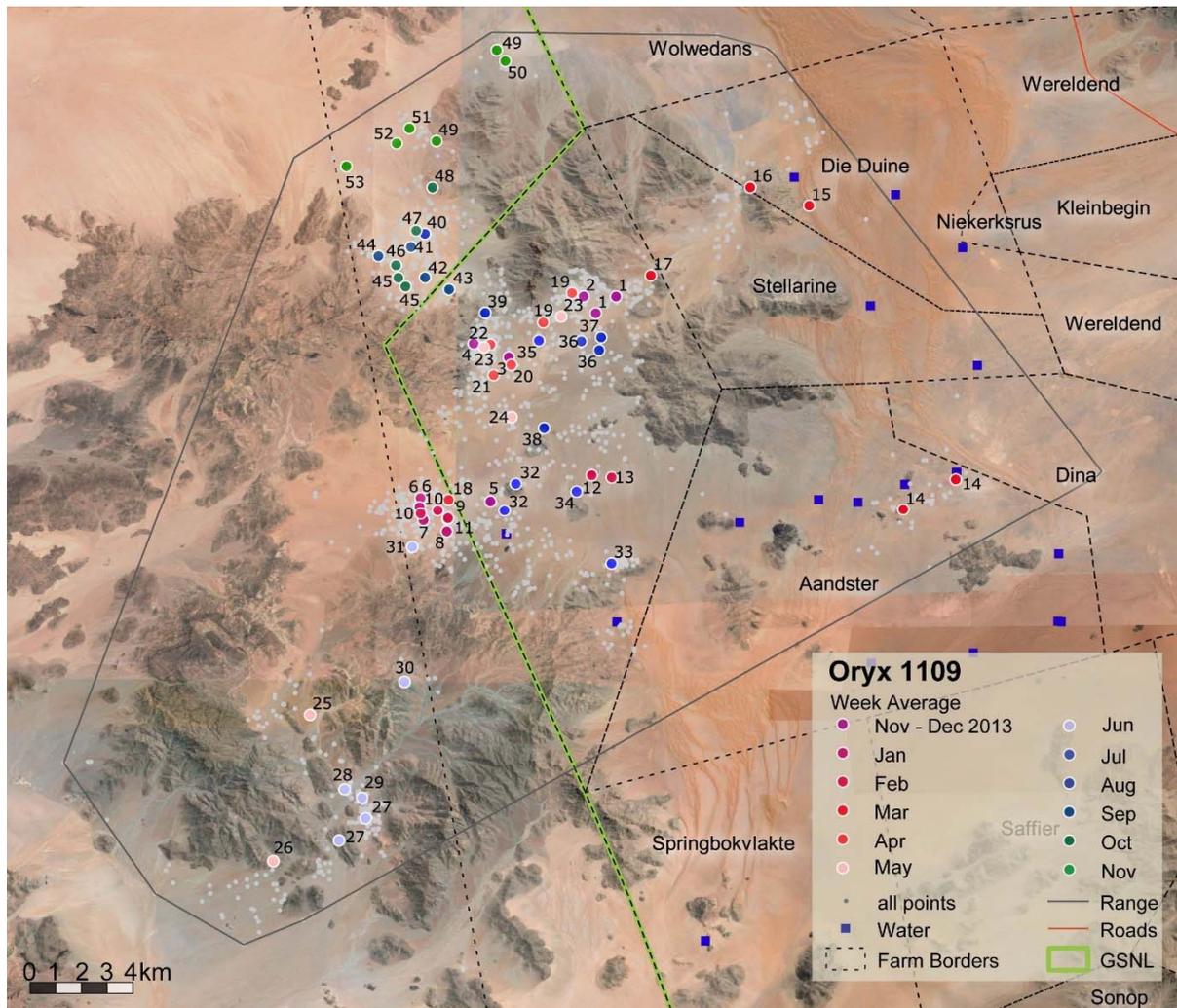




Oryx 1107. Most of the other oryx ranged widely, seldom concentrating their activity for any length of time. However, this female successively shifted from one area to another: first and broadly in the eastern areas of its range between November and May, then to a small area in the north-west for the months of June to September, and then to other more focussed areas in October and November.



Oryx 1108. This female and 1109 occupy much the same area, and both spent several weeks in a small area of valleys in the south of their range in June and July.



Oryx 1109. This female had by far the largest home range (about 77,000 hectares). Within that area, however, its activities were often localised.

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