Q1 2020 UPDATED LION & CHEETAH FIGURES

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MARA PREDATOR CONSERVATION PROGRAMME

We are pleased to present updated lion and cheetah figures from the 2019 survey period, which spanned from August 1st-October 31st, with our first quarterly report.

Lions

New lion figures

Table 1 shows estimates for lion density, abundance, and sex ratio for lions over the age of one year in the Masai Mara (National Reserve and the surrounding wildlife conservancies) for 2018 and 2019. As the table shows, there is a slight drop in lion density and hence in lion abundance. It is however important to emphasise that this is merely a fluctuation between two consecutive years, and not a trend. All wildlife populations fluctuate naturally from year to year. What matters is how a population behaves over a 10-15 year period, where population trends can be analysed. Furthermore, the highest posterior intervals for density across the two surveys overlap, which means that there is no real change in 2018 vs. 2019 densities.

Lions	2018	2019
Study area (km^2)	2,541	2,544
Lion Density	18.87	17
Lion Abundance	484	427
Sex ratio	1.5	1.74

Table 1: Lion density is given as lions/100km2 > 1 year old, lion abundance is lions > 1 year old, sex ratio is female to male

Table 2 shows the same parameters for the respective management units.

Protected area	Abundance		Density	
	2018	2019	2018	2019
Enonkishu	5	3	15.50	8.6
Lemek	17	19	27.52	31.1
Mara North	52	45	17.74	15.4
Naboisho	39	38	18.49	18.1
Olarro (North+South)	17	7	20.48	8.4
Ol Chorro	7	7	13.04	13.01
Olderikesi	4	4	10.81	10.1
Ol Kinyei	11	17	16.24	25.1
Olare Motorogi	35	19	23.62	12.6
Siana	5	5	13.76	14.2
Mara Triangle	85	81	17.82	17.0
MMNR	209	183	19.91	17.5
MMNR + Mara Triangle	294	264	18.96	17.02
All conservancies combined	192	164	19.39	16.52

Table 2 Lion abundance and density for the different management units for 2018 vs 2019

During our survey period, Lemek Conservancy had the highest lion density, while Olderikesi had the lowest, which is the same scenario as in 2018. When we start to analyse how the different variables we measure, e.g. livestock, prey etc. affect lion density and distribution, we will hopefully be able to give reasons as to why the densities in each management unit differ as they do. Olare-Motorogi has dropped to almost half its lion density from 2018, and we are in the process of looking into plausible reasons for this.

The 2019 lion densities can be viewed in the form of a heat map as shown in figure 1.

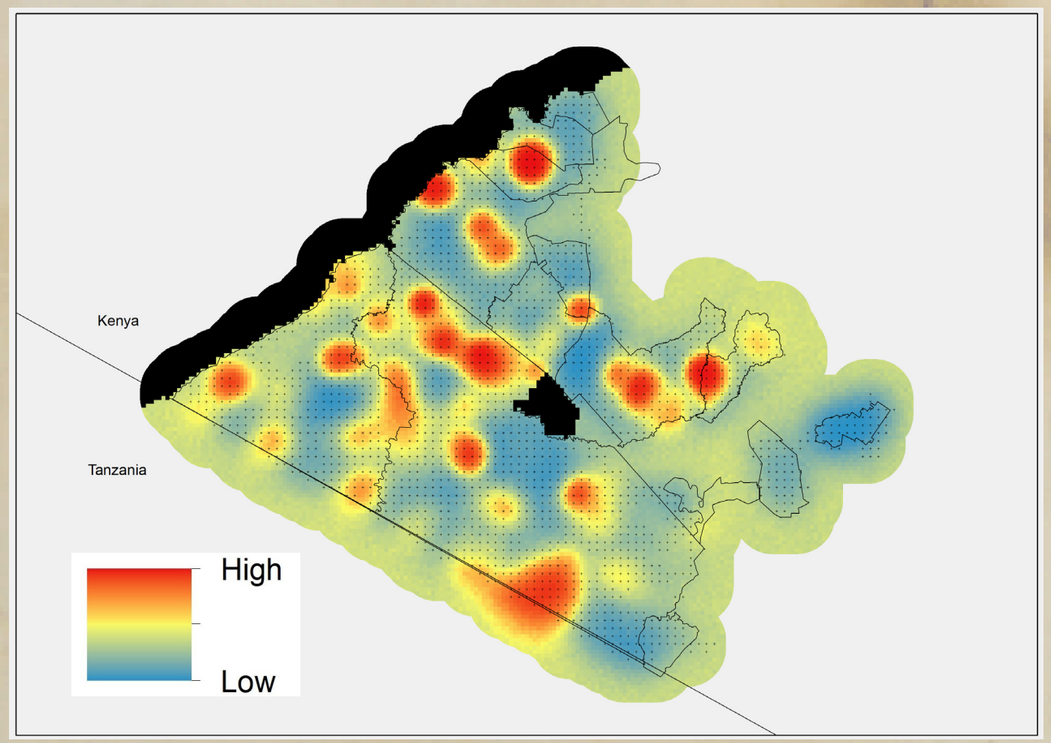

Figure 1. Lion density heat map

Cheetahs

New cheetah figures

Table 3 shows estimates for cheetah density, abundance and sex ratio for independent individuals in the Masai Mara (National Reserve and the surrounding wildlife conservancies) for 2018 and 2019.

Resident cheetahs	2018	2019
Study area (km2)	2,541	2,544
Cheetah Density	1.20	1.27
Cheetah Abundance	30	32
Sex ratio (F:M)	0.9	1.18

Table 3: Cheetah density is given as independent individuals/100km2, cheetah abundance is for independent individuals, sex ratio is female to male

As the table shows, there is only a small fluctuation in cheetah numbers between the two years. Here, it is important to note that we are presenting numbers for resident cheetahs during the three-month survey periods. Cheetahs can have enormous ranging areas, and there are a number of individuals that come into the wildlife areas that are transient or spend most of their time outside the Masai Mara protected areas, like the Serengeti. This explains why we can record a higher number of cheetahs during some surveys than the estimated number of cheetahs within the Mara. For example, in the 2018 survey, we recorded 43 unique independent cheetahs, but the estimated number was only 30. To illustrate this further, if we add a 9 km buffer of suitable habitat around the protected areas, we will get an estimate of 58 cheetahs for the same period.

As with the lion data, we can produce a cheetah density heat map, which is illustrated in figure 2.

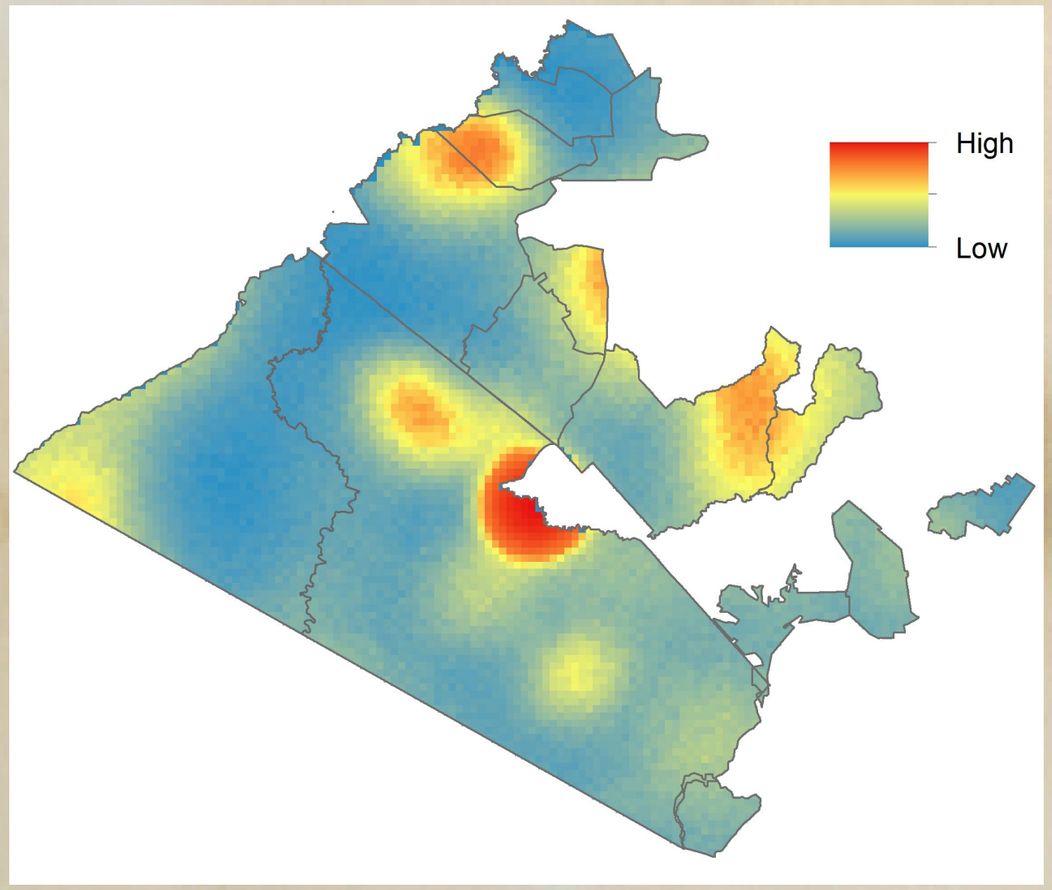

Figure 2: Cheetah density heat map. Created by Femke Broekhuis. Femke Broekhuis would like to acknowledge the use of the University of Oxford's Advanced Research Computing (ARC) facility in carrying out this work (http://dx.doi.org/10.5281/zenodo.22558).

We have completed analysis of cheetah densities from 2014-2019, with two surveys per year from 2015-2018. This is illustrated in figure 3. Again, as for lions and other wildlife populations, it is important to collect long-term data to look at population trends and not just these natural fluctuations as shown in the graph. Because of a low cheetah density and hence a small sample size, a sudden increase or decrease in cheetah due to a disease outbreak, for example, will cause large fluctuations within the population.

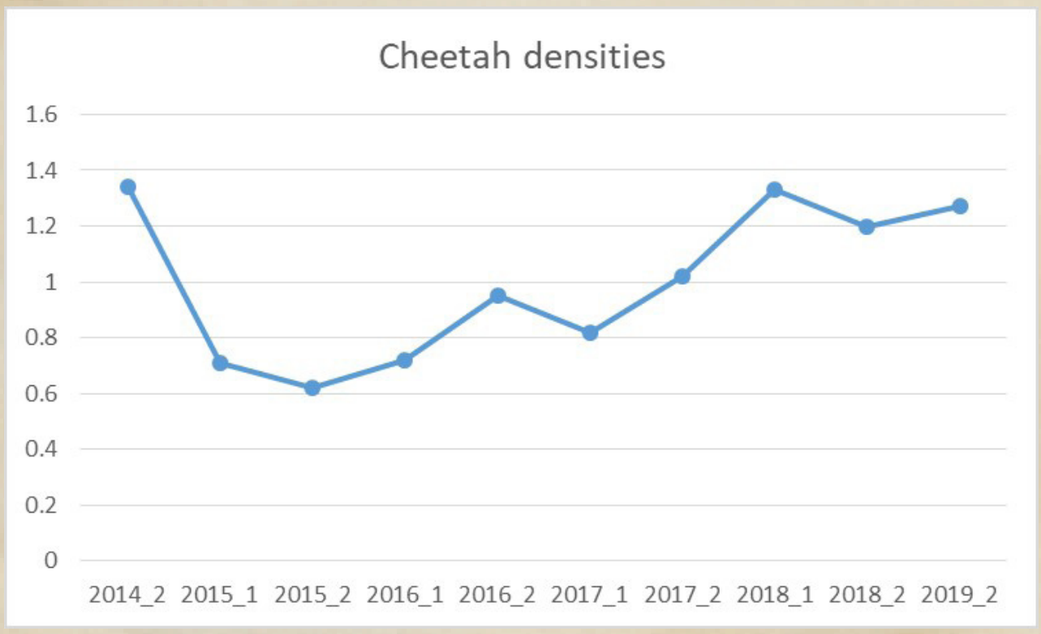

Figure 3: This graph shows cheetah densities (without the error margins) from 2014-2019. There was one survey in 2014 and 2019 (01August-31October), and two surveys in 2015-2018 (01February-30April &01August-31October).

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