

Carnivore population dynamics on two reserves, comparable or not?

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Objective:

The objective of this study was to investigate competition among carnivores and the potential role of small carnivores in disease transmission.

Introduction:

Carnivore presence was determined on reserves managed by Mpumalanga Tourist and Parks Agency. Manyeleti is contiguous with Kruger National Park (KNP), has an area of 23 000 hectares, and has villages on one side (Manyeleti, 2014). Andover does not adjoin KNP, has an area of 7000 hectares, and has villages on three sides of the reserve (Kruger park, 2014). The competition among carnivore species provides possible disease transmission opportunities.

Method:

Camera traps were placed in randomly selected locations for a period of 4 to 6 weeks before being moved to the next location (Cusack et al., 2015). Permanent camera traps were also placed on the interface between the reserves and the villages. Data were entered into Excel and mapped using ArcGIS 10.4.1. Spatial distributions were analyzed using ordinary Kriging, Inverse Distance Weighting and Co-kriging. The presence of each specie was determined for each location and the Mackenzie model was used to determine the daily detection probability.

Results:

Table1: Most frequent species captured on camera traps

Manyeleti		Andover	
Common Name	Scientific Name	Common Name	Scientific Name
Spotted Hyena	<i>Crocuta crocuta</i>	Spotted Hyena	<i>Crocuta crocuta</i>
Lion	<i>Panthera leo</i>	Leopard	<i>Panthera pardus</i>
Leopard	<i>Panthera pardus</i>	Banded mongoose	<i>Mungus mungo</i>
Jackal	<i>Canis adustus</i>	Serval	<i>Leptailurus serval</i>
Serval	<i>Leptailurus serval</i>		

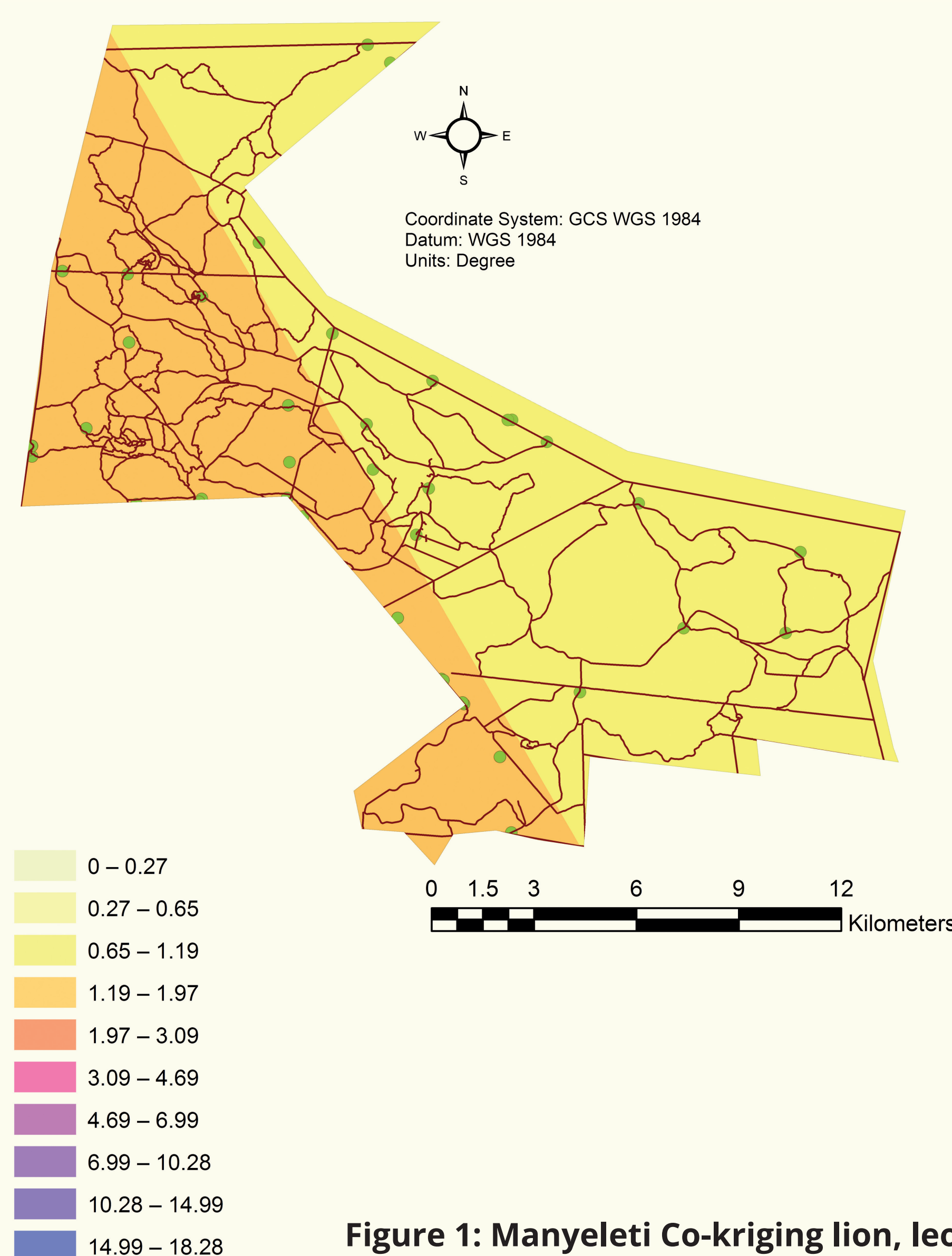


Figure 1: Manyeleti Co-kriging lion, leopard, hyena

Carnivores occupy specific areas wherein the chances of interaction and competition is higher. The reserve has two basic areas of competition between these species. At four of these sites different carnivore species were also found during the bi-annual census.

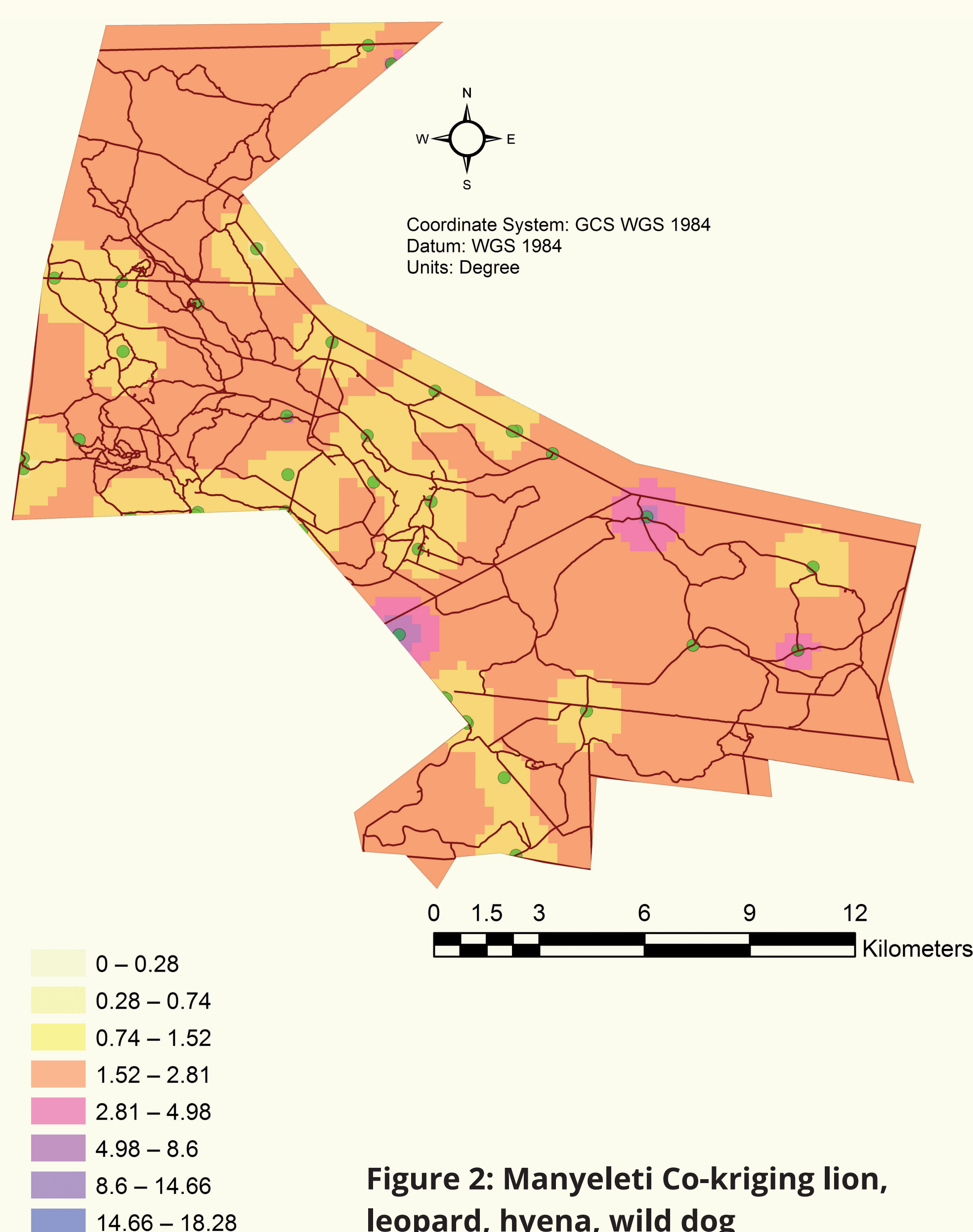


Figure 2: Manyeleti Co-kriging lion, leopard, hyena, wild dog

Andover

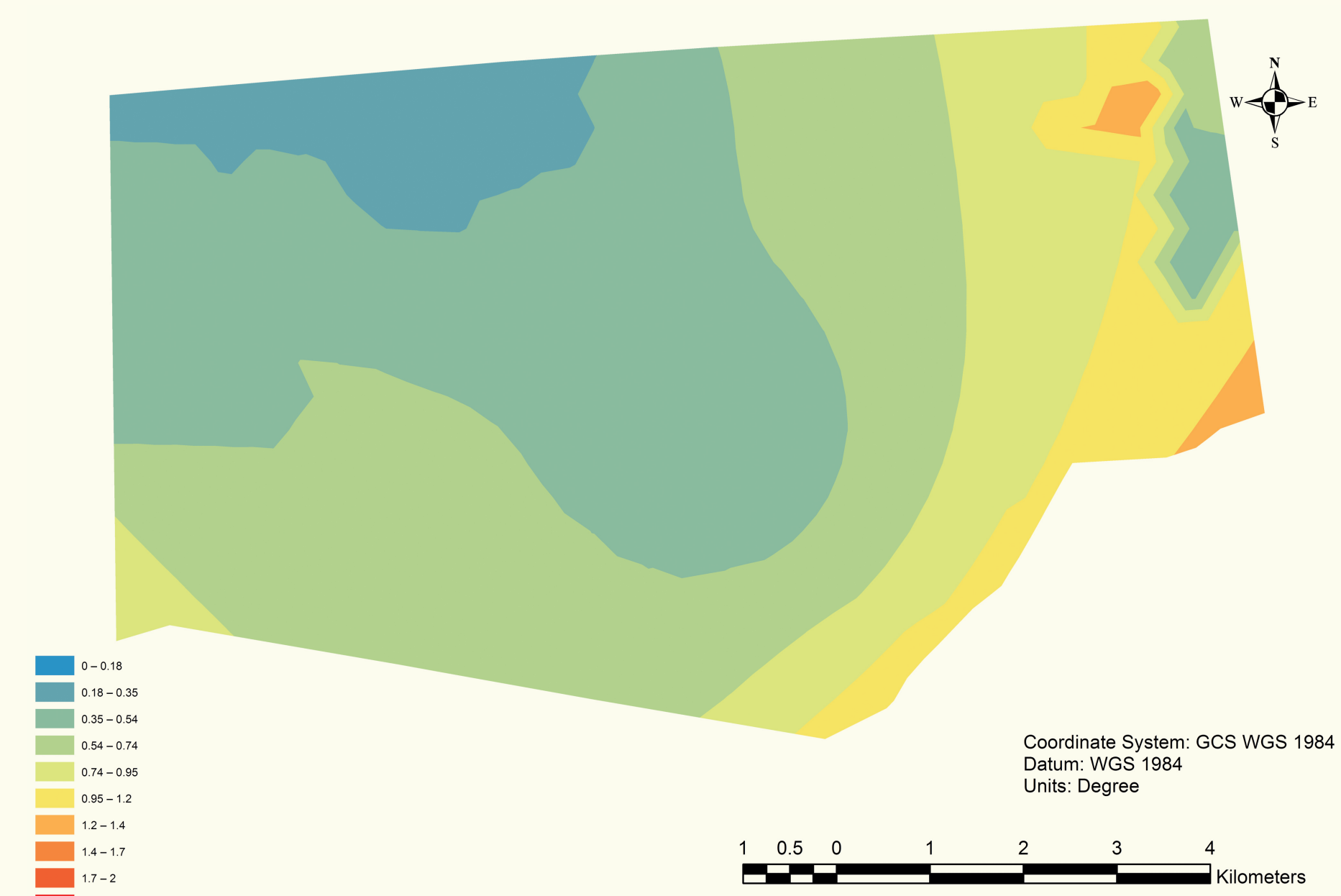


Figure 3: Andover inverse distance weighting dogs

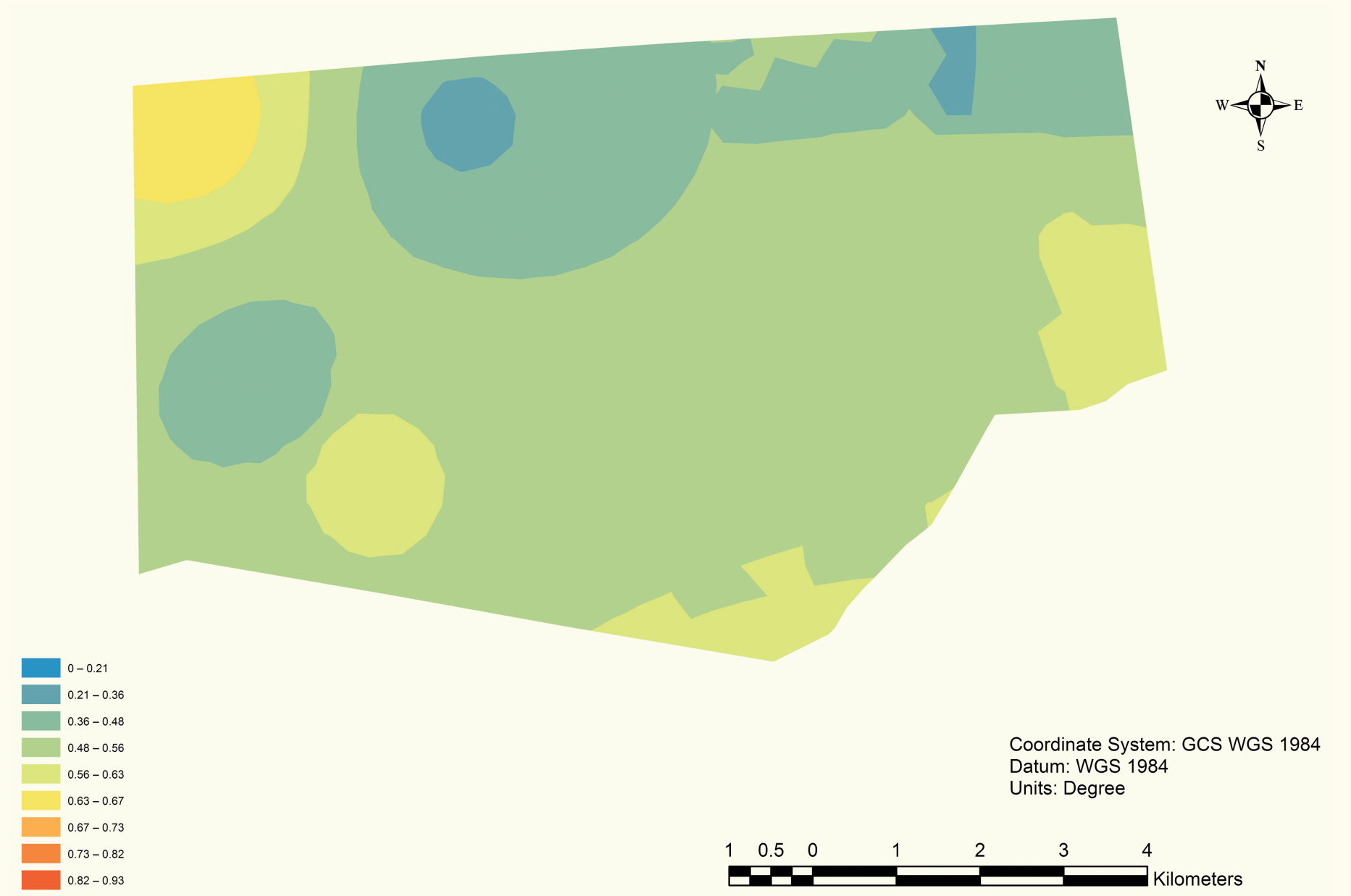


Figure 4: Andover inverse distance weighting leopards

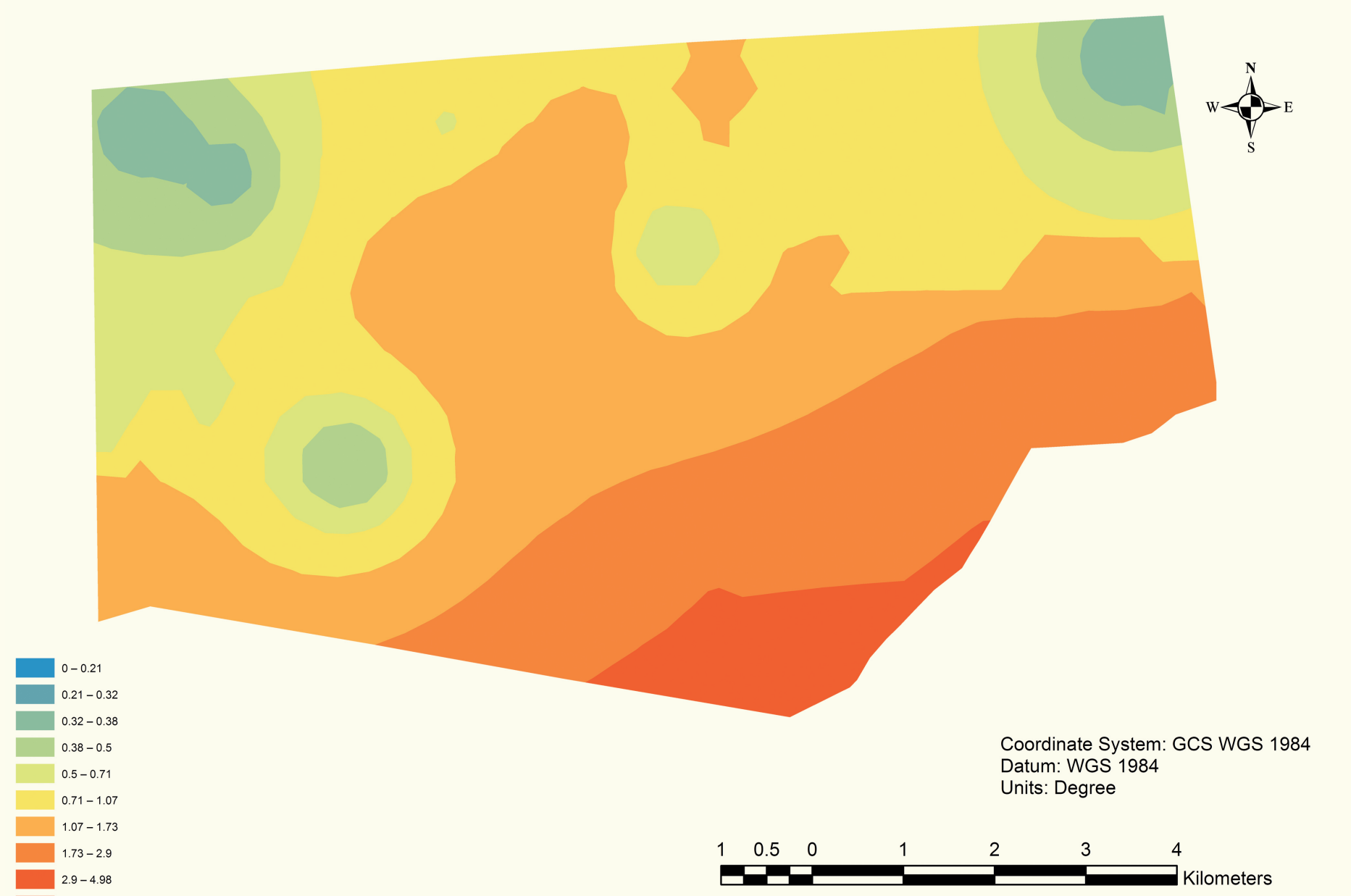


Figure 5: Andover inverse distance weighting hyena

The most abundant species present in Manyeleti were hyena (*Crocuta crocuta*) and lion (*Panthera leo*).

In Andover, the only mega predator present was leopard (*Panthera pardus*), while serval (*Leptailurus serval*), caracal (*Caracal caracal*) (Meso predator), and mongoose (*Mungus mungo*) (small carnivore) were also detected. Some locations where shared among carnivore species, while other areas had no observed carnivore species. Areas with prey species, water and access routes to water had the highest probability of carnivore detection.

Discussion:

Manyeleti Nature Reserve has all apex predators, while Andover has more meso predators and small carnivores and only leopard and hyena as the mega carnivores. The abundance of different species will influence the transmission of diseases on the reserves.

The Co-Kriging results of the lion, leopard and hyena show areas of higher competition possibilities. This is especially true at the interface with KNP and Sabi Sand where the fences has been removed.

The Co-Kriging results for lion, leopard, hyena and wild dog show the highest area of competition being on both interfaces: the interface with KNP and the interface with grazing areas.

Due to the low numbers of carnivores (mega carnivores, meso carnivores, small carnivores). Neither Kriging or Co-Kriging could be performed and only Inverse Distance Weighting (IDW) could be performed on data of Andover. That the leopards favour the Timbavati river side, away from the villages and that the hyena and dogs areas overlap. This overlap allows for competition and disease transmission.

Conclusion:

Thus, comparable? No, because of the following reasons:

The disease transmission link differ between the two reserves, because of the specie diversity present on the reserves

The Management teams differ between the reserves

The fence lines/interface differ between the two reserves: Manyeleti has an open area/grazing area between the reserve and the village, while Andover is directly next to the villages.

Reference:

- Caro, T.M., Stoner, C.J. 2003. The potential for interspecific competition among African carnivores, *Biological Conservation*. 110(1):67-75.
- Cusack, JJ, Dickman, AJ, Rowcliffe, JM, Carbone, C., Macdonald, DW, Coulson, T. 2015. Random versus Game Trail-Based Camera Trap Placement Strategy for Monitoring Terrestrial Mammal Communities. *PLoS ONE* 10(5): e0126373. doi:10.1371/journal.pone.0126373
- Kruger Park, 2014. (<http://www.krugerpark.co.za/Krugerpark-times-2-1-andover-nature-reserve-18956.html>, Accessed, 14/07/14, 7:33 PM).
- Manyeleti, 2014. (<http://www.manyeleti.com/information-manyeleti.html>, Accessed, 14/07/14, 7:30 PM).

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