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Supplementary Material

Home range, habitat suitability and population modelling of feral Indian peafowl (*Pavo cristatus*) on Kangaroo Island, South Australia

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Table S1. Additional details of the environmental covariates used for fitting habitat suitability models using *Maxent.* All covariates were mapped at 20 m and 100 m resolutions.

Environmental layer	Details
Habitat	We separated land cover into 12 categories by grouping similar dominant species or land uses together. The final habitat categories were: urban residential, shrubland<1m, pasture, other conservation, marsh/wetland, mallee/stringybark, tall Eucalypt, Melaleuca shrubland>1m, drooping sheoak, other shrubland> 1m, unclassified native, forestry.
%Native	Percentage of native vegetation within each 1 km^2 cell.
%Pasture	Percentage of pasture, crop or open grass within each 1 km^2 cell.
%NativeNeighbour	Percentage of native vegetation within a moving 100 m by 100 m window. We created this layer using the Focal Statistics (Spatial Analyst) tool in ArcMap 10, which passes a moving window of 5x5 pixels (100 m x 100 m) over the entire island. The percentage of pixels within this window that were native vegetation was placed in the middle pixel of the moving window. For example, if 10 out of the 25 pixels in the moving window were native vegetation, the centre pixel of the moving window was given a value of 40%. The intention of this was to assess the size of each patch of native vegetation. It was not sufficient to simply use the area of each vegetation patch because there were many long narrow patches of vegetation, which would have large areas but would in fact offer very little cover for peafowl because they were so narrow, for example, vegetation along paddock fence-lines.
Dist2pasture	The Euclidean distance to nearest pasture, crop or open grass

Table S2. Parameterisation of the baseline *VORTEX* population model for feral peafowl. Square brackets also indicate the ranges tested during a sensitivity analysis on three key parameters – the percentage of adult females that breed annually, and annual mortality rates for juveniles and adults/sub-adults.

Variable	Values	Details and references
Number of years simulated	10	Chosen as a reasonable time frame for management
Number of iterations	100	-
Reproductive system	Polygynous	Madge *et al.* (2002)
Age of first offspring (females)	2	Coles (2009)
Age of first offspring (males)	3	Coles (2009)
Maximum age of reproduction	20	Butcher (2006)
Max number of broods per year	1	Although females can double-clutch if their first clutch is destroyed (Latham 2011).
Max number of progeny per brood	8	Madge *et al.* (2002)
Sex ratio at birth	1:1	Assumed given no evidence for unequal sex ratios at birth
Percent adult females breeding	90 [60 – 100]	In combination with other parameters, an annual breeding probability for adult females of 90 % produced a cohort of juveniles in the first simulation year that closely matched the estimated number of juvenile peafowl produced on KI in 2013.
Offspring per female per brood	Mean = 4.5, SD = 1	Madge *et al.* (2002). Standard deviation (SD) is arbitrary.
Mortality for juveniles (age 0 to 1)	79% [60 – 100]	On average, across three studies, 43% of peafowl eggs successfully hatched (Pike and Petrie 2005; Loyau *et al.* 2007; Mushtaq-ul-Hassan *et al.* 2012). Survival rate of first year chicks raised by their mother was estimated at 50% (BYC 2013). Therefore, we calculated a mortality rate during the first year of life of 100 × (1 – (0.43 × 0.5) = 79%.
Sub-adult and adult mortality (ages >1 year)	20% [10 – 50]	To our knowledge, there are no available data on peafowl mortality rates in the wild. One study of 80 peafowl at London Zoo reported a stable annual mortality rate of approximately 10% for adults (Comfort 1962). Within the Family Phasianidae,

		one study reported an average annual mortality rate of 31.7% for wild turkey (*Meleagris gallopavo*), attributing about 95% of mortality to predation (Palmer *et al.* 1993). Given the low abundance of predators on KI, but probably less favourable conditions than in a zoo, for the baseline model we used an annual mortality of 20% for sub-adult and adult peafowl.
Initial population size	380	This is our estimate of the peafowl population size on Kangaroo Island (see Figure 1 of main text, showing the map of peafowl group locations and population estimates).
Specified age distribution (M:F)	130:250	We estimated a male-to-female ratio of 1:1.92 ratio across the Dover Farm and Murray Lagoon groups (together totalling approximately 105 individuals). Veeramani and Sathyanarayana (1999) reported two similar estimates of peafowl sex ratio in the wild.
Carrying capacity	15,000	Carrying capacity was set arbitrarily high so as not to influence population simulations within the 10 year time frame. Note that our habitat suitability modelling indicates that there is abundant uncolonised but suitable habitat for peafowl on Kangaroo Island.

Figure S1: Read times separated into one hour intervals for pooled radio-tracking data.

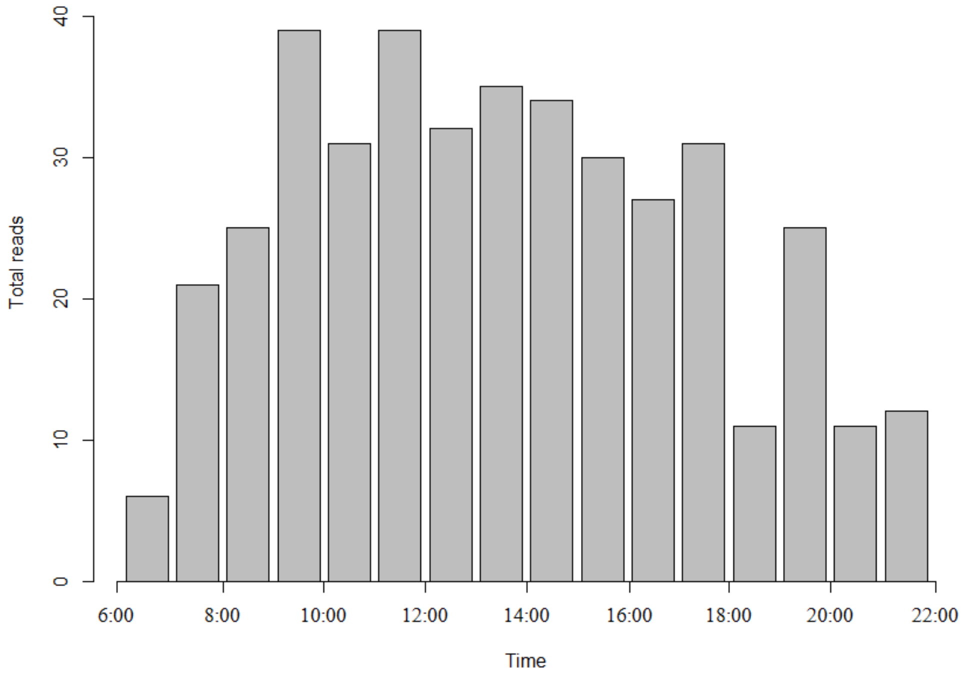
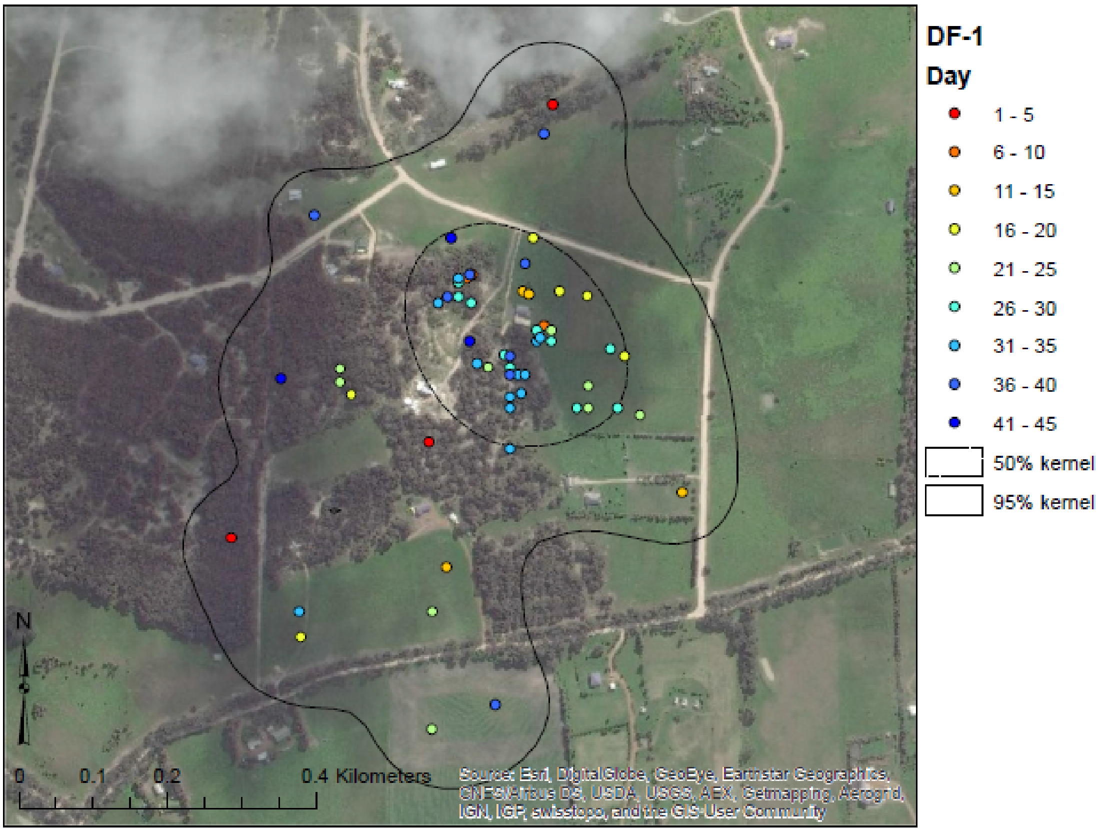
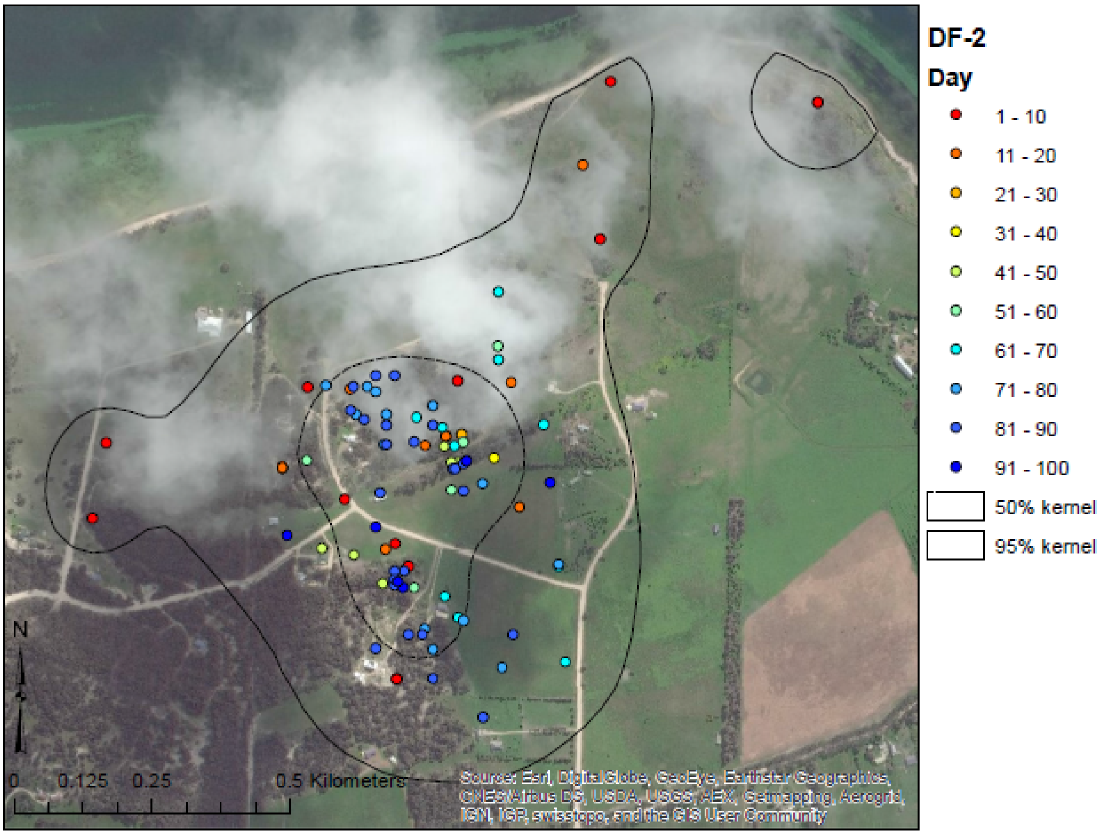
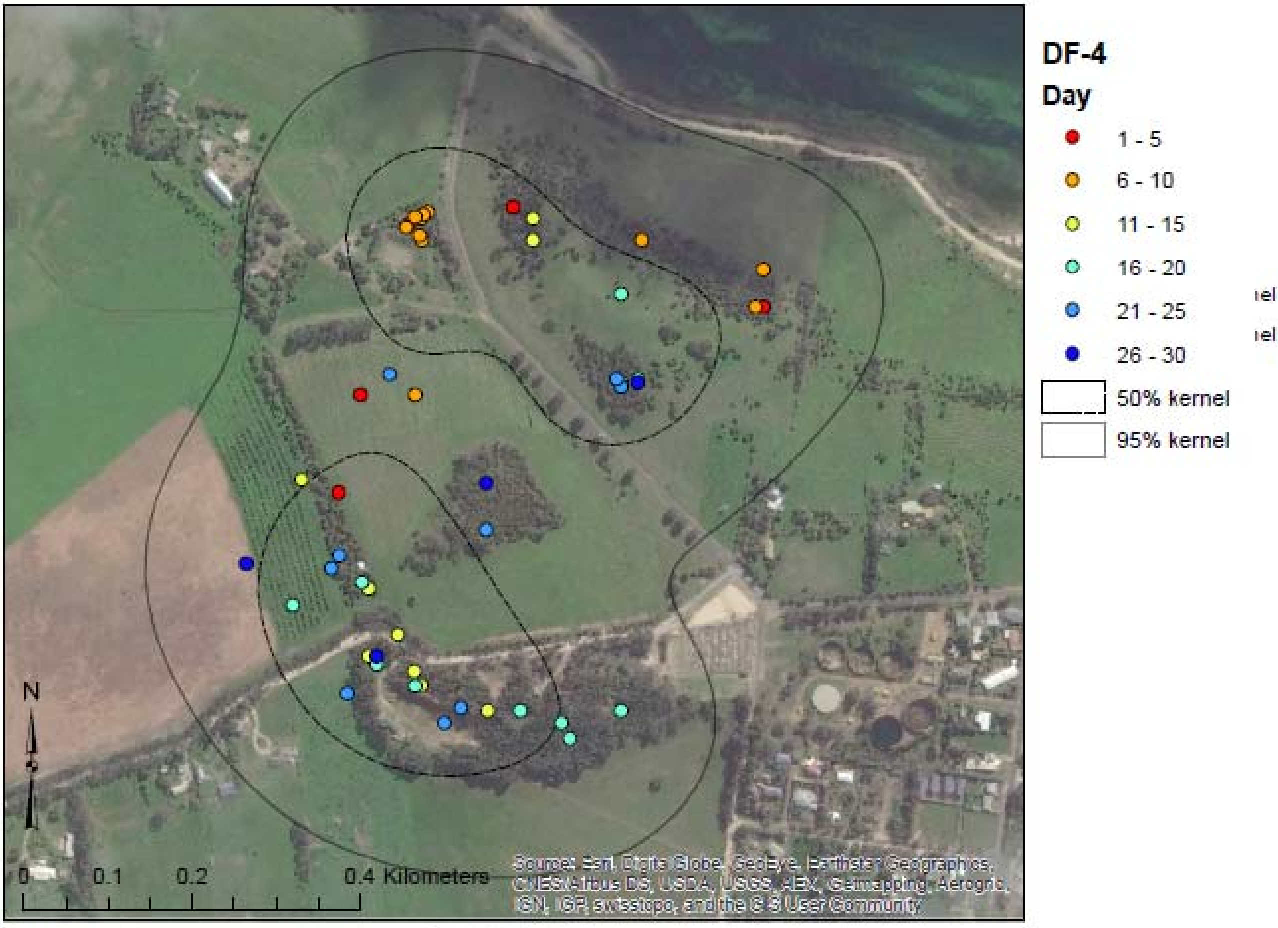
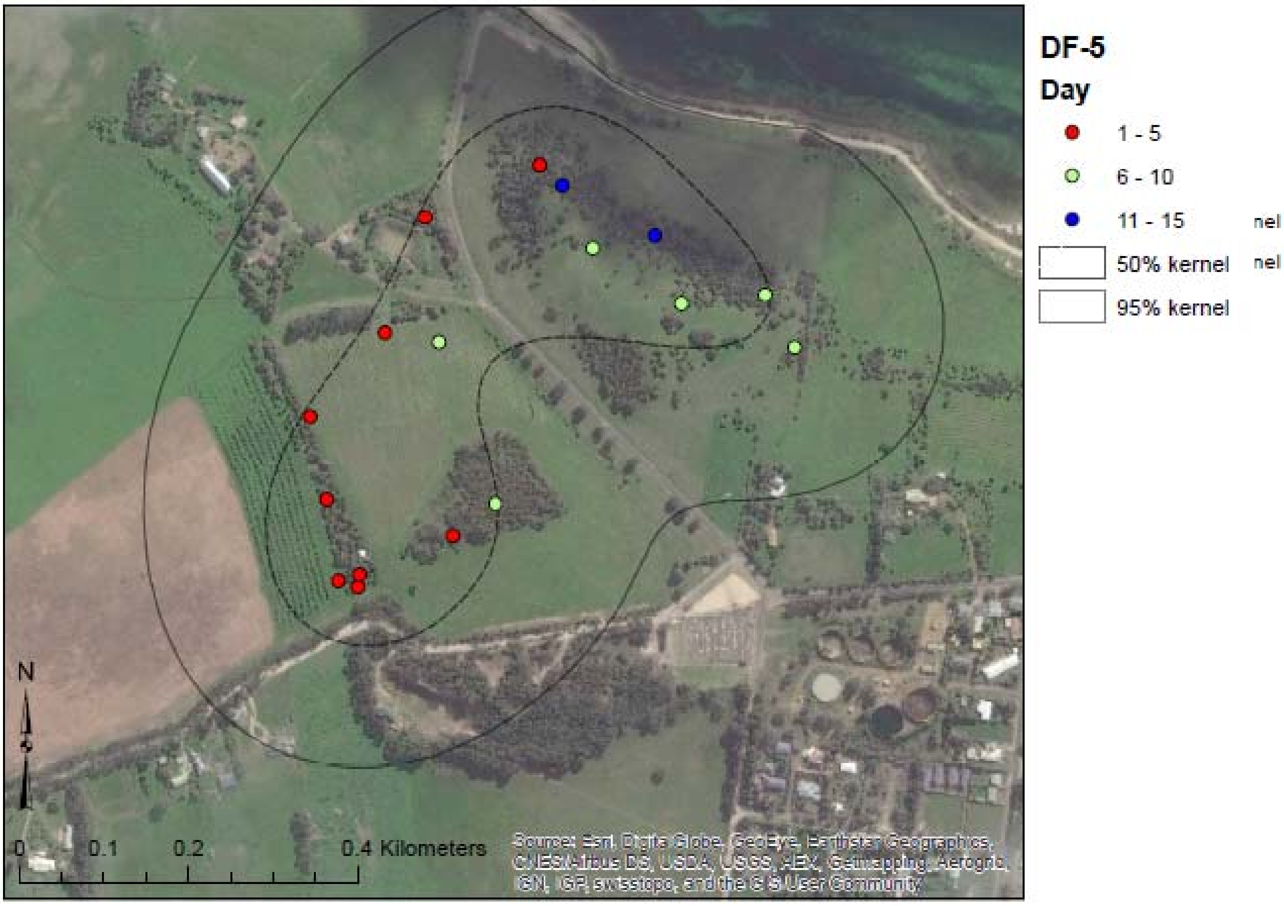


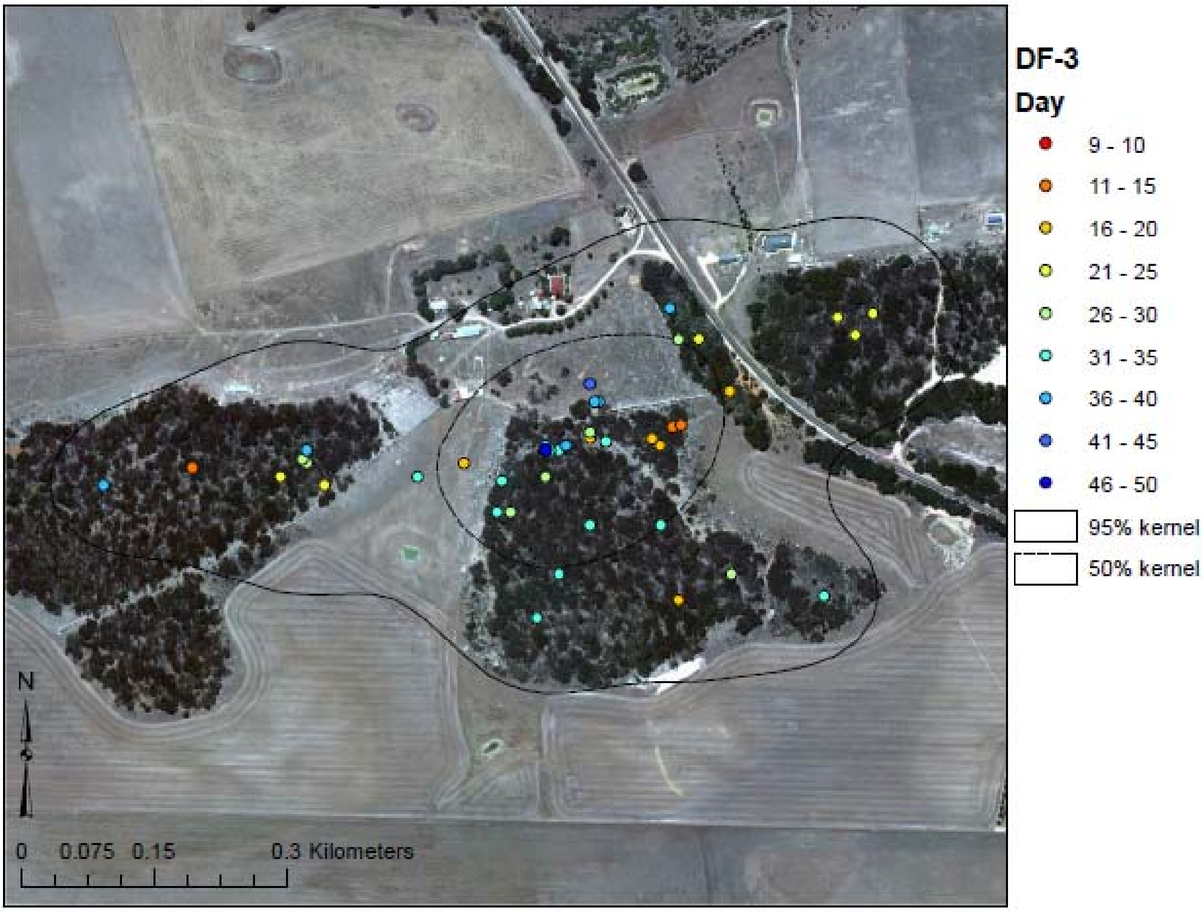
Figure S2. Fixed-kernel home ranges and radio-tracking locations for all collared peafowl. Radio-tracking locations are separated into five or ten day intervals, visually demonstrating that peafowl were active across much of their home ranges for the duration of radio-tracking.

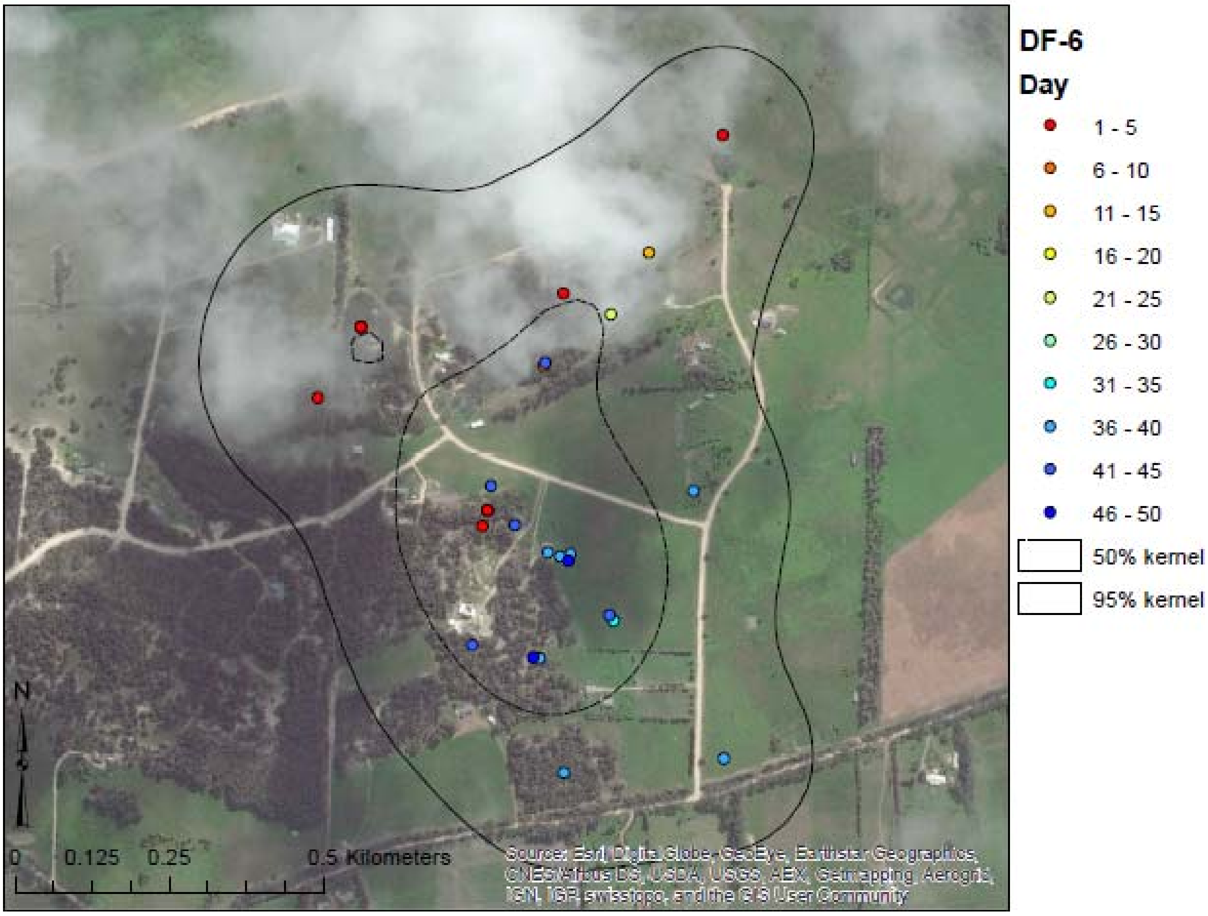


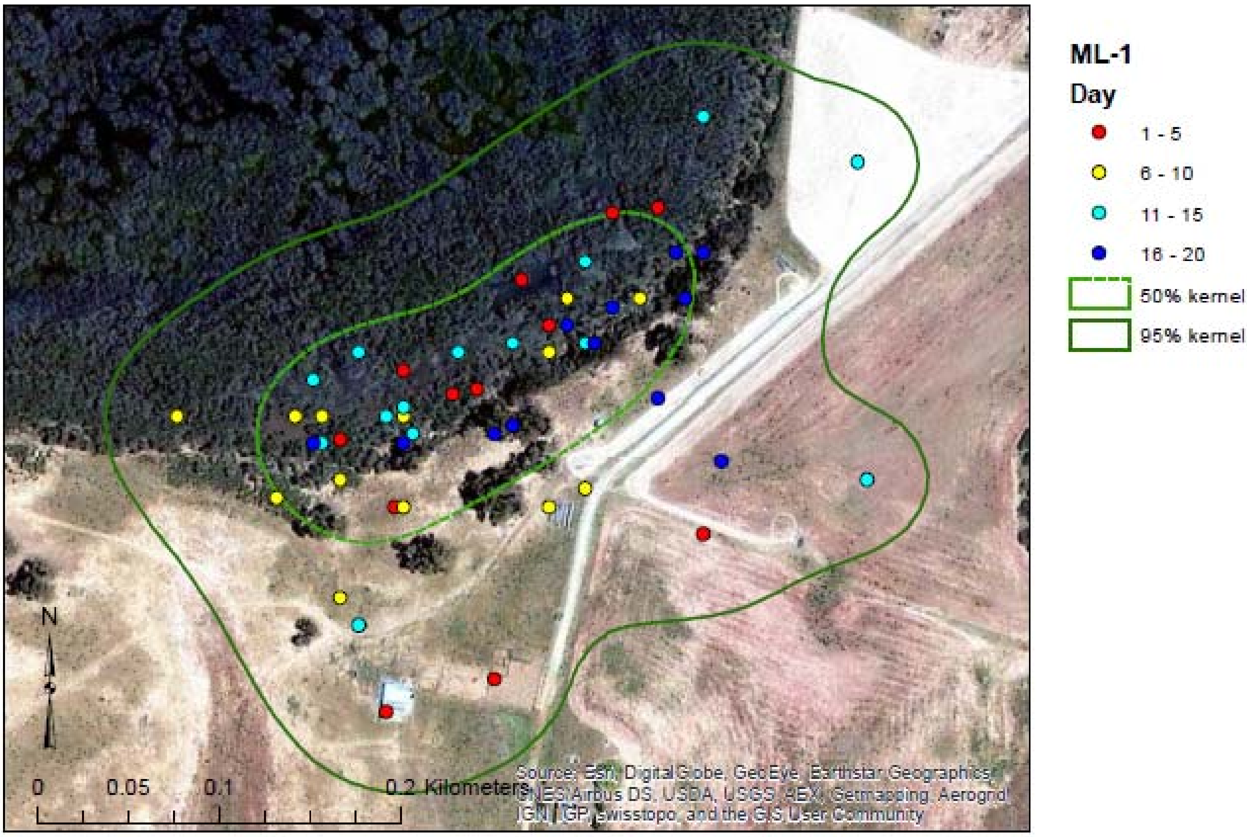



DF-4
Day
1 - 5
6 - 10
11 - 15
16 - 20
21 - 25
26 - 30
50% kernel
95% kernel
N
0 0.1 0.2 0.4 Kilometers
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


DF-5
Day
1 - 5
6 - 10
11 - 15
50% kernel
95% kernel
N
0 0.1 0.2 0.4 Kilometers
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


DF-3
Day
9 - 10
11 - 15
16 - 20
21 - 25
26 - 30
31 - 35
36 - 40
41 - 45
46 - 50
95% kernel
50% kernel
N
0 0.075 0.15 0.3 Kilometers


DF-6
Day
1 - 5
6 - 10
11 - 15
16 - 20
21 - 25
26 - 30
31 - 35
36 - 40
41 - 45
46 - 50
50% kernel
95% kernel
N
0 0.125 0.25 0.5 Kilometers
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


ML-1
Day
1 - 5
6 - 10
11 - 15
16 - 20
50% kernel
95% kernel
N
0
0.05
0.1
0.2 Kilometers
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

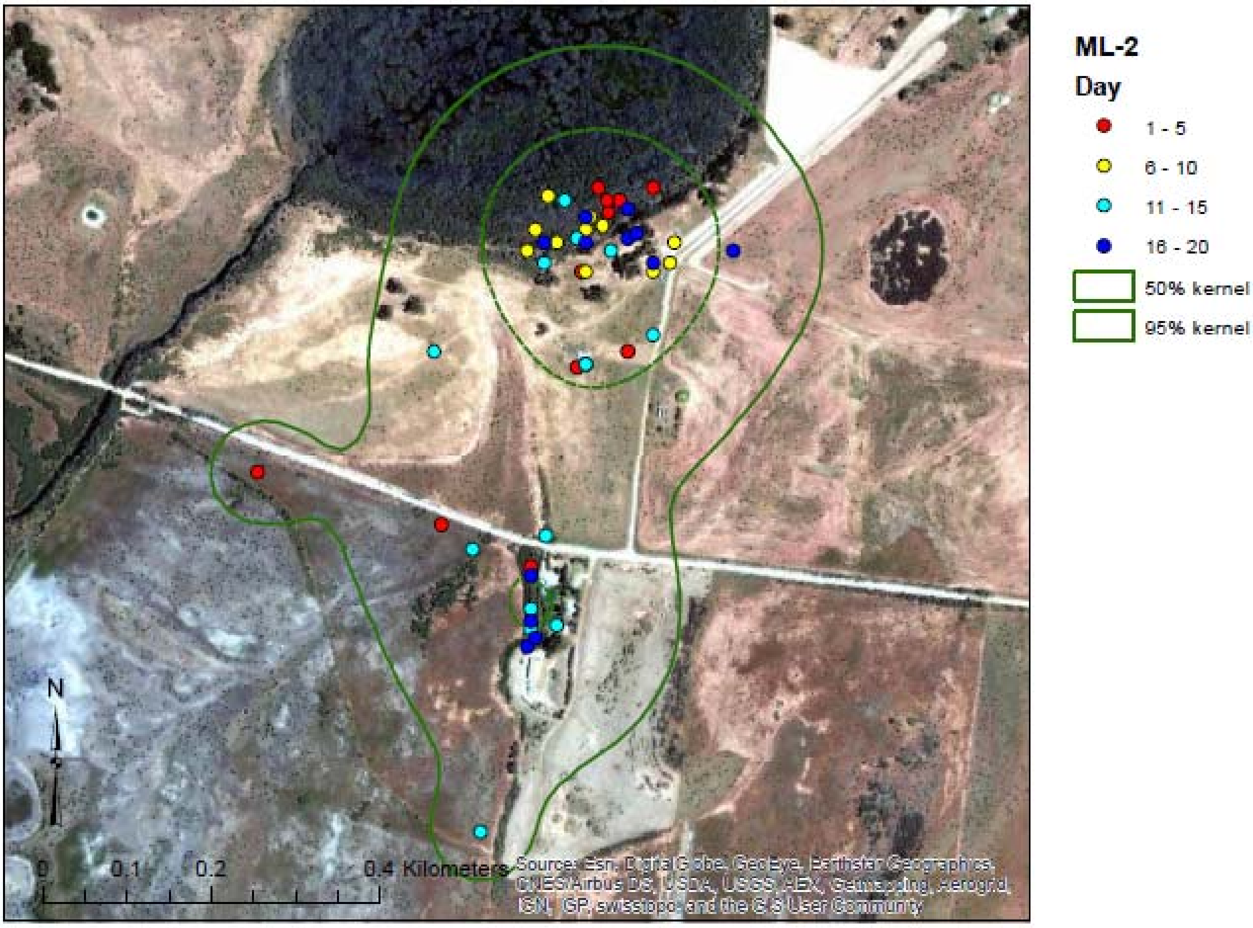

ML-2
Day
1 - 5
6 - 10
11 - 15
16 - 20
50% kernel
95% kernel
N
0
0.1
0.2
0.4 Kilometers
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure S3. Area-observation plot used for asymptote analysis.

The area-observation plot is used to determine whether sufficient observations were taken to accurately characterise each individual's home range. We created area-observation plots for each individual by randomly generating 100 sub-samples of *size x*, where *x* ranged from a minimum of 5 to the sample size *n*, and produced home range estimates for each sub-sample. We then plotted the mean home range estimates (± 95% confidence intervals) against the sub-sample size. Most individuals appeared to reach asymptote (using the eyeballing technique), indicating that peafowl did establish home ranges during the tracking period and were not transient throughout the landscape, and that sufficient observations were recorded.

* denotes the two individuals that potentially do not quite reach asymptote.

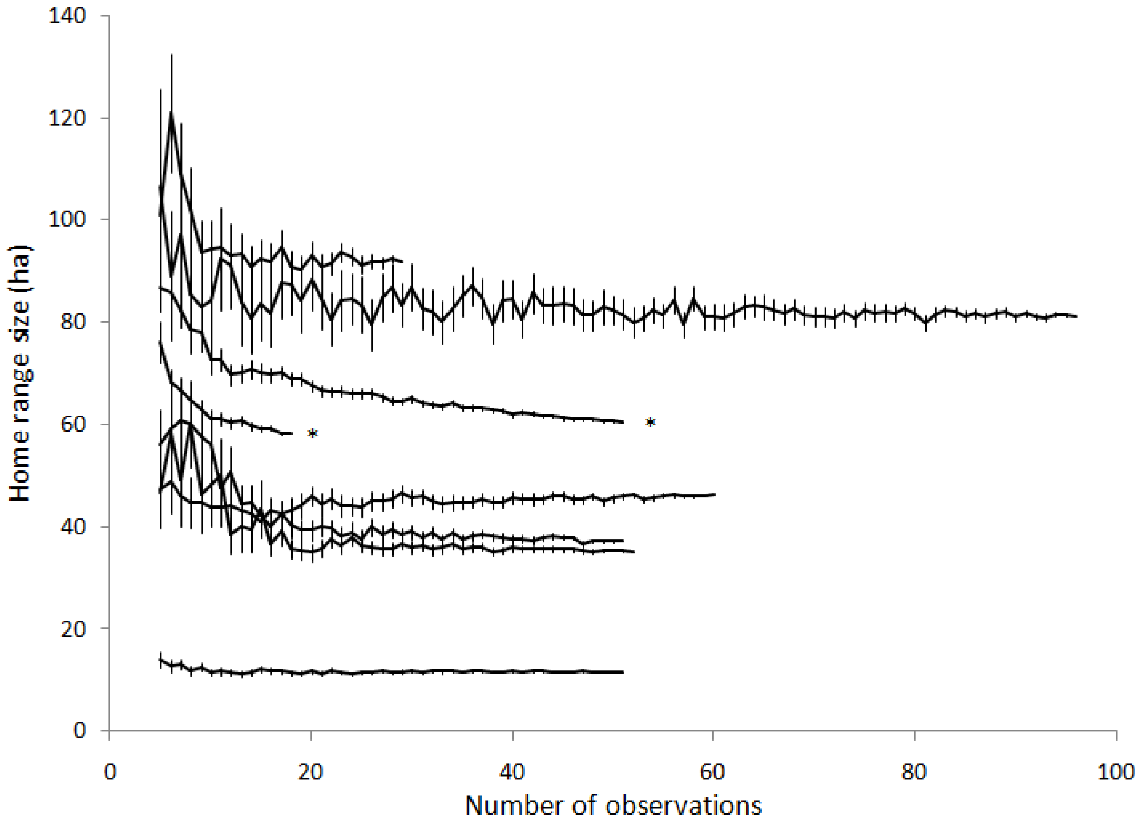


Figure S4. Partial effects plots for the selected Maxent habitat suitability model. These plots show how the logistic output (probability of peafowl presence [red] ± one standard deviation [blue]) changes as each environmental covariate is changed, while keeping other environmental covariates at their mean value.

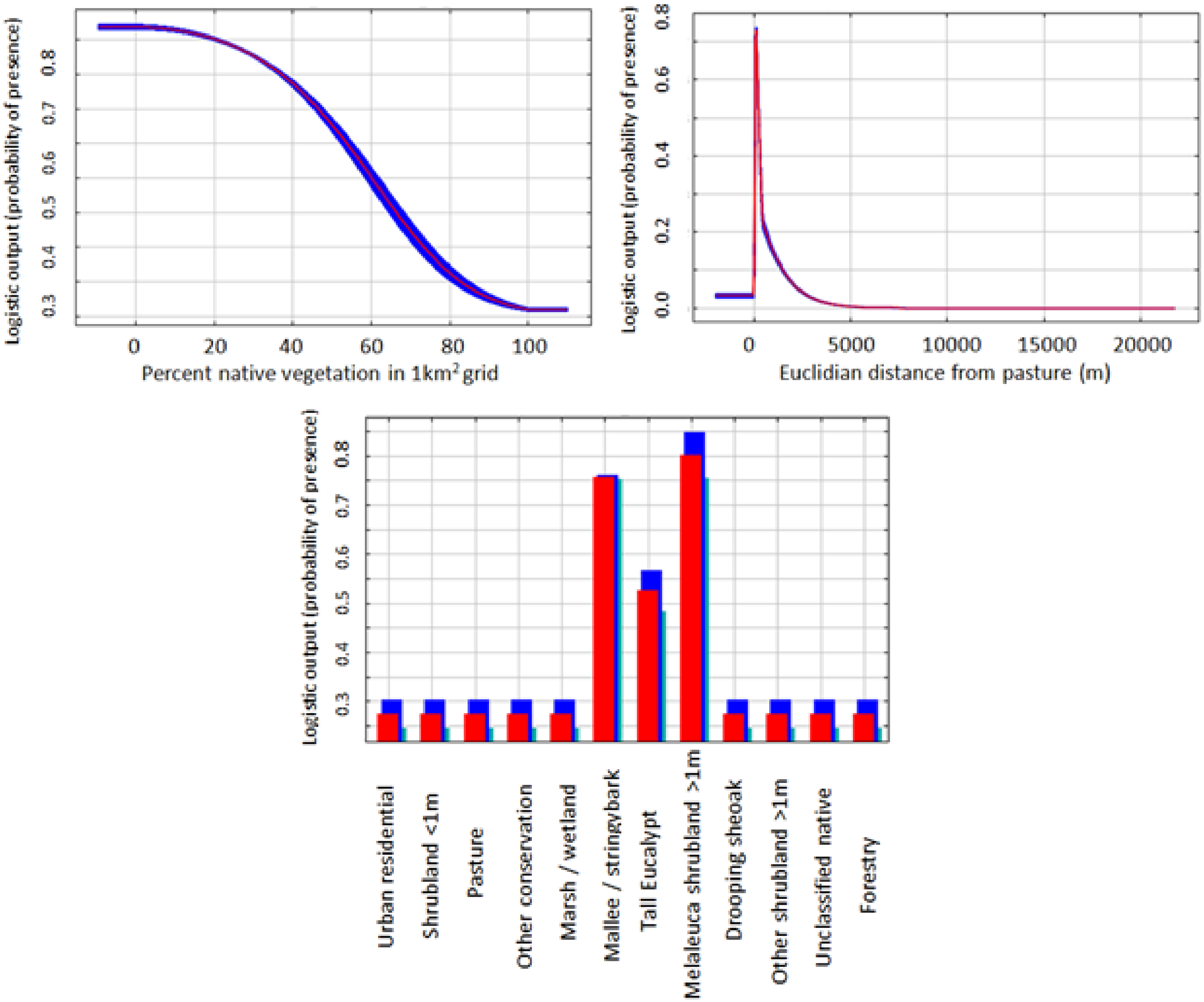
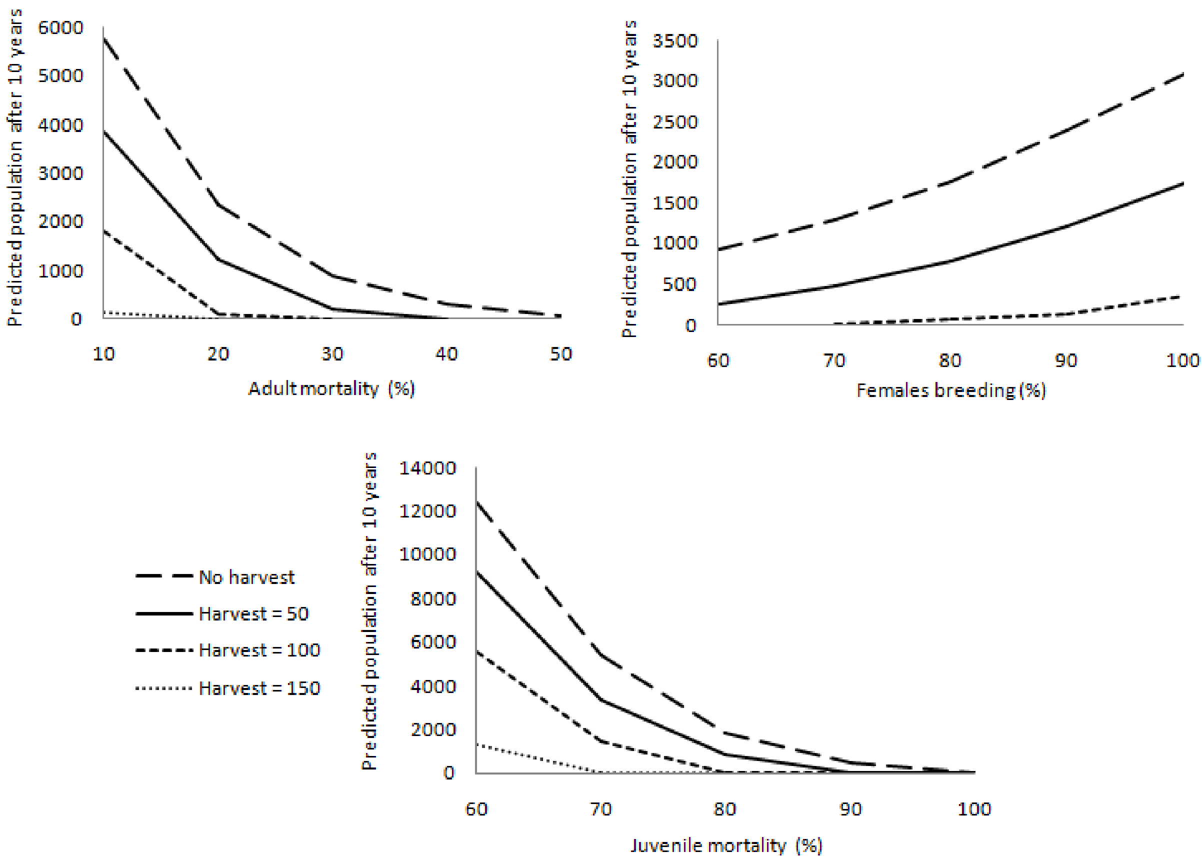


Figure S5. Sensitivity analysis of the baseline *VORTEX* population model.

Sensitivity analysis was conducted for three key parameters: the percentage of females breeding, the juvenile mortality rate, and the sub-adult/adult mortality rate. These plots show the mean simulated population size of peafowl after 10 years, for different demographic parameterisations and different scenarios of harvest management.



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