

Wolves’ resting behaviour in human-dominated landscapes

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1. INTRODUCTION

For large carnivores, to avoid encounters with humans may increase chances of survival. Iberian wolves (*Canis lupus signatus*) inhabit in some areas with high levels of human density and activity where they never became extinct. To understand the behavioural traits that have made this long-term coexistence possible is crucial for wolf’s management and conservation.

Objective: understanding the resting behaviour of wolves depending on variations in human-derived risk on a daily basis.

Hypothesis:

- Wolves adjust their activity pattern to avoid humans, becoming more nocturnal.
- In the daytime wolves rest at locations (a) with lower human associated risk and (b) which provide them more protection than nocturnal resting sites’ locations.

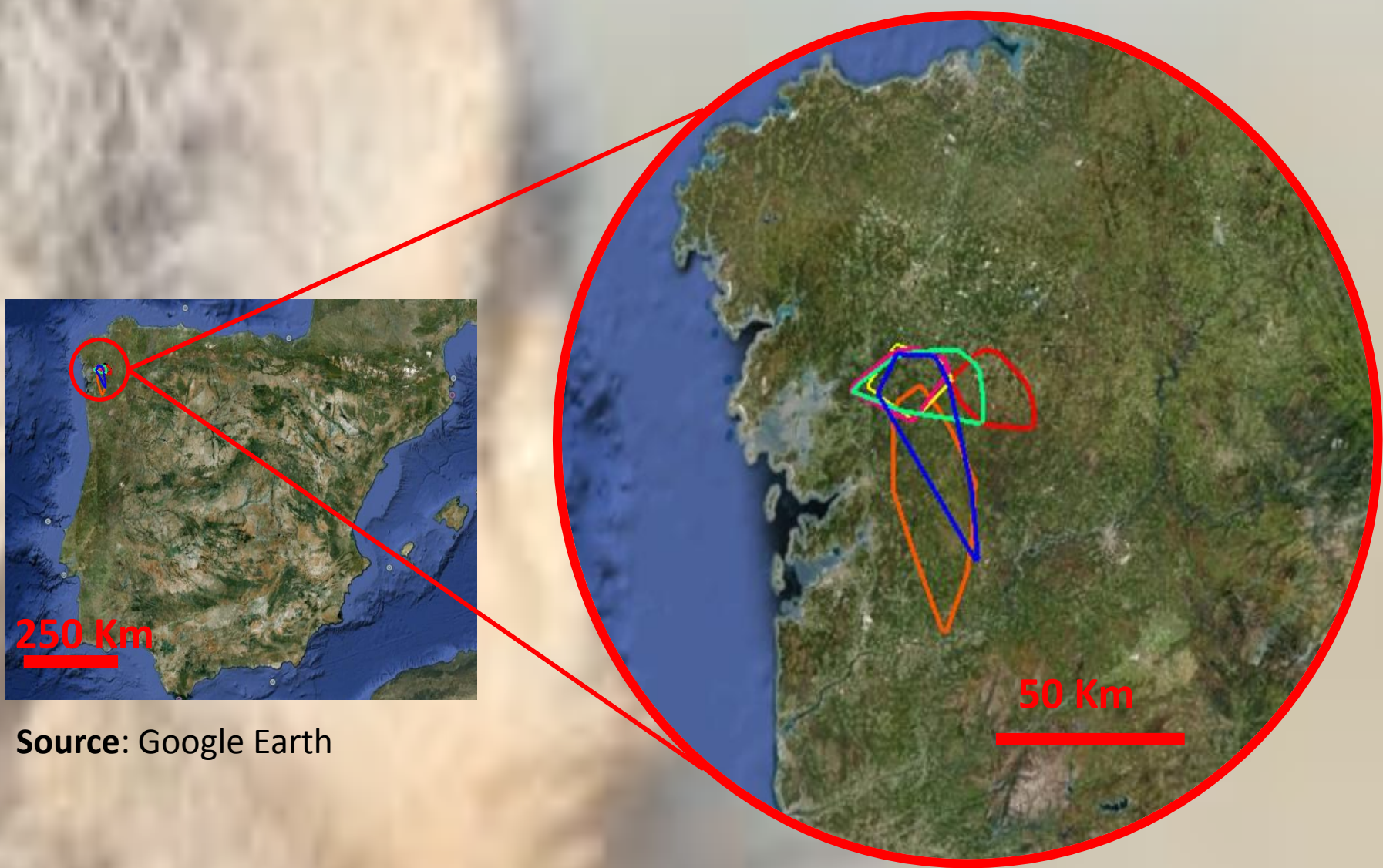


Fig. 1. Study area (Pontevedra, Galicia, NW Spain). Individual home ranges (MCP containing 100% locations) of the wolves studied.

2. MATERIALS AND METHODS

The study was conducted in a human-dominated area of Galicia (Fig. 1). Six wolves were tracked with Tellus GPS-GSM. Resting sites were defined (Fig. 2) and characterized by a set of variables related with human activity and habitat characteristics (Table 1). We compared diurnal and nocturnal resting sites by Student-T test (parametric data) and Mann-Whitney U test (not normally distributed data).

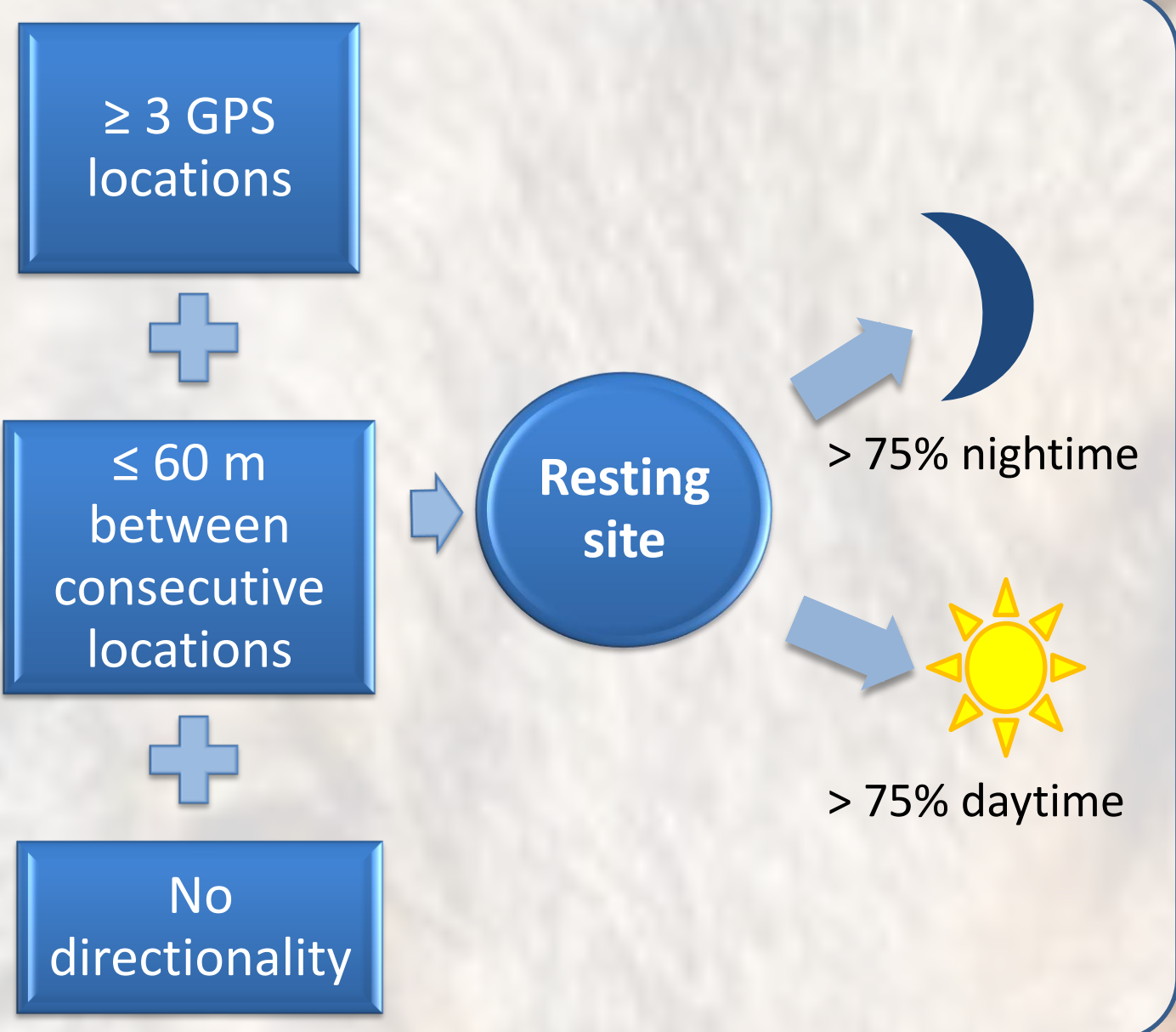


Fig. 2. Requirements to define a resting site.

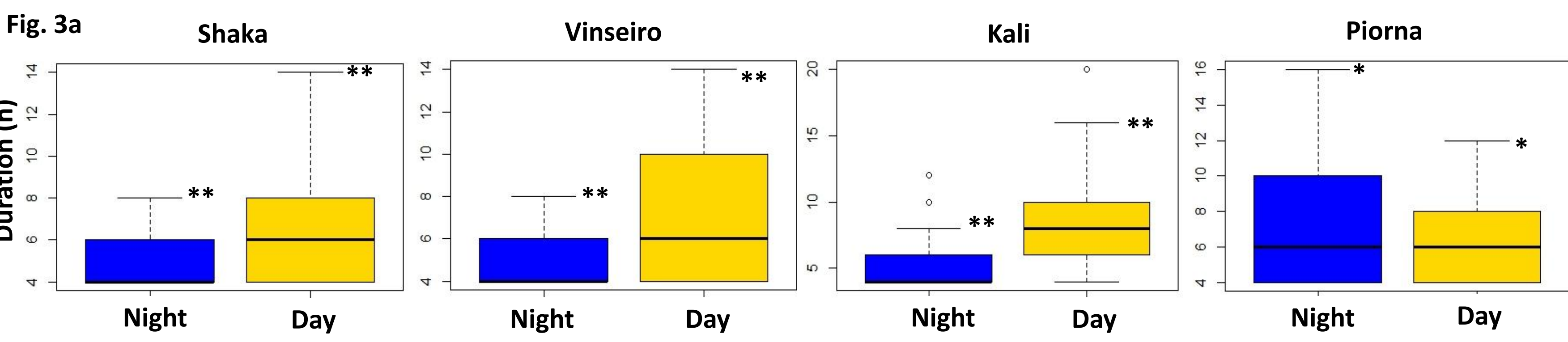
VARIABLES		DATABASE
Duration (h)		Resting site database
Humanization related variables	Distance to de nearest house (m) *	BCN 25
	Distance to the nearest unpaved road (m)	BCN 25
	Unpaved road density within 250m radius (Km)	BCN 25
Landscape attributes	Scrub cover within 100m radius (%) *	SIOSE
	Forest cover within 100m radius (%)	SIOSE
	Elevation (m) *	DEM
	Slope (%) *	DEM

Table 1. Variables measured to characterize wolves’ resting sites. Database: data sources used. BCN 25: Numeric Cartographic Database at 1:25000; SIOSE: Information System of Land Occupation in Spain; DEM: Digital Elevation Model. *: Results not shown.

3. RESULTS AND DISCUSSION

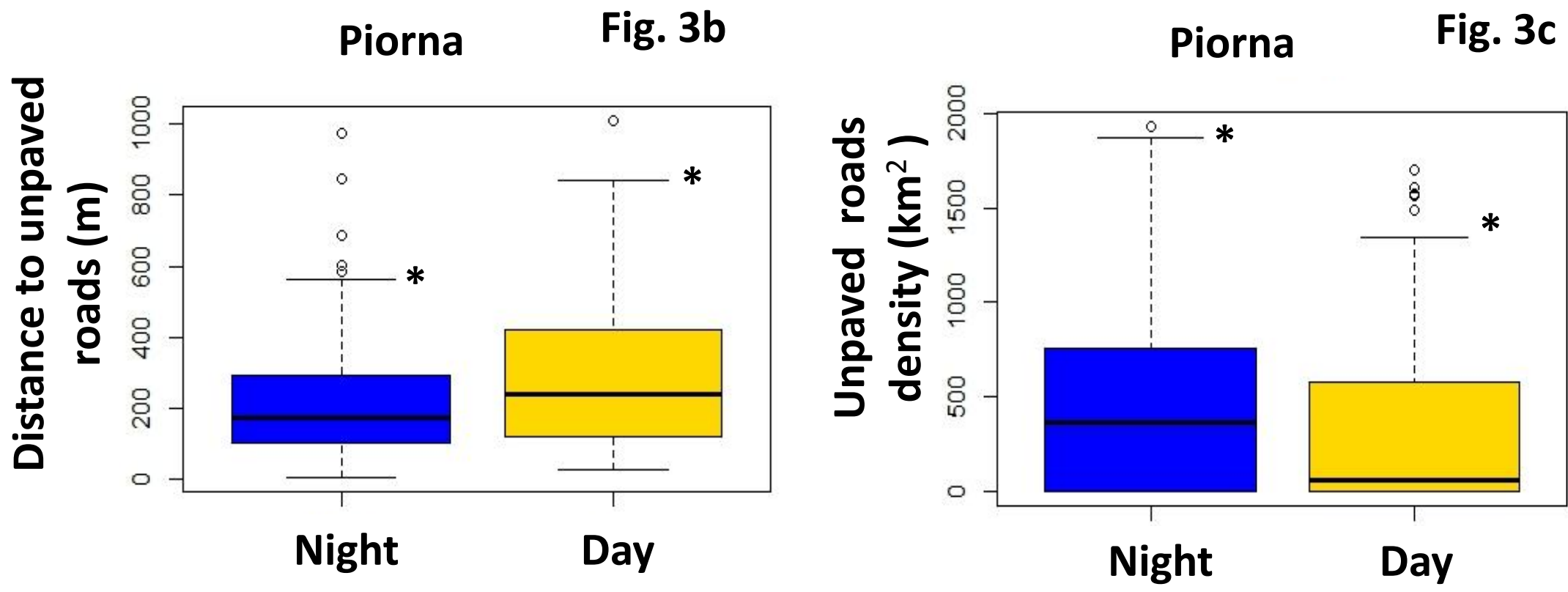
Duration

Most (4/6) of the wolves spent more time in diurnal resting sites, suggesting that they were more active during the nighttime (Fig.3a). Our results may be interpreted as a temporal avoidance of humans. An exception was Piorna, the wolf with the least humanized home range, which rested marginally significantly longer in nocturnal resting sites. In this case, other external or internal variables may be influencing its activity pattern.



Human related variables

We did not find an evident response to human related variables. However, the non-existing responses do not necessarily indicate the absence of disturbance. Disturbance avoidance only could take place when animals have suitable habitat nearby. This is what our results seemed to suggest, since only the wolf with a less humanized home range (Piorna) chose diurnal resting sites further from roads and with less roads density than nocturnal resting sites (Fig.3b,3c).



Landscape attributes

Although we did not find significant forest cover differences between diurnal and nocturnal resting sites in all wolves, our results suggested that forest cover is a factor selected for diurnal resting sites (Fig.3d).

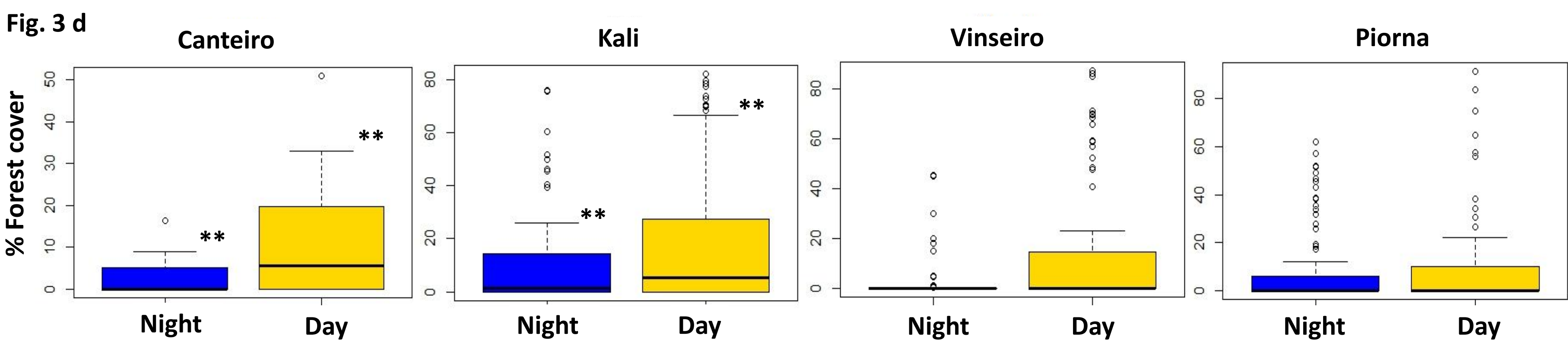


Fig. 3. Comparison between diurnal (yellow) and nocturnal (blue) wolves’ resting sites. Wolves’ identification names are shown (Piorna, Canteiro, Kali, Vinseiro, Shaka, Seara). Box plots of: (a) Duration (hours), (b) Distance to the nearest unpaved road (m), (c) Amount of unpaved roads in a 50-m radius, (d) Forest cover (%). Boxes show the median, 25th and 75th percentiles. Error bars show 10th and 90th percentiles, and circles show outliers. We tested differences between diurnal and nocturnal resting sites using U-Mann Whitney test and T-Student. *: p<0,1, **:p<0,05.

4. CONCLUSIONS

- (1) Wolves living in highly humanized areas spent more time resting in diurnal resting sites, suggesting that they adjust their activity pattern to daily human activity fluctuations.
- (2) The few differences found between diurnal and nocturnal resting sites suggest that wolves are able to detect shifts in human activity on a daily basis.
- (3) Forest cover may play an important role allowing wolves to be unnoticed when resting during the daytime.
- (4) Individual differences in resting behaviour may be a consequence of different home range characteristics.
- (5) Further studies, increasing the sample size and conducting other type of analyses are needed to clarify this issue.