

LARSyS
Laboratory of Robotics
and Engineering Systems



MARETEC
MARINE ENVIRONMENT & TECHNOLOGY CENTER

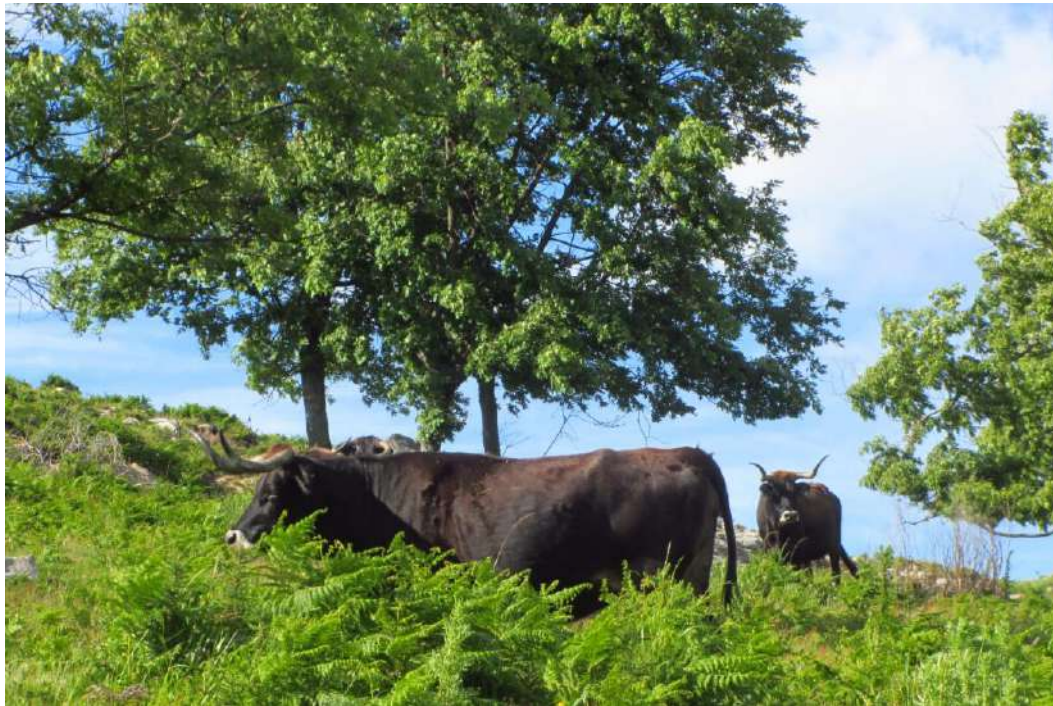
Symposium “Towards Precision Agro-Ecology for Sustainable Grazing”

Livestock herbivory as tool for ecosystem management and restoration

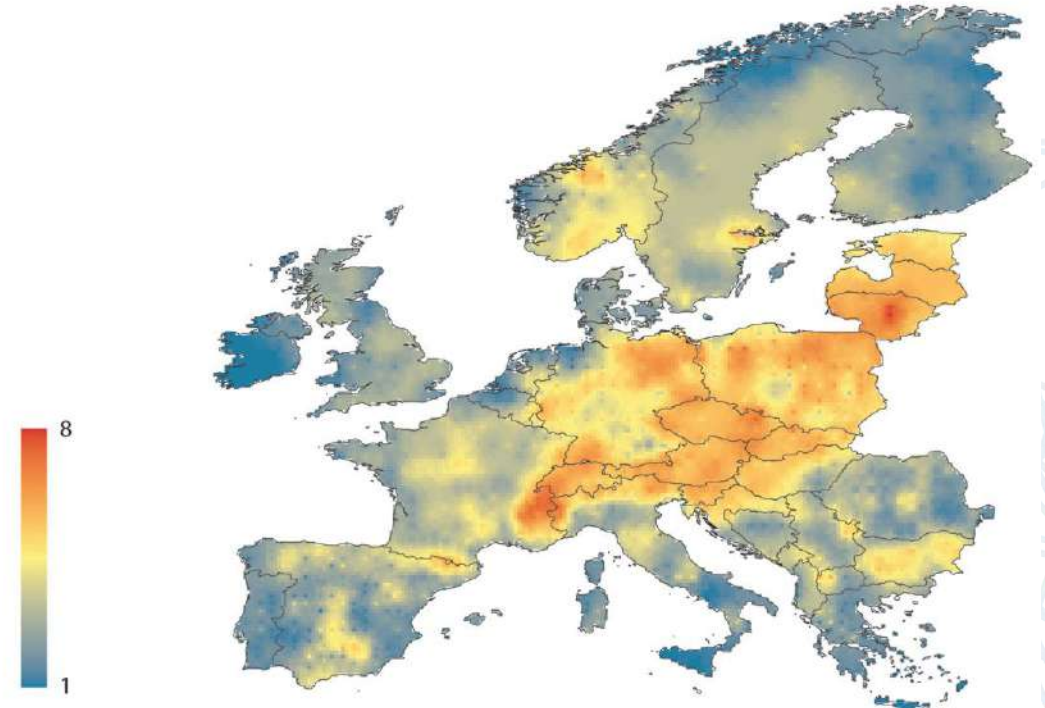
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Nuno Rodrigues², Leonor Themudo Barata^{1,3}

¹ MARETEC, LARSyS, Instituto Superior Técnico, Univ. Lisboa; ² Terraprima; ³ LEAF, Instituto Superior de Agronomia, Univ. Lisboa

Large herbivores and ecosystem dynamics



Species richness for extant large herbivores of Europe



Navarro et al. 2015, Rewilding European Landscapes

Testing the use of livestock to manage vegetation

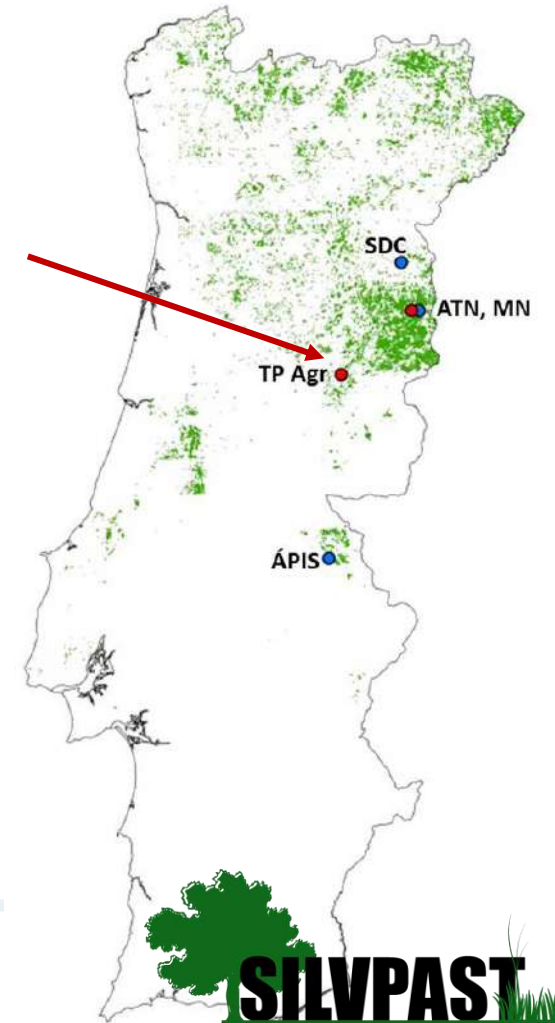
Operational Group SILVPAST

Goal: test and develop the implementation of silvo-pastoral mosaics, supported by remote sensing tools, to assist agricultural and forestry activities in areas of black oak (*Quercus pyrenaica*).

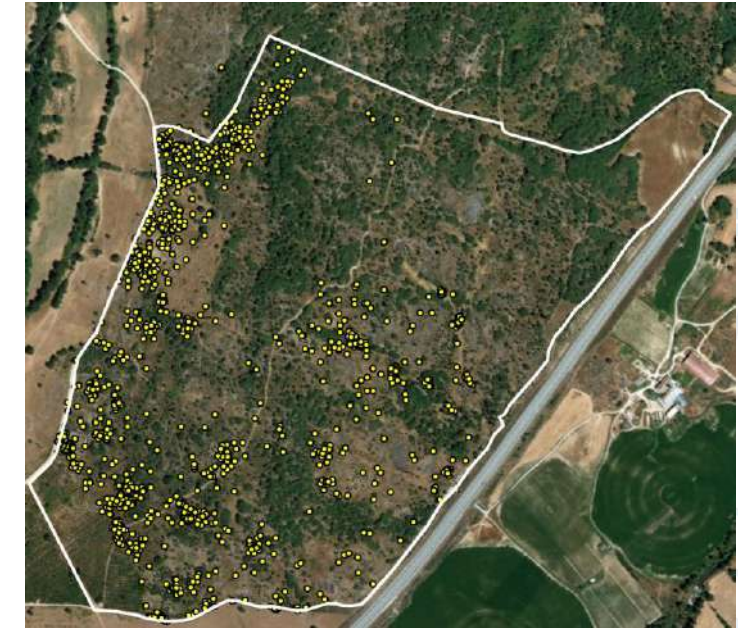
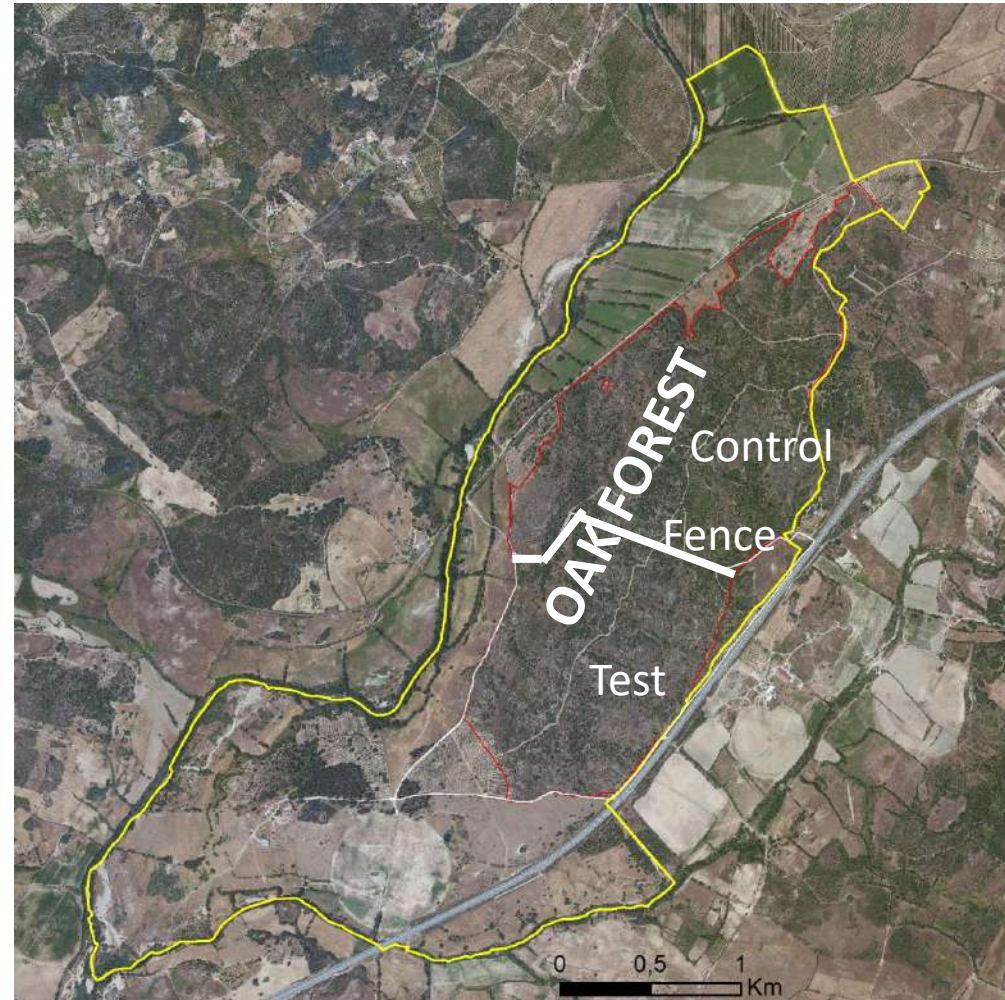
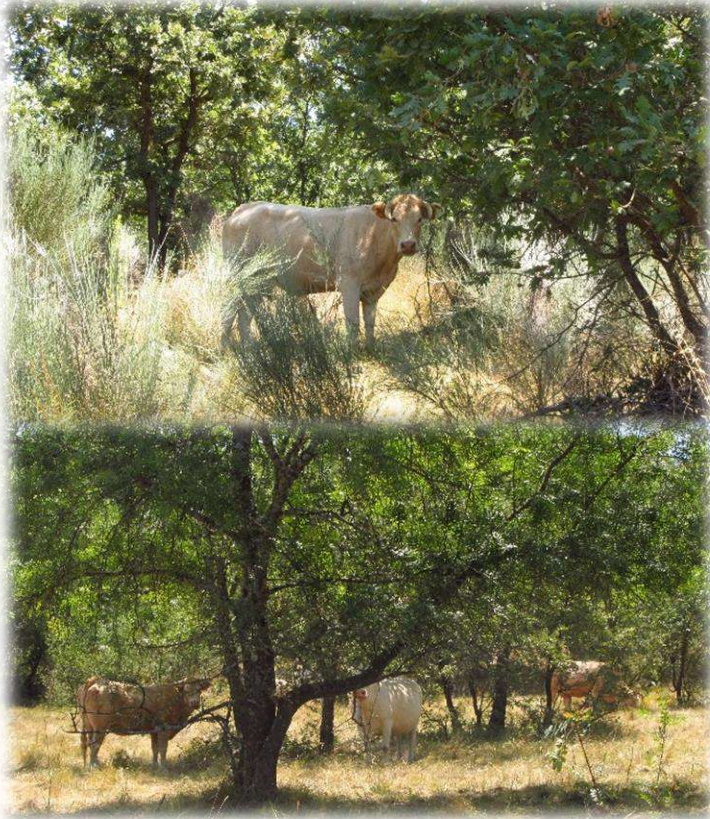
Team: Farmers (land owners), NGOs, Researchers

Silvo-pastoral mosaics :

- i) Pastures in open areas, with livestock
- ii) Forest parcels open to livestock
- iii) Forest parcels closed to grazing

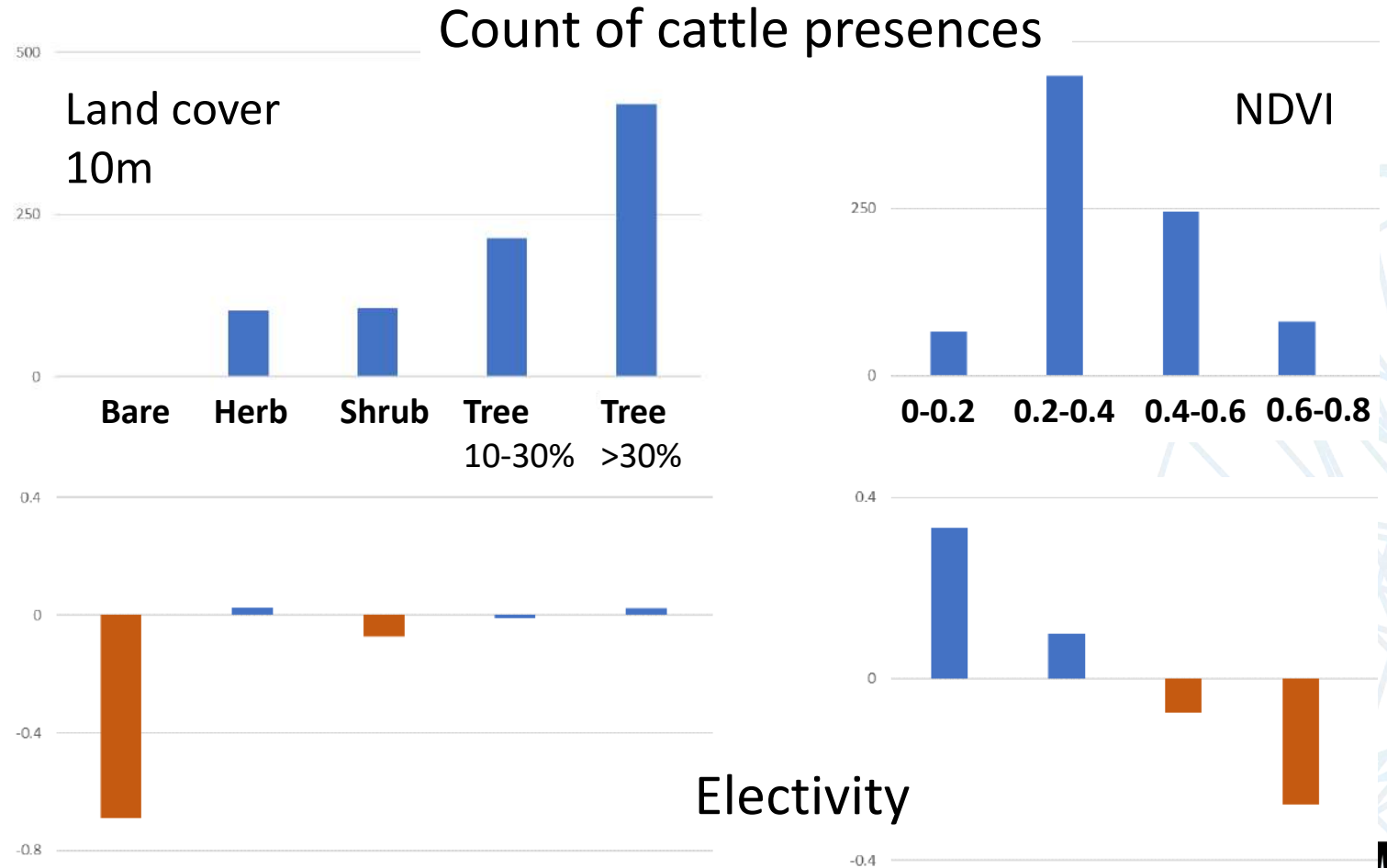
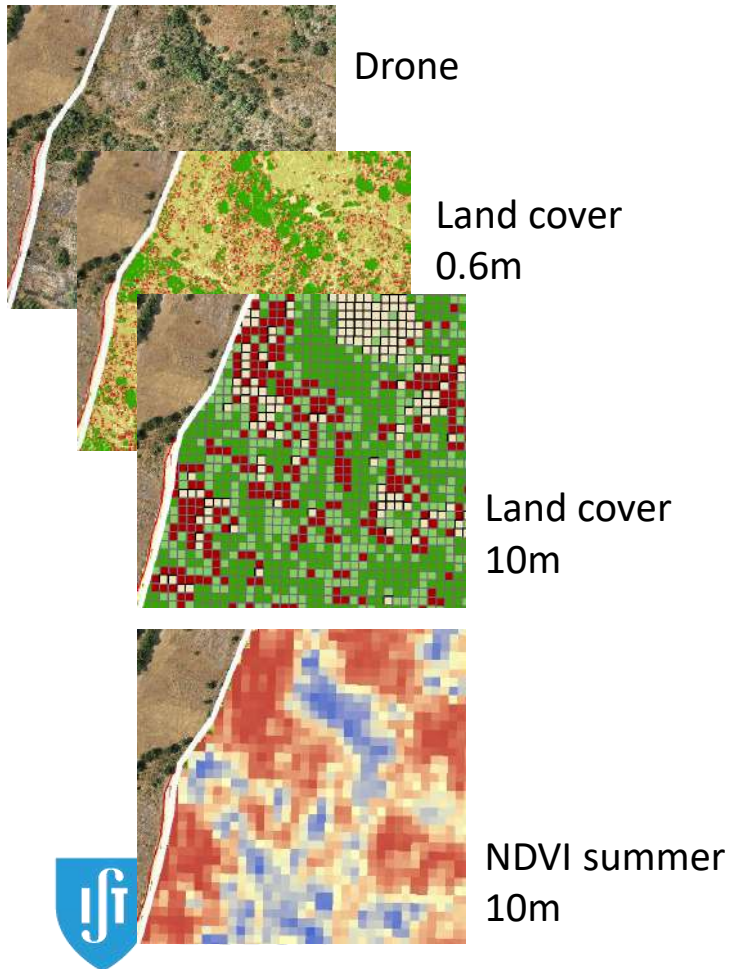


Study Area – Quinta da França

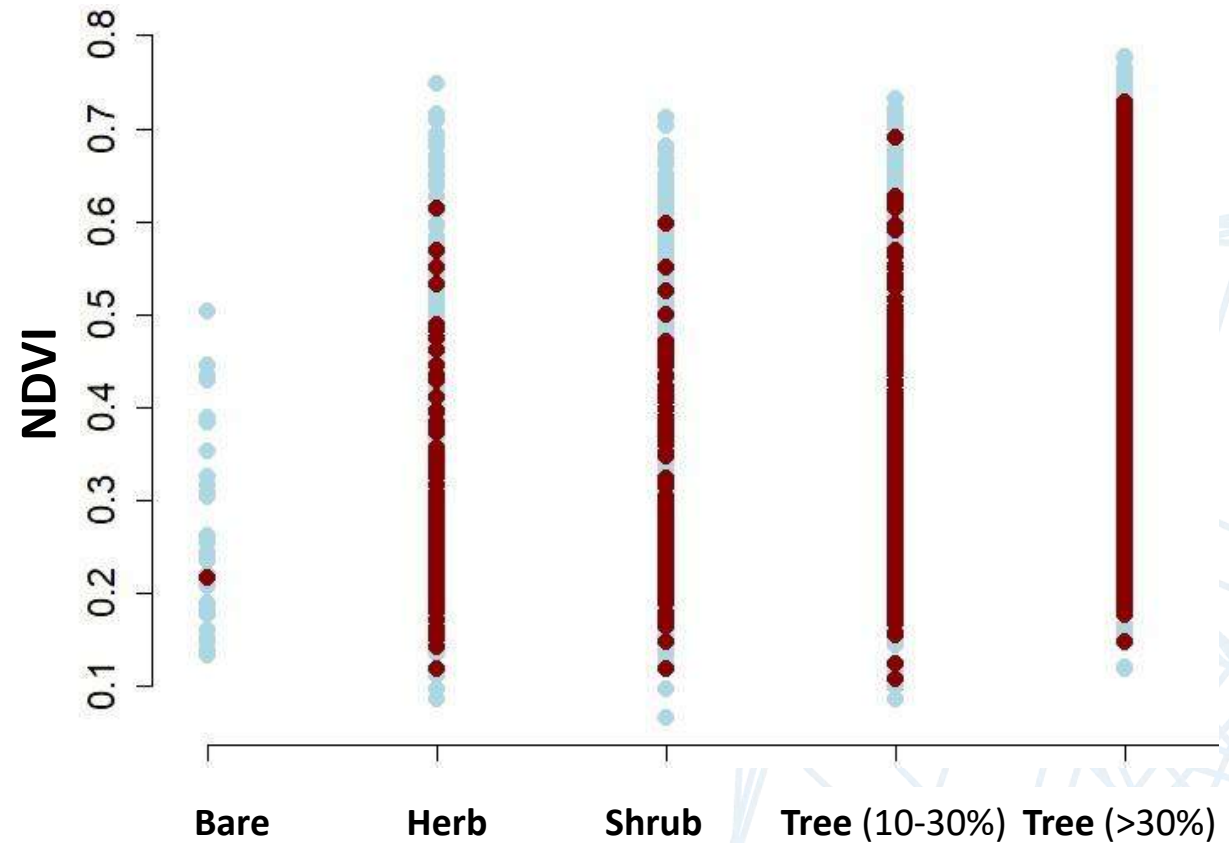
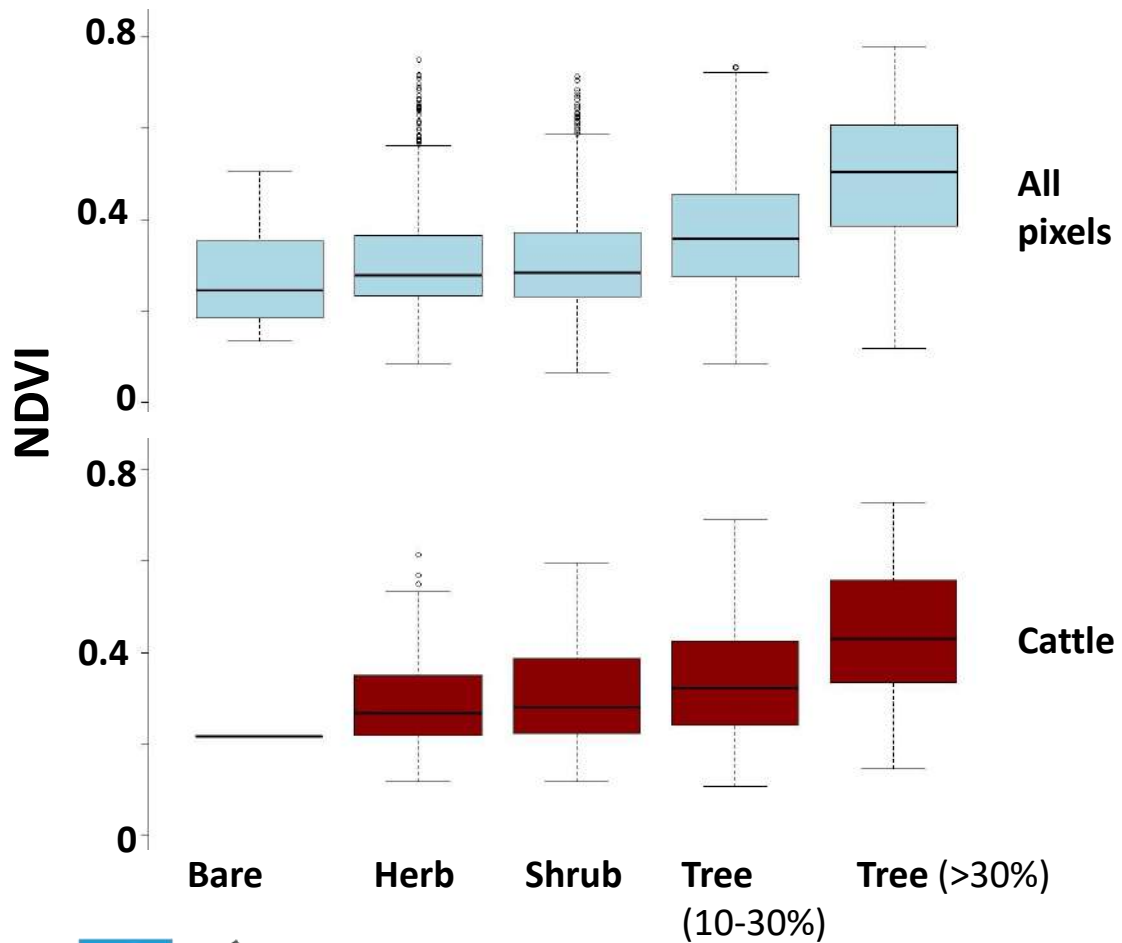


Test area
Cattle GPS locations
July 2018

Use of space and habitat selection by cattle



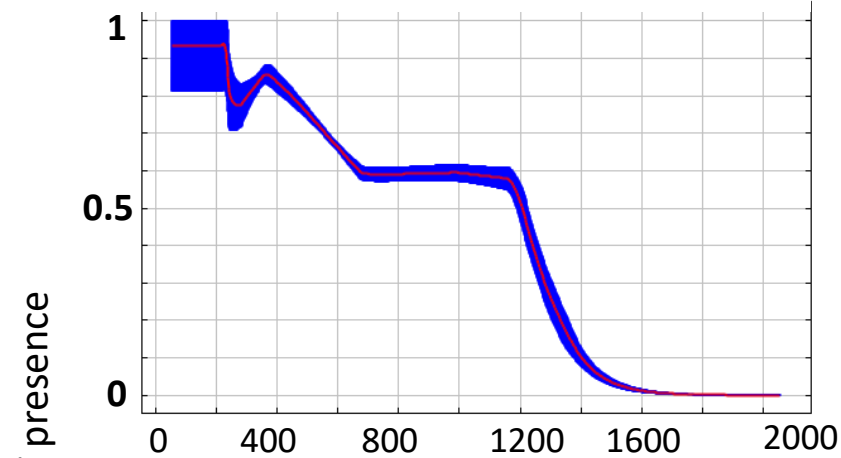
Use of space and habitat selection by cattle



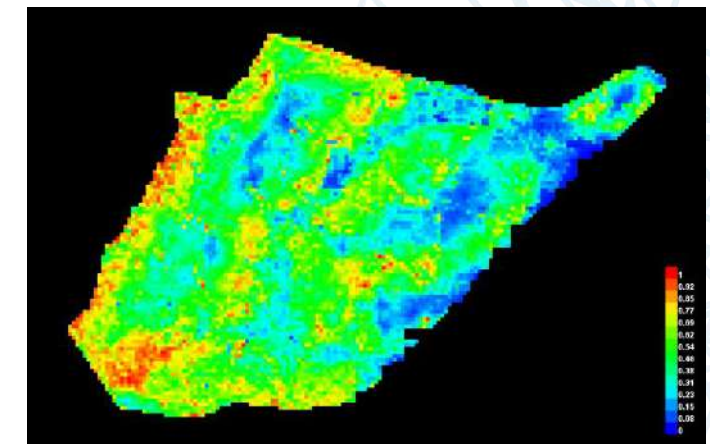
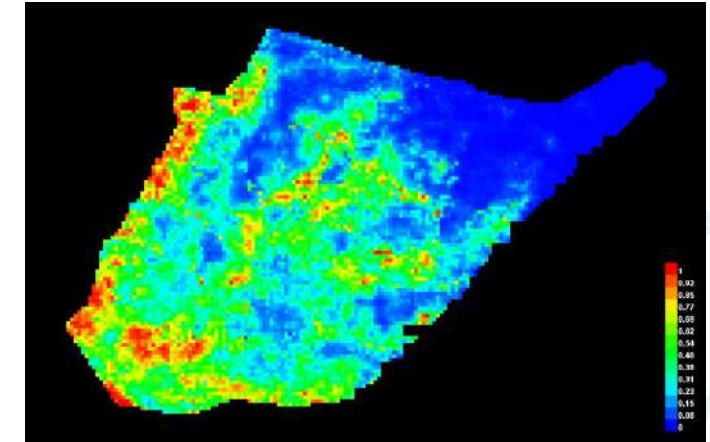
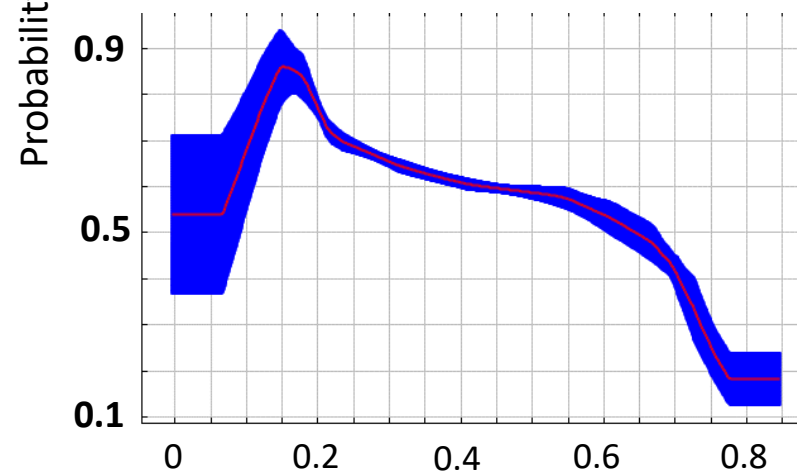
Use of space and habitat selection by cattle

- Maxent to model use of space
- Most important variables:
 - Distance to water
 - Distance to roads
 - Slope
 - NDVI
- Least important variables:
 - Land cover (%)

Response to distance to water (m)

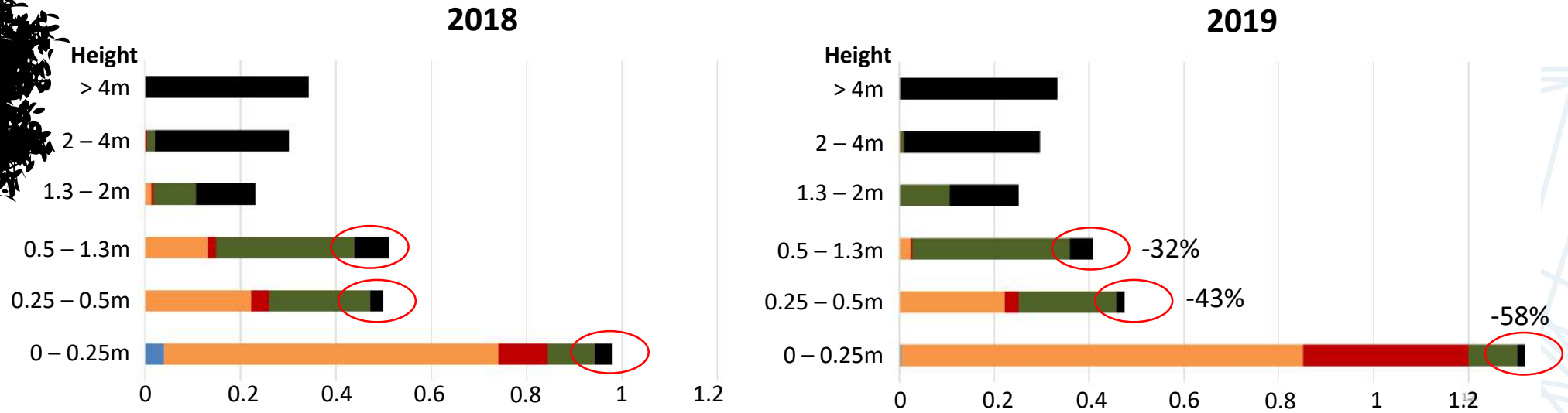
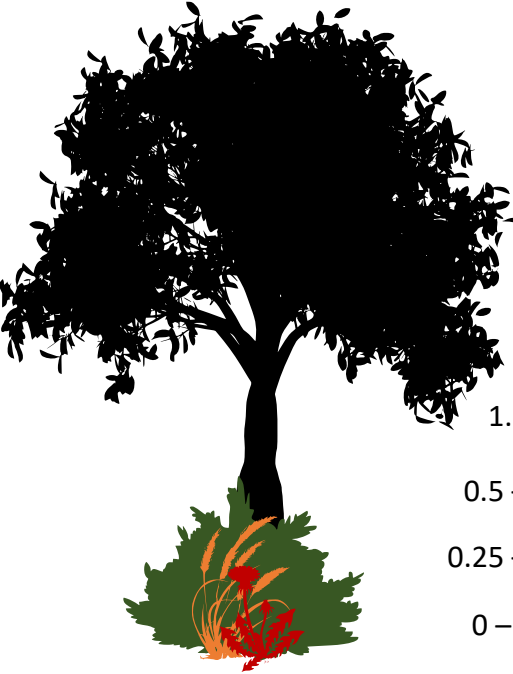


Response to summer NDVI



[distance to water not included]

Effects on vegetation structure (1st year)

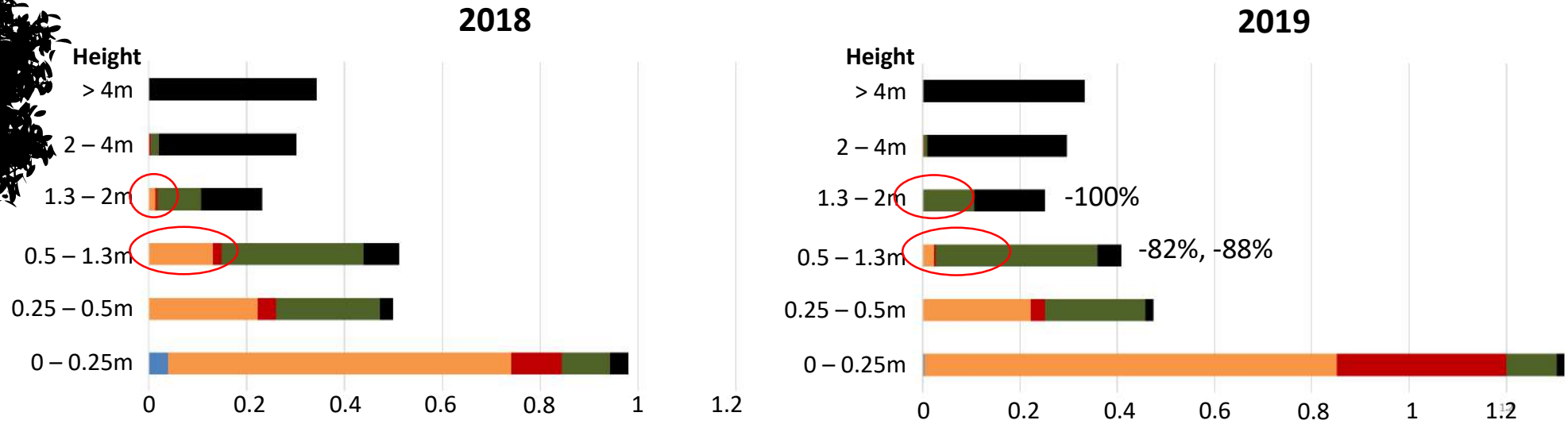
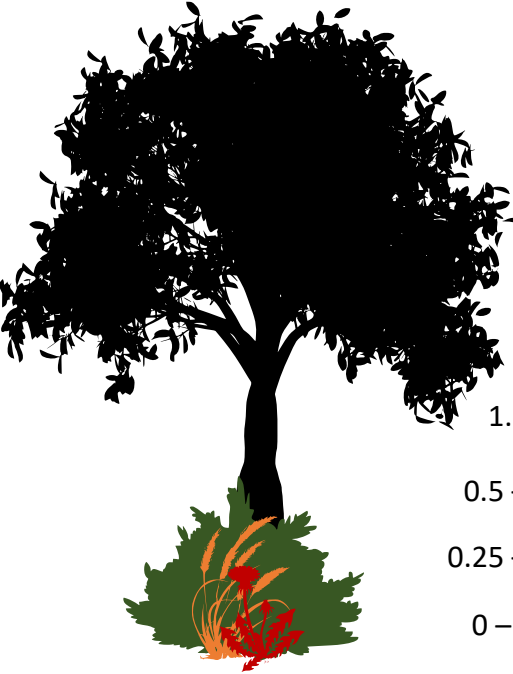


24 (100m²) quadrats=pixels
21 intercept points p/quadrat
= 504 points

■ Bare soil
 ■ Grass
 ■ Forb
 ■ Shrub
 ■ Tree

- Decline of oak cover in the lower layers

Effects on vegetation structure (1st year)

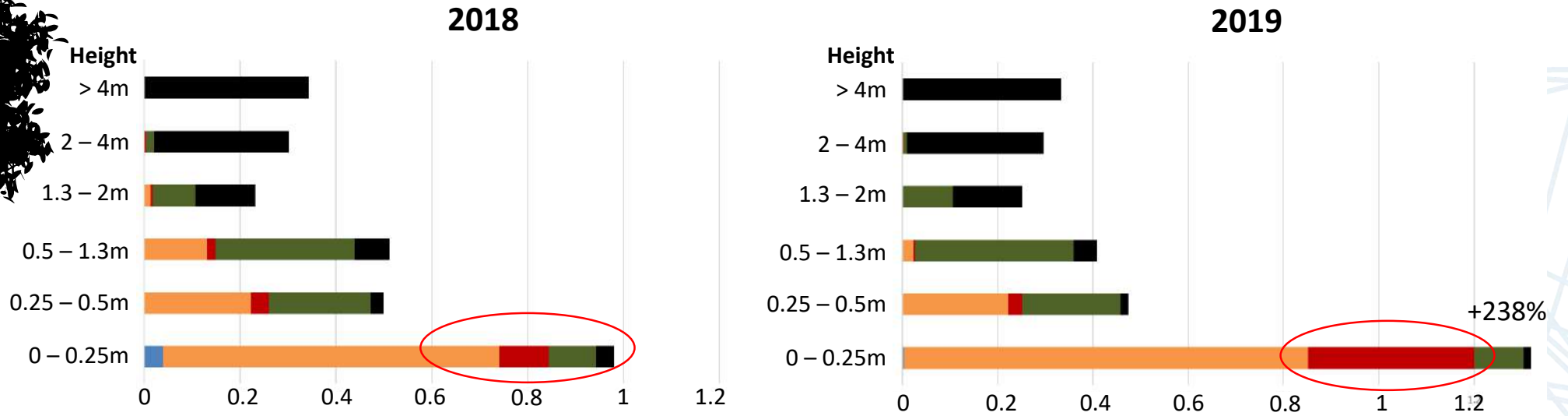


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■ Bare soil ■ Grass ■ Forb ■ Shrub ■ Tree

- Decline of oak cover in the lower layers
- Decline of tall grasses in the intermediate layers

Effects on vegetation structure (1st year)



24 (100m²) quadrats=pixels
21 intercept points p/quadrat
= 504 points

■ Bare soil ■ Grass ■ Forb ■ Shrub ■ Tree

- Decline of oak cover in the lower layers
- Decline of tall grasses in the intermediate layers
- Increase of forbs in the ground layer
- Changes to NDVI not conclusive yet

To conclude...

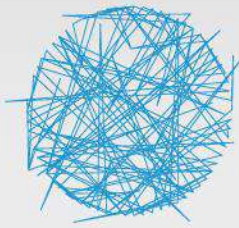
Use of space:

- Distance to water
- Presence of roads/trails
- Vegetation complexity

Effects on vegetation structure:

- Possible impacts on oak regeneration
- Simplification of structure at lower layers
- Limited control of shrub cover





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