INTRODUCTION

Determining and predicting species habitat use is complicated by the inherent spatial and temporal variability of resource availability. This is particularly problematic as land cover and its phenology are predicted to change under future climate conditions. Species may be responding to habitat patchiness, phenology or both. Further, species life-cycles may be synchronized to respond to habitat cues. Here we propose that (1) remote sensing can provide state-of-the-art habitat descriptors at multiple spatial and temporal scales, (2) animal radio-tracking data can be linked to remote sensing products, and this fusion allows further understanding of species-habitat relationships, and their dynamics, and (3) make informed predictions on whether climate changes would strengthen or decouple these relationships.

RESULTS:

Legend

METHODS + RESULTS

European badger (Meles meles)

Test descriptors of ecosystem type and function

- General distribution in Europe
- Construct sets
- Inhabits many ecosystem types
- In Mediterranean ecosystems tracks spatial and temporal variability of food resources
- Life-cycle: delayed implantation, birth in late winter, weaning in early summer

- Not widely distributed
- Social
- Requires burrows
- Inhabits many ecosystem types
- Tracks spatial variability of food resources
- Ecology not fully known
- Life-cycle: implantation after mating, birth in early spring, weaning in early summer

Analysis:

Response variable:
Badger presence

Predictor variable(s):
“snap-shot” habitat descriptors for land cover, canopy cover, productivity and stress

Evaluation:
Arals Inetermination Criteria (AICc) and Area Under the Curve (AUC)

Results:
The best models included land cover type, canopy cover, productivity and stress descriptors. The best models (in yellow) show that NDVI = SAVI in performance.

Table 1: Selected IEm used to predict European badger presence as a function of

Table 2: Effect of temporal resolution on habitat descriptors

Test effect of temporal resolution on habitat descriptors

- Land cover
  - CORINE 2000 (Figure 6a)
- Canopy cover
  - PCA of Landsat bands (Figure 6b. Carreiras et al. 2006)

Table 3: Multi-temporal Landsat TM + ETM+ for the tracking period of American badgers

Western oak woodlands
Agriculture
Dry agriculture
Canopy cover
Productivity
Stress

Amalthea

Oak woodlands
Agriculture
Dry agriculture
Canopy cover
Productivity
Stress

Best model

Best model
Annual grasslands
Coastal oak woodlands
Coastal sage scrub
Canopy cover
Productivity
Stress

We showed that:

(1) Badger presence was best predicted by habitat descriptors that measured land cover type, cover, productivity and stress. This is likely because the addition of such descriptors can describe flowering and fruiting time, and enhance the importance of linking ecosystem type and function.

(2) Models were improved with multi-temporal snap-shots of habitat descriptors. In California, it requires monthly descriptors while in Portugal seasonal repetitions are sufficient. This shows the importance of spatio-temporal matching.

(3) Badgers tracked the productivity of their most preferred habitat over time. This was particularly important over the reproductive season. This suggests a strong tie between ecosystem productivity and reproduction.

Predicted future change in ecosystem types and functioning can greatly affect badger populations, in particular because of the demonstrated synchronicity between reproduction and ecosystem productivity.

CONCLUSION

Oak woodlands are the most important land cover type. Badgers track the productivity of these ecosystems. Reproduction is tied to time periods of high ecosystem productivity.

American badger (Taxidea taxus)

Test synchronicity between badger life-cycle and ecosystem phenology

- Land cover
  - Taxus 2000 (Figure 6b)
- Canopy cover
  - PCA of Landsat bands (Figure 6b. Carreiras et al. 2006)

Table 4: Multi-temporal Landsat TM + ETM+ for the tracking period of American badgers

Best model
Annual grasslands
Coastal oak woodlands
Coastal sage scrub
Canopy cover
Productivity
Stress

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(1) Badger presence was best predicted by habitat descriptors that measured land cover type, cover, productivity and stress. This is likely because the addition of such descriptors can describe flowering and fruiting time, and enhance the importance of linking ecosystem type and function.

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CONCLUSION

Annual grasslands are the most important land cover type. Badgers track the productivity of these ecosystems. Implantation and birth are tied to time periods of high ecosystem productivity.