Wind farm prioritisation based on potential impacts on wolf (Canis lupus) habitat in Croatia

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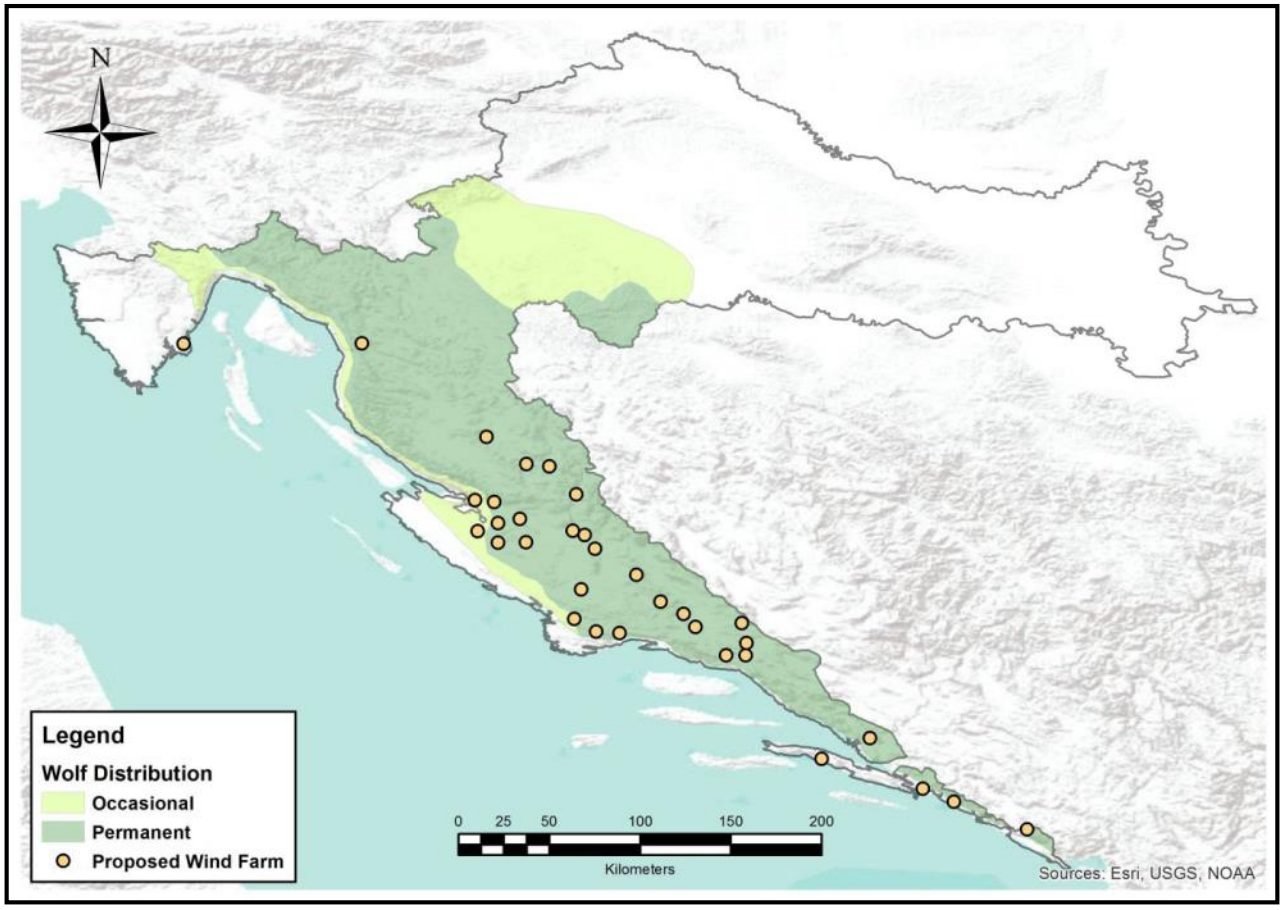
Gioele Passoni

SCCS Cambridge, March 2016

Wolves in Croatia



Population estimates

~ 200 wolves

Main threats

- conflict with humans
- wind farm construction

(Kaczenski *et al*, 2012; Štrbenac, 2010)

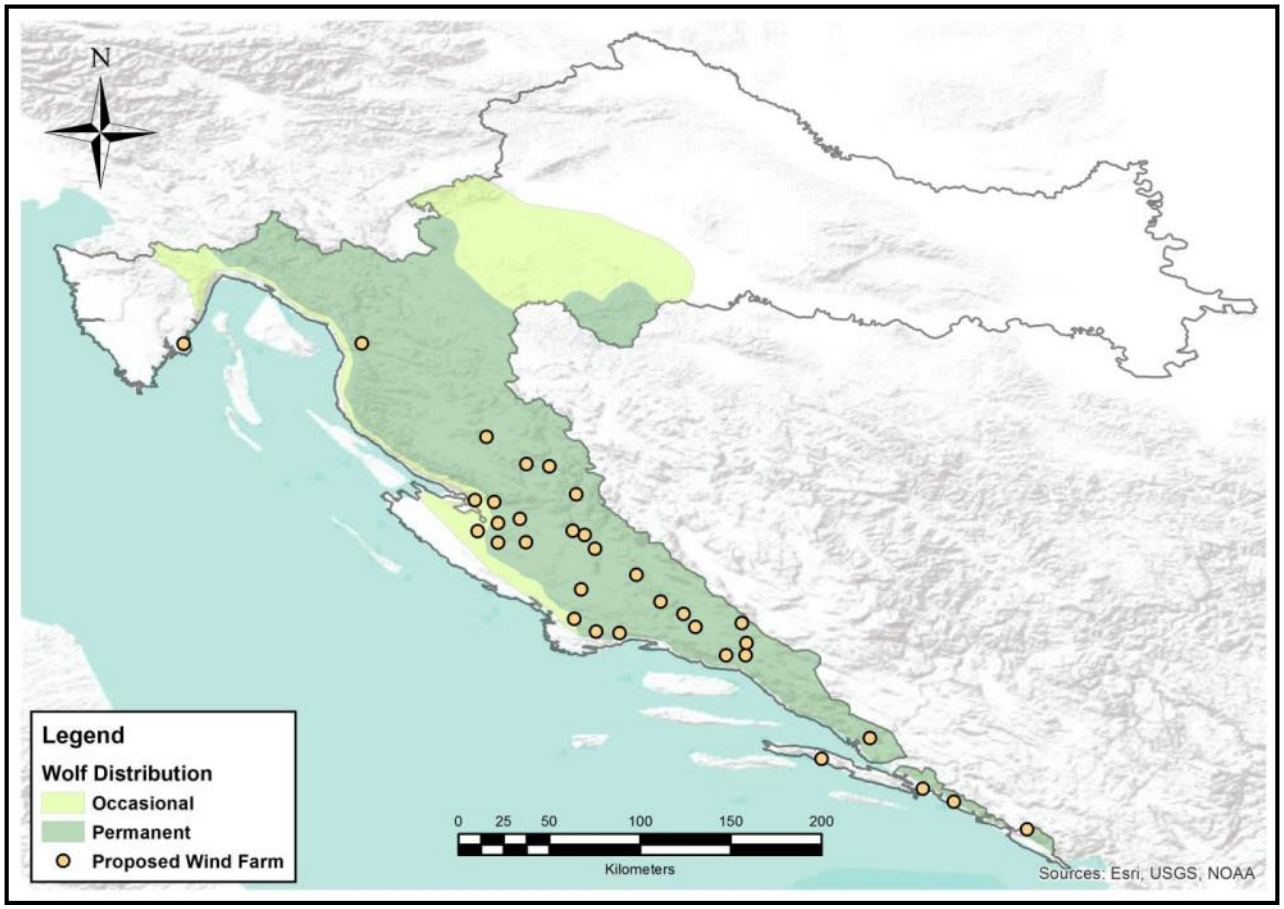
Wind Farm Impacts on Wolves

- Loss of suitable habitat
- Increased human access
- Noise disturbance???

During construction: decreased breeding rate
During operation: breeding sites located >4 km from turbines

(Helldin, Jung *et al.* 2012, Kuvlesky Jr, Brennan *et al.* 2007 Álvares, Rio-Maior *et al.*, in press)

Wind Farms in Croatia



Wind Farms		Installed Capacity
Proposed	(currently)	1,555 MW
Needed	(2020 EU target)	747.25 MW

(MINGO, 2016)

Aim

Select wind farms in order to meet EU energy targets while minimising potential ecological impacts on wolves

Methodological Framework

Breeding sites localisation → Habitat Suitability Model (MaxEnt) → Estimation of potential impact → Wind farm prioritisation (Marxan)

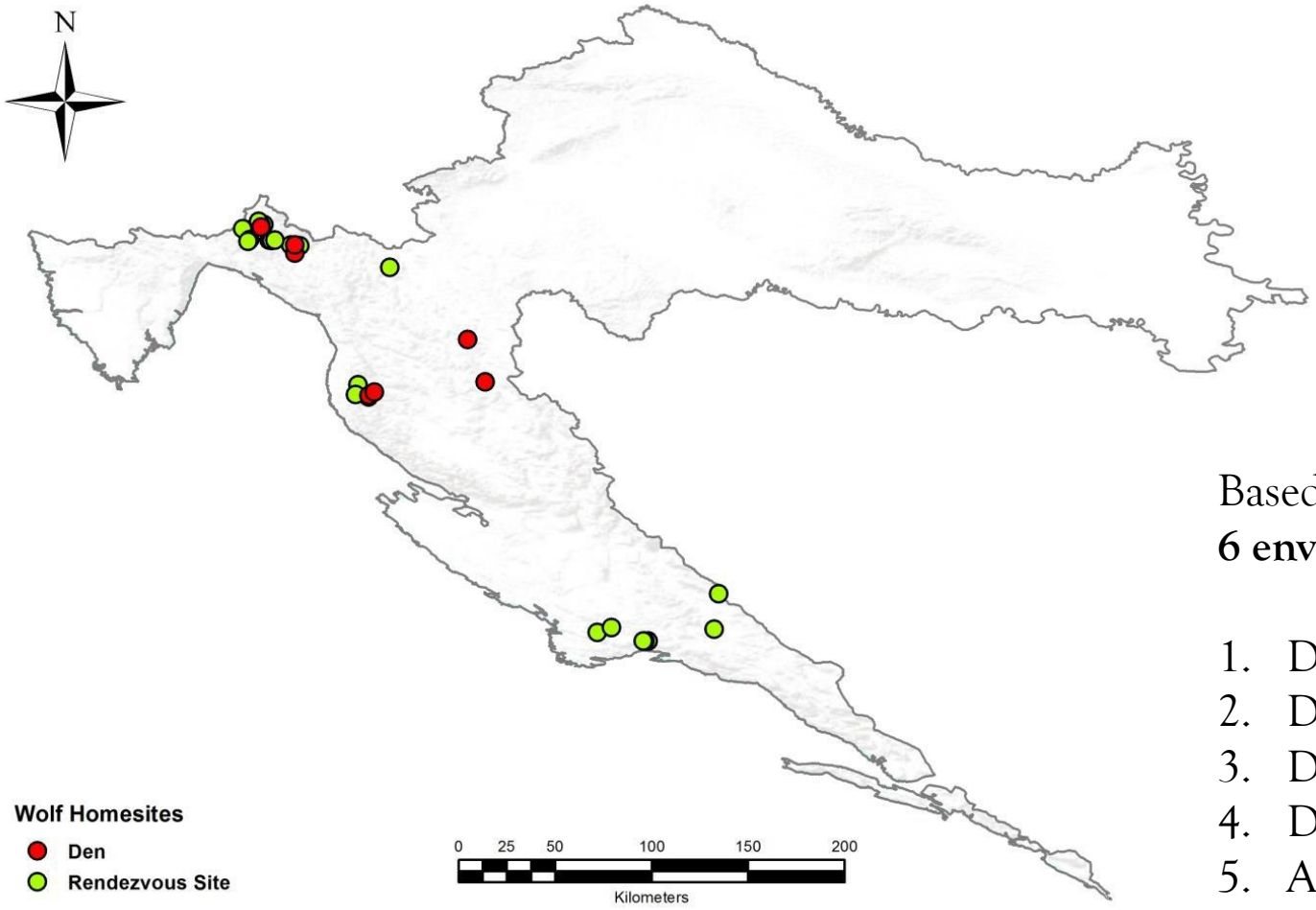
Homesites localisation

Howling surveys

Direct observations

From April to September between 1997 and 2015

Habitat Suitability Model - MaxEnt



Based on **31 homesites** and **6 environmental predictors**:

1. Distance to settlements
2. Distance to farmland
3. Distance to roads
4. Distance to forest edge
5. Altitude
6. Slope

Pearson's Correlation $R < 0.7$

Wind Farm Prioritisation

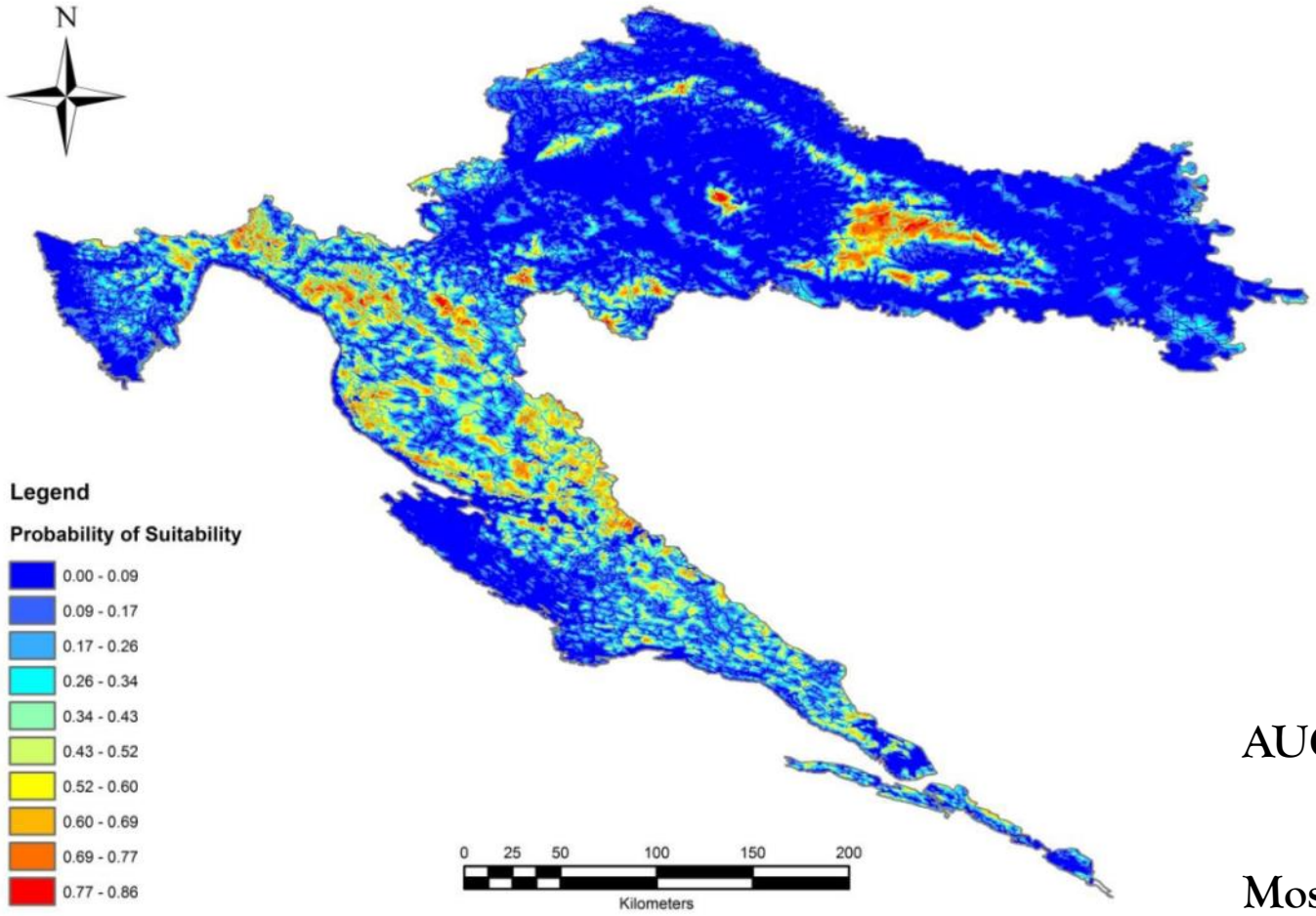
Marxan allows selecting the optimal configuration of wind farms which reach the energy target while minimising the ecological cost on wolf habitat

Each wind farm contributes to energy targets at a certain ecological cost.

Each Wind Farm
Energy Contribution = Installed capacity (MW)
Cost = Sum of Maxent cell values in a 4km buffer

Overall Target
EU energy target (747.25 MW)

Results

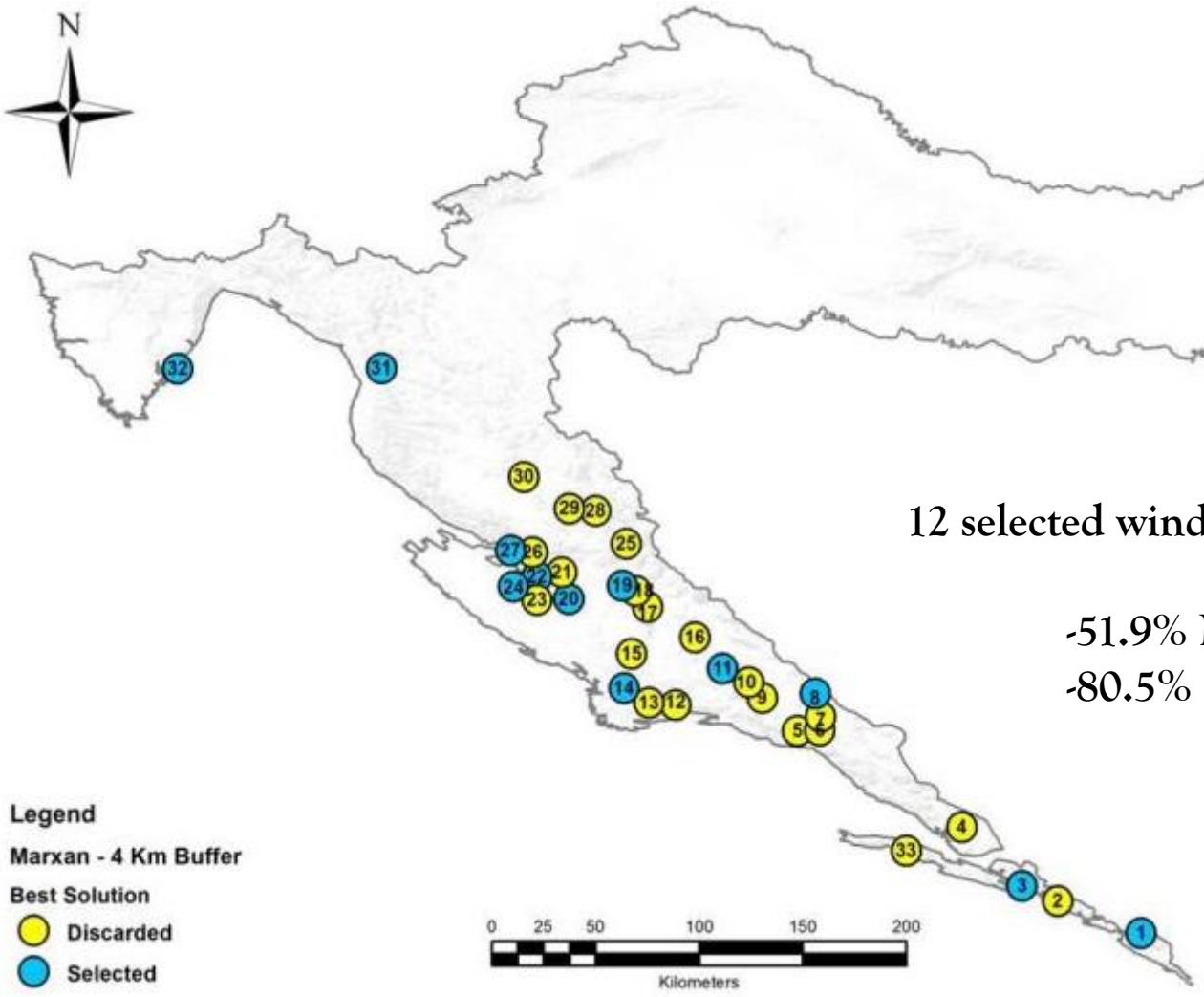


31 homesites
7 dens
24 rendezvous site

AUC value:
0.805 (SD=0.072)

Most important predictors:
Distance to settlements (29%)
Distance to farmland (14%)
Distance to roads (12%)
Distance to forest edge (33%)

Results



12 selected wind farms out of 33

-51.9% MW

-80.5% in the impact on wolves

Wind farms are good

...BUT...

Environmental, social and economic drawbacks, particularly where there is high competition for land.

It is important that all these factors are taken into consideration in the planning process.

Discussion

- **Relatively simple and evidence based framework** for wind farm prioritisation based on impacts on wolf critical habitat in Croatia

- Used in the meetings with wind farm developers and the Ministry of Nature Protection

- Applicable to other infrastructure and other large carnivore species (e.g. bears and lynx)

Photo credit: Gioele Passoni

What more can be done?


Photo credit: Gioele Passoni

- **More evidence** on the impact of wind farms on wolves and other terrestrial mammals

  ...in the meanwhile, **precautionary approach!**

- **Minimisation of impacts during construction and operation**

  (closing access roads to public, avoid works during reproduction time and when wolves are most active...)

Acknowledgements

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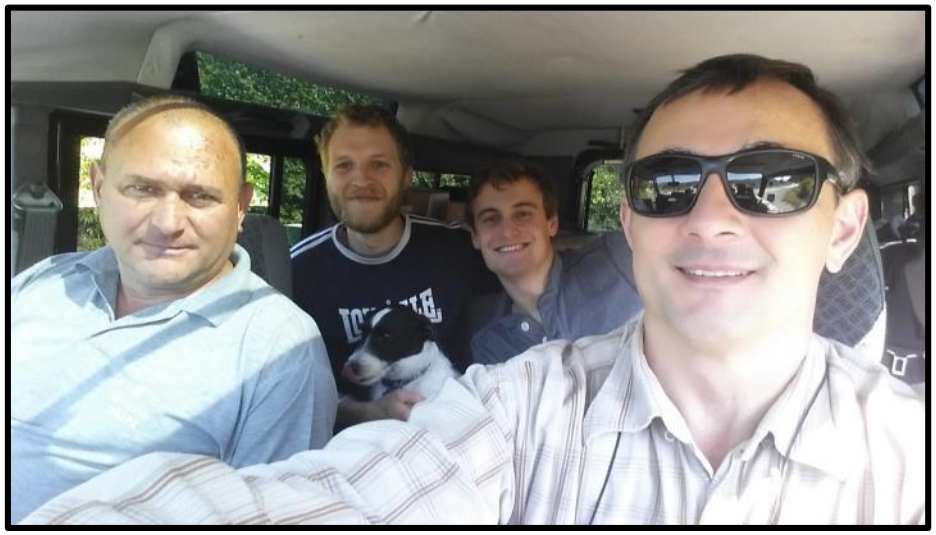

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