

# The ConnectGREEN Ecological Network

– from Habitat Suitability Models to  
definition of Core Areas & Corridors

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# The Three C's - concept

## • Cores – Corridors – Carnivores

- identification of **CORE** regions of suitable habitat large enough to host viable populations
- wildlife **CORRIDORS** for smooth movement of animals such as wide ranging large carnivores and genetic flow between animal populations
- **CARNIVORES** represent the apex predators within ecosystems whose presence within a landscape enables ecosystem revival

# Key aims

1. Assessment of habitat suitability
2. Definition of **core areas & stepping stones**
3. Evaluation of habitat connectivity
4. Identification of **migration corridors**

# Methodology

1. **Data collection, preparation & harmonization**
  - occurrence data
  - environmental variables
2. **Habitat suitability modelling**
  - Maxent (*Phillips et al. 2006*)
3. **Definition of core areas & stepping stones**
4. **Modeling habitat connectivity**
  - Circuit Theory (*McRae 2008*)
5. **Identification of migration corridors**
  - Least Cost Path approach (Linkage Mapper, *McRae et al. 2012*)

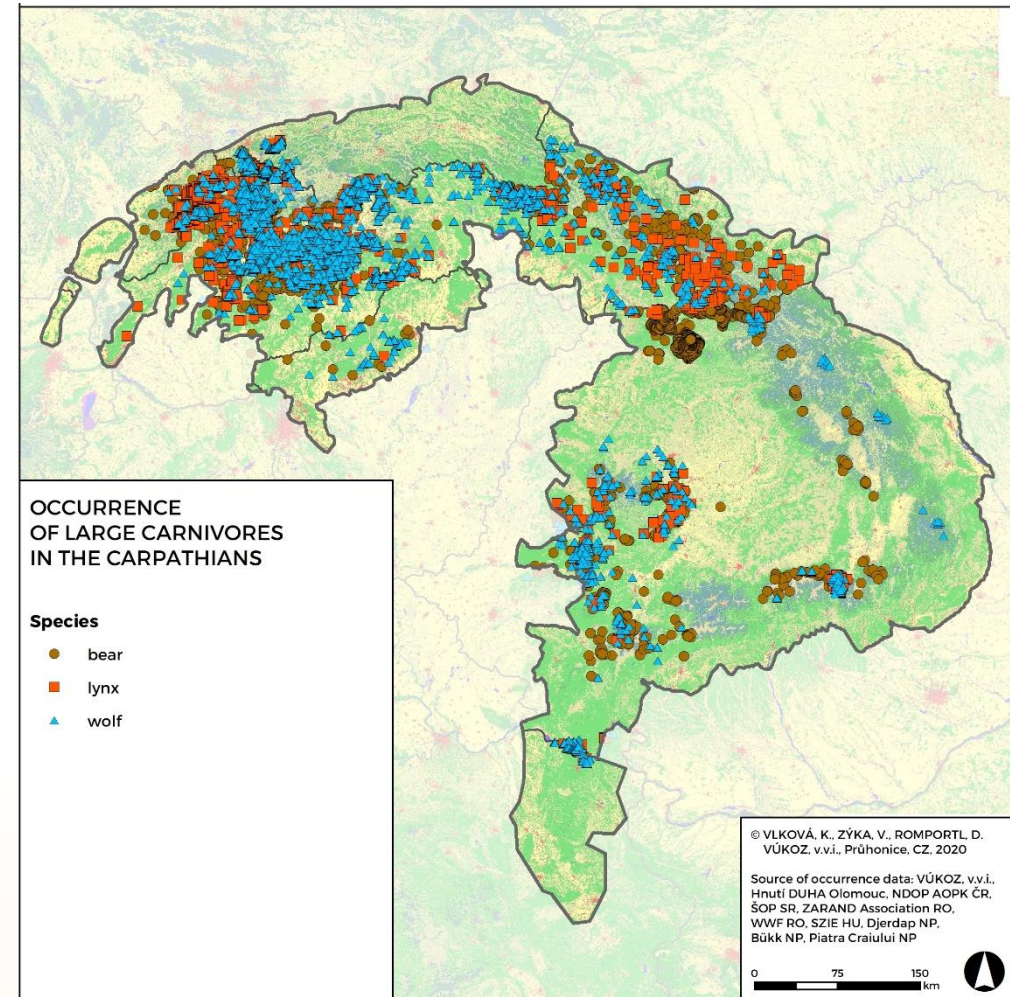
# Data collection

## Occurrence data

- unique & overwhelming dataset:
  - 3.811 lynx positions
  - 6.746 wolf positions
  - 23.803 bear positions

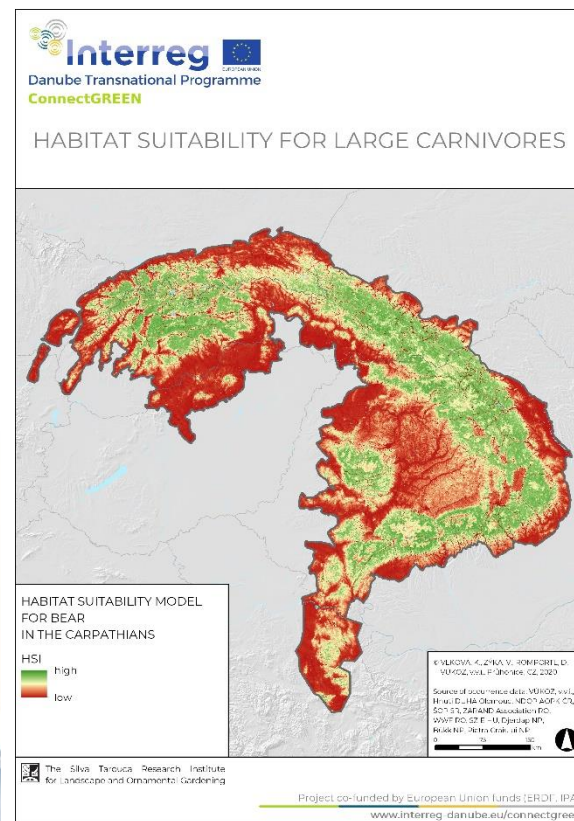
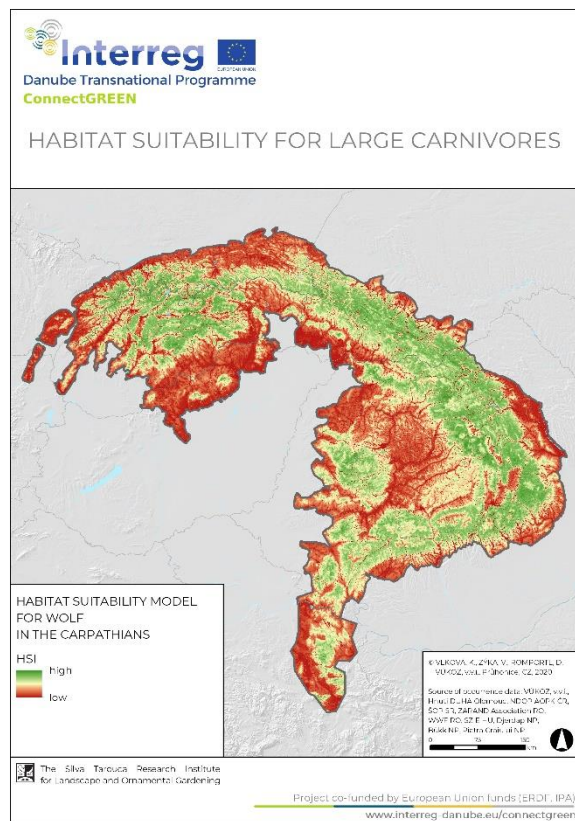
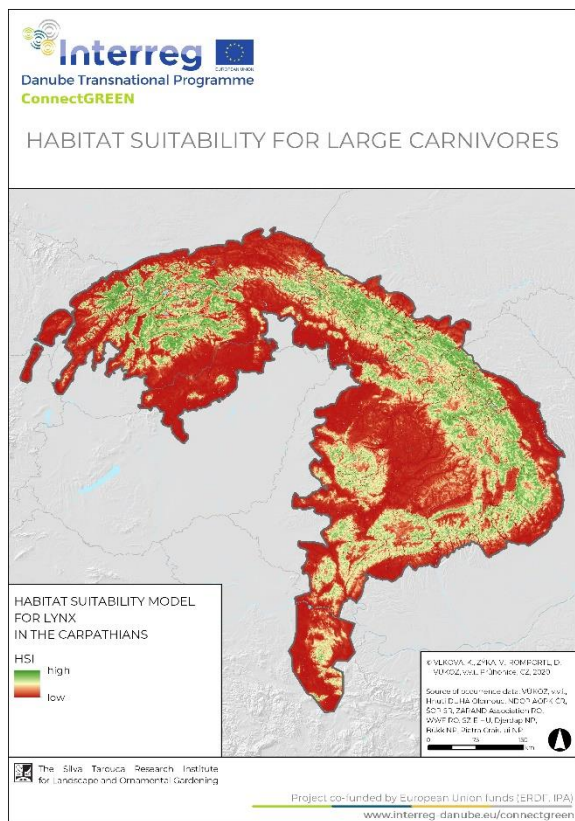
## Environmental data

- abiotic factors (topography, climate gradients)
- habitat factors (land cover, distance to sources)
- anthropogenic factors (dist. to roads, settlements)



# Habitat suitability modelling

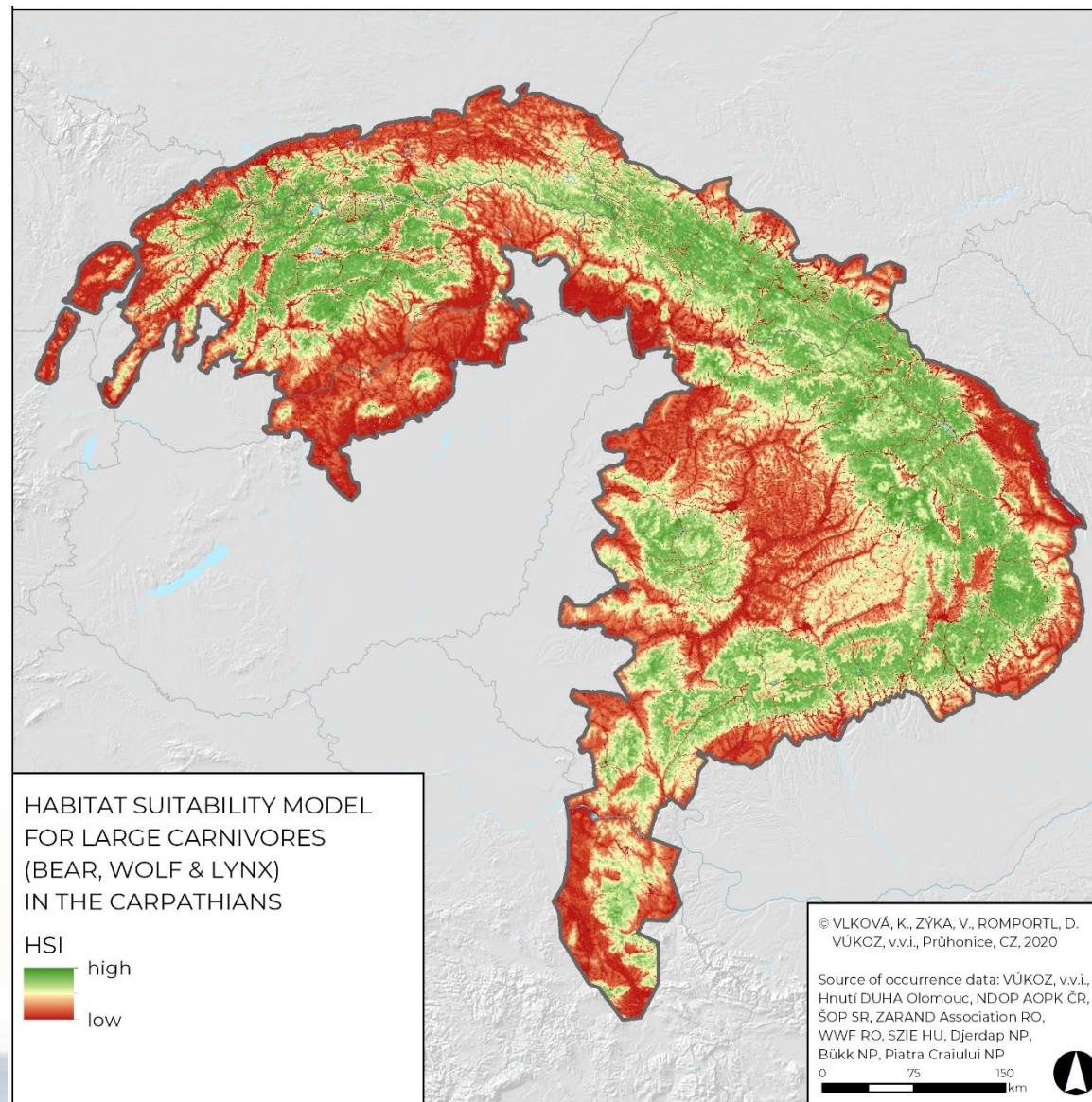
## Particular models for lynx, wolf & bear



**Synthesis**

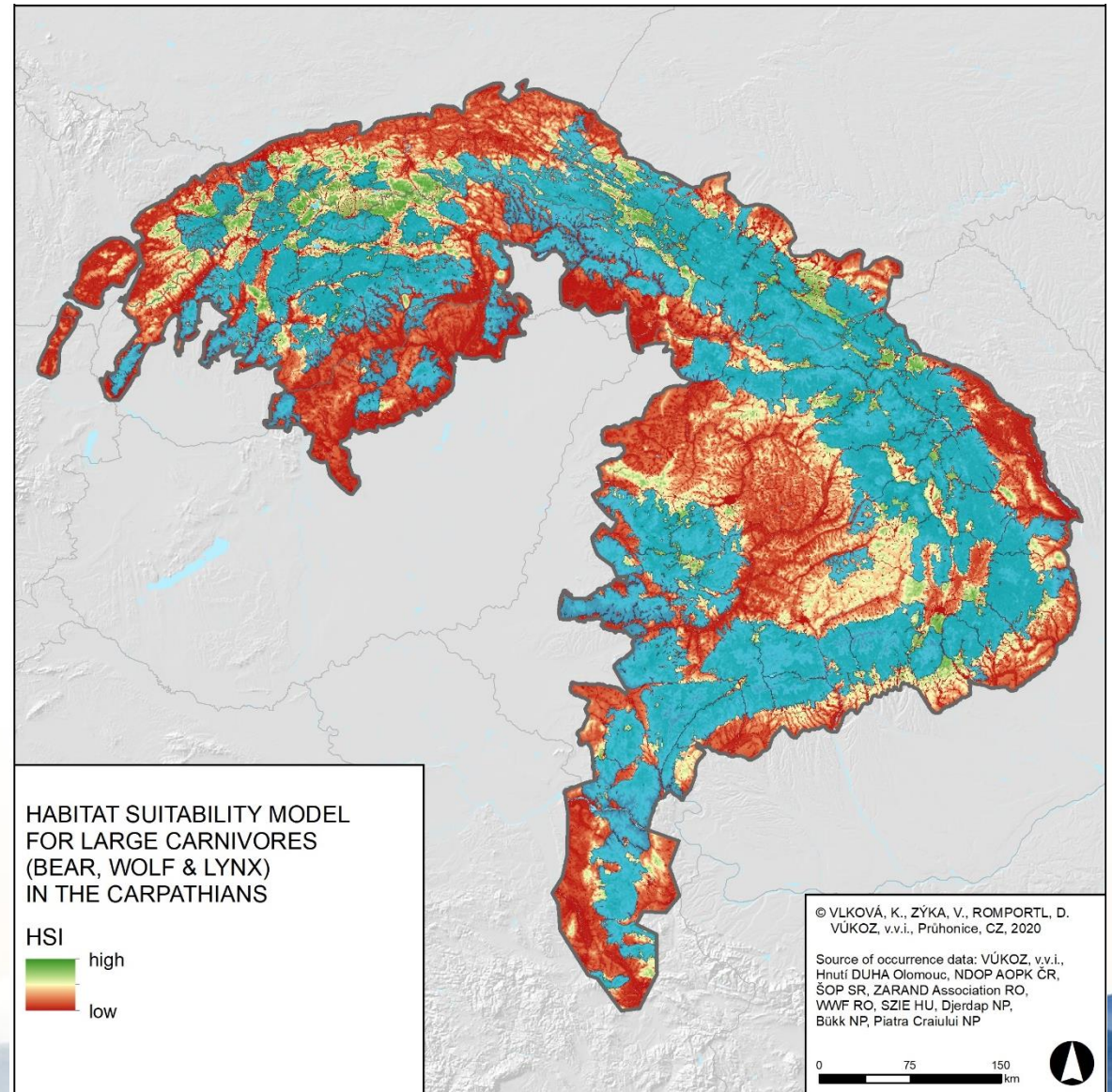
# Habitat suitability modelling

**Synthesis of particular  
three species-specific  
models**



# Definition of core areas & stepping stones

- qualitative criteria
- spatial requirements





# Modelling habitat connectivity

- inverse habitat suitability

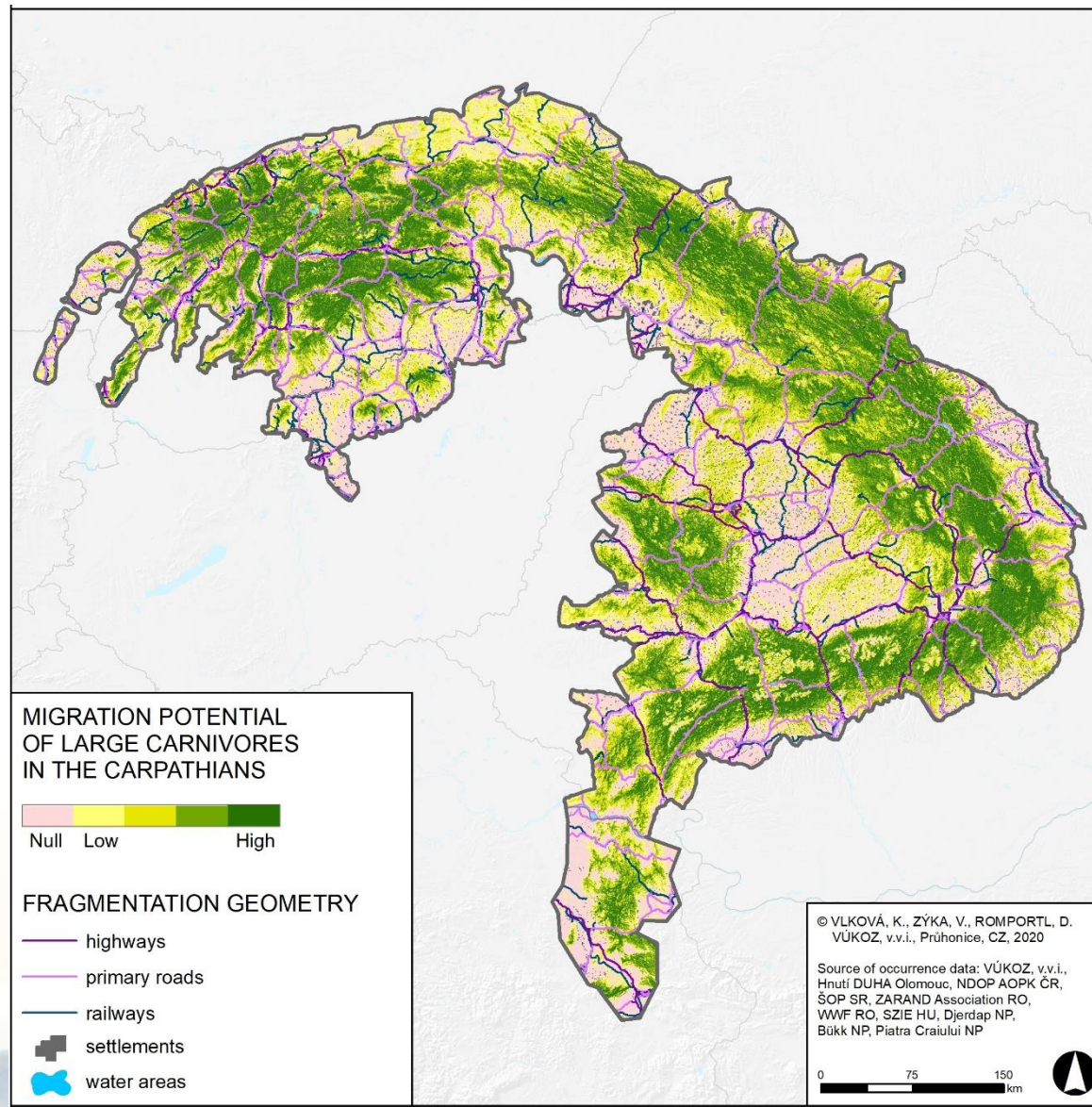


- fragmentation geometry



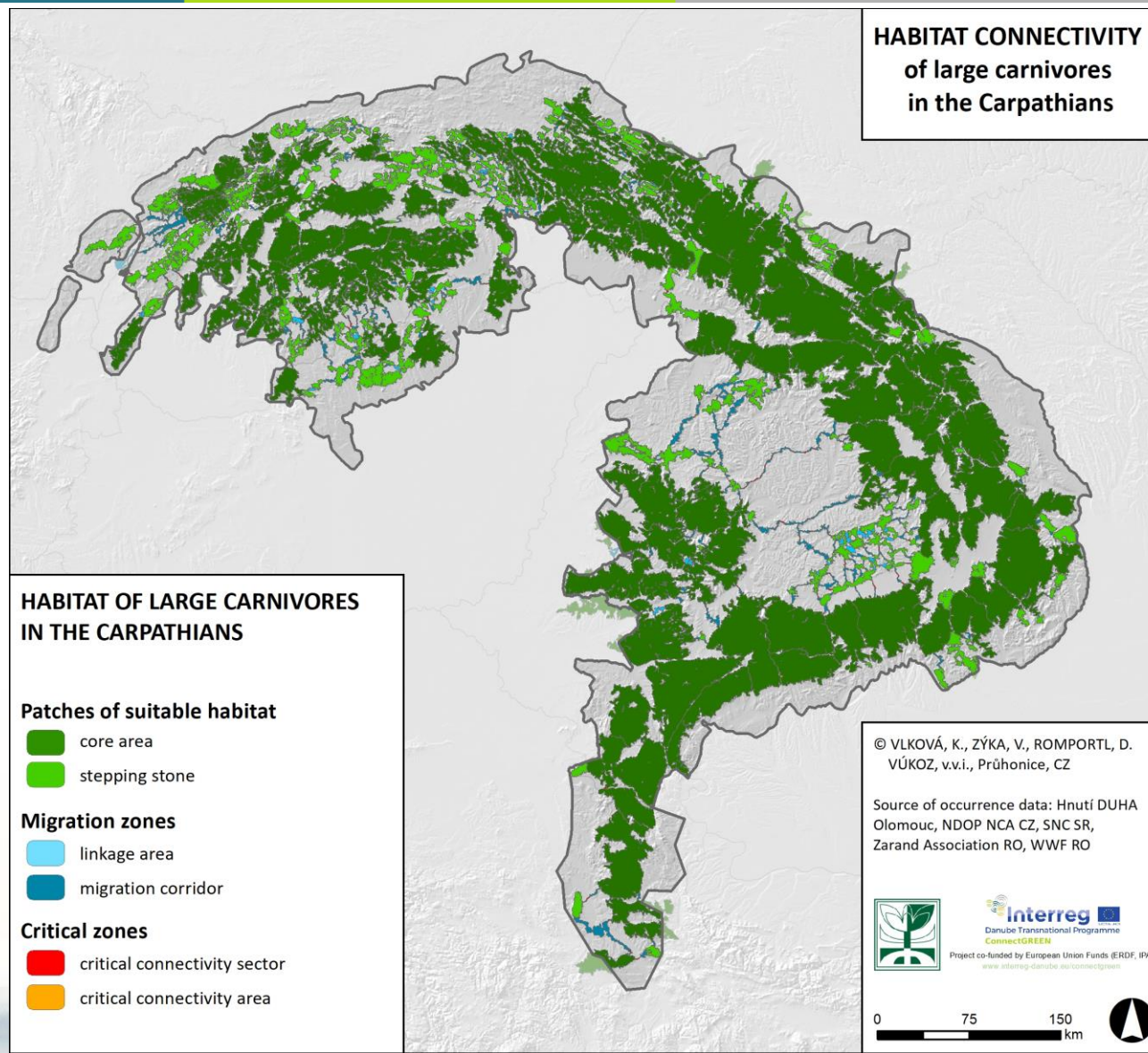
**resistance surface**

- **CIRCUIT THEORY**  
omnidirectional connectivity



# Identification of corridors

- the first draft of the ecological network - provided to all partners and other national and local experts to:
  - edit delineation of corridors, identification of critical zones
  - proposed classification of ecological network components



# Identification of corridors

- valuable feedback & editing the layer



# Identification of corridors

- valuable feedback & editing the layer



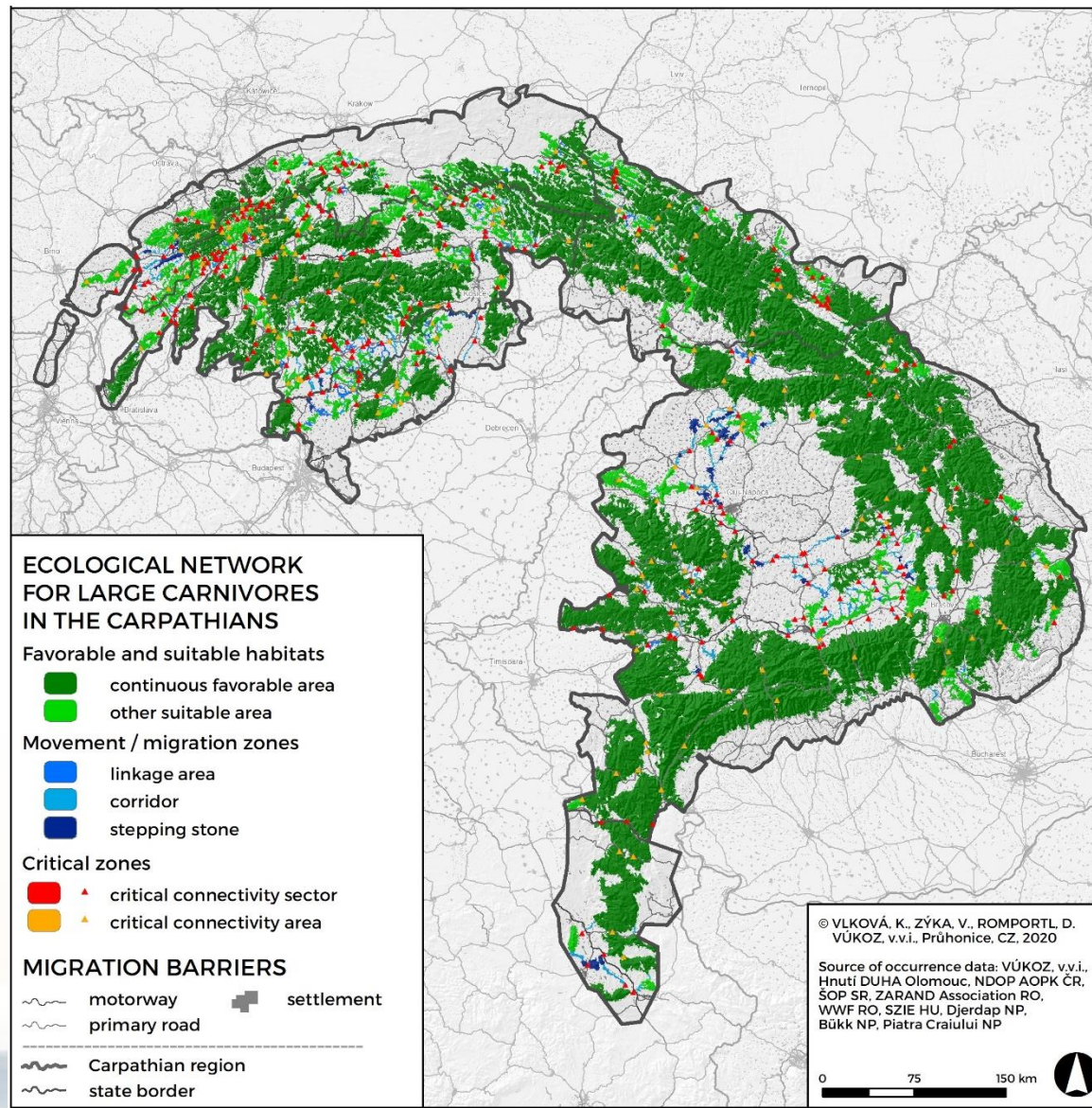
# New classification of the ecological network

- Favorable and Suitable Habitats
  - (Relatively) Continuous Favorable Areas (assimilated to Core Areas)
  - Other Suitable Areas
- Movement /Migration Zones
  - Linkage Areas
  - Corridors
  - Stepping Stones
- Critical Zones
  - Critical Connectivity Sector
  - Critical Connectivity Area

ConnectGREEN classification including correspondence with IUCN categories			
IUCN	ConnectGREEN		
CATEGORIES	MAIN CATEGORY	SUBCATEGORIES	SPATIAL LIMITS
<b>Protected Areas</b> A clearly defined geographical space, recognized, designated and managed through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. Preservation is the primary objective.	<b>Favourable and suitable habitats</b> Favourable (may include different classes, including optimal) and suitable habitats for long-term or temporal occurrence of large carnivores.	<b>(Relatively) Continuous Favourable Areas (assimilated to Core areas)</b> It is primarily a natural continuous habitat (usually forested) which meets both qualitative and spatial requirements of particular species for their long-term occurrence.	area > 300 km <sup>2</sup>  width > 1 km
<b>Conserved Areas (OECMs)</b> A geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustainable long-term outcomes for the in-situ conservation of biodiversity with associated ecosystem functions and services and where applicable cultural, spiritual, socio-economic, and other locally relevant values. Delivers the effective in-situ conservation of biodiversity, regardless of its objectives.		<b>Other Suitable Areas</b> Relatively continuous habitats which meet qualitative (mostly forested) but not spatial requirements of particular species for their long-term occurrence. It could be used permanently/seasonally by individuals/small segments of populations, or not used at present.	10 x area > 300 km <sup>2</sup>  width > 1 km
<b>Ecological Corridors</b> A clearly defined geographical space, not recognized as a 'protected area' or an other effective area-based conservation measure (OECM or conserved area) that is governed and managed over the long-term to conserve or restore effective ecological connectivity with associated ecosystem services and cultural and spiritual values.	<b>Movements/ Migration zones</b> Relatively suitable patches of habitats, which maintain the landscape connectivity by linking favourable and/or other suitable areas.	<b>Linkage area</b> A relatively large and heterogeneous area connecting two or more favourable or suitable areas, normally includes multiple stepping-stones and corridors, but the latter cannot be clearly defined due to the heterogeneity of the relatively permeable landscape.	width > 0.5 km
		<b>Corridor</b> A "classic" corridor (relatively continuous and linear-shaped habitat) that connects favourable/suitable areas through a relatively impermeable landscape.	width > 0.5 km
		<b>Stepping zones</b> Smaller patches of relatively suitable habitats used by individuals as temporary refuges during movements/dispersals through a relatively impermeable landscape. Might not be easily identified at the Carpathian level (due to resolution for instance).	
	<b>Critical zones</b> Zones critical for connectivity (e.g. places where movement/migration is mainly depending on currently permeable sections along linear features/infrastructure).	<b>Critical connectivity sector</b> A narrow corridor intersected by one or more linear barriers, which are limiting the movement possibilities of the animals within the landscape. Each situation has to be individually assessed. This might be more subcategories, identified at the national or local level, based on the low/magnitude of cumulative effect.	
		<b>Critical connectivity area</b> A favourable or suitable area intersected by one or a series of linear barriers, which are limiting the movement possibilities of the animals within the landscape. Each situation has to be individually evaluated based on the assessment of the permeability of the linear barriers.	

# Final identification of the ecological network

- online version [here](#)
- uploaded on CCIBIS database
- provided to all partners, stakeholders or other experts, spatial planners etc.



Thanks for your attention..

Special thanks to **Kristýna Vlková & Vlád'a Zýka**  
for their outstanding effort