Situation of the large carnivores in Hungary with particular reference to the used monitoring methods

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Population monitoring:

- Pre-planned scientific needs
- Regularly and co-ordinated work
- With same (non-invasive) methods
- Periodically repeated sampling
- Collection of distorted data
- GIS documented territorial unit observations
- Statistically evaluated
- Public and available data

Occasional observations:

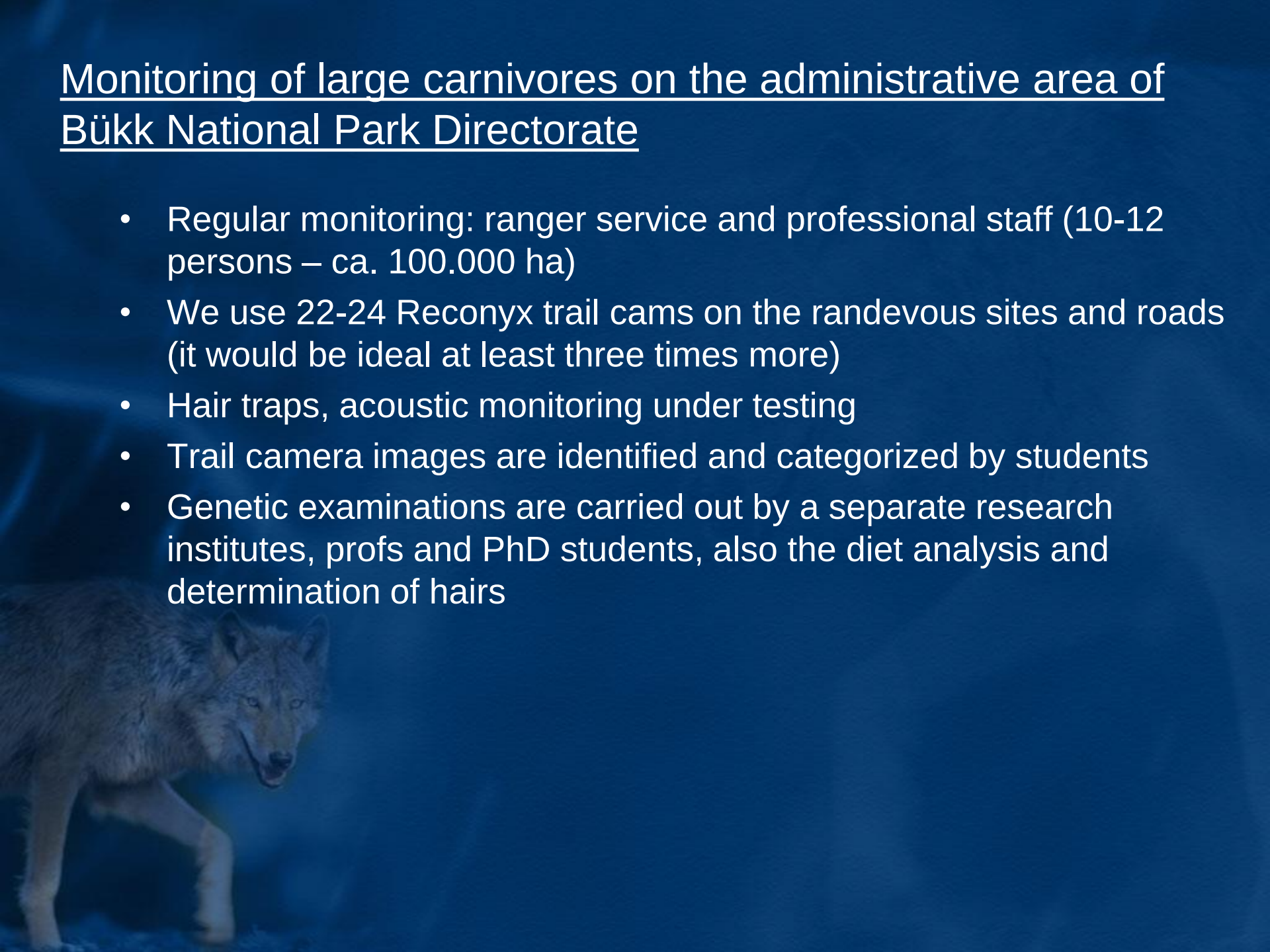
- Not well documented
- Doubtful information, to be certified
- Non systematical (ad hoc) data collection
- But it may also refer to new phenomenon

- Methods of mammal species monitoring implemented in Hungarian Biodiversity Monitoring System
- The distribution data published in EU National Reports (Natura 2000 sites, Standard Data Form)
http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=HUBN20001

- The results also can be found on the site:
http://web.okir.hu/sse/?group=TIR

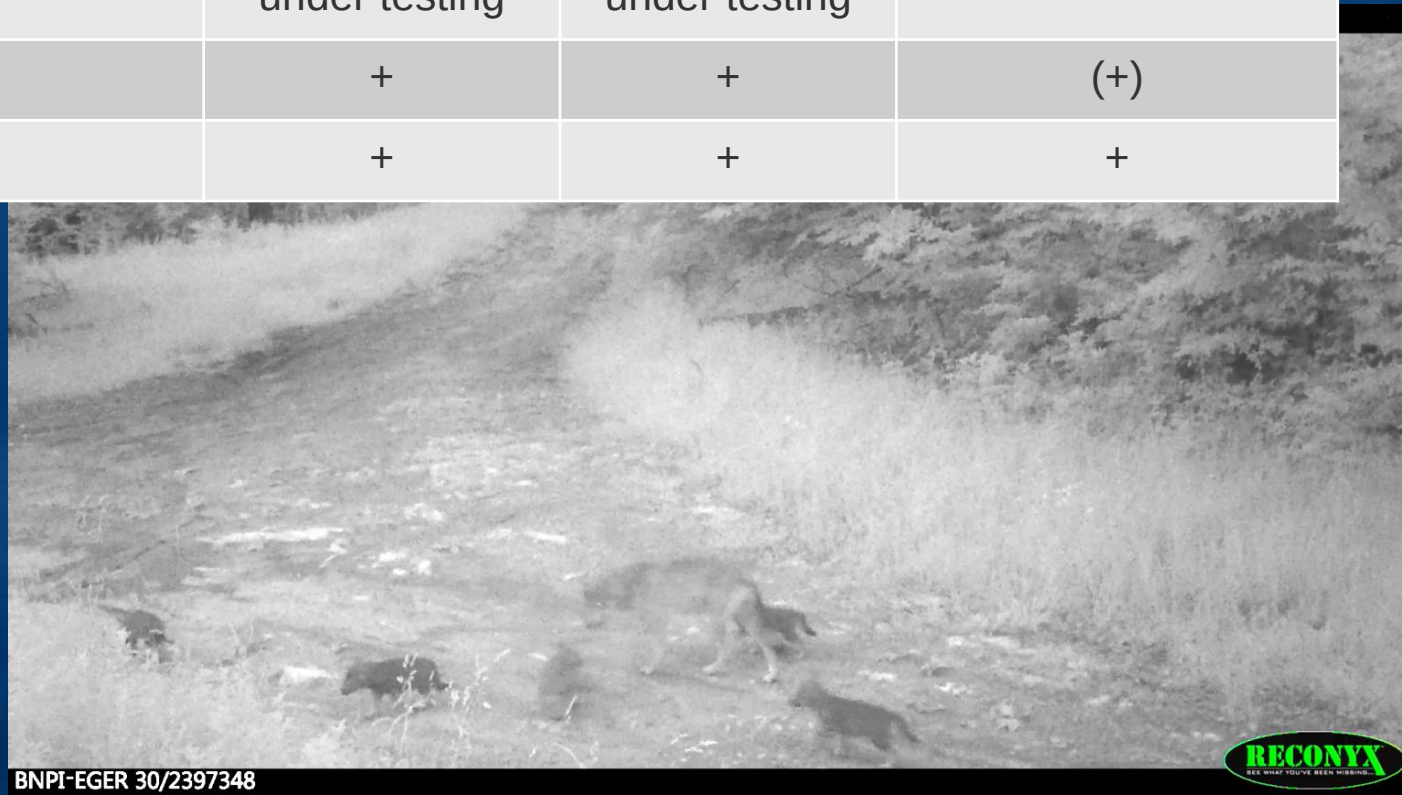
Monitoring of large carnivores on the administrative area of Bükk National Park Directorate

- Regular monitoring: ranger service and professional staff (10-12 persons – ca. 100.000 ha)
- We use 22-24 Reconyx trail cams on the randevous sites and roads (it would be ideal at least three times more)
- Hair traps, acoustic monitoring under testing
- Trail camera images are identified and categorized by students
- Genetic examinations are carried out by a separate research institutes, profs and PhD students, also the diet analysis and determination of hairs



Methods of surveys:

Methods	Lynx lynx	Canis lupus	Ursus arctos
Snow tracking	+	+	
Search for preys, droppings	+	+	
Hair traps	+		under testing
Acoustic monitoring	under testing	under testing	
Use of trailcams	+	+	(+)
Genetical analysis	+	+	+



Few results of non-genetic methods:

- More than 1500 observation datas collected in the last 10 years about LCs distribution on the administrative area of Bükk National Park Directorate.

- Identification of LL habitat with hair traps

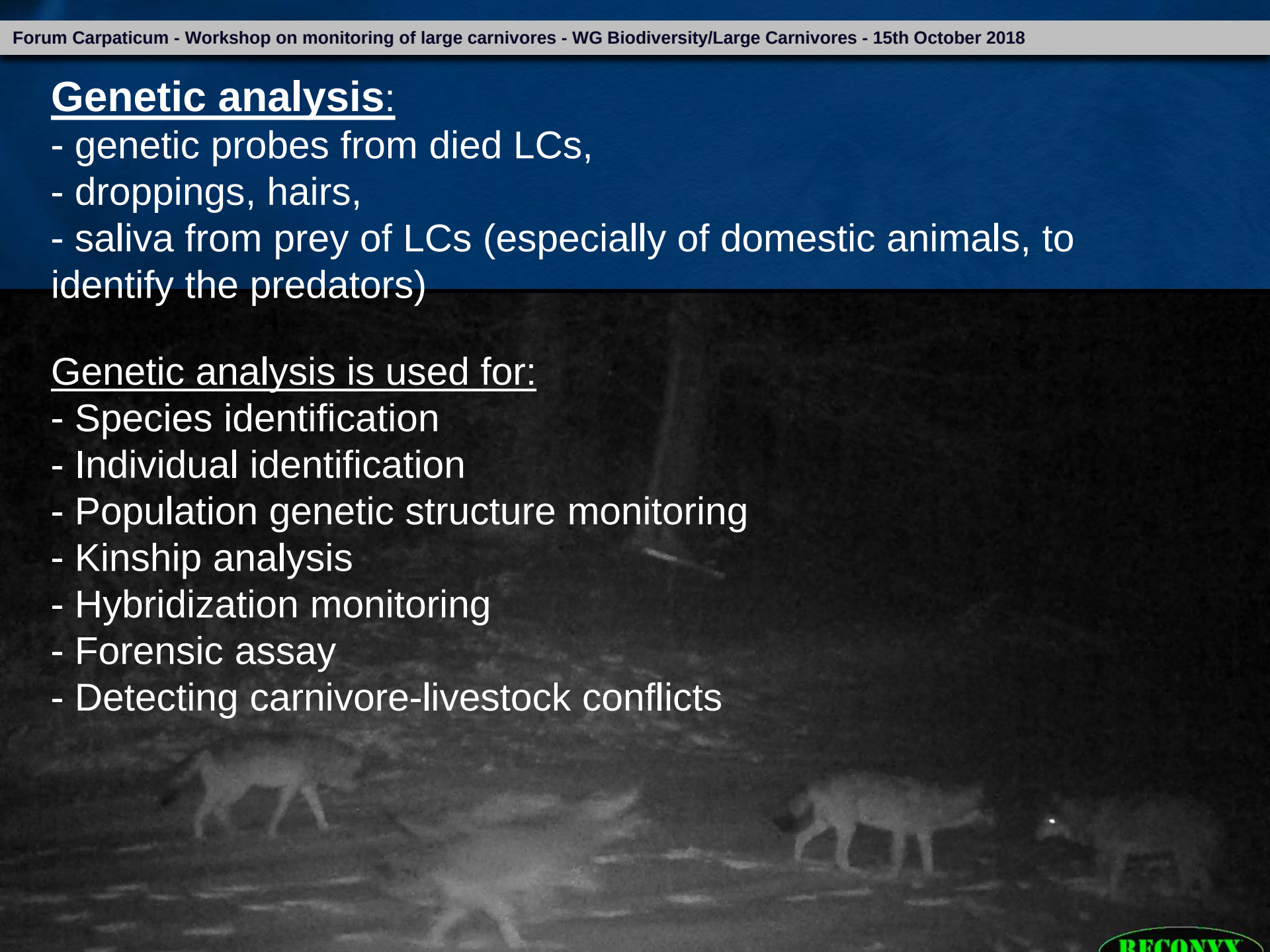
- It is also possible to identify individuals and estimate the size of the population based on the cameras' recordings. The wolf pack consists 7-8 individuals of the Bükk Mts. One of them was shot on the last week.

Genetic analysis:

- genetic probes from died LCs,
- droppings, hairs,
- saliva from prey of LCs (especially of domestic animals, to identify the predators)

Genetic analysis is used for:

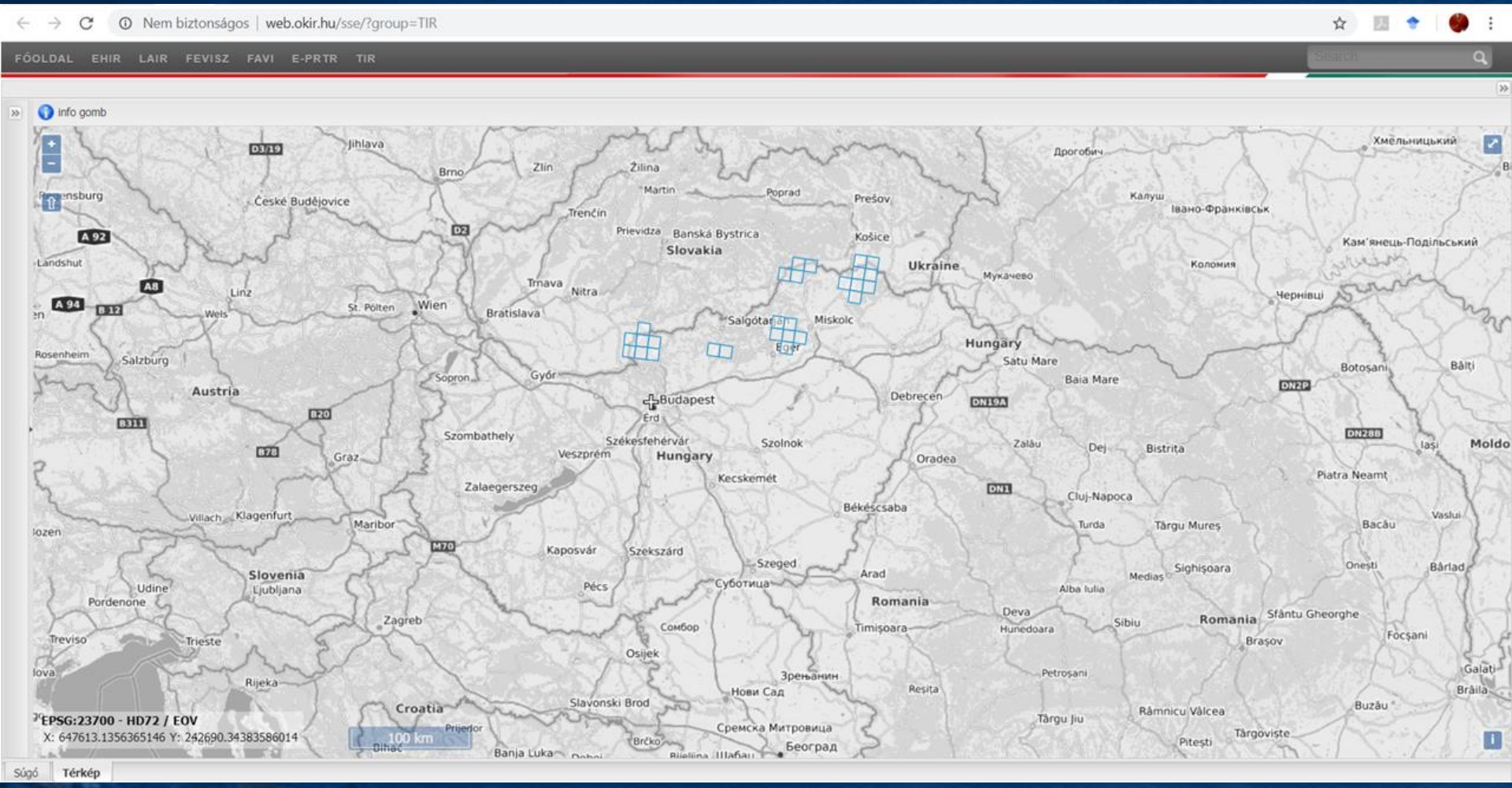
- Species identification
- Individual identification
- Population genetic structure monitoring
- Kinship analysis
- Hybridization monitoring
- Forensic assay
- Detecting carnivore-livestock conflicts



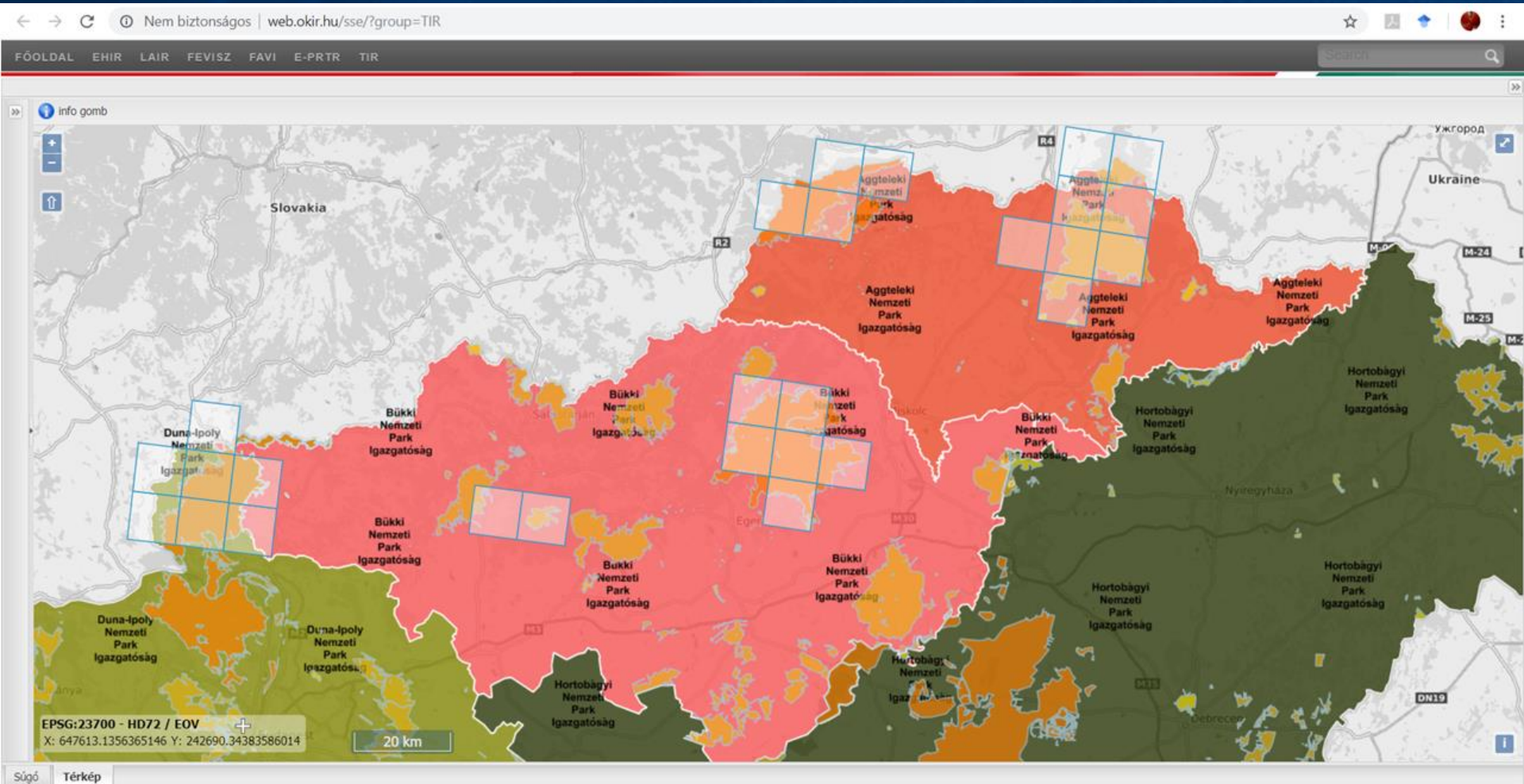
Sets used to genetic analysis:

Eurasian lynx, wild cat and feral cat	We use 21 polimorphic microsatellite loci (combined with 3 plex) for genetic identification + one for the sex identification FCA043, FCA023, FCA097, FCA132, FCA096, FCA223, FCA698, FCA149, FCA310, FCA035, FCA126, FCA229, FCA220, FCA391, FCA090, FCA559, FCA008, FCA045, FCA001, FCA506, F115
Grey wolf	We use 23 polimorphic microsatellite loci (combined with 4 plex) for genetic identification + one for sex identification (amelogenin) C2001, AHT137, c2054, c2096, FH2538, PEZ3, PEZ5, PEZ6, PEZ8, PEZ11, PEZ12, PEZ19, AHTh171, AHTh260, FH2088, PEZ02, FH3377, PEZ17, FH2010, FH2004, FH2107, FH2309, FH3313
Brown bear	We use 8 polimorphic microsatellite loci (combined with 2 plex) for genetic identification + one for the sex identification UarT006, UarT259, UarT647, UarT838, UarT380, UarT602, UarT739, UarT825

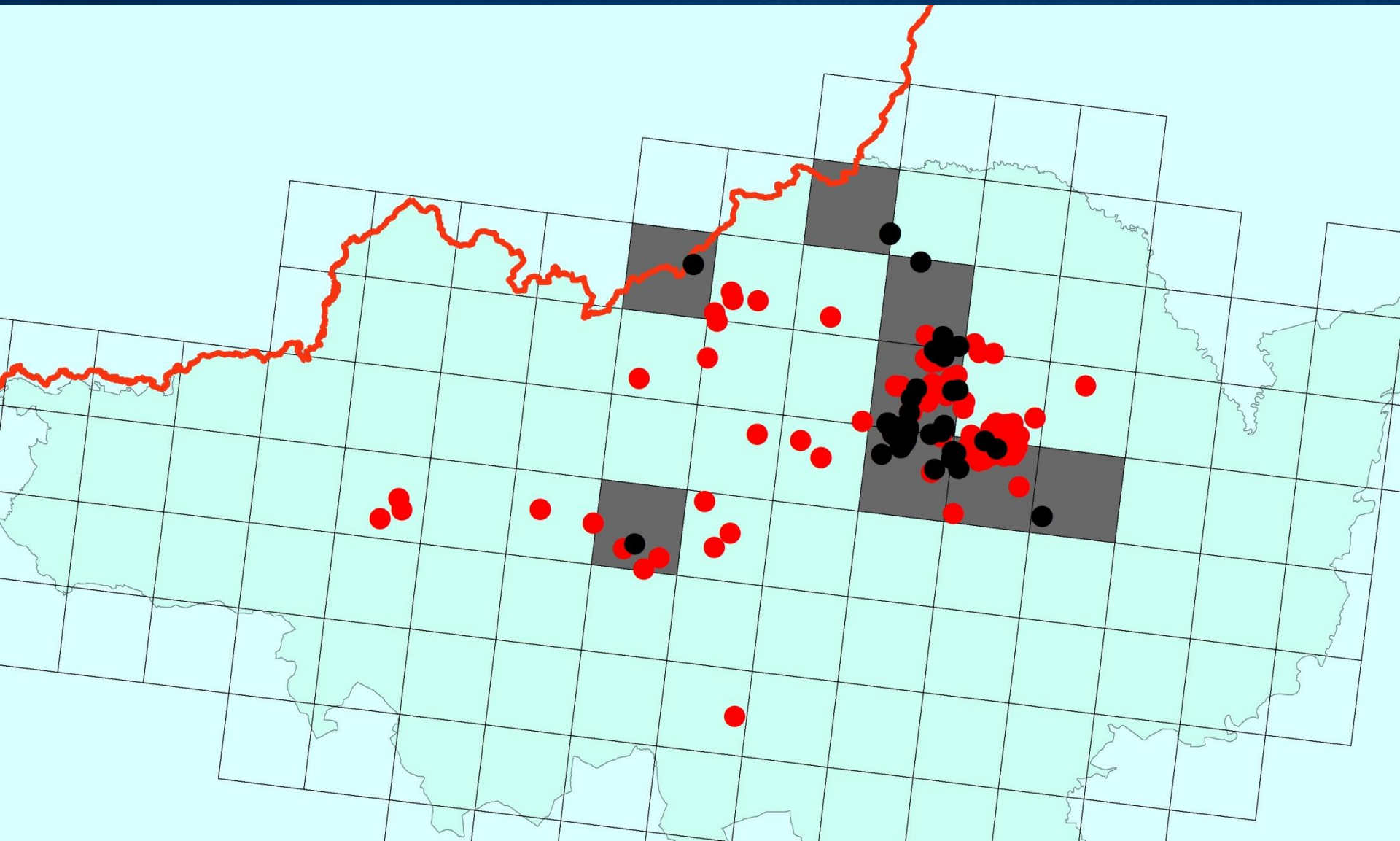
Distribution of Lynx lynx on the Northern part of Hungary - SDF dataset



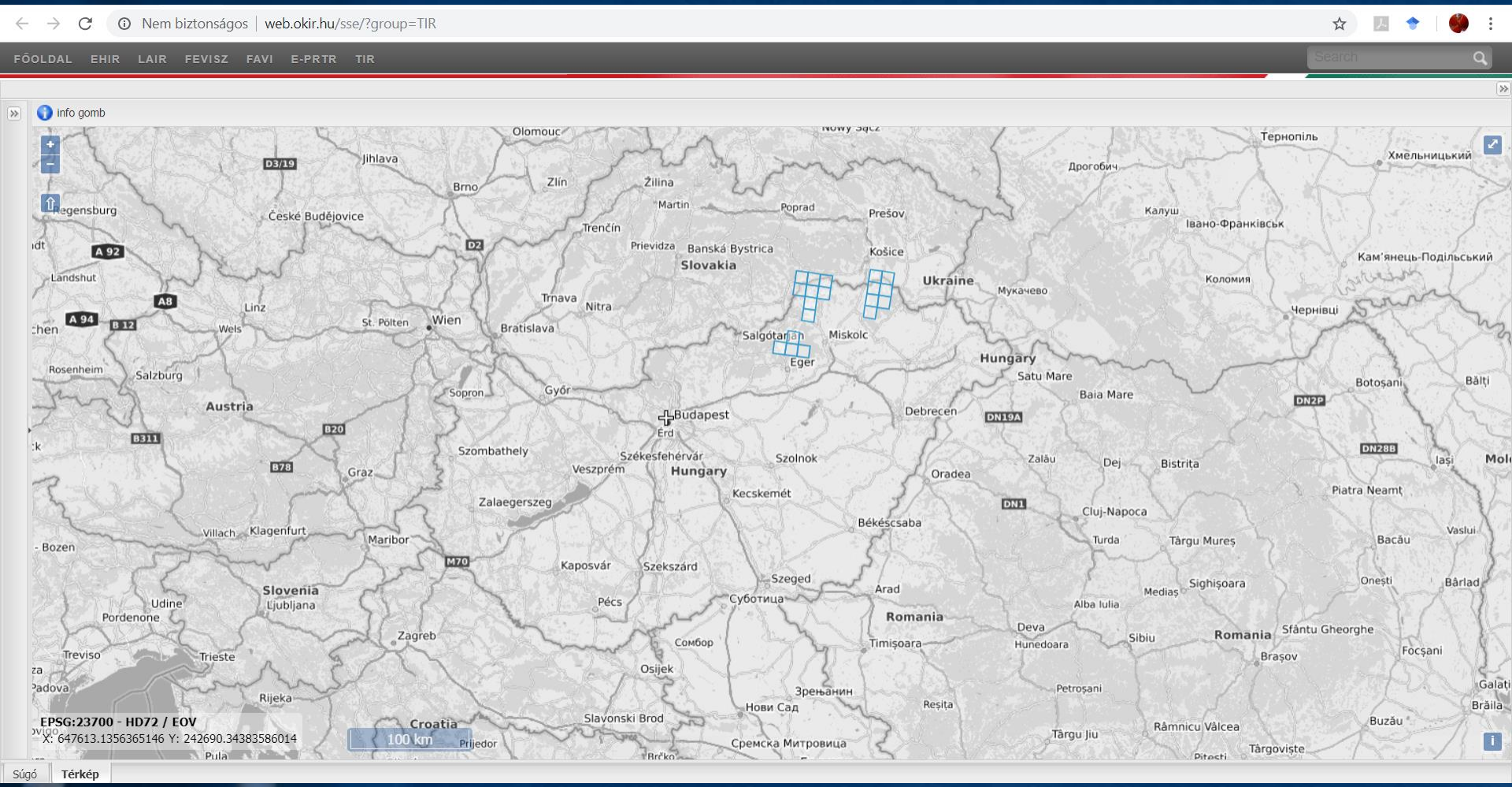
Distribution of Lynx lynx on the Northern part of Hungary - SDF dataset



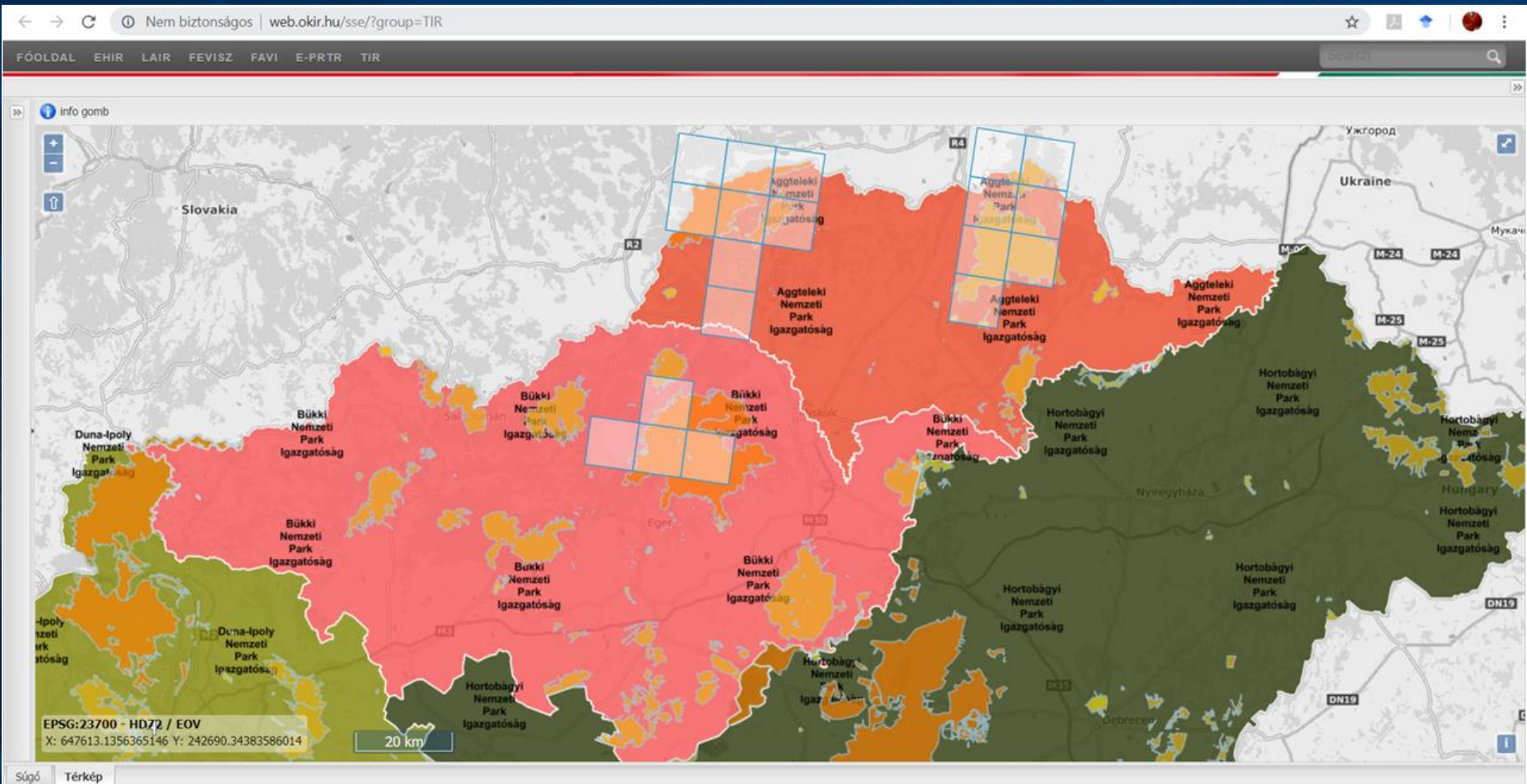
The actual distribution of Lynx lynx on the administrative area of Bükk National Park Directorate



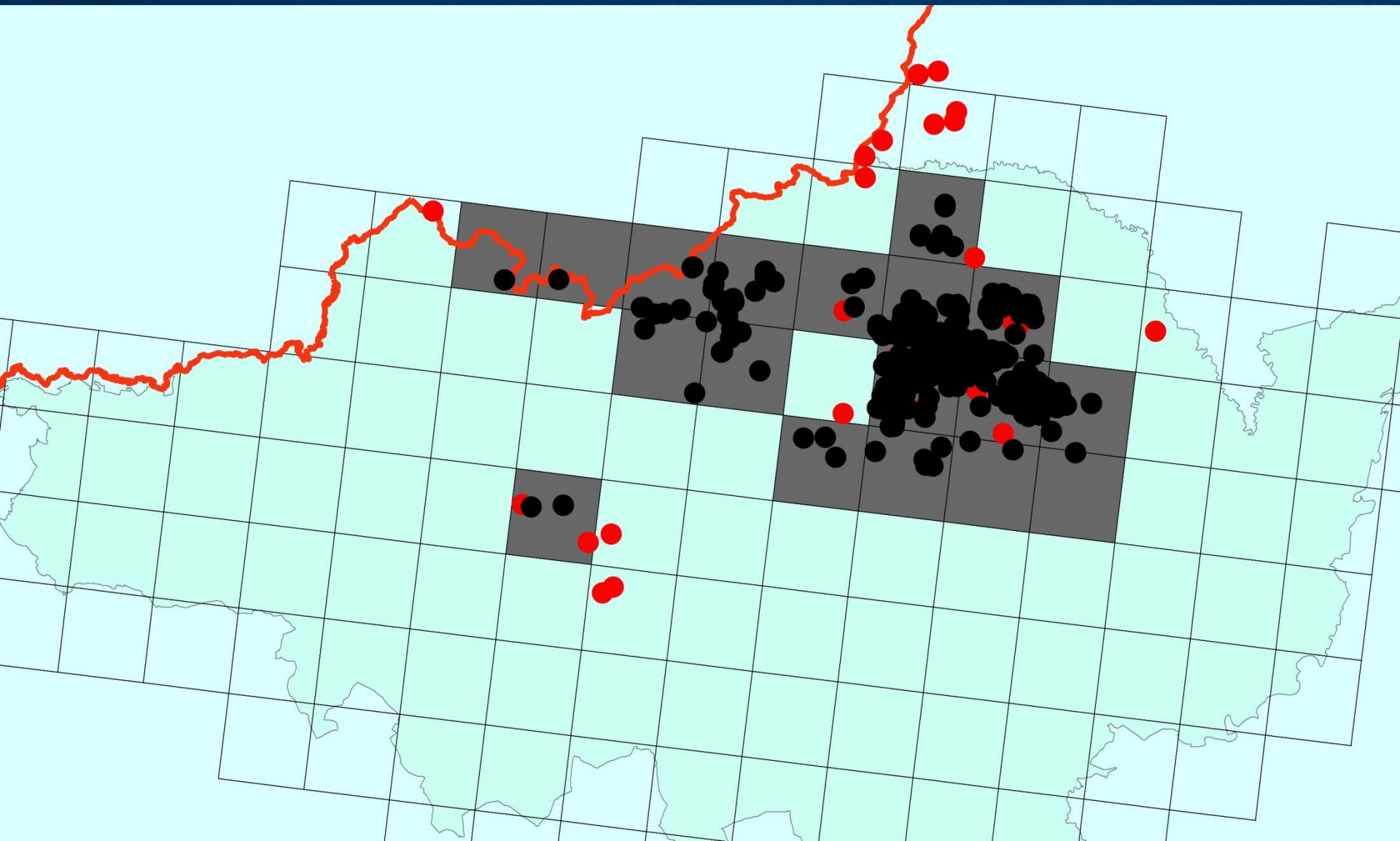
Distribution of Canis lupus on the Northern part of Hungary - SDF dataset



Distribution of Canis lupus on the Northern part of Hungary - SDF dataset



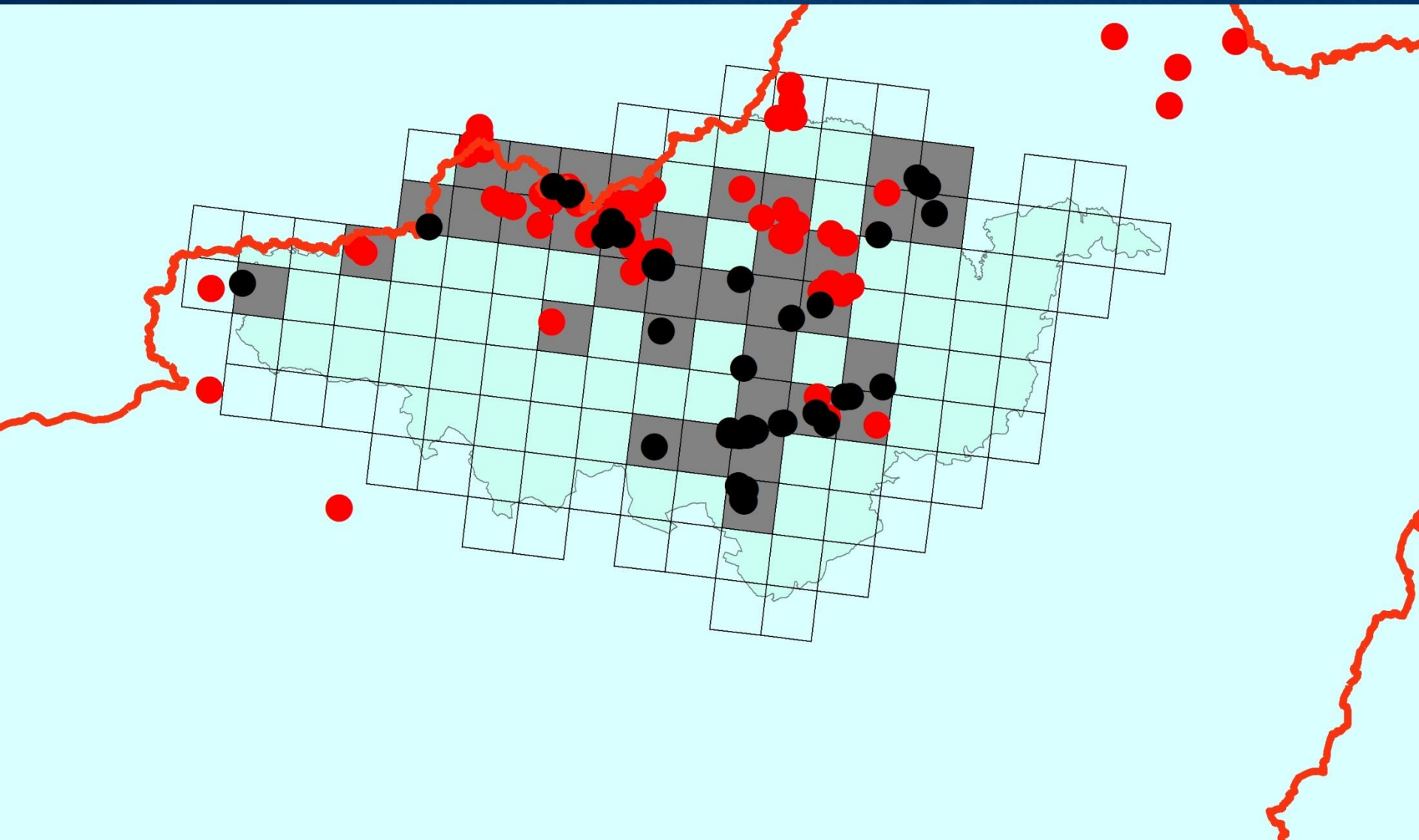
Actual distribution of Canis lupus on the adminstrative area on the Bükk National Park Direcorate



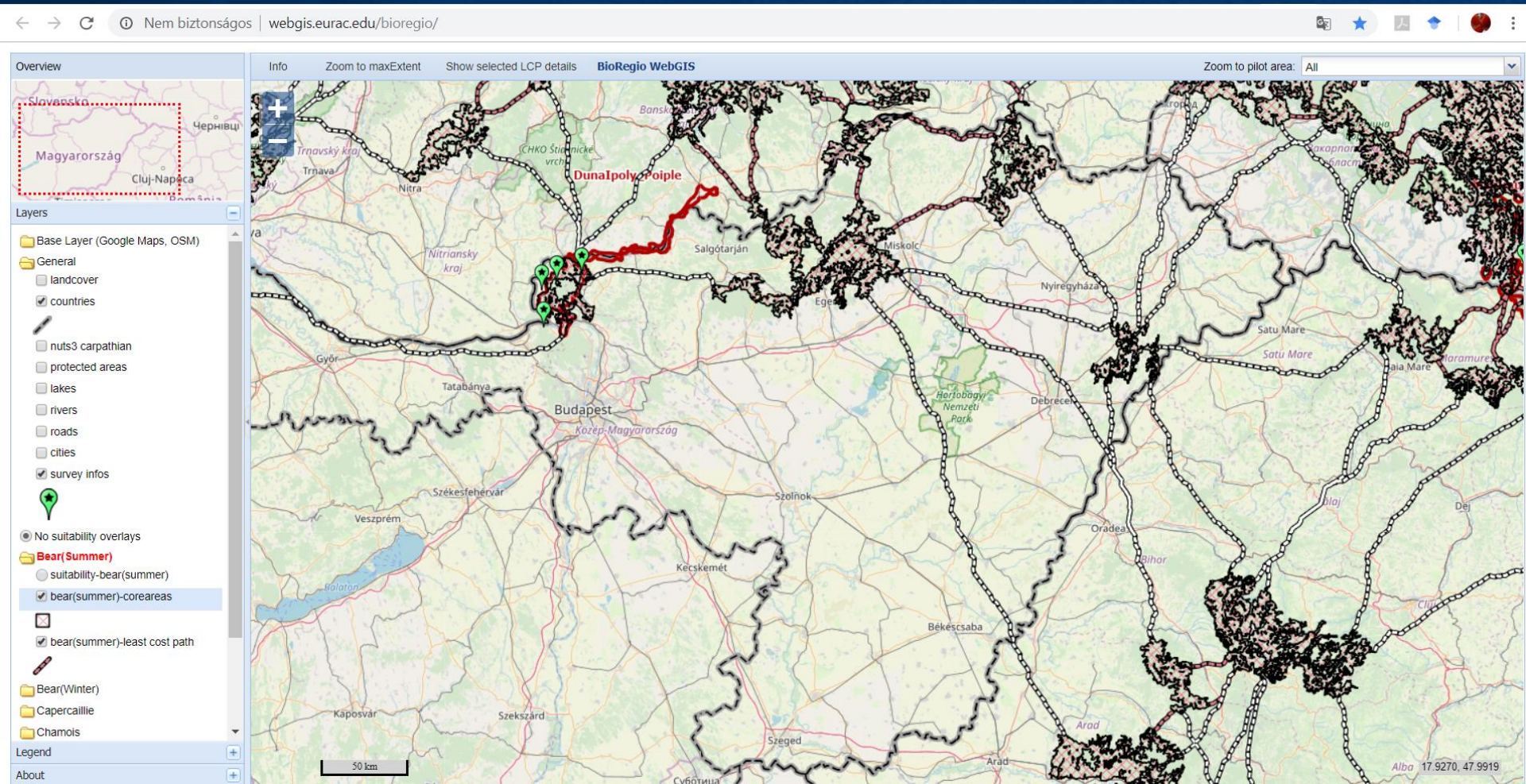
Status of Ursus arctos on the adminstrative area of BNPD

- No EU-report is required for brown bear in Hungary
- Mostly occositional observations, but standing specimens on the HU-SK border – weekly-monthly observations throughout the year (from February to December)
- Wintering specimen and newborn bear not known
- Large home range --> migrant individuals
- (2016 Iwo, 2018 Robert/Roberta)
- Growing Carpathian population - individuals passing through Hungary to Romania (Possible new challenges to face)

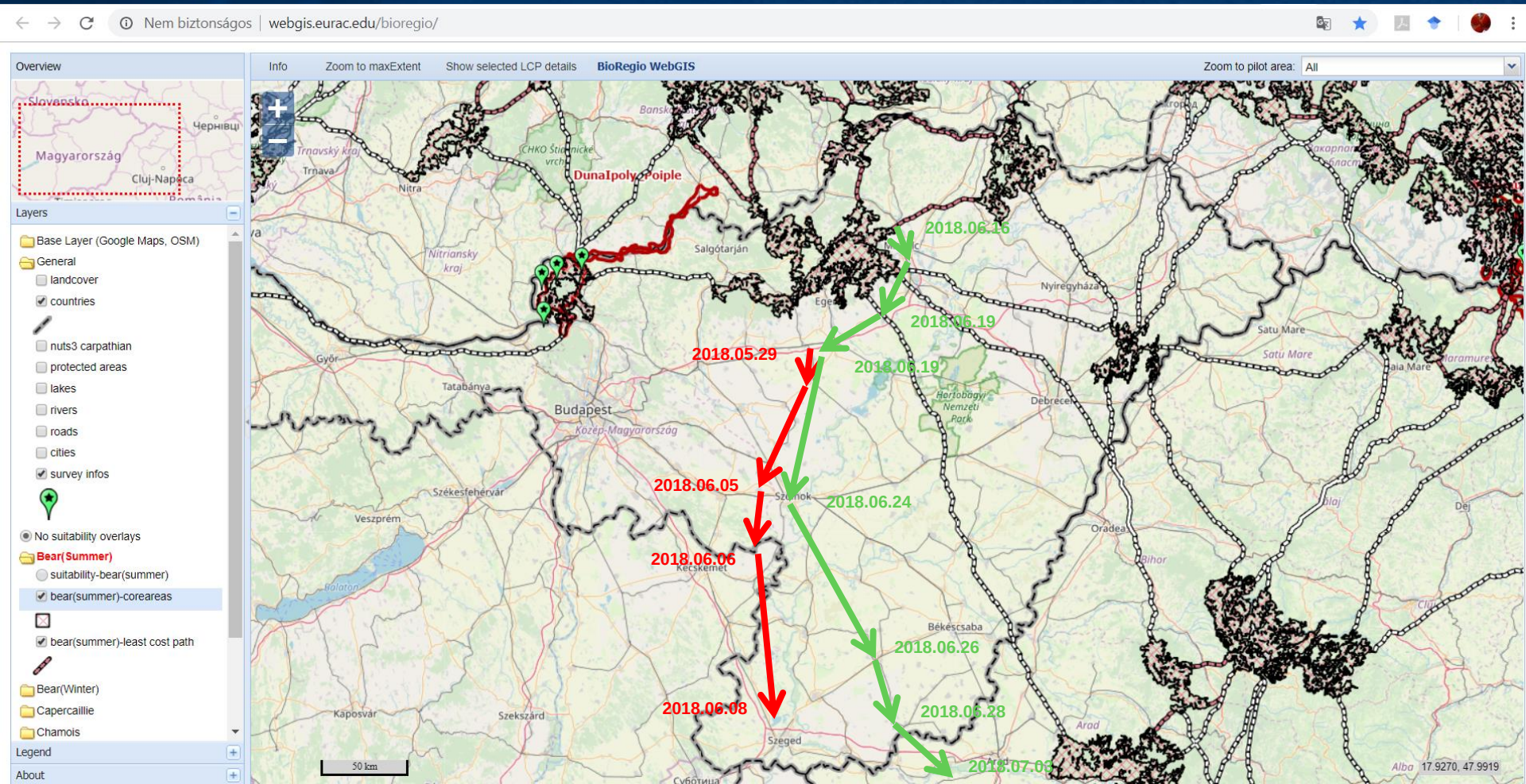
Ursus arctos observations on the administrative area of Bükk National Park Directorate



Core areas of Ursus arctos and least cost paths in Carpathians (Bioregio Carpathians Project)



Core areas of Ursus arctos and least cost paths in Carpathians and „bear-rally” in Hungary



Transboundary cooperation needed

- For the conservation of established populations, ensuring genetic and geographic connections, too (roads, highways, forest cover etc.)
- To prevent illegal activities especially in border regions
- To find the connectivity of crossborder populations, green corridors
- Harmonized monitoring methods to follow the population processes in each country
- Standardize/integrate the microsatellite markers and protocols
- Reciprocal exchange and access to DNA samples to determinate the geographical and populations
- Easily accesable online database with the Carpathian countries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