

Status of the Eastern Imperial Eagle (*Aquila heliaca*) in Hungary between 2019 and 2023

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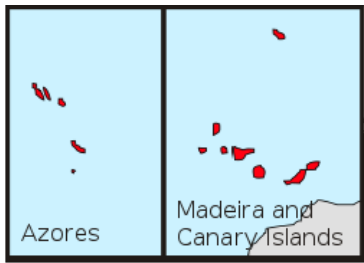


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Third International Scientific and Practical Conference
IX. International Conference on the Conservation of the Eastern Imperial Eagle
Almaty, Kazakhstan, 27. September 2023

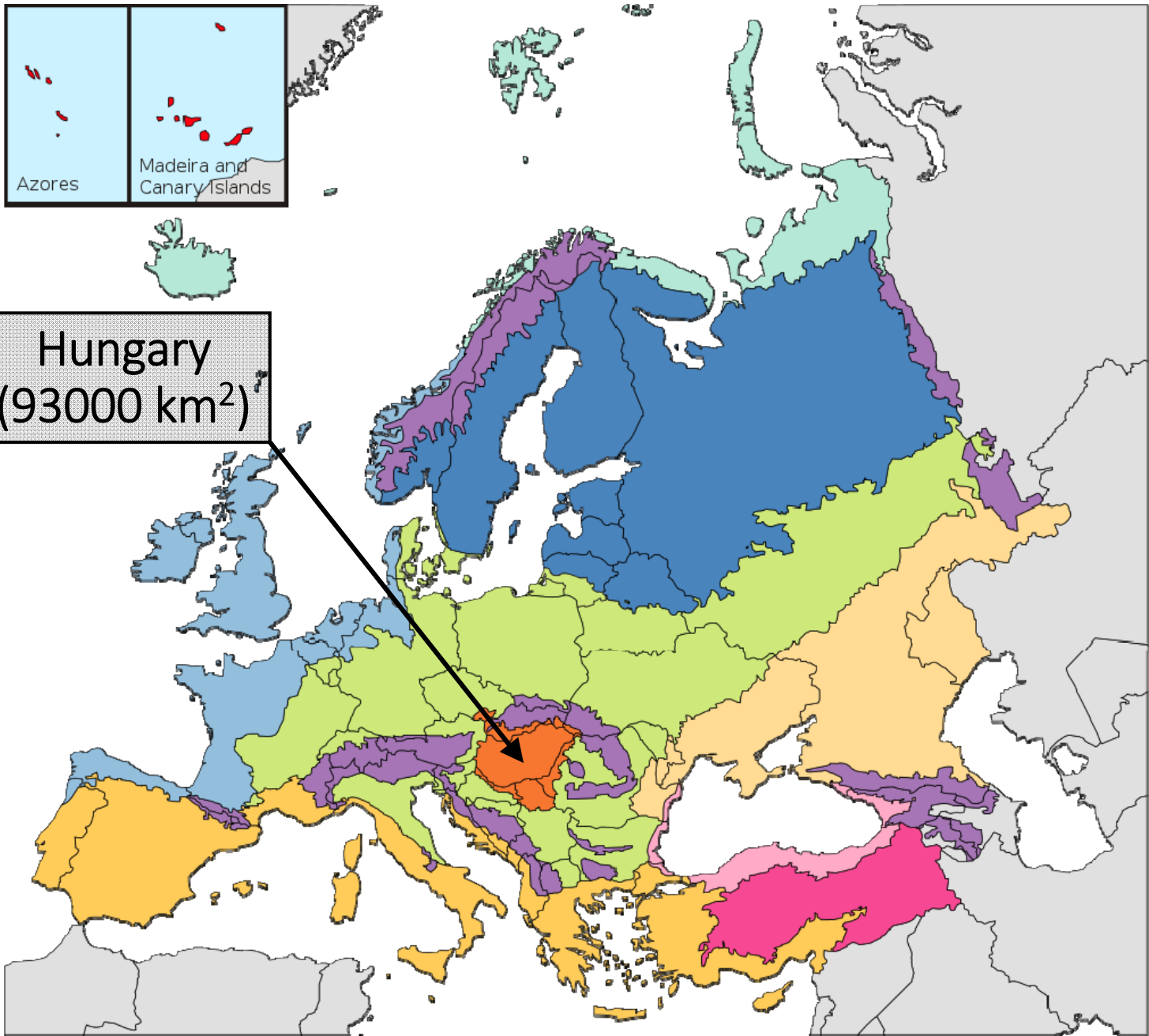


Introduction





Hungary
(93000 km²)



Biogeographical regions of Europe

- Arctic
- Boreal
- Atlantic
- Continental
- Alpine
- Pannonian**
- Mediterranean
- Macaronesian
- Steppic
- Black Sea
- Anatolian

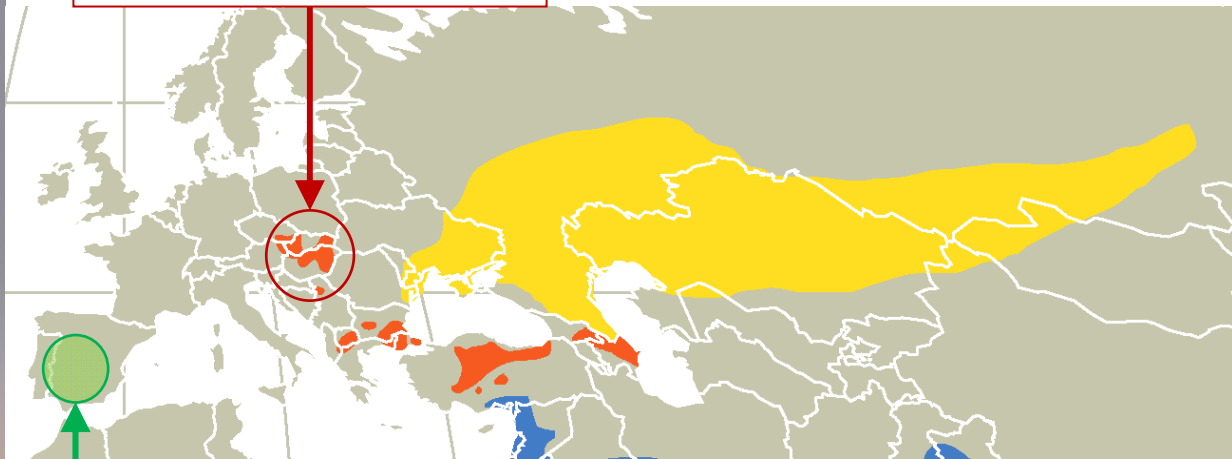
After a map by the European Environmental Agency: www.eea.eu.int

Eastern Imperial Eagle (EIE, *Aquila heliaca*)



- IUCN: *Globally threatened (Vulnerable)*
- Habitat: *forest-steppe*
- Diet: *medium-sized mammals, birds and reptiles*

Pannonian population



Aquila adalberti



Resident

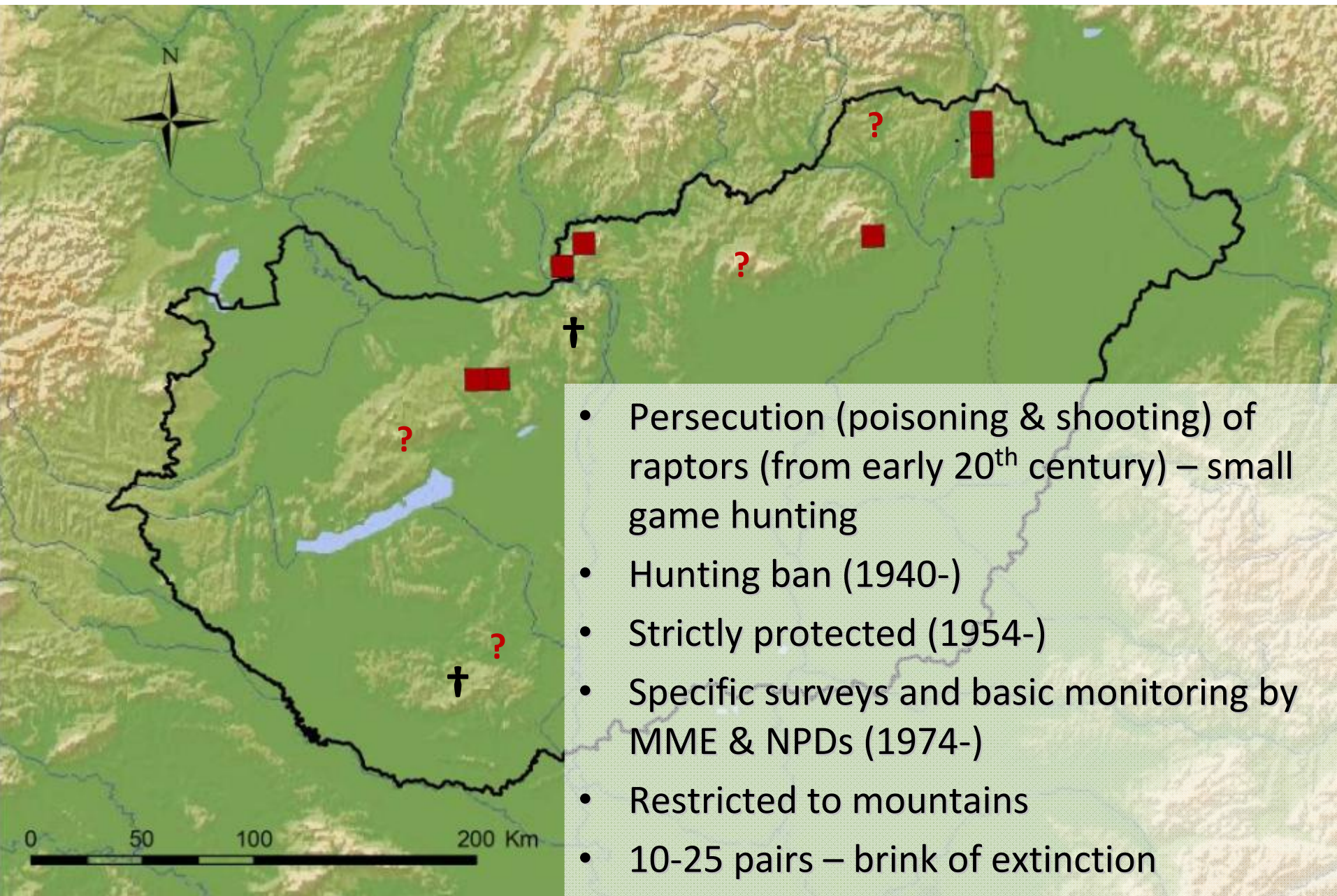


Summer



Winter

Eastern Imperial Eagle in Hungary: 1974 – 1979



- Persecution (poisoning & shooting) of raptors (from early 20th century) – small game hunting
- Hunting ban (1940-)
- Strictly protected (1954-)
- Specific surveys and basic monitoring by MME & NPDs (1974-)
- Restricted to mountains
- 10-25 pairs – brink of extinction

POPULATION INCREASE OF IMPERIAL EAGLE (*AQUILA HELLICA*) IN HUNGARY BETWEEN 1980 AND 2000

*János Bagyura – Tamás Szitta – László Haraszthy – Gábor Firmánszky –
Levente Viszló – András Kovács – Iván Demeter – Márton Horváth*

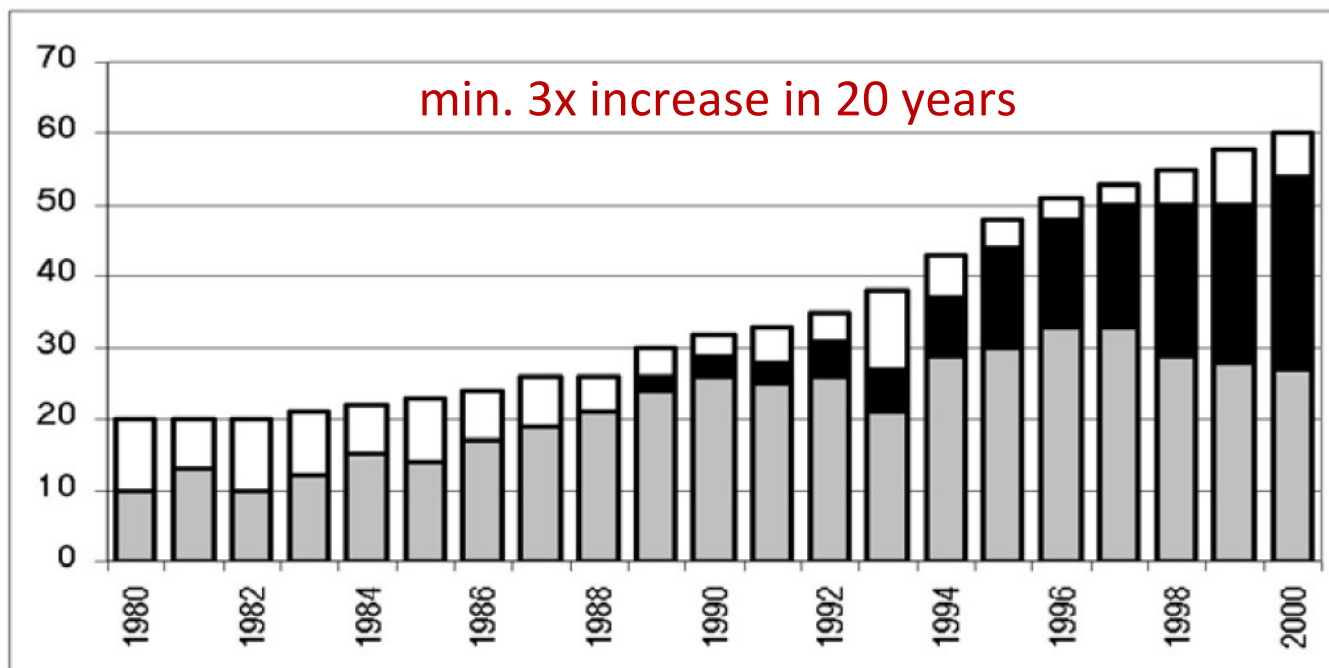


Figure 1. Population size of the Imperial Eagle (*Aquila heliaca*) in Hungary between 1980 and 2000. Grey: known hill territories; Black: known lowland territories; White: estimated number of unknown territories

Aims

- Follow the long-term trends of the Hungarian EIE population (1980-2000 + 2001-2022; 43 years)
- Investigate if increasing density affects population parameters, including breeding success
- Develop sustainable monitoring methods (2023-)



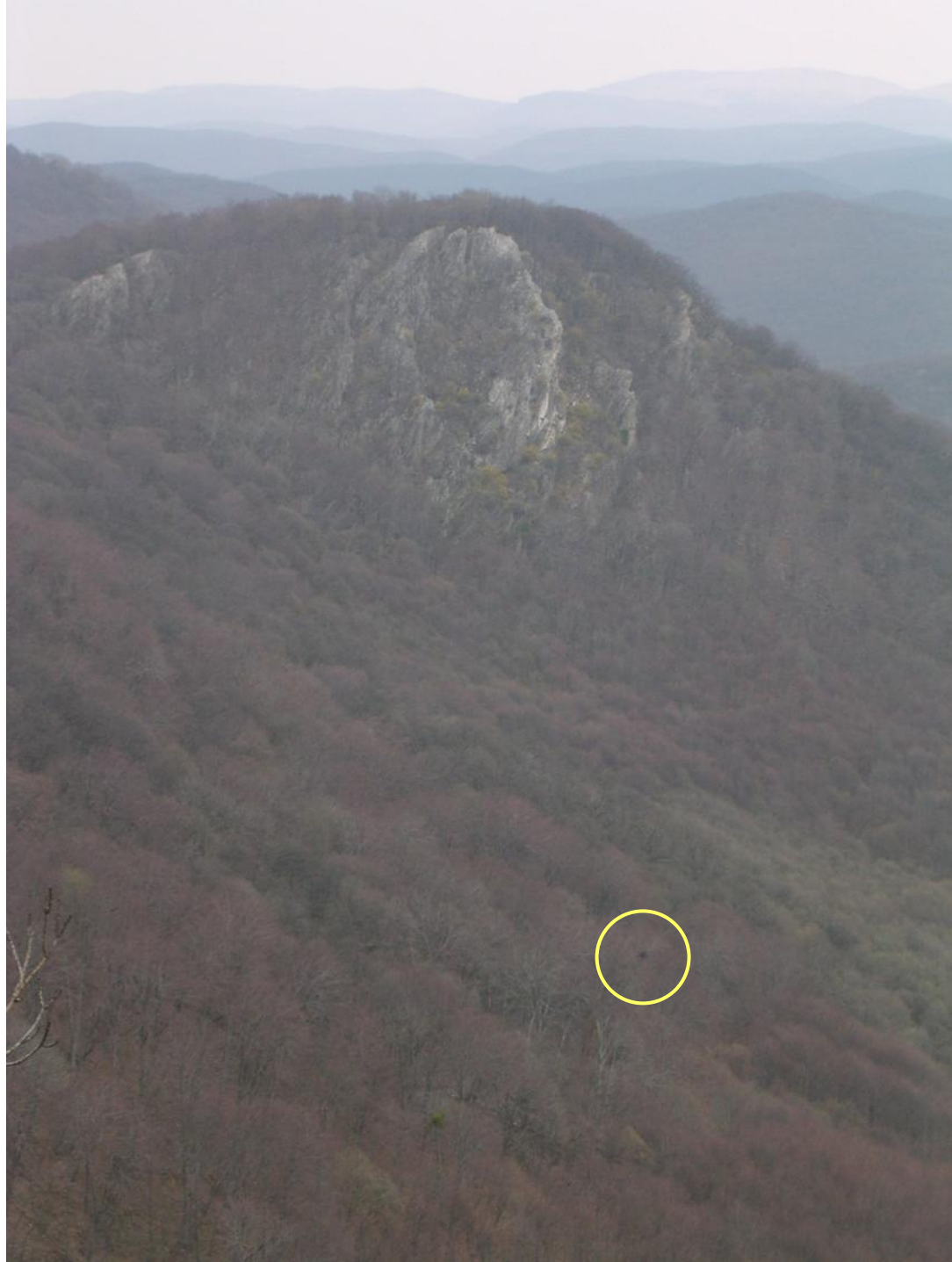
Methods



The 1980s



Mountain forests



The 2010s

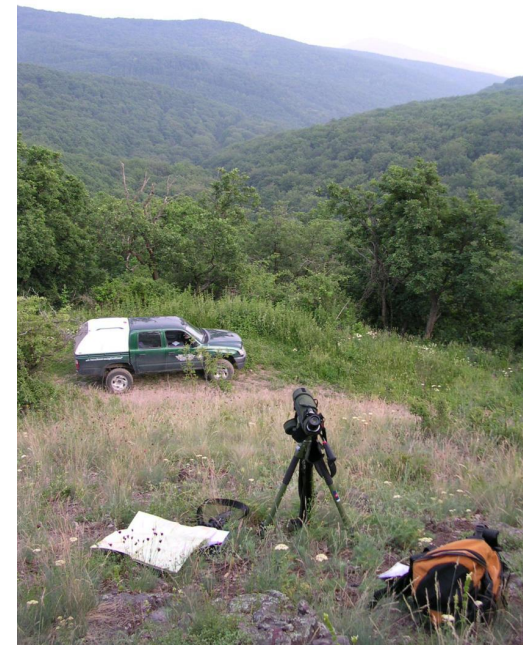


Solitary trees or group of trees
in open habitats



Monitoring and conservation efforts (1980-2011)

- Hungarian Imperial Eagle Working Group (national parks, NGOs: 300 participants)
- Annual population survey and regular nest controls
- Bird-friendly modification of electric power lines (>50 000)
- Artificial nests (>1 000)
- Restriction of human activities around nest sites (100-600 m, 1-5/y)
- Rehabilitation of specimens (1-5/y)
- Nest guarding (occasionally)
- Publicity (10-100 reports/y in media)



Bagyura, J., Szitta, T., Haraszthy, L., Firmánszky, G., Viszló, L., Kovács, A., Demeter, I. & Horváth, M. (2002) *Aquila*

Horváth, M., Szitta, T., Fatér, I., Kovács, A., Demeter, I., Firmánszky, G. & Bagyura, J. (2011) *Acta Zoologica Bulgarica*

2012-2022

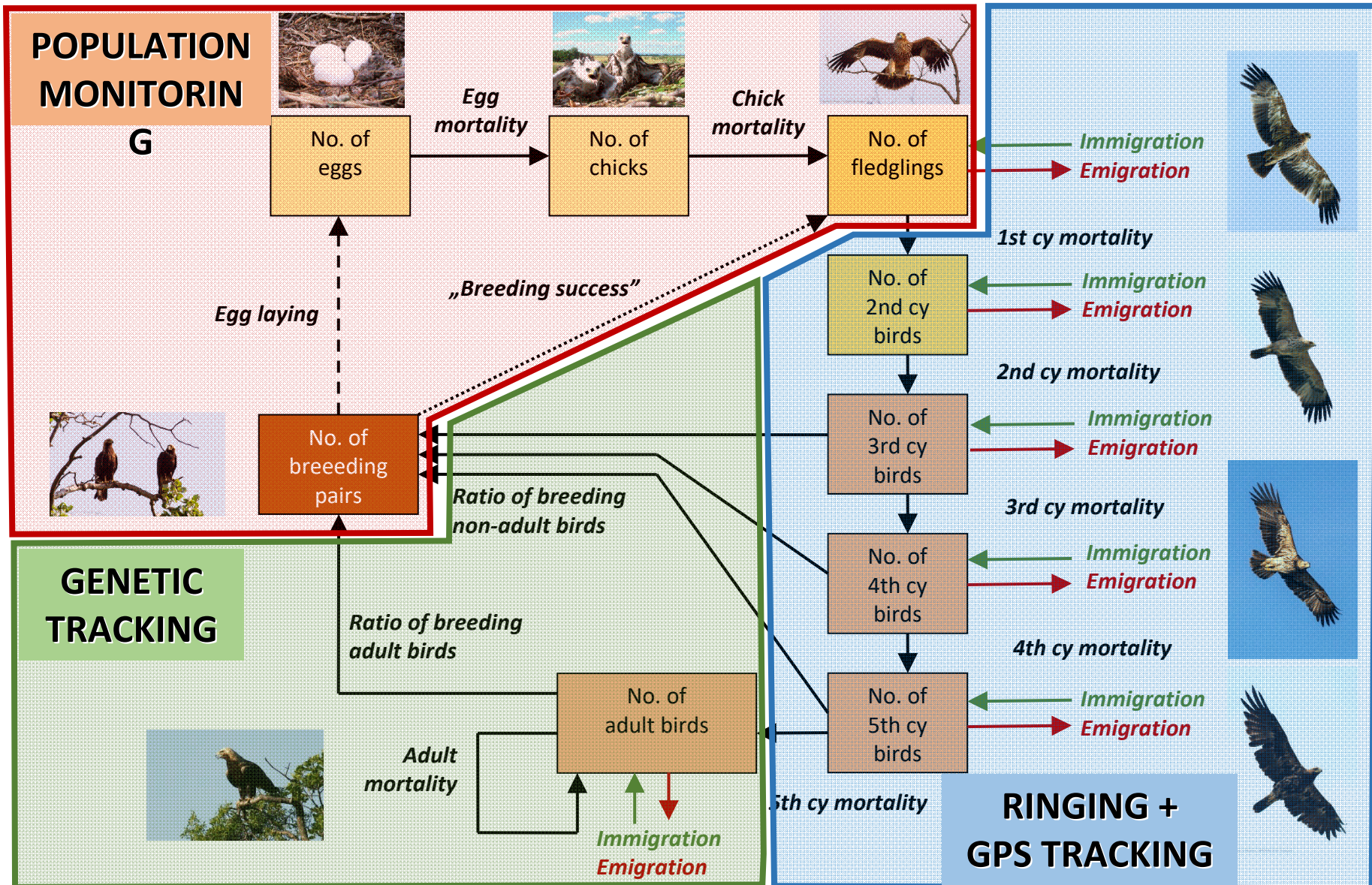
- Enhanced population monitoring



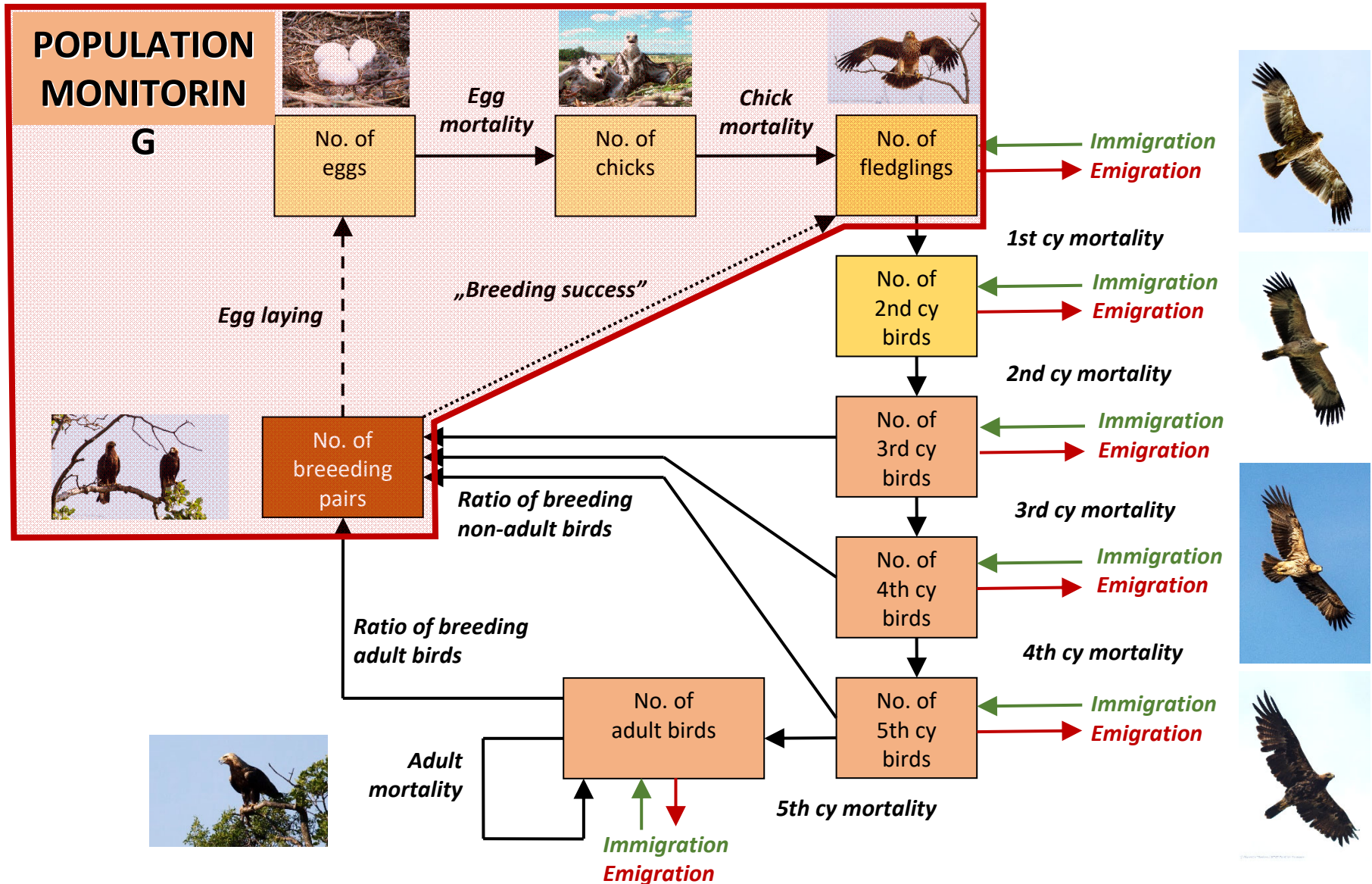
- Various anti-poisoning activities



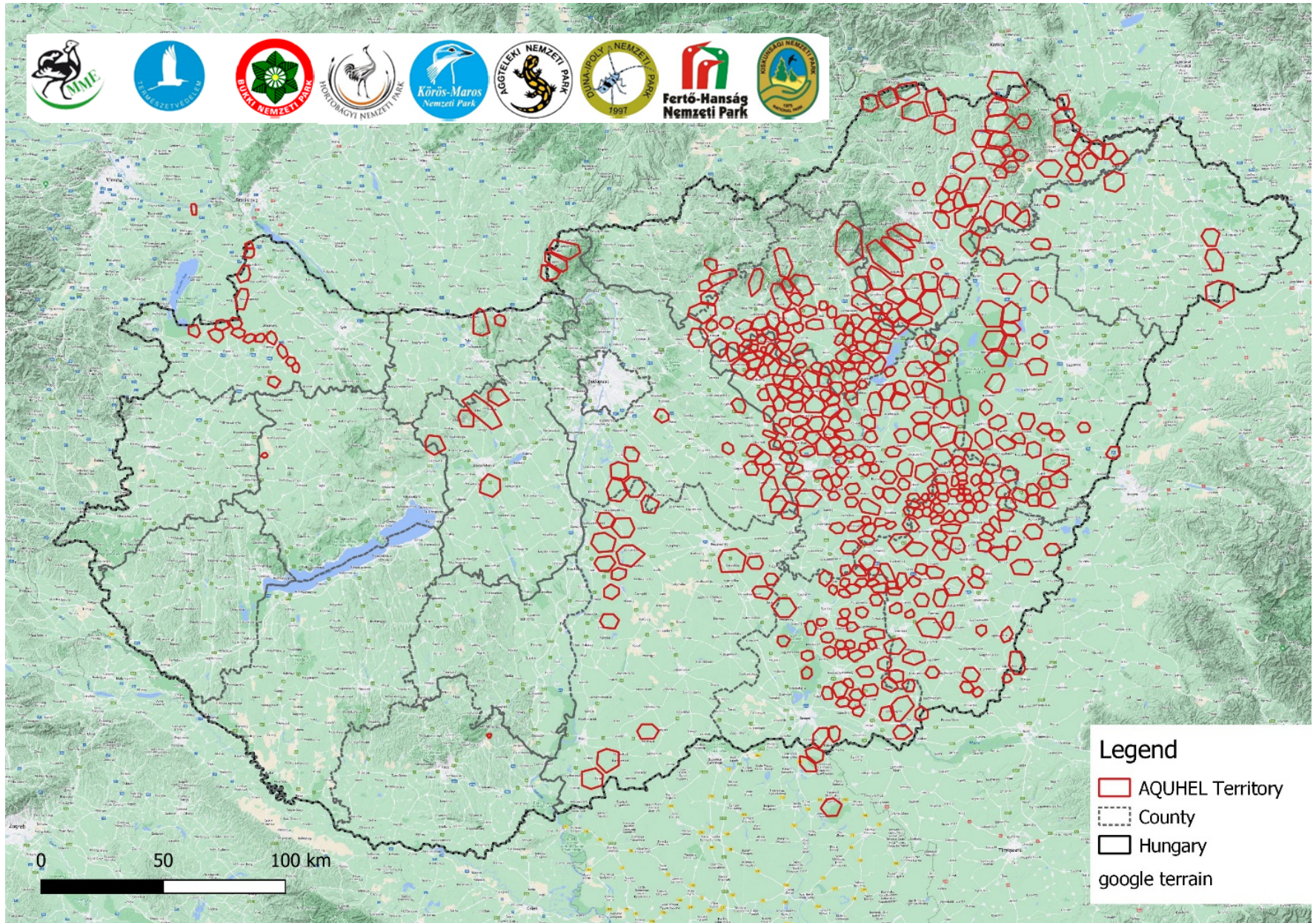
Main processes of population dynamics of EIEs



Main processes of population dynamics of EIEs



„Territory coordinator” system



Monitoring the breeding population



Feb-March
Nesting
pairs



April-May
Breeding
pairs



June
Chick-rearing
pairs

10-30 June
2-4 teams



July-August
Successful
pairs

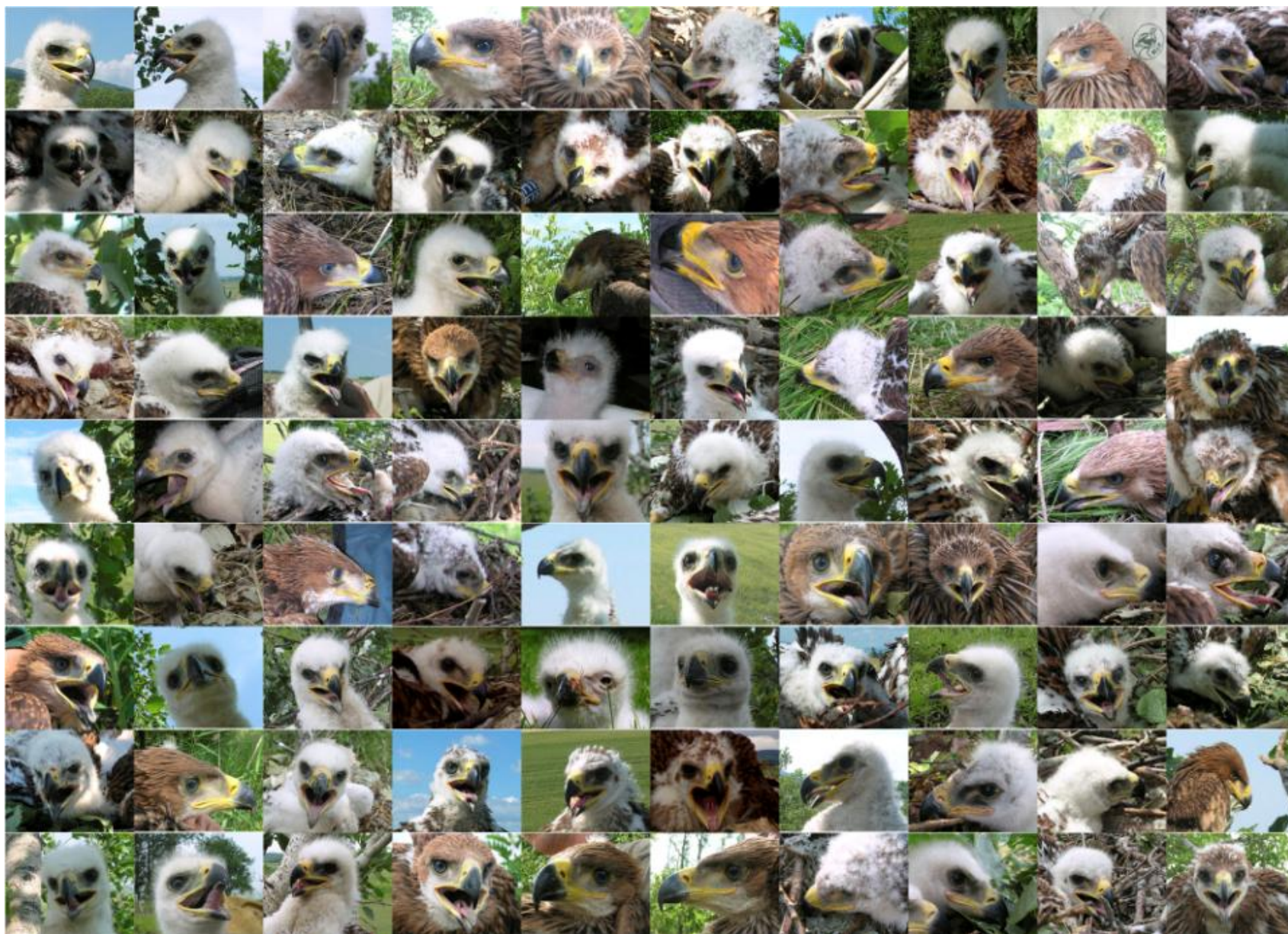
Nest controls in June

- **Remote survey by binocular/telescope**
(2012: 40% → 2022: 10%, mostly failed)
- **Nest climbing (ringing)**
(2012: 60% → 2022: 25%)
- **Drone control**
(2016: 0% → 2022: 65%)

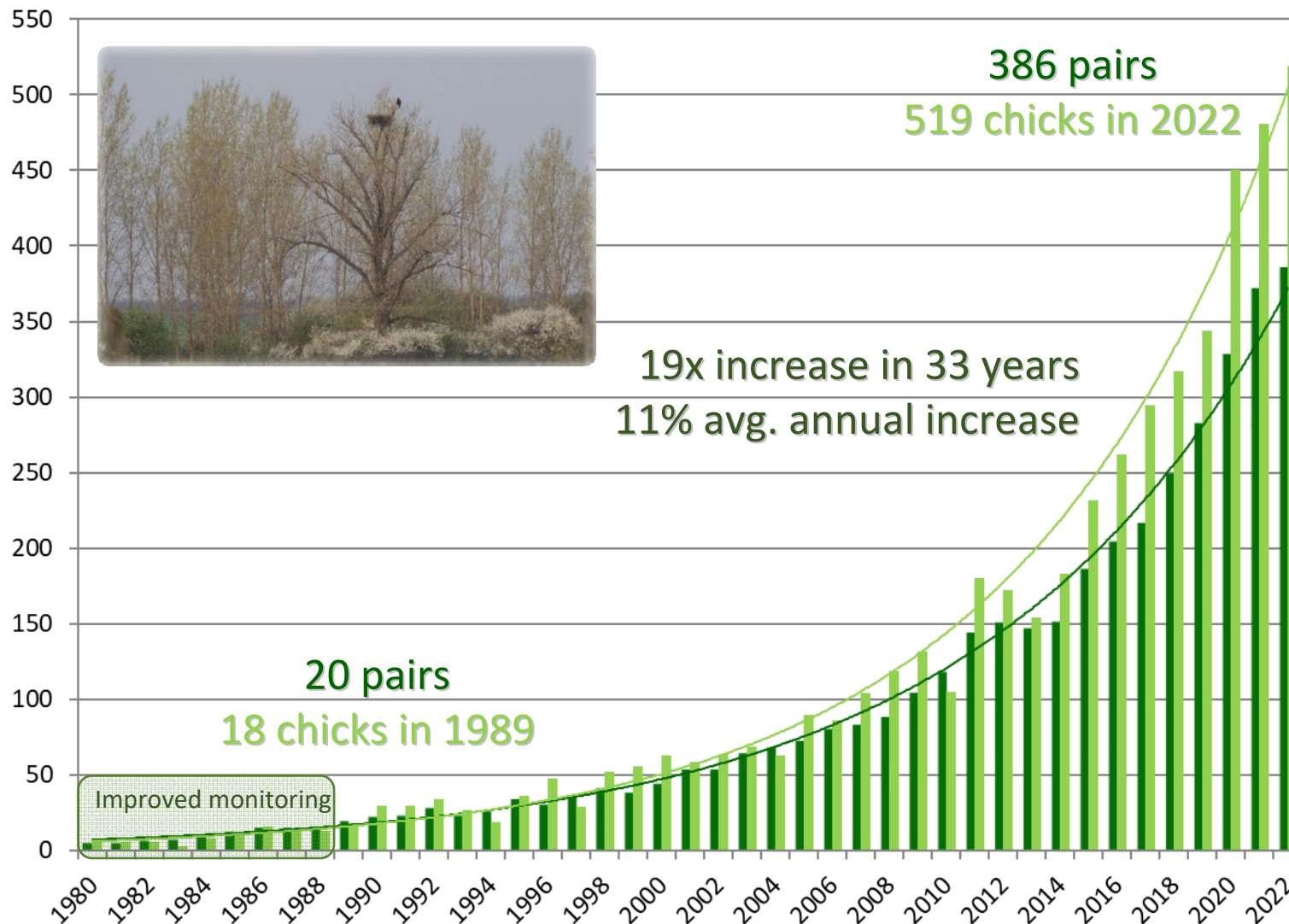
4101 surveyed nesting event
5030 chicks controlled (4-7 weeks old)
2450 chicks ringed





Results



Population trend of the Eastern Imperial Eagle in Hungary (1980-2022)



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imperialeagle.eu

 Nesting pair
 Fledgling no.



Fészeklő parlagisas-párok eloszlása a két fő élőhely-típusban

Magyarországon /

Distribution of Imperial Eagle nesting pairs in the two main habitat types in Hungary

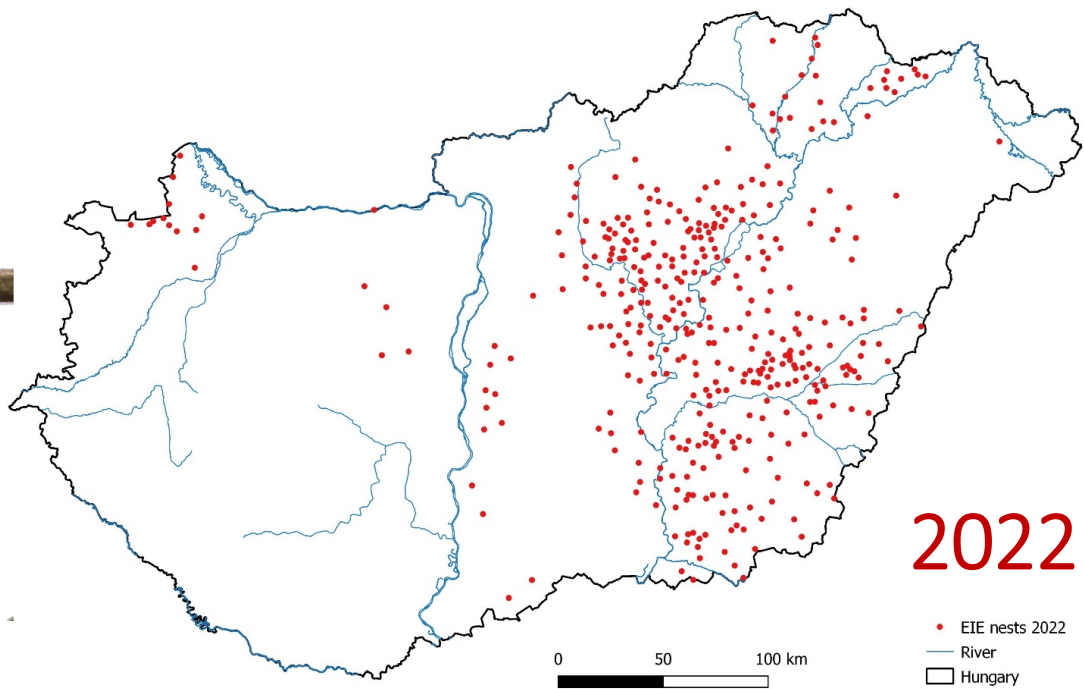
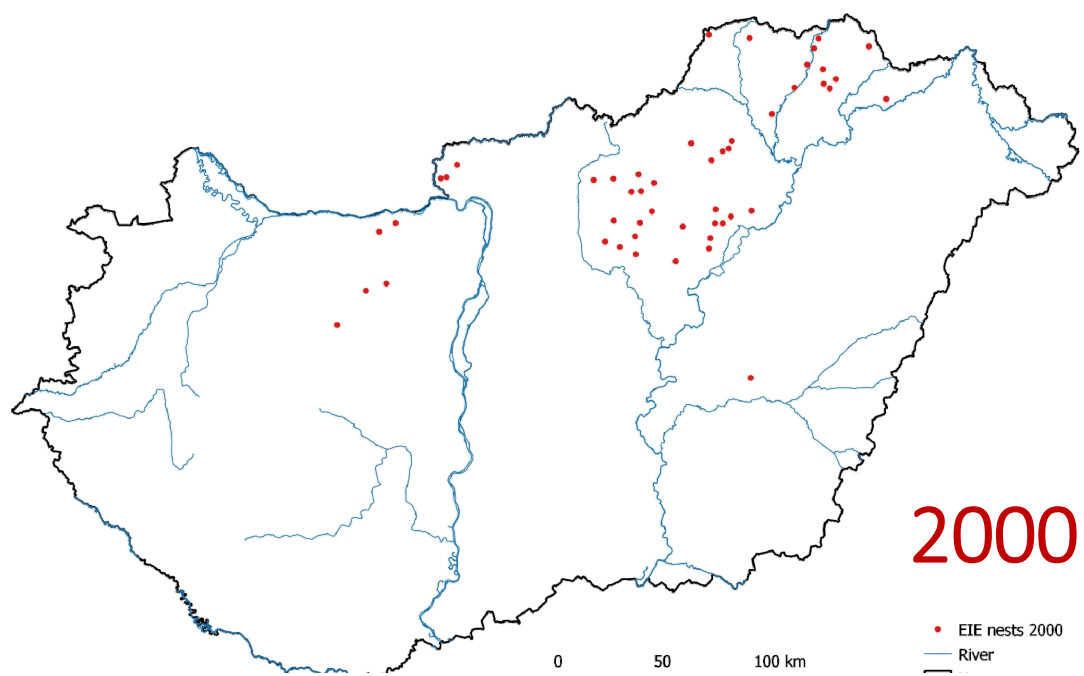


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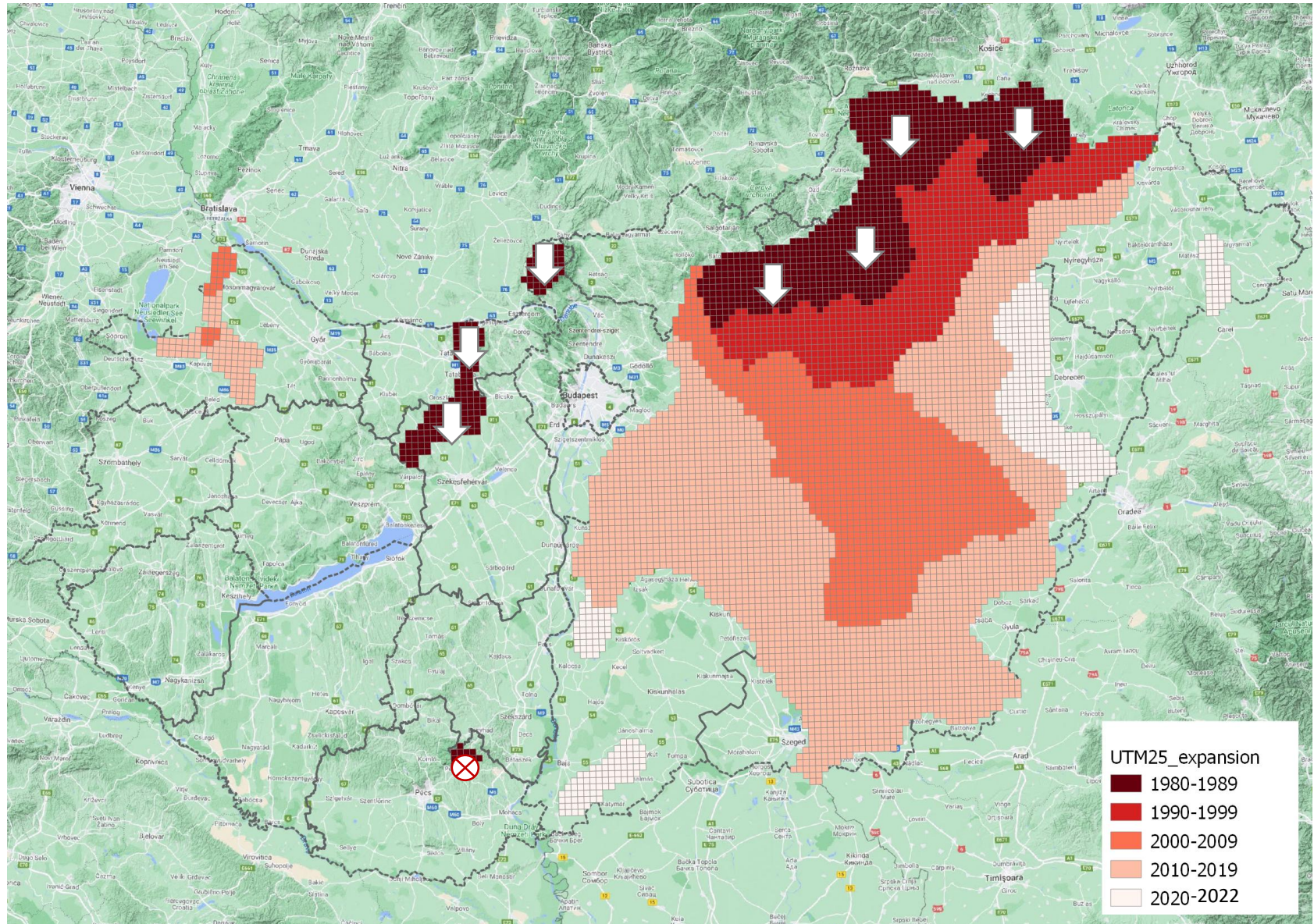
■ Síkvidék /
Lowland

■ Hegyvidék /
Mountain

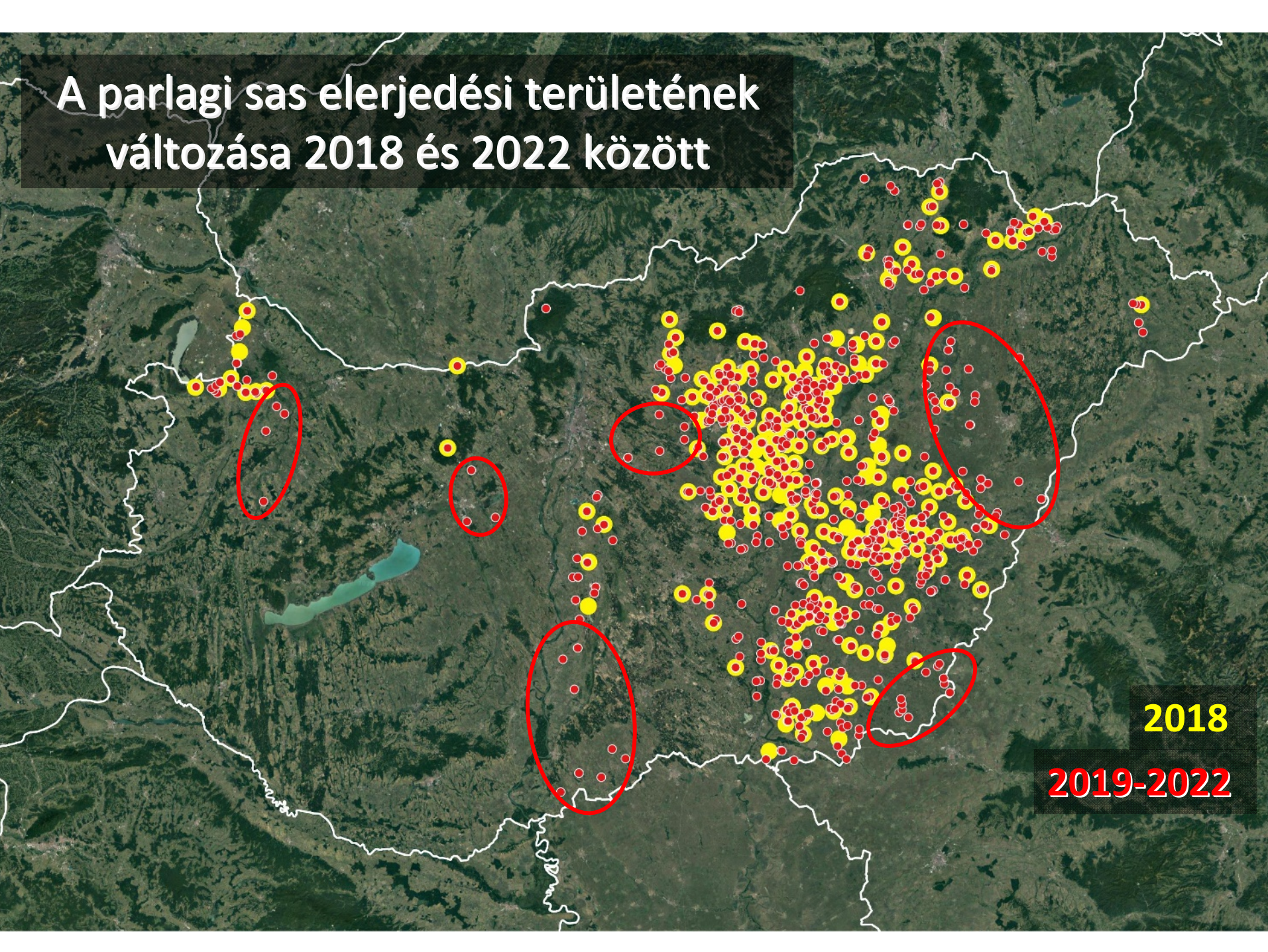




Breeding distribution



A parlagi sas elerjedési területének változása 2018 és 2022 között

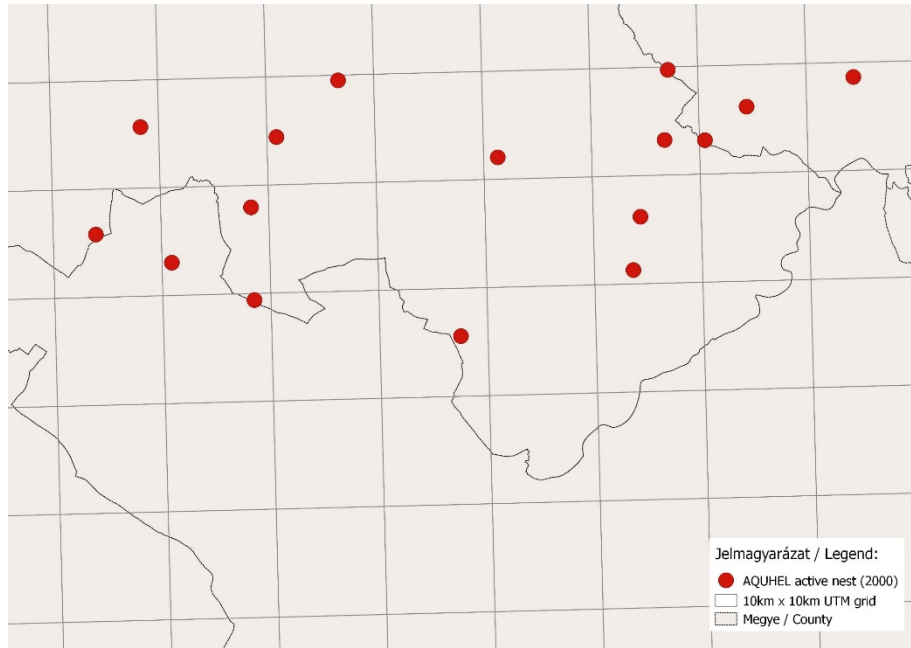


2018

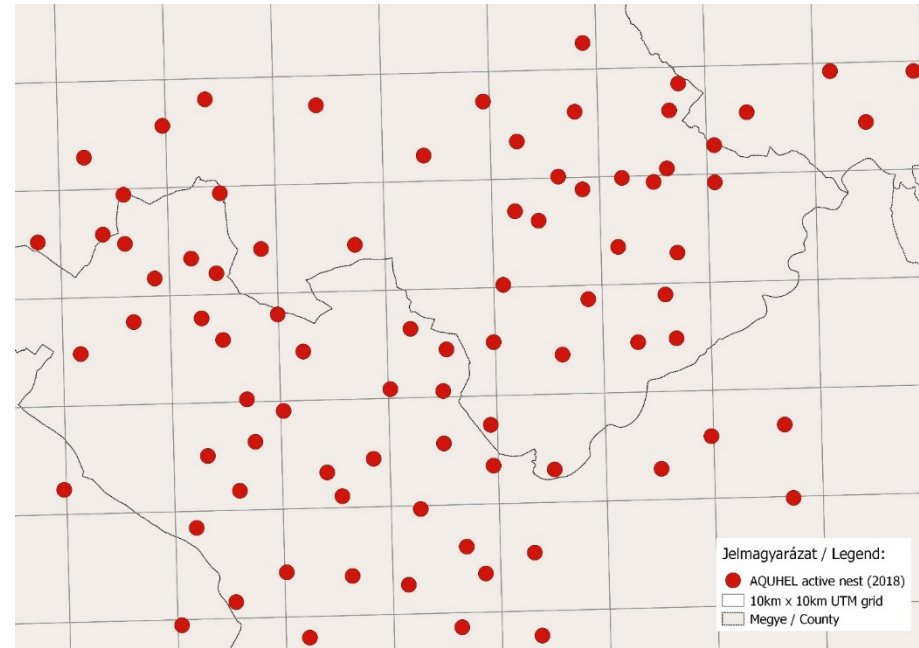
2019-2022

Breeding density

2000



2022



Average nearest neighbour distance (NND):

9.26 km

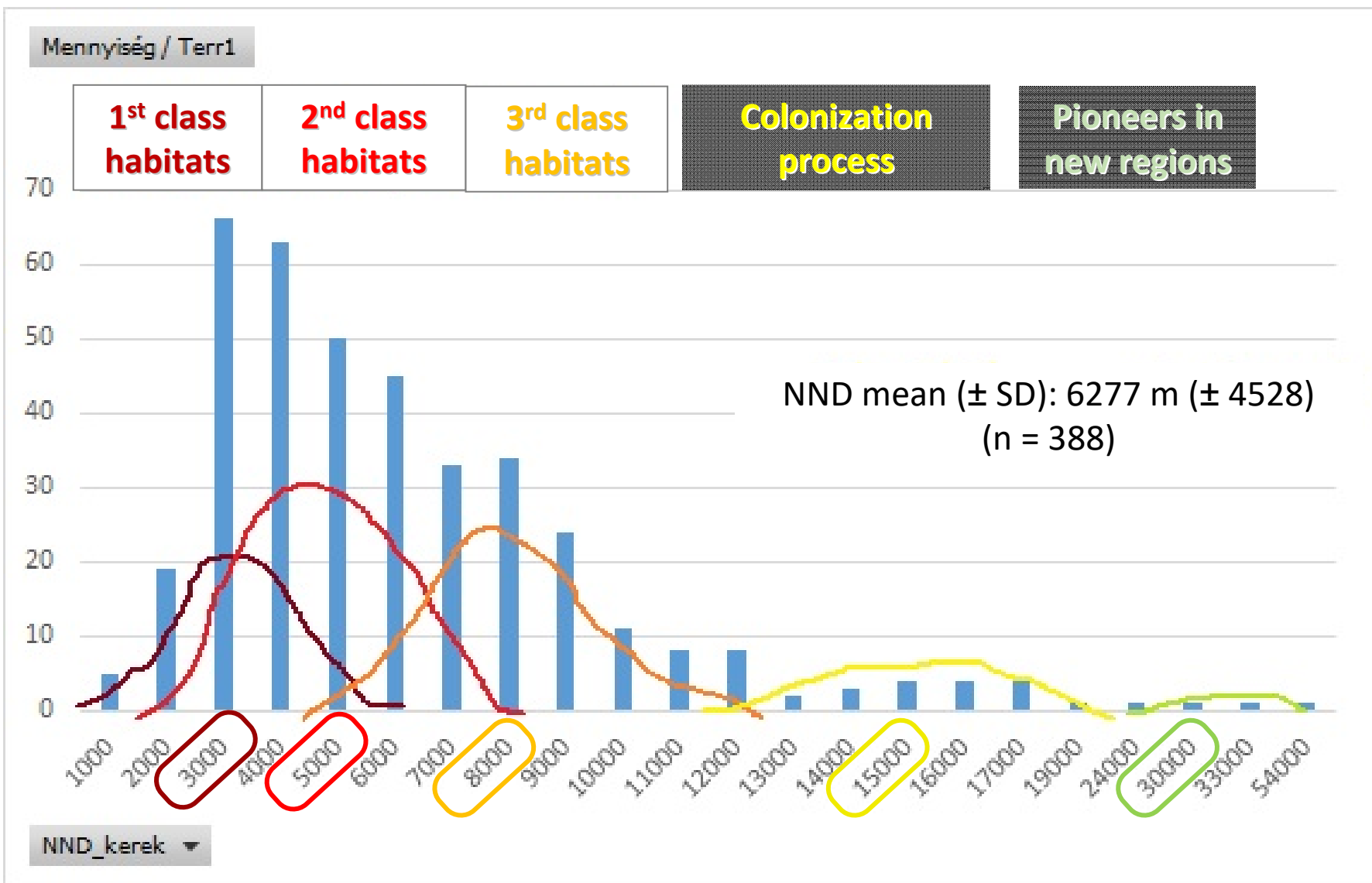
Average theoretical territory size:

67 km²

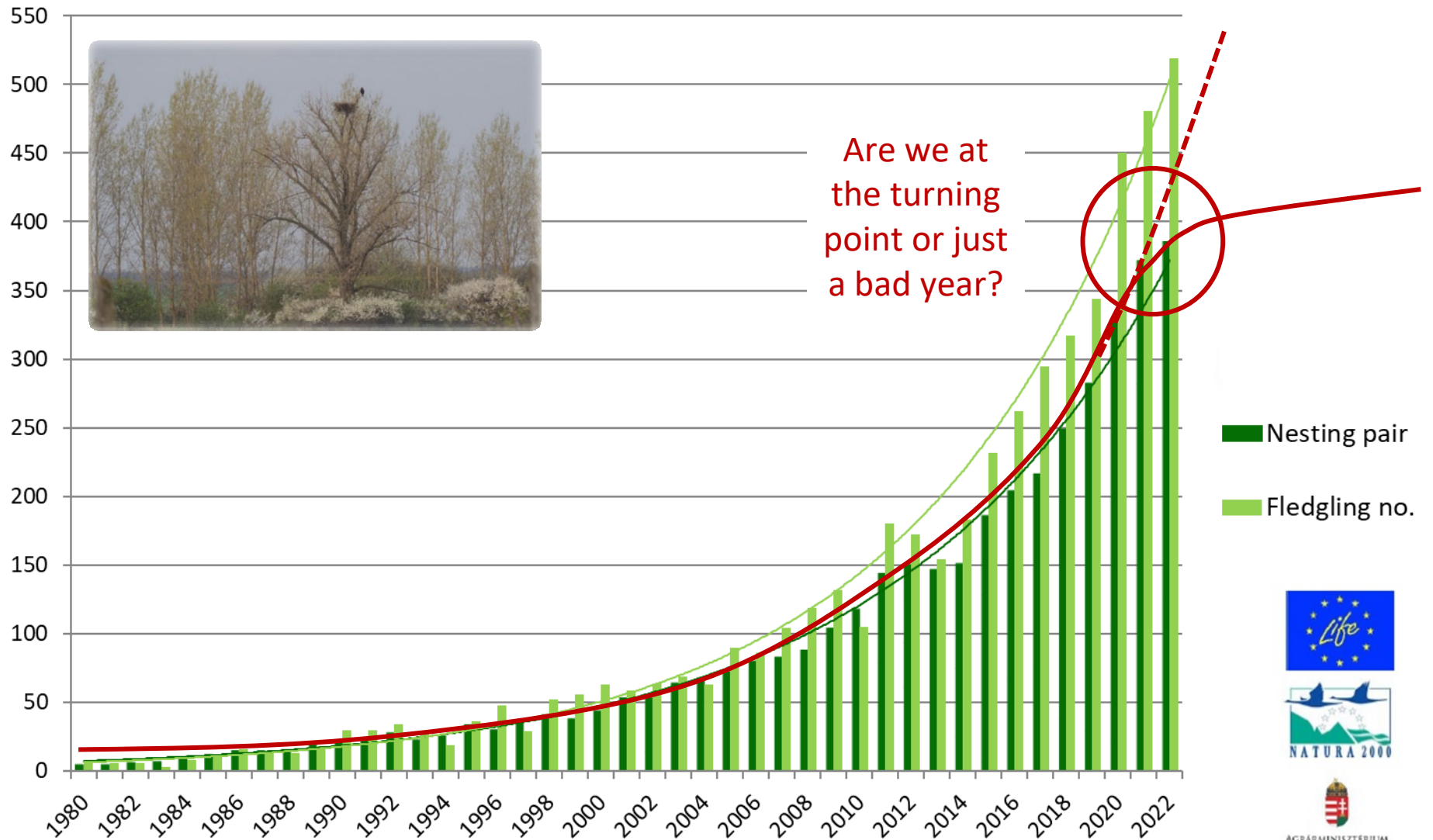
6.28 km (4 km in best habitats)

31 km² (13 km² in best habitats)

Distribution of imperial eagle nests according to the nearest neighbour distance (NND) in 2022



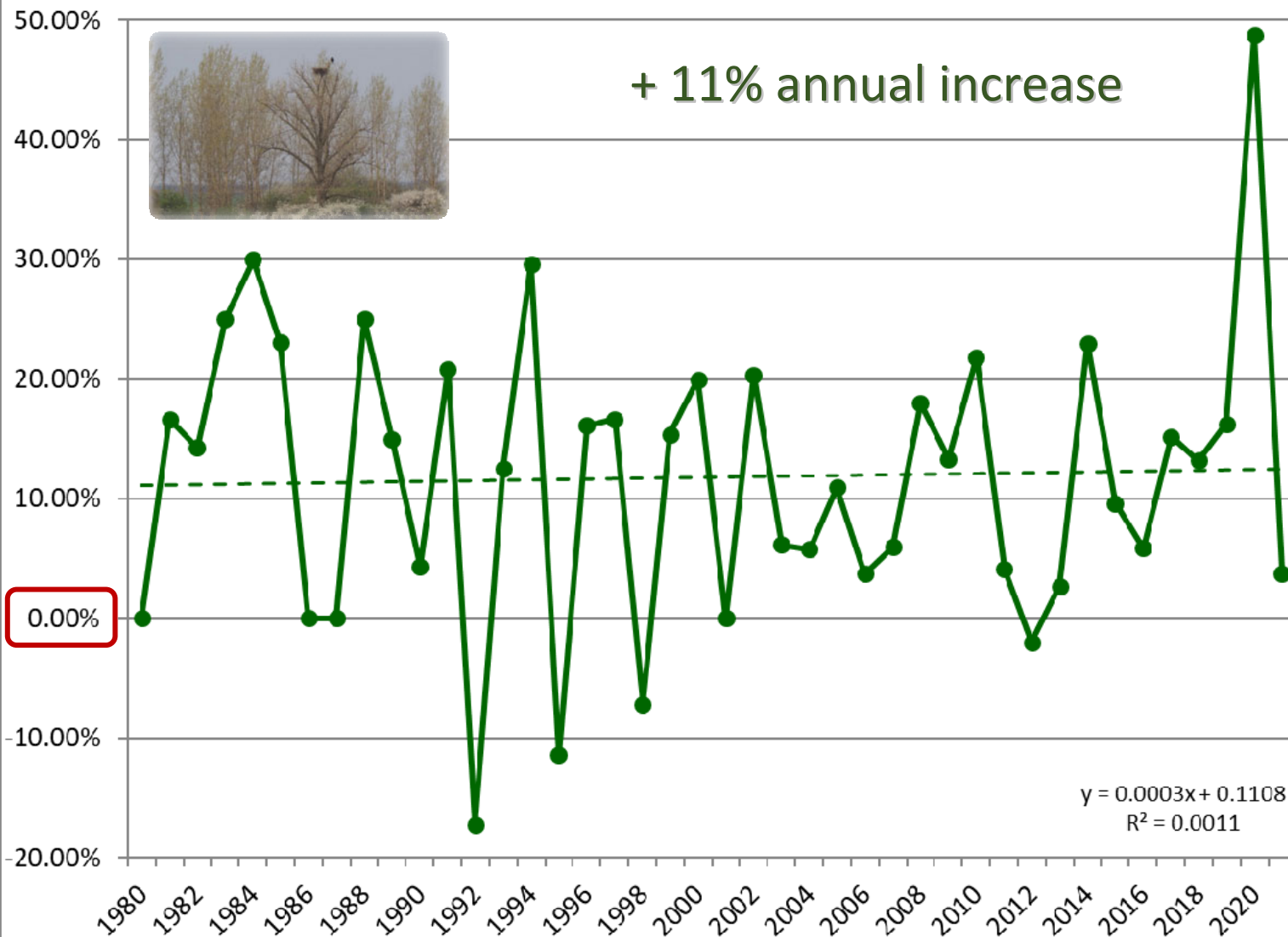
Population trend of the Eastern Imperial Eagle in Hungary (1980-2022)



Annual changes in the no. of Eastern Imperial Eagle nesting pairs



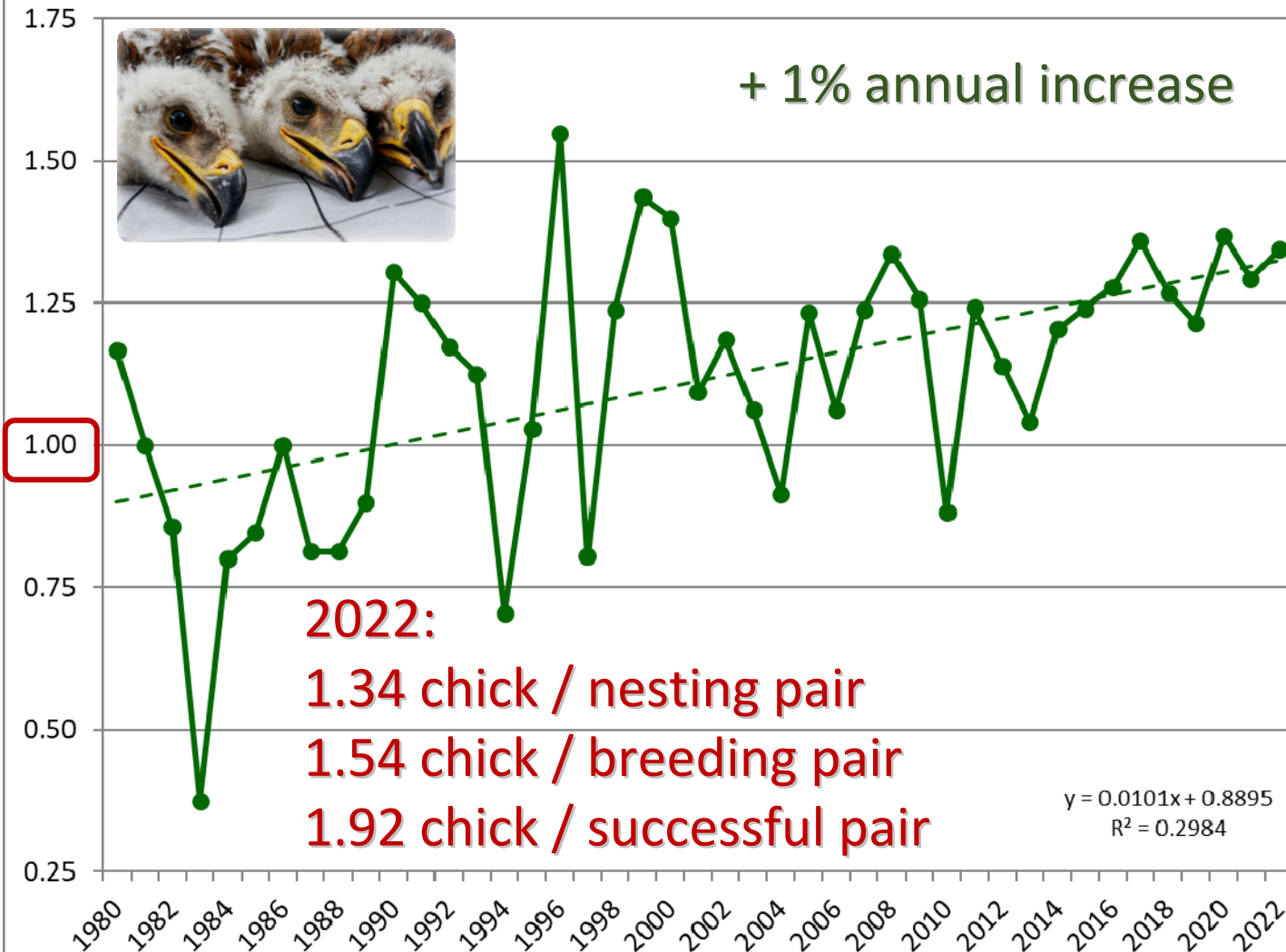
+ 11% annual increase



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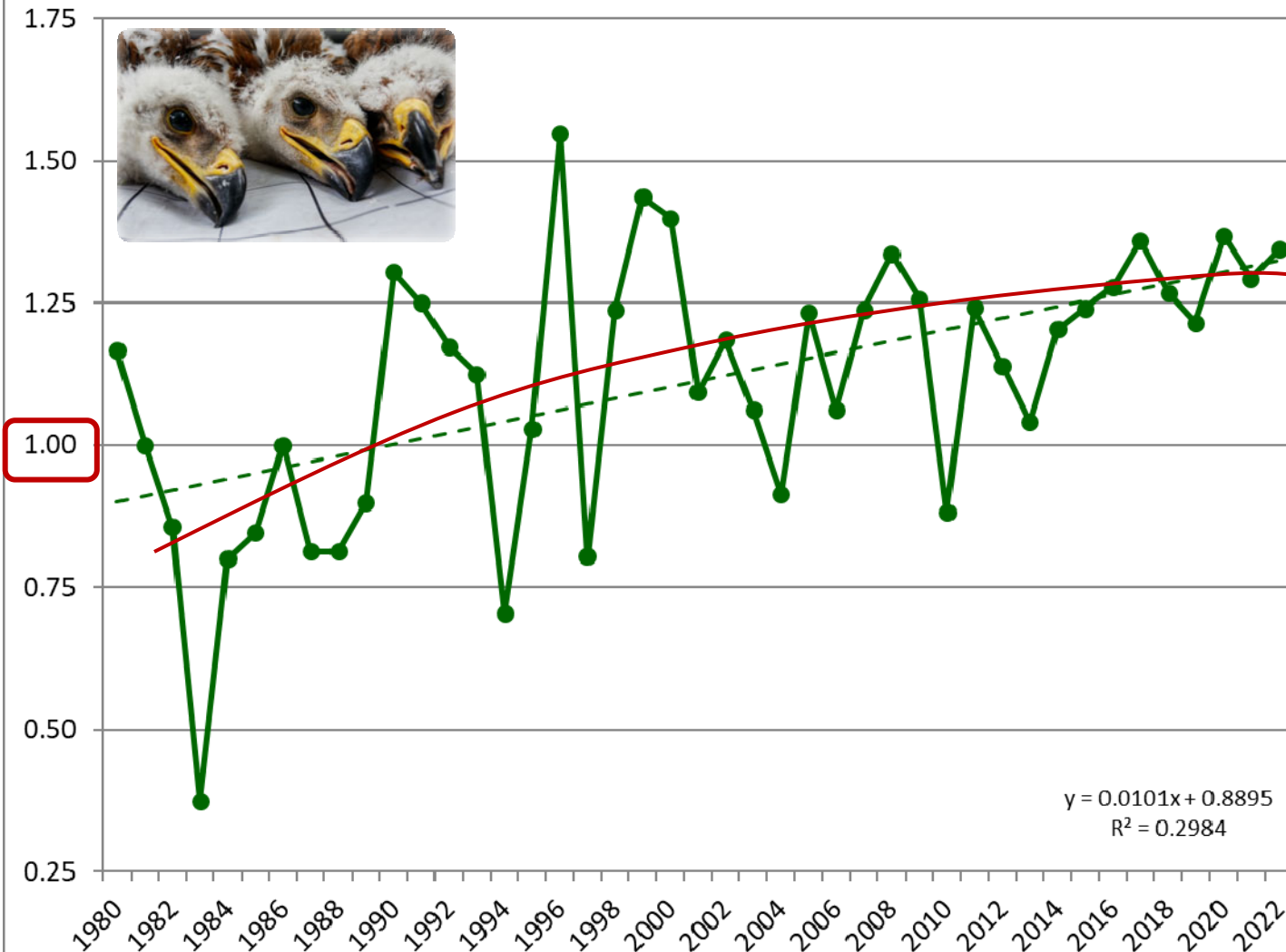
Annual productivity of the Eastern Imperial Eagle in Hungary (chick/nesting pair)



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Annual productivity of the Eastern Imperial Eagle in Hungary (chick/nesting pair)



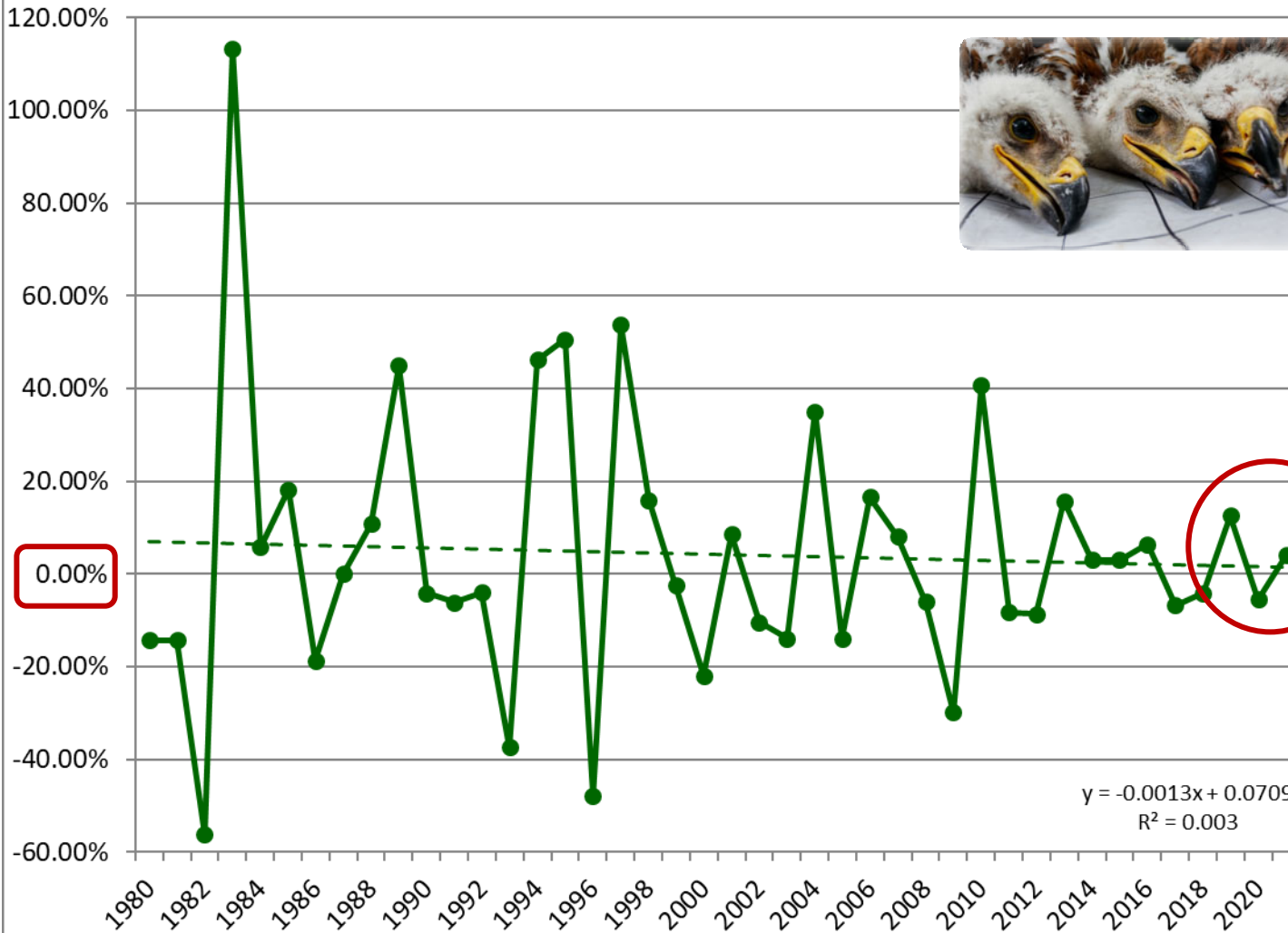
Are we at the turning point?



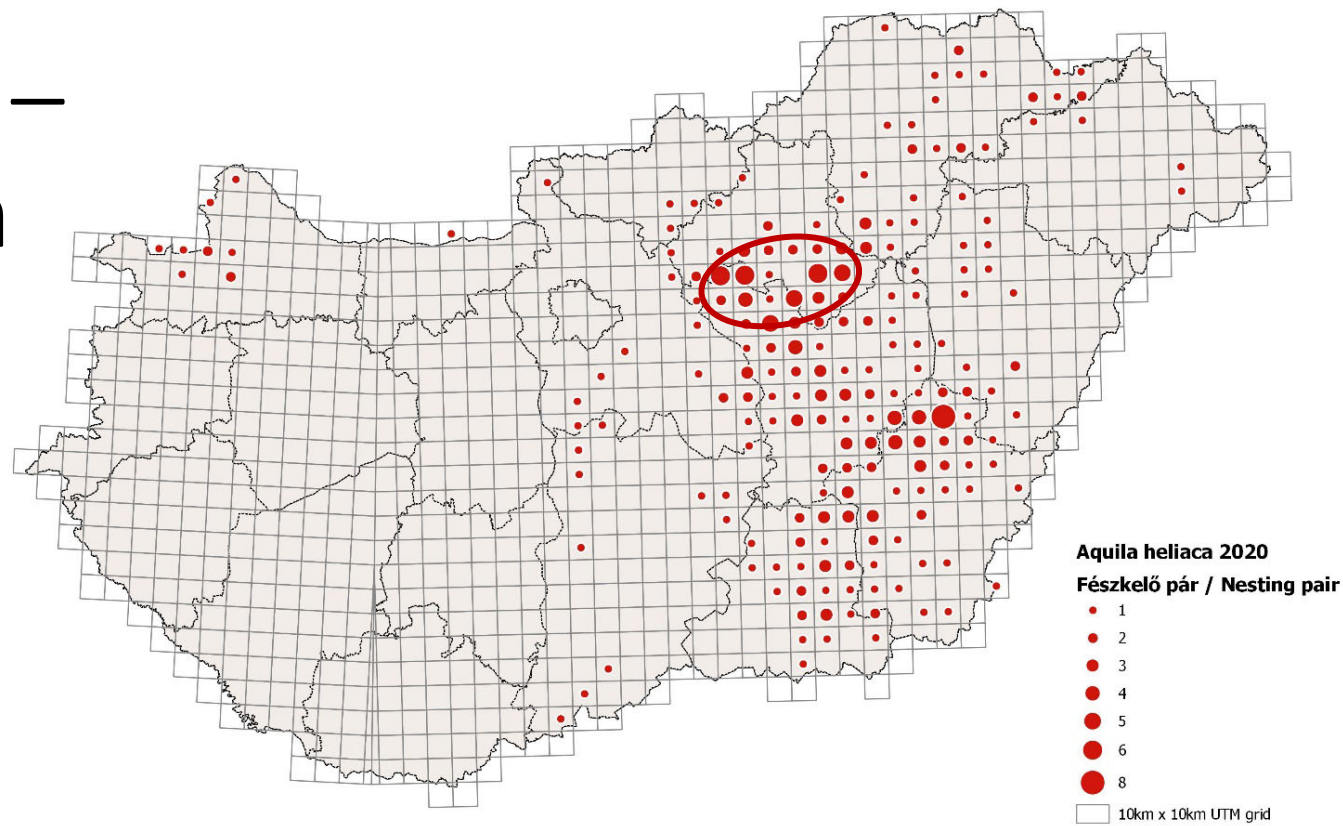
Annual changes in the nesting success of Eastern Imperial Eagles in Hungary



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Subsample – Heves Plain

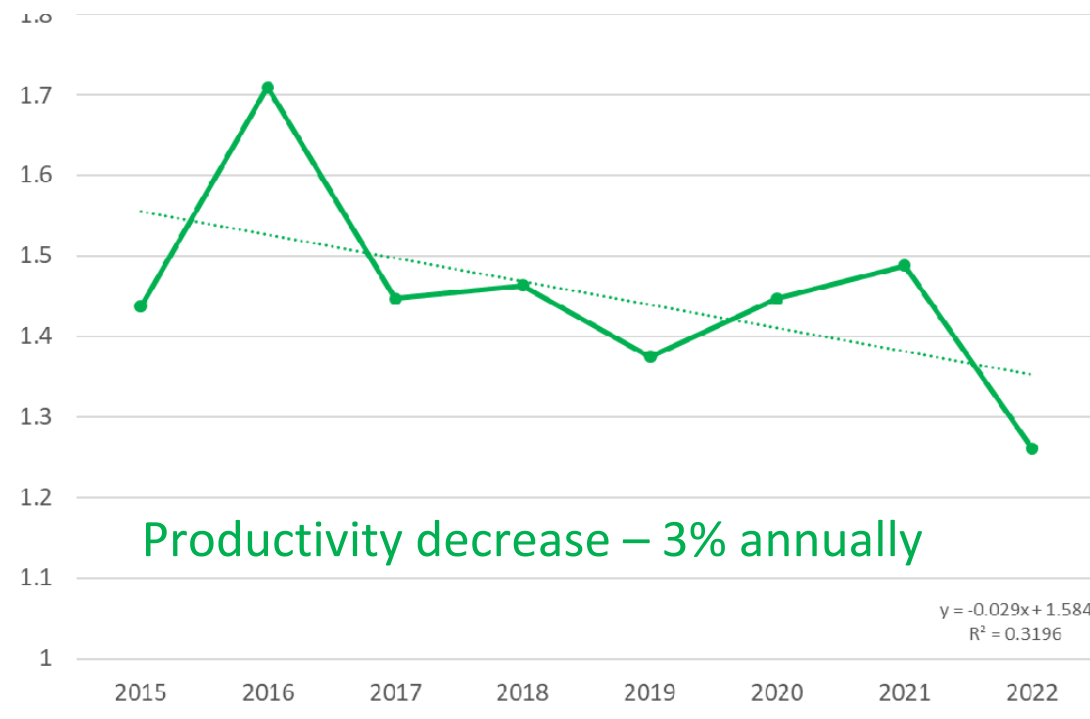
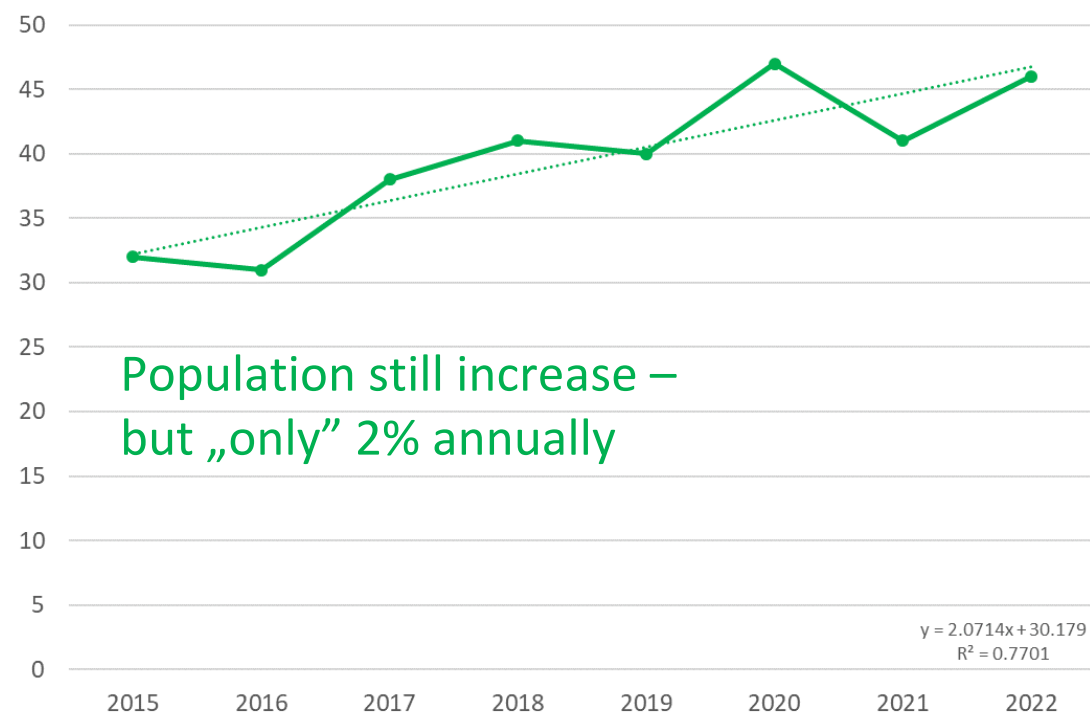


- Firstly colonized lowland areas (1988-)
- Long-term and precisely monitored
- Ca. 1400 km²
- 1 → 48 pairs in 35 years



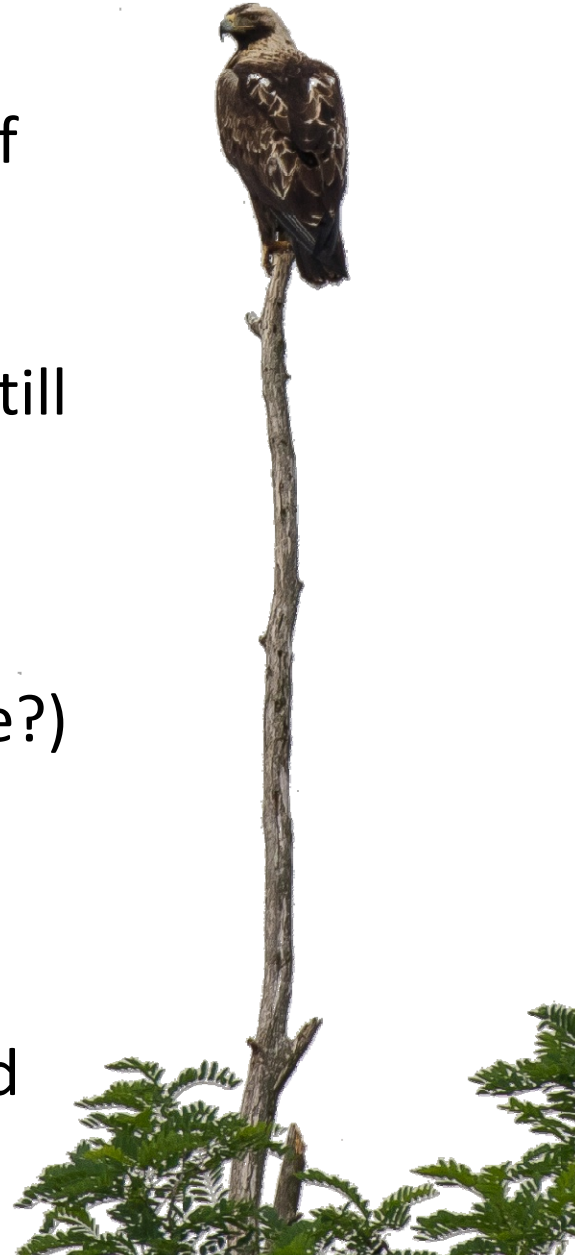
2015-2022

Preliminary results:
First clear signs of
density-
dependence?



Conclusions

- In spite of the 19x increase no clear signs of negative density-dependence nationally – yet
- The Hungarian EIE population is probably still further from saturation (vacant suitable habitats)
- Anyway, the breeding success seems to be stabilised by 2022 (not increasing any more?)
- Population increase slowed down and breeding success decreased in firstly colonized, high-density habitats
- A density-dependent regulation is expected to be detected in the near future

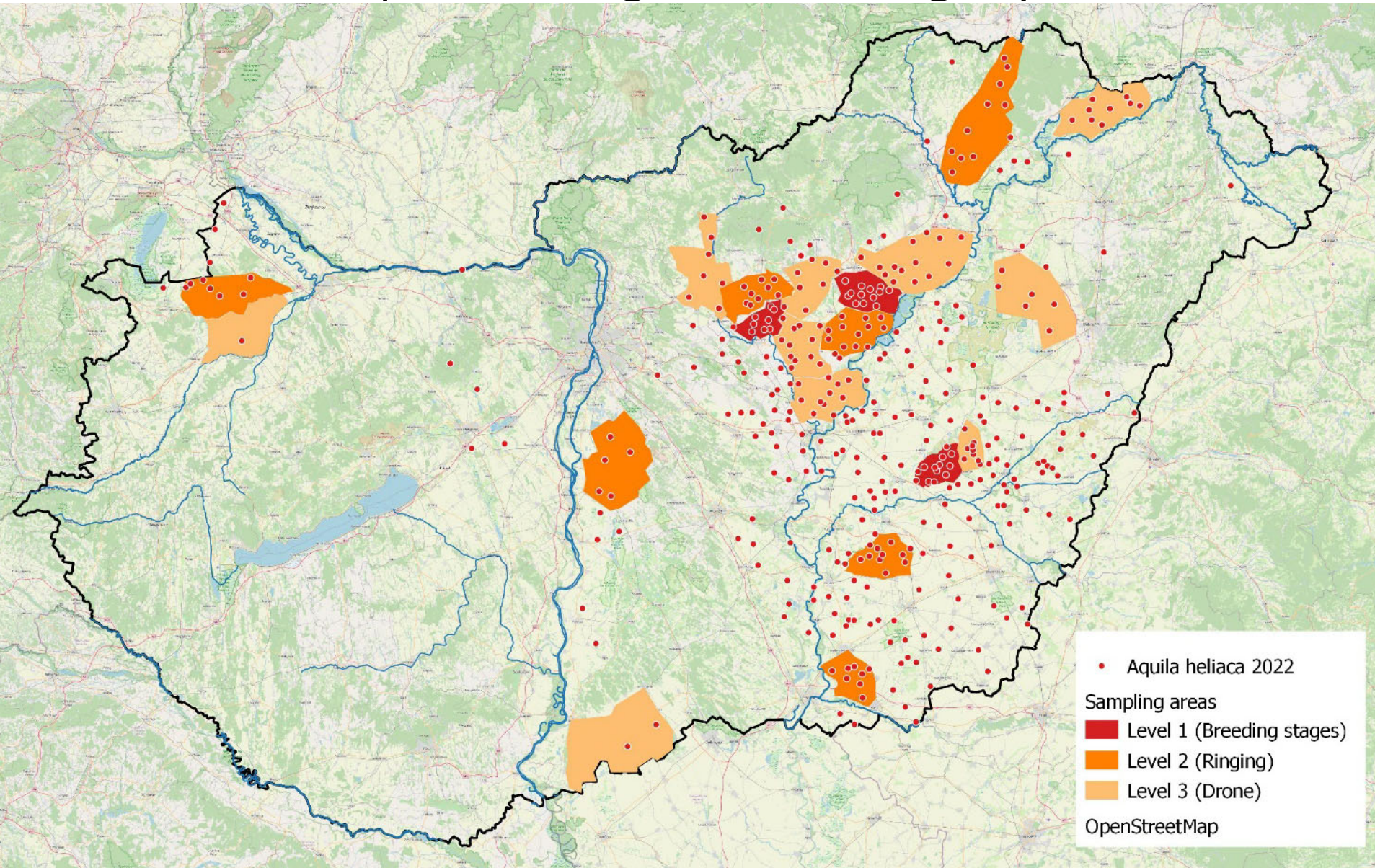


Future of monitoring

- No capacity to undertake monitoring of the total population with the same intensity
- Initiate a multilevel system from 2023 to keep the monitoring of:
 - Nesting population size
 - „Breeding success” (medium-aged chicks/breeding pair)
 - Mortality of breeding birds (genetics)
 - Mortality of non-breeding birds (ringing/tracking)
 - Diet composition
- Initiate new monitoring program of:
 - Breeding stages (brood size in clutches of: eggs, small-, medium-, large-chicks)



Sampling areas for multilevel monitoring of Imperial Eagles in Hungary



2023.04.21.



2023.05.23.



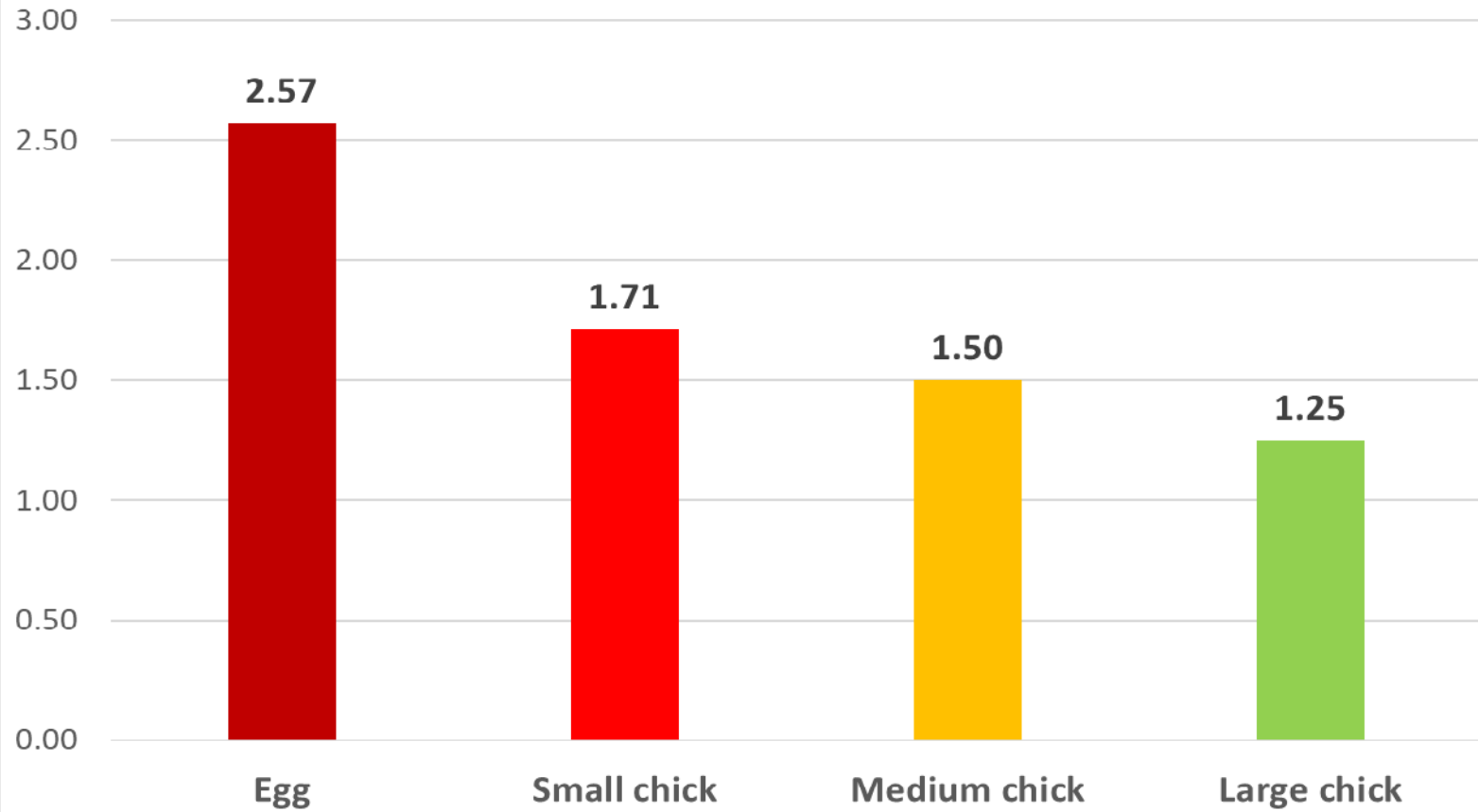
2023.06.21.



2023.07.10.



Clutch sizes of Imperial Eagles in different breeding stages (n=15, Devavanya sampling area, 2023)



World record?

1st known successful 4-chick brood

2021 Dévaványa, Hungary



Acknowledgement

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