

Natura 2000 in a Changing World:

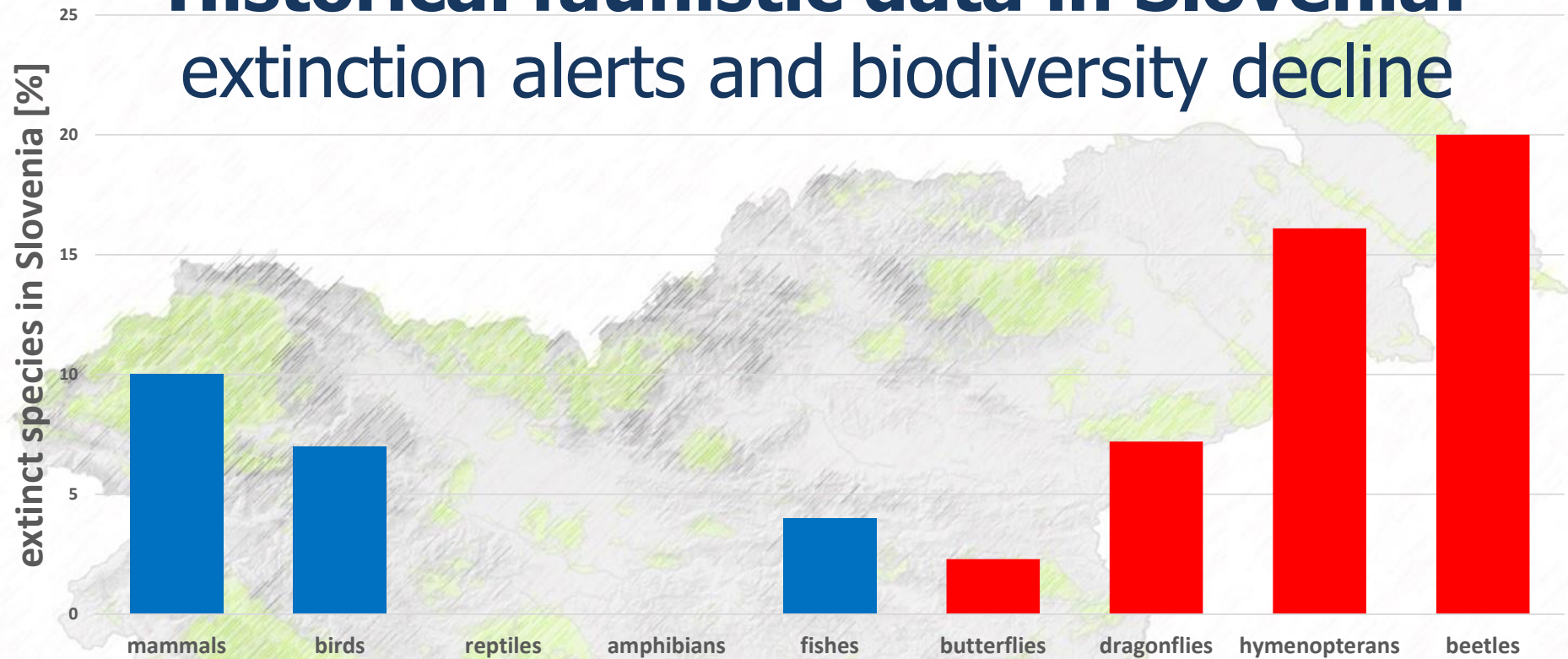
Insights from Long-Term Monitoring in Slovenia

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Historical faunistic data in Slovenia: extinction alerts and biodiversity decline



Colias myrmidone



1993

Gomphus flavipes



1961

Camptopoeum frontale



1945

Dorcadion fulvum



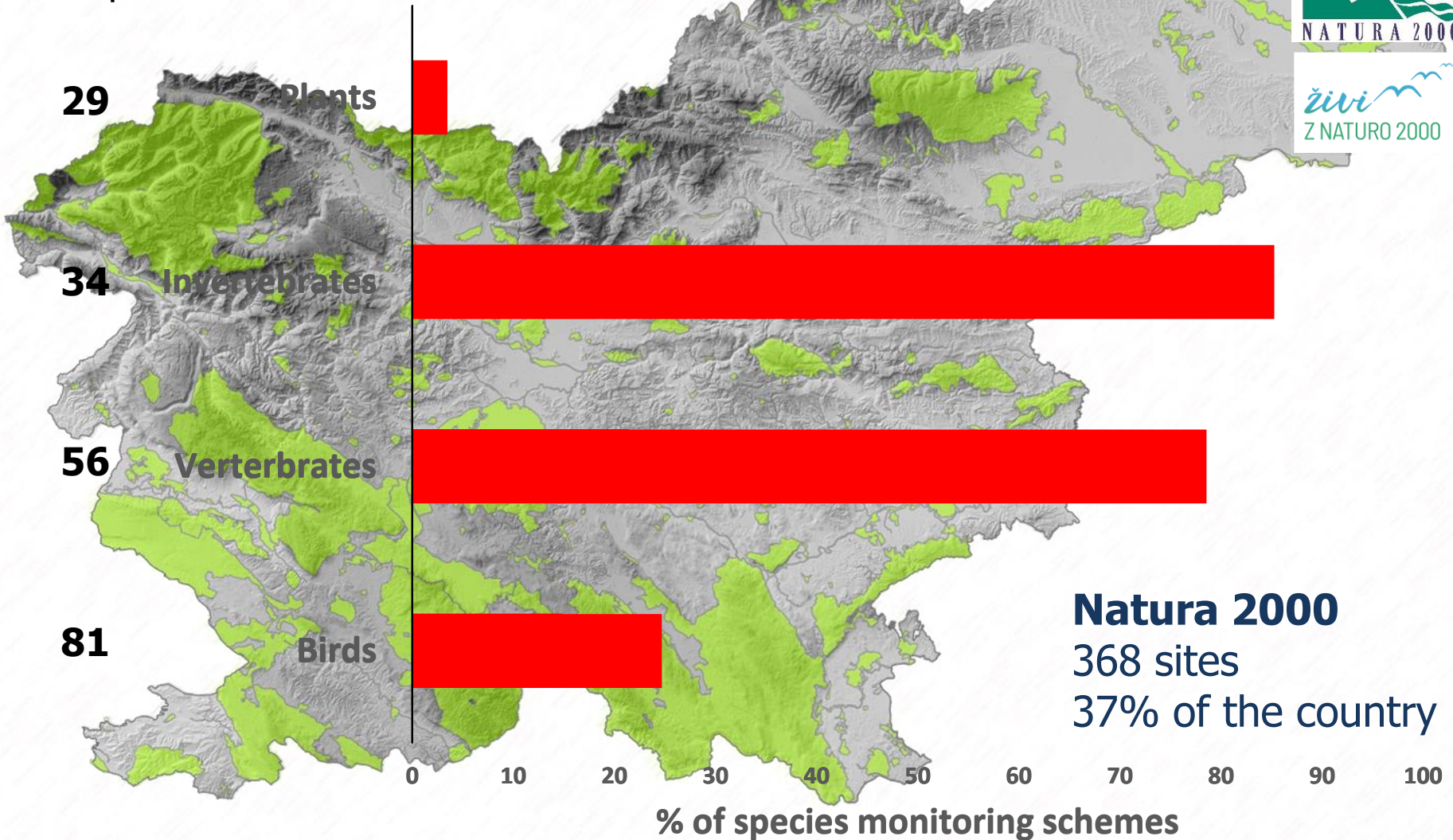
1899

Slovenia: model for Natura 2000 monitoring and management



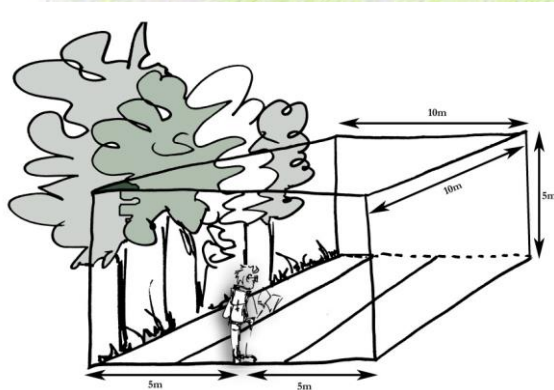
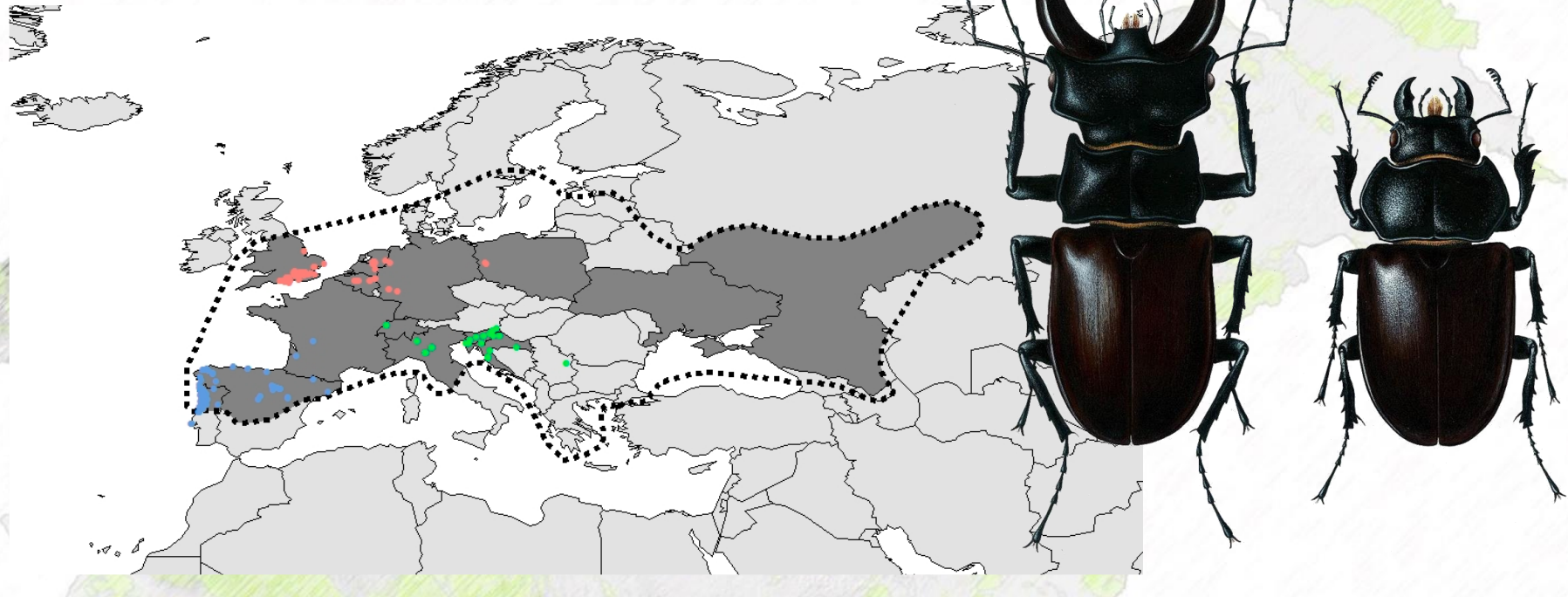
No. species

Monitoring 2004-2020 (>10 years)



Stag Beetle (*Lucanus cervus*)

(Thomaes et al. 2021, *Insects*)



(Campanaro et al. 2016, *Insect Conservation and Diversity*)

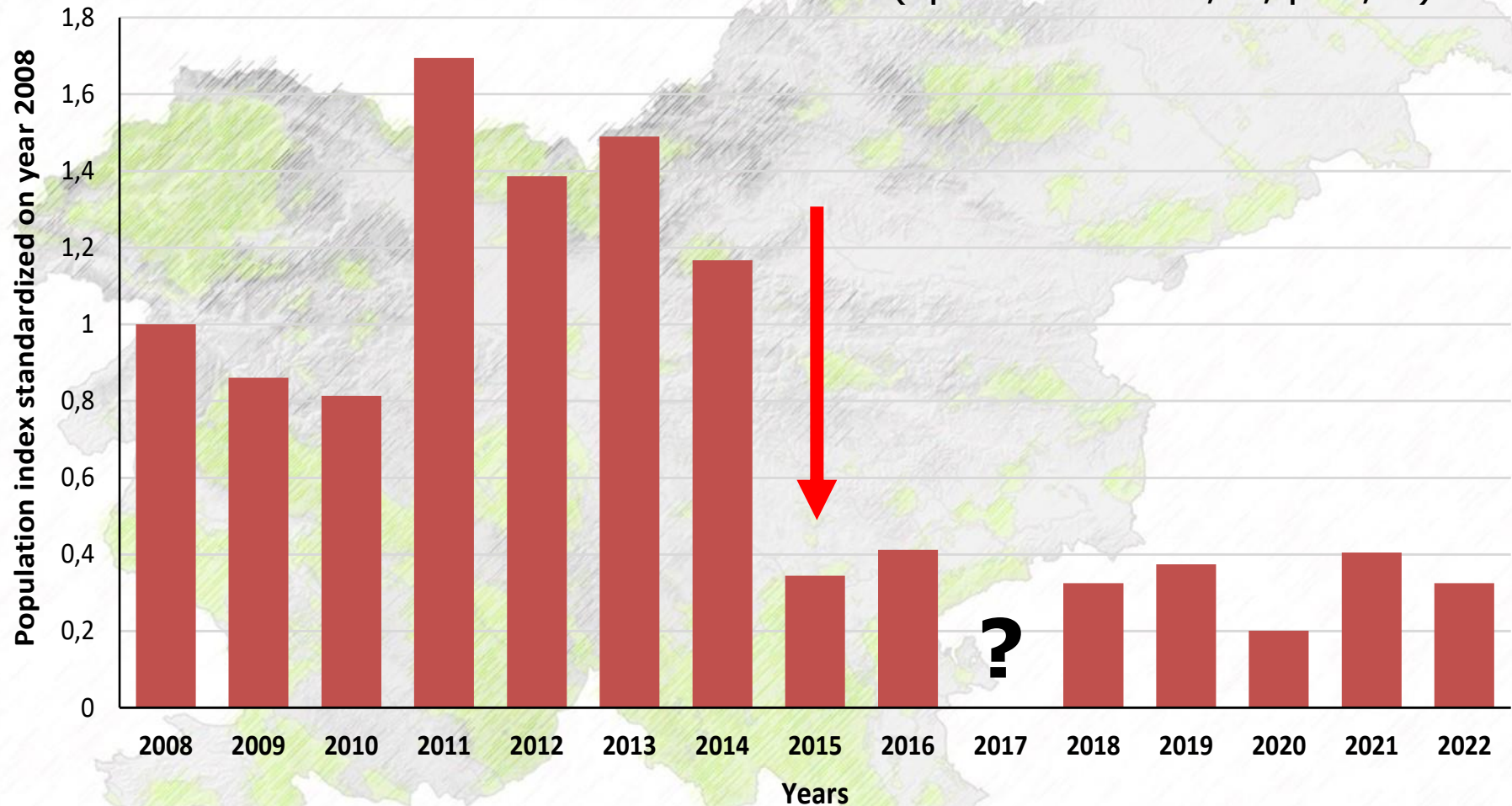
Table 1. Countries with the number of transects and transect walks ordered by number of transect walks. Percentage comparing numbers to total number of transects set up. For transects with multiple years, percentage is calculated by excluding the transects set up in 2020 because they do not yet have data from multiple years.

Country	No. Transects			Mean Years of Data/Transect	No. Transect Walks
	Set Up (100%)	with at Least One Transect Walk	with Data from Multiple Years		
Slovenia	10	10 (100%)	10 (100%)	10.4	319
The Netherlands	20	19 (95%)	12 (60%)	2	308
Portugal	46	40 (87%)	1 (10%)	1.05	290
Spain	33	28 (85%)	10 (56%)	1.71	239
Belgium	13	8 (62%)	6 (55%)	3.63	162
United Kingdom	50	21 (42%)	4 (9%)	1.24	103
Italy	8	8 (100%)	4 (57%)	1.88	101
Croatia	5	5 (100%)	3 (60%)	1.6	86
Germany	4	4 (100%)	3 (75%)	3	80
Switzerland	1	1 (100%)	1 (100%)	5	30
Poland	2	2 (100%)	0 (0%)	1	10
France	2	1 (50%)	0 (0%)	1	6
Serbia	1	1 (100%)	0 (0%)	1	1
Total	195	148 (76%)	54 (39%)	2.23	1735

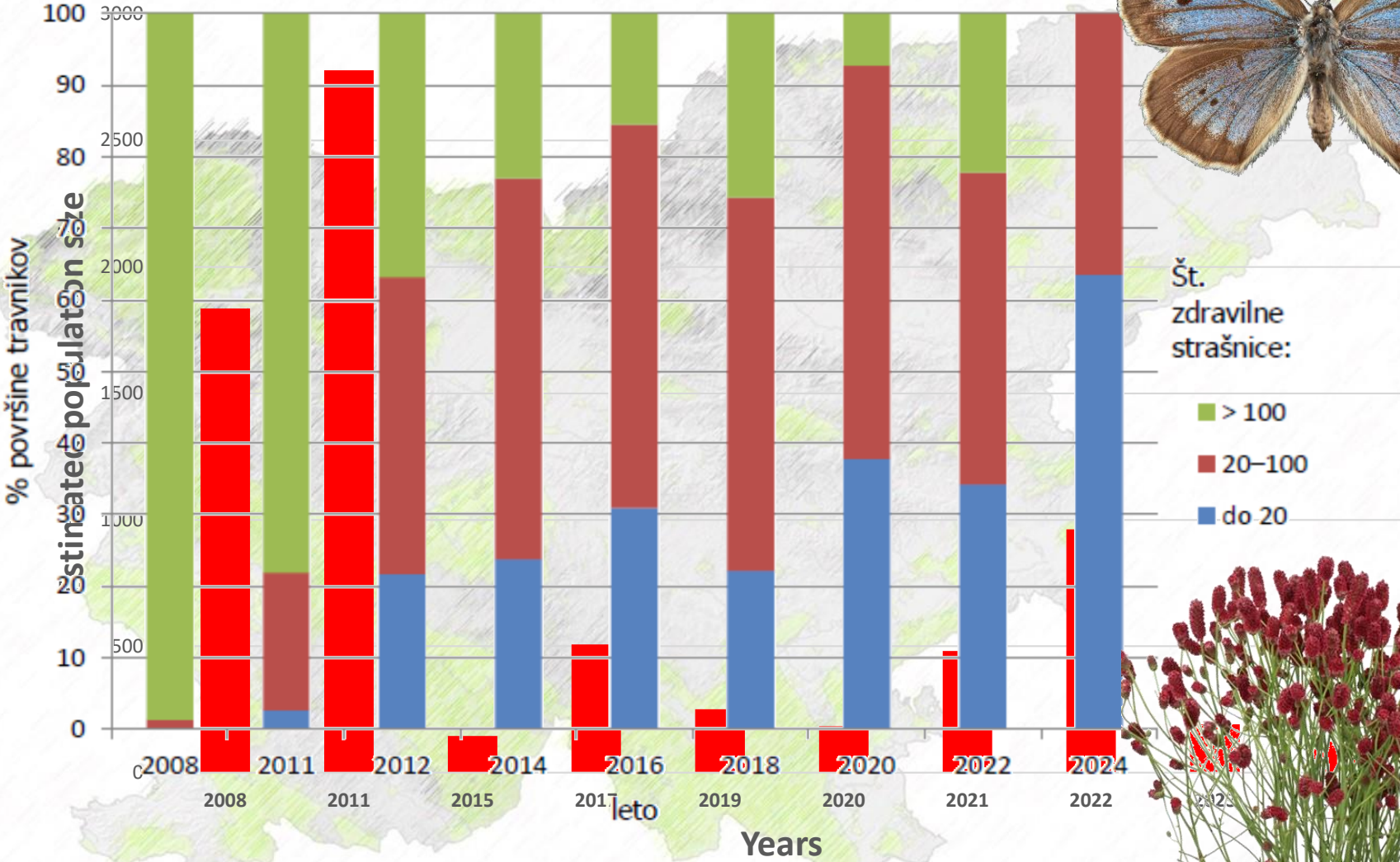
Population dynamics indicates gradual large-scale decline

Lucanus cervus

STRONG DECLINE (Spearman $r_s = -0,66$, $p < 0,05$)



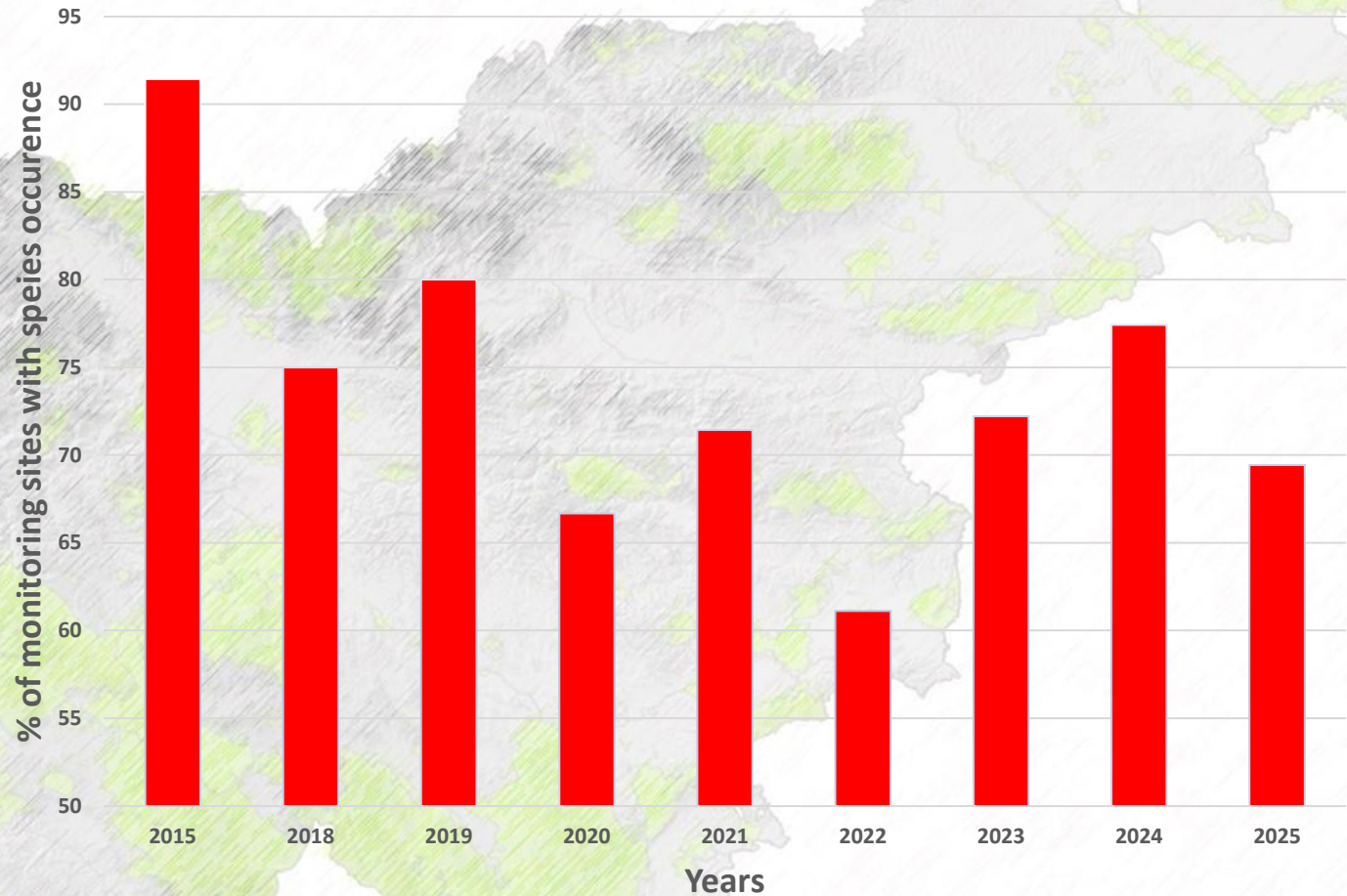
Scarce Large Blue (*Phengaris teleius*)



(Zakšek et al. 2024, Monitoring izbranih ciljnih vrst metuljev v letu 2024)

Great Brunet
(*Sanguisorba officinalis*)

Stone Crayfish (*Austropotamobius torrentium*)



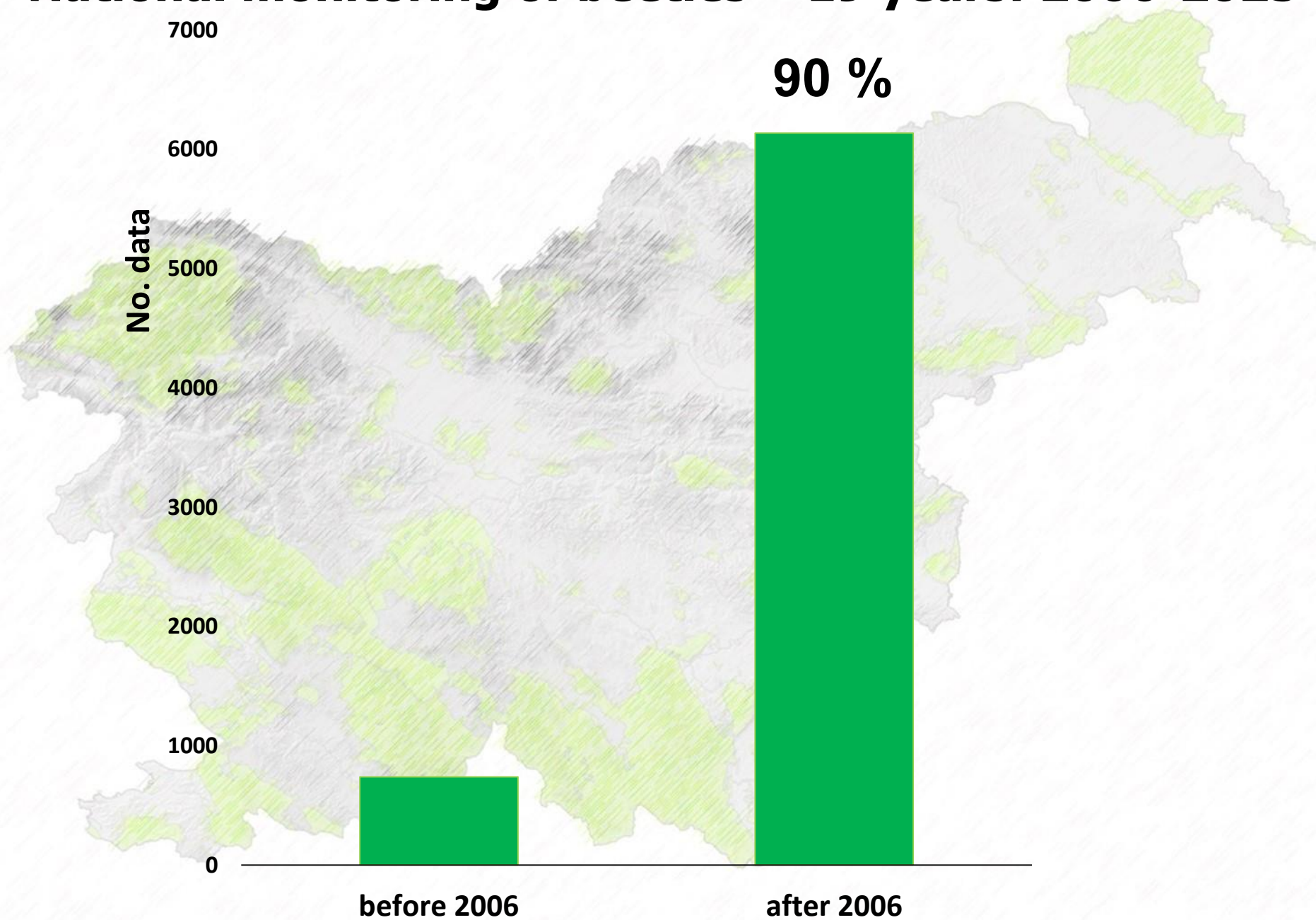
(Govedič et al. 2025, *Monitoring koščaka (Austropotamobius torrentium) in koščenca (Austropotamobius pallipes) v letih 2024, 2025 in 2026*)

A close-up photograph of a crayfish resting on a muddy bank. The crayfish has a brown and orange mottled pattern on its shell. It is positioned near a small stream with water and fallen leaves visible in the background.

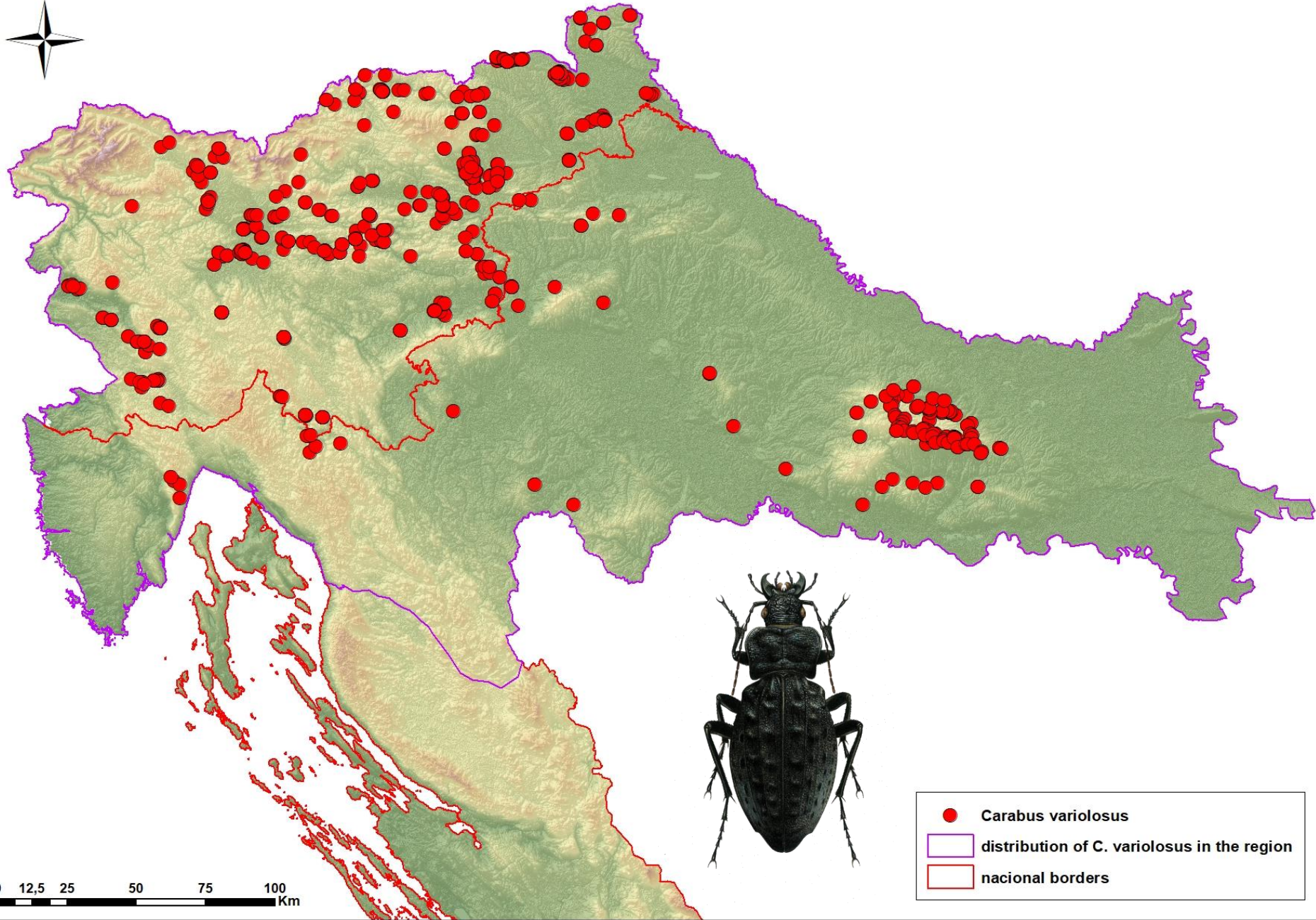
Crayfish Plague – *Aphanomyces astaci*

1861

National monitoring of beetles – 19 years: 2006-2025

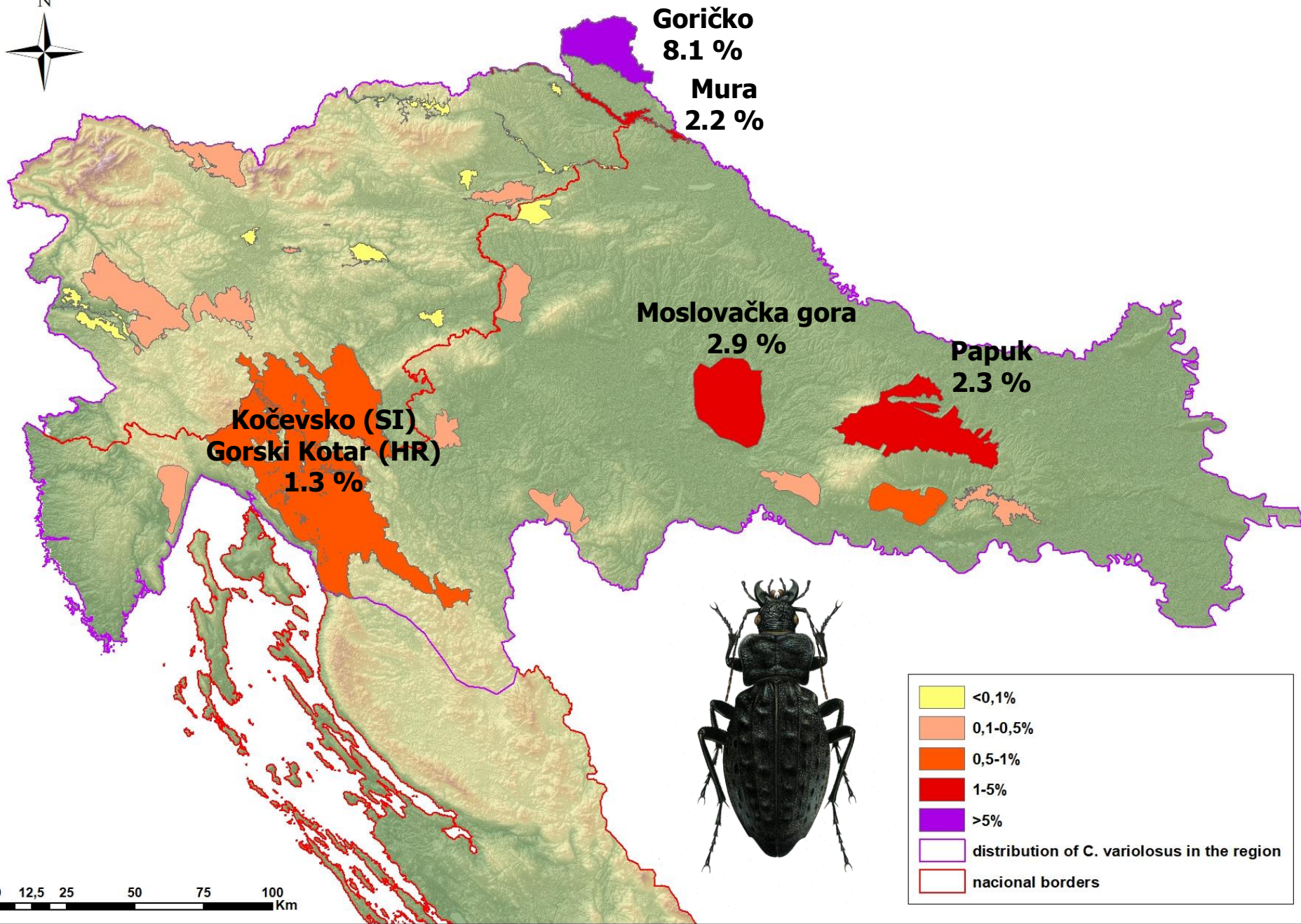


Carabus (variolosus) nodulosus



- *Carabus variolosus*
- distribution of *C. variolosus* in the region
- nacional borders

Population size assessment



REDISCOVERIES

Graphoderus bilineatus

Possibly extinct in 1937



Short-eared Owl
(*Asio flammeus*)



2019: breeding
after 83 years

Whiskered Tern (*Chlidonias hybrida*)



2025: new breeder

Rediscovered in 2011
(Ambrožič et al. 2015, *Acta ent. slov.*)



Nature restoration

Nobel Penshell (*Pinna nobilis*)

- Endemic mediterranean bivalve,
- Important structuring element of muddy and sandy habitats
- One of the highest densities of *P. nobilis* (until 2020) recorded in Slovenia
- Selected as important element in evaluating status of Natura 2000 sites in Slovenia
- Recognised as important Indicator of physical damage on the sea floor (anchoring)

Threat: unprecedented mass mortality events in the whole Mediterranean due to parasites (*Haplosporidium pinnae*, *Vibrio* sp., *Micobacterium* sp.)

CRITICALLY ENDANGERED SPECIES

Nature restoration

Nobel Penshell (*Pinna nobilis*)

LIFE PINNA

Conservation and Re-stocking of *Pinna nobilis* in the western Mediterranean and Adriatic Sea



Installation of larval collectors



Collection of juveniles



Transplantation



In-situ maintenance



Ex-situ maintenance



Next generation monitoring

Telemetry

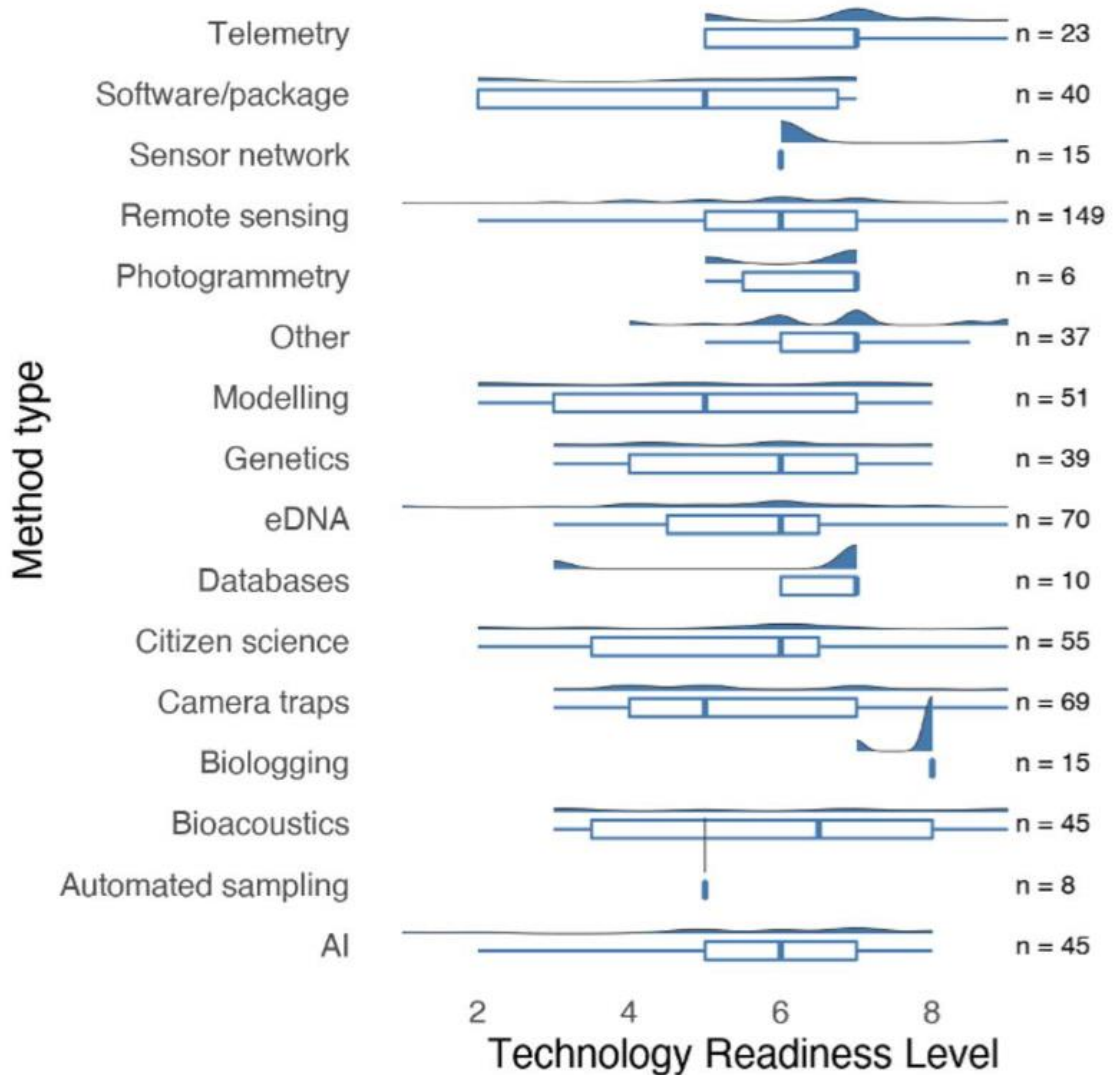
Passive acoustic monitoring

Biotremology

Environmental DNA

Camera traps

Citizen Science





THANK YOU FOR YOUR ATTENTION!