GOLDEN JACKAL AS A CASE STUDY OF POPULATION CONTROL IN CROATIA

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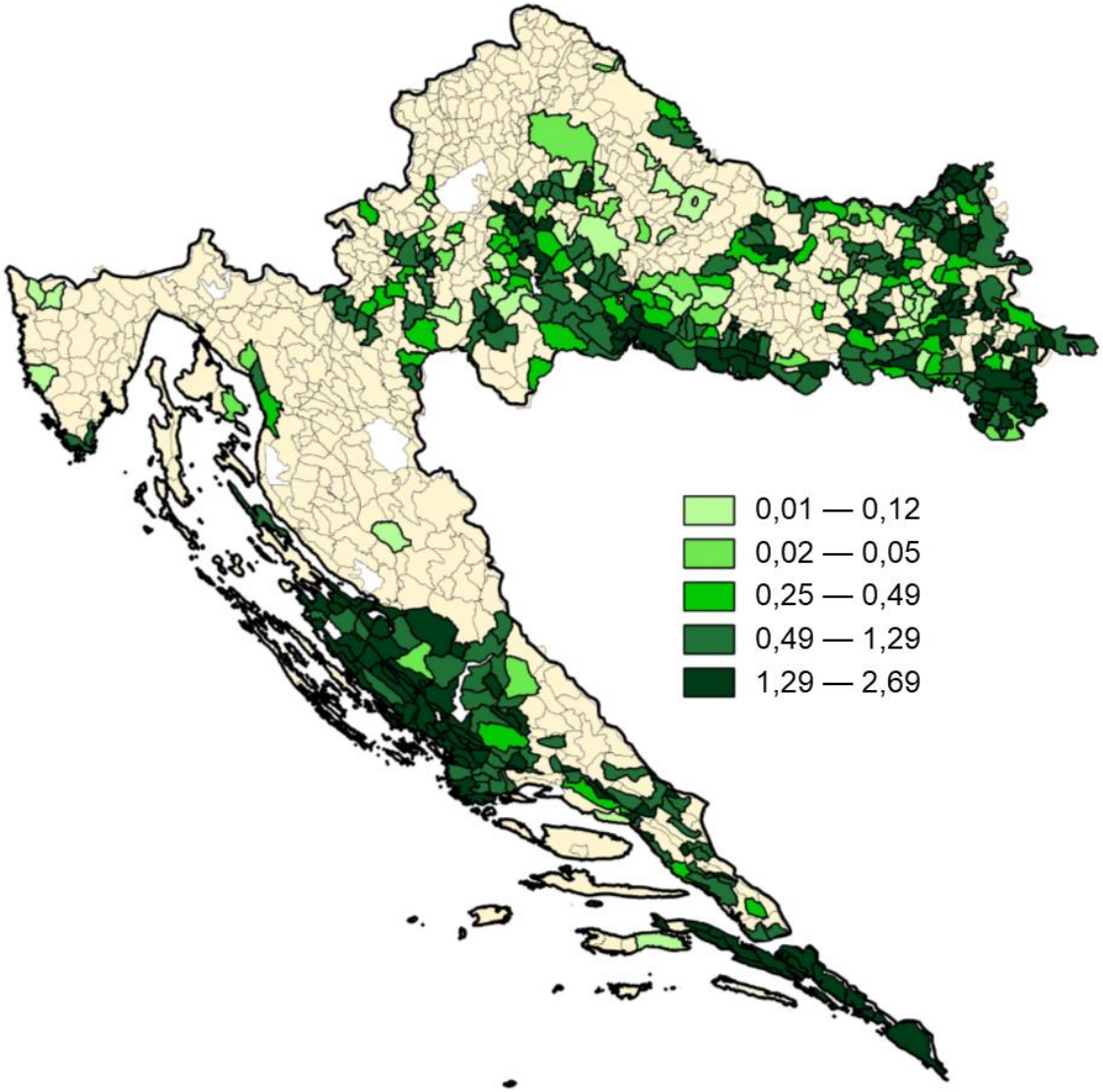
GOLDEN JACKAL IN CROATIA

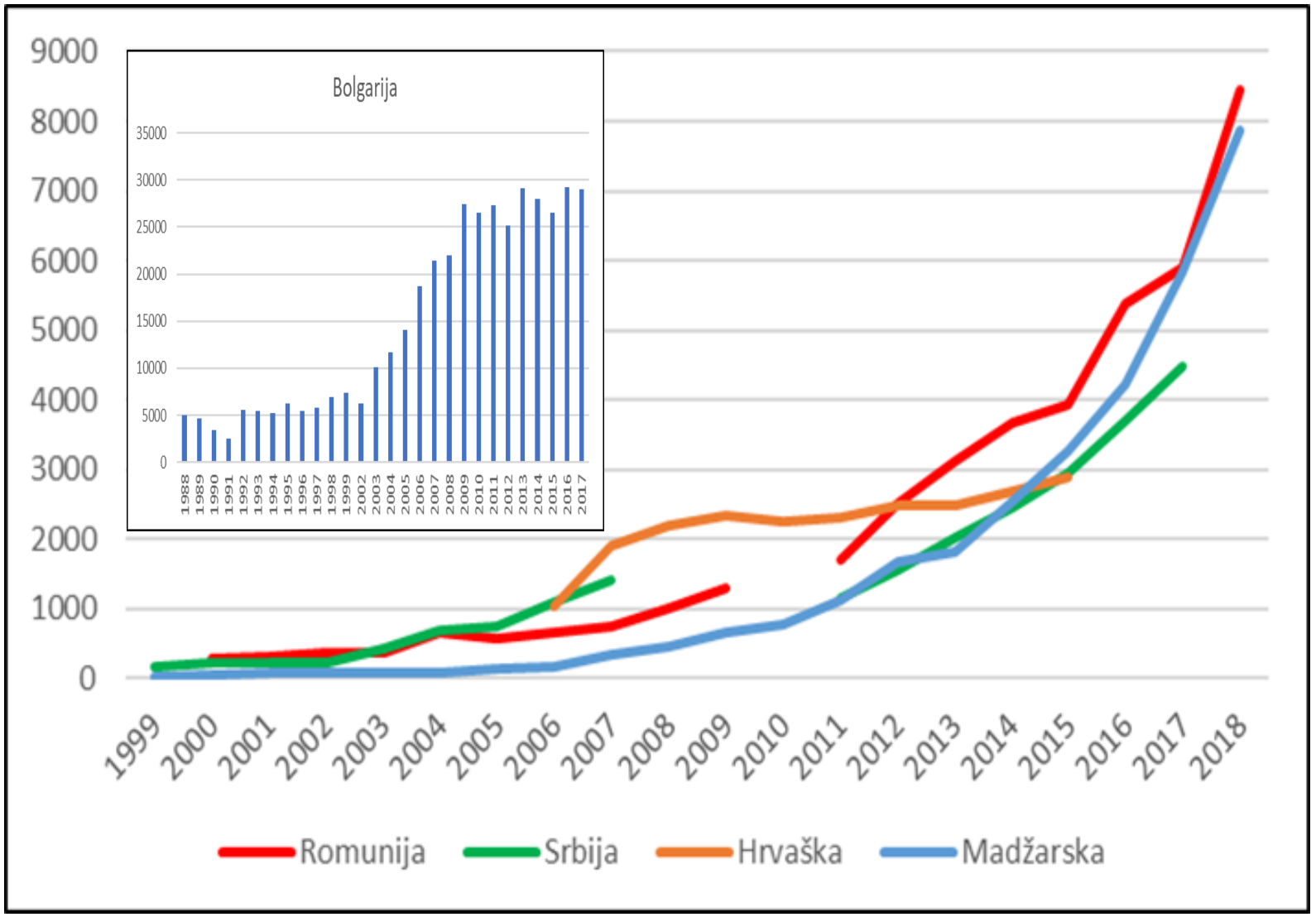


HISTORY of THE SPECIES in CROATIA:

- **First record from 1491 (island of Korčula)** ➔ since than, permanently present in Dalmatia (Jeričević 1952)
- Dalmatian population is different from Pannonian-Balkan one ➔ both considering morphometric traits (Kryštufek & Tvrtković 1990a) and genetic outlook (Fabbri et al. 2014, Stronen et al. 2022)
- In early 1990s ➔ jackals started inhabiting several islands (Kryštufek 2011, Martić 2018)
- First record in the continental part ➔ at the end of 19th century (Kryštufek & Tvrtković 1990b)
- Since 1998 ➔ rapid increase of both abundance and spatial distribution in the continental Croatia (Bošković 2012, 2013)
- **Last estimation of population size ➔ approx. 8,000 individuals** ➔ 6,700 from Pannonian-Balkan and 1,300-1,400 from Adriatic population (Ranc et al. 2018)

Density of golden jackal harvest (individuals/1,000 ha) in the period 2011–2015 (Bezmalinović 2019)

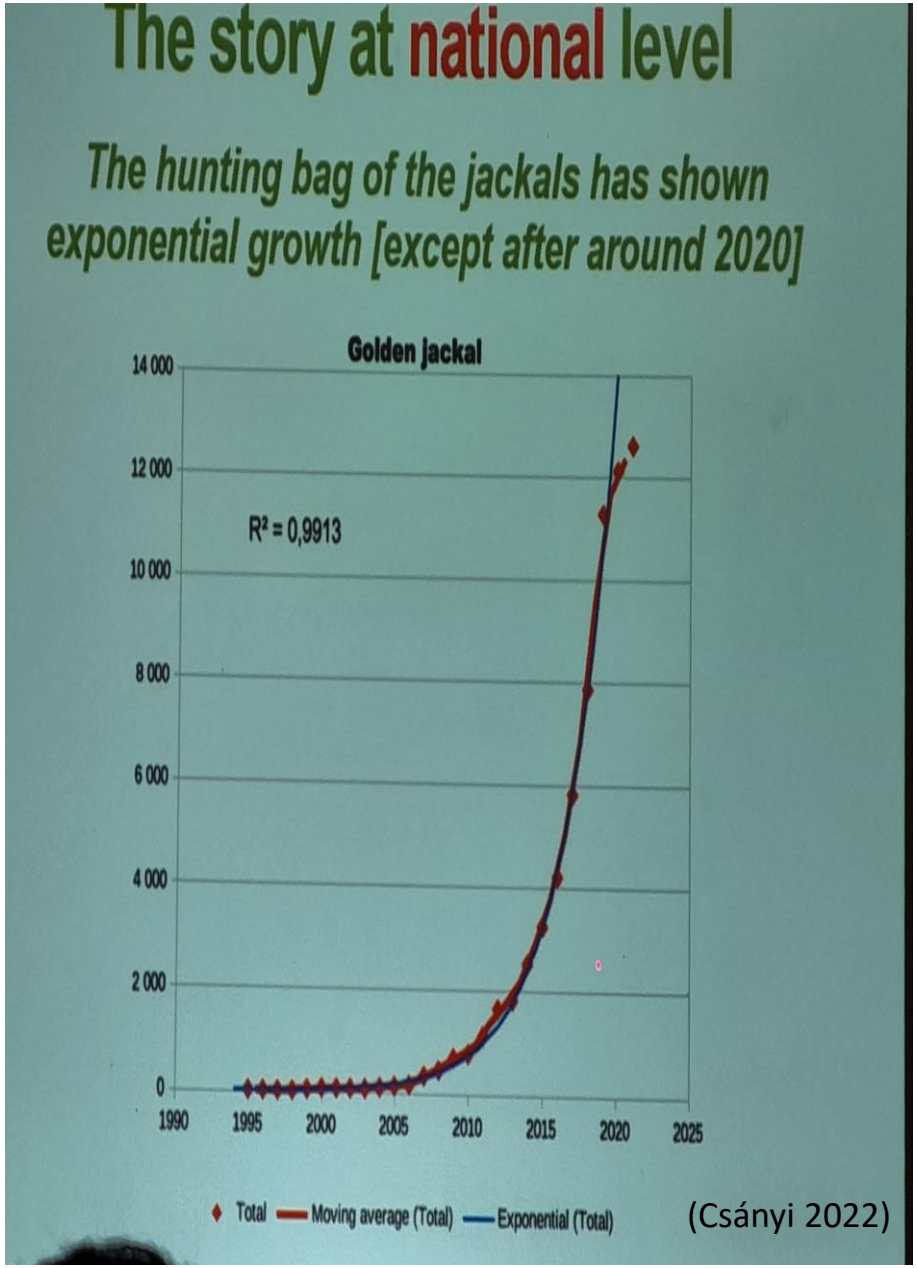
Fact 1: Huge increase of abundance in „domicile“ European countries



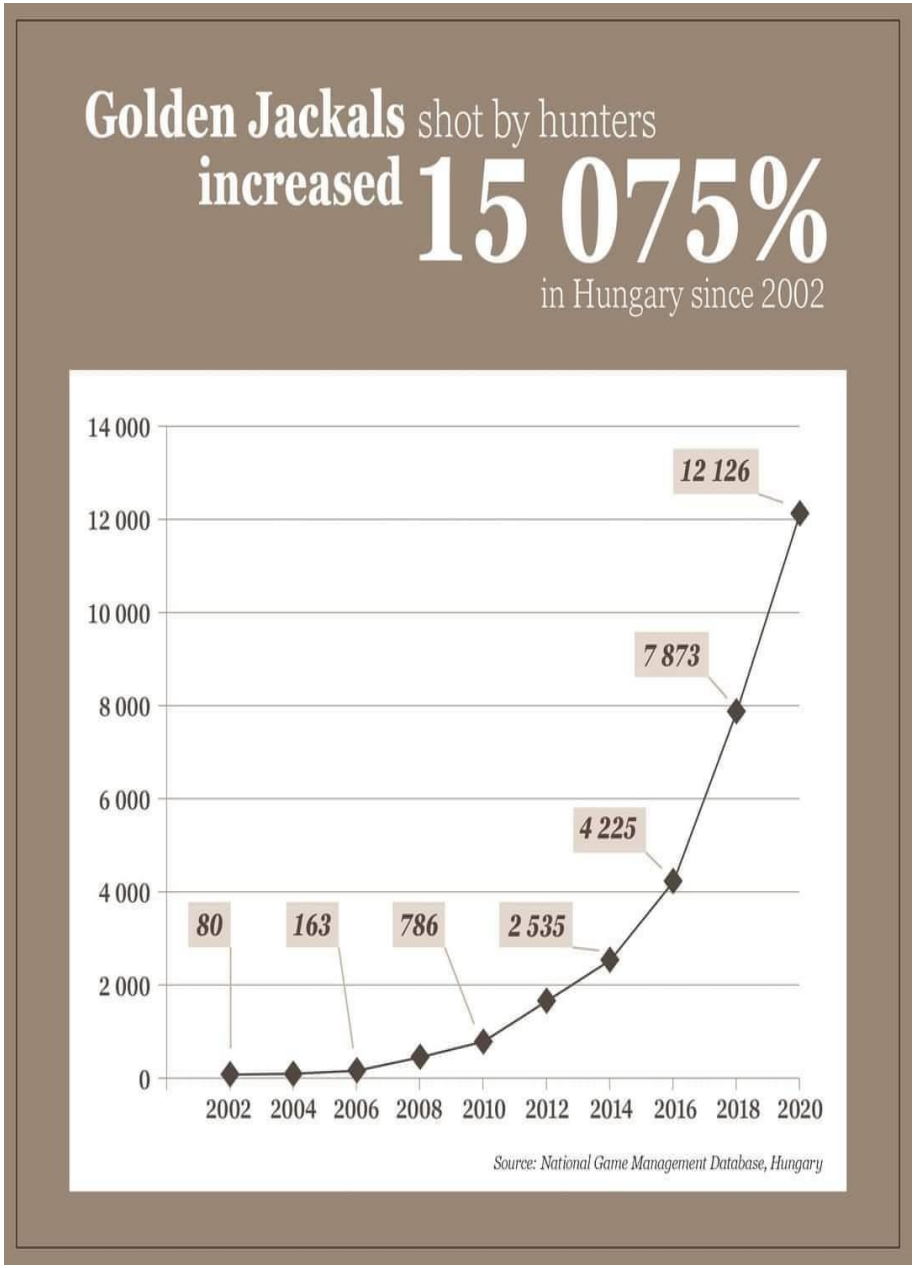
Annual harvest of golden jackal in Romania, Serbia, Croatia, and Hungary, 1999-2018

(from Potočnik et al. 2019; based on Penezić 2016; RZS 2019 (for Serbia), Farkas et al. 2018, Papp et al. 2018 (for Romania), Csányi et al. 2018 (for Hungary), Bezmalinović et al. 2018 (for Croatia); Stoyanov 2018 (for Bulgaria))

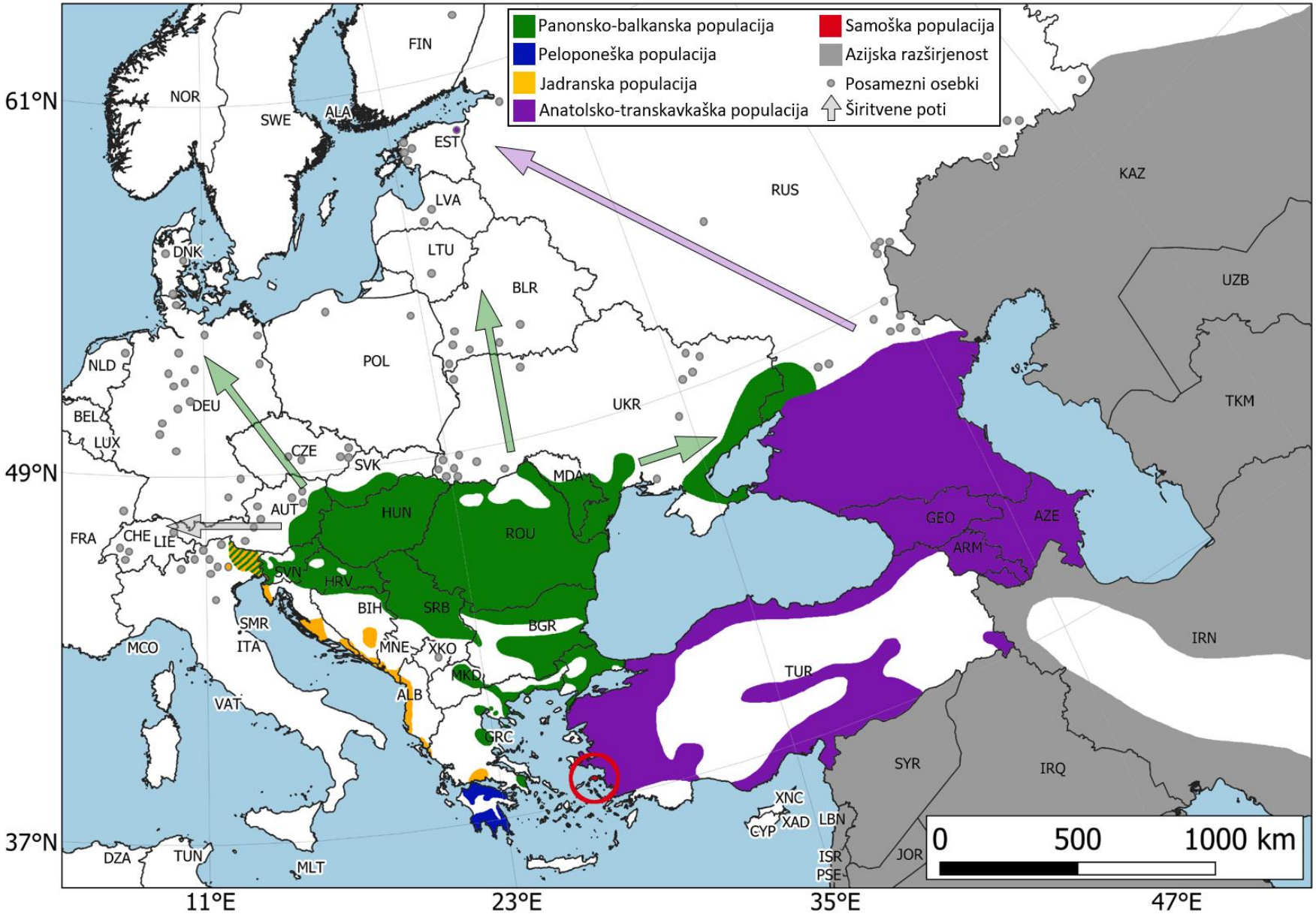
Fact 1: Huge increase of abundance in „domicile“ European countries



(Csányi 2022)

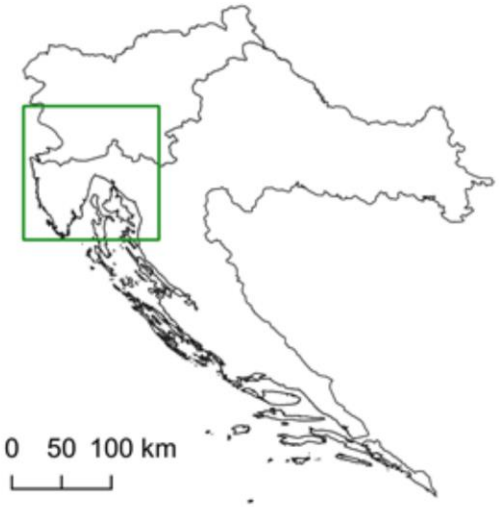


Fact 2: Fast expansion of the species in Europe



(from Potočnik et al. 2019; adopted from Ambarli et al. 2016; Spassov & Acosta-Pankov 2019)

Fact 3: High dispersal potential

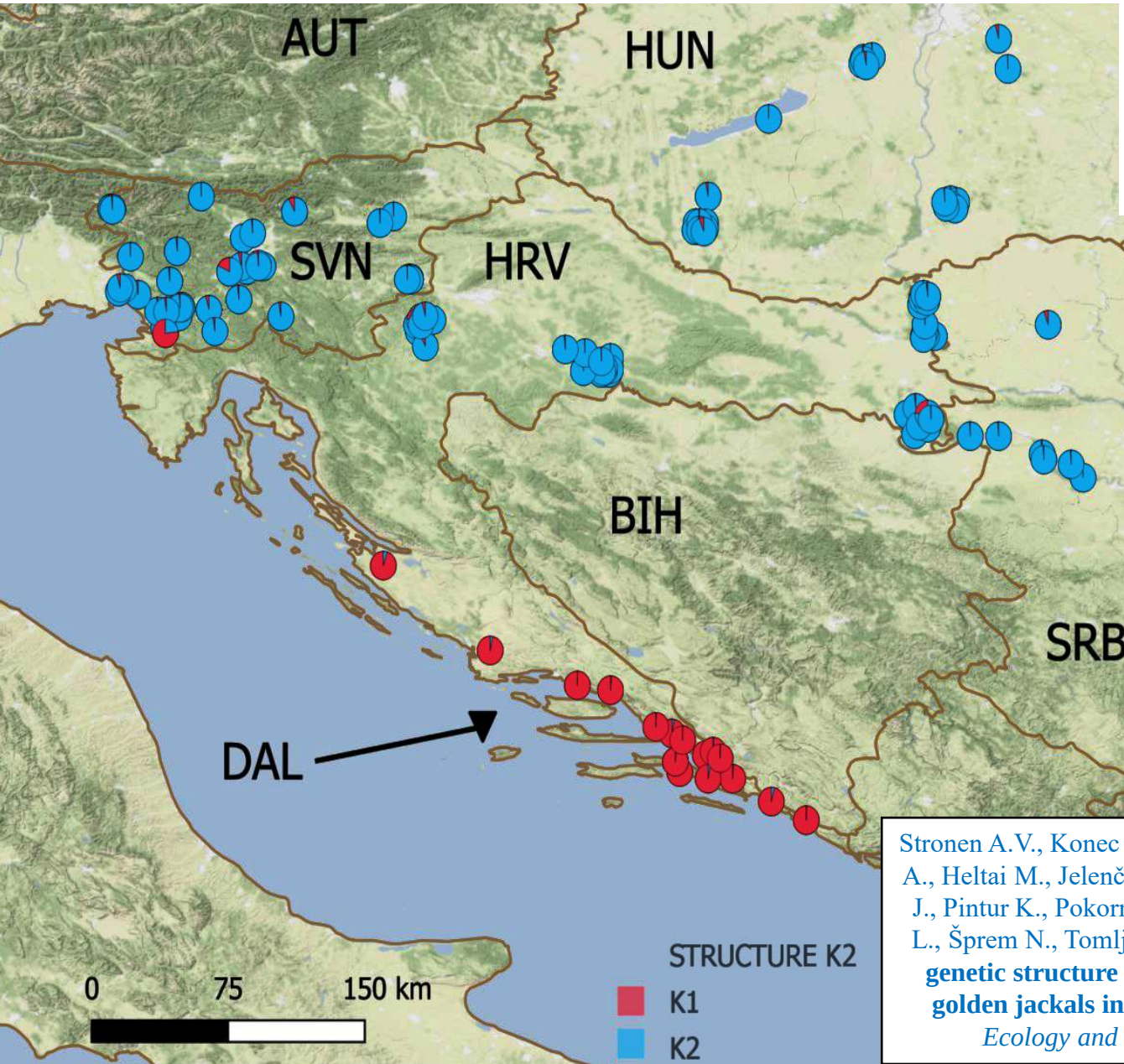


Dispersion of one-year old male jackal ➔ from Slovenia to Croatia

Distance of dispersion: **178,5 km**

Travelled in 14 days

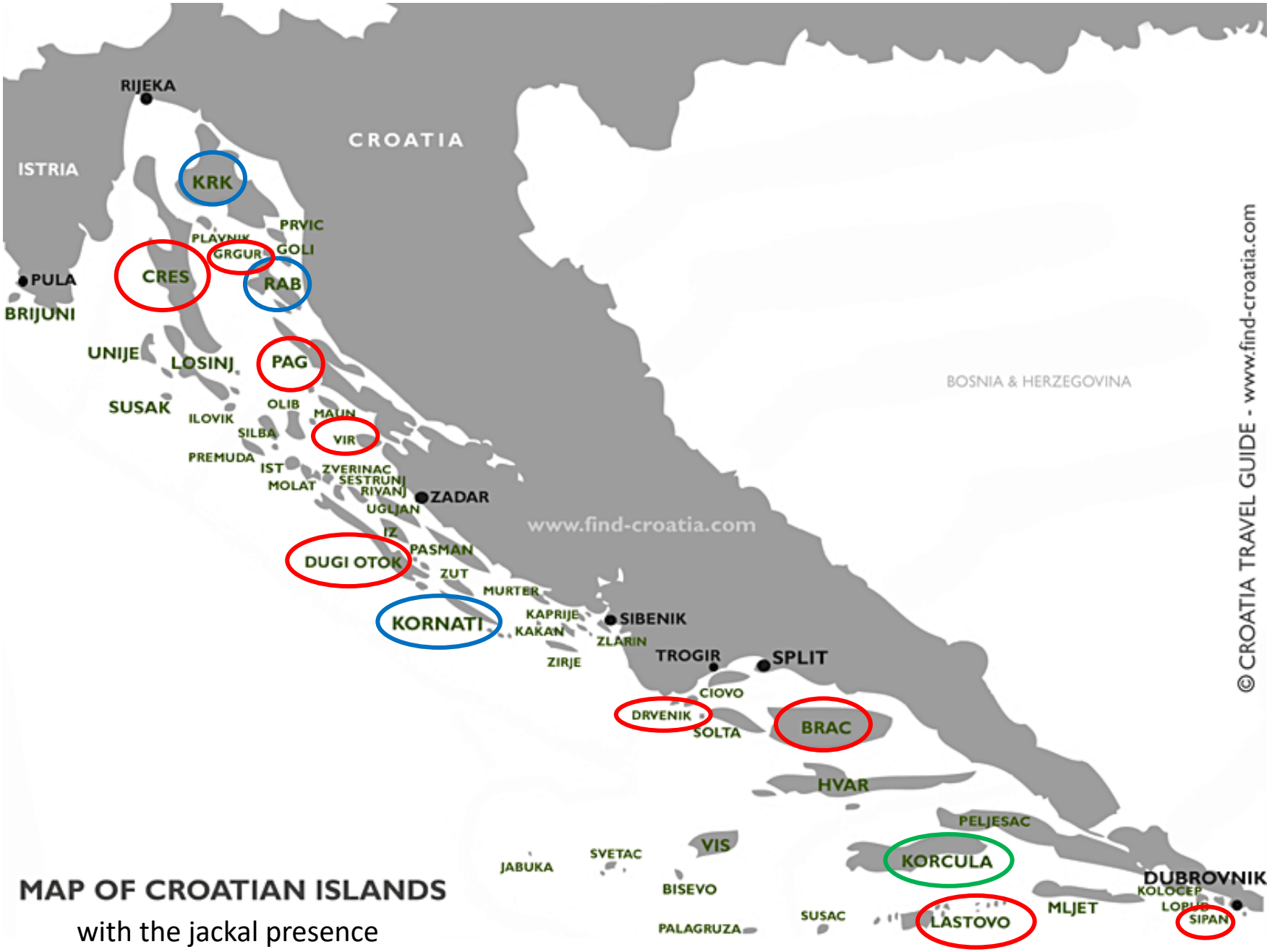
Fact 3: High dispersal potential



Connectivity and gene flow between Pannonian-Balkan and Adriatic populations

Stronen A.V., Konec M., Boljte B., Bošković I., Gačić D., Galov A., Heltai M., Jelenčič M., Kljun F., Kos I., Kovačič T., Lanszki J., Pintur K., Pokorny B., Skrbinšek T., Suchentrunk F., Szabó L., Šprem N., Tomljanović K., Potočnik H., 2021. **Population genetic structure in a rapidly expanding mesocarnivore: golden jackals in the Dinaric-Pannonian region**. *Global Ecology and Conservation*, 28: e01707, str. 1-11.

Fact 4: Ability to colonize also remote island by swimming



MAP OF CROATIAN ISLANDS

with the jackal presence

Fact 5: Hybridization and introgression of dog‘s genes

Galov et al. (2015)

Fact 6: Habituation to people, presence in (sub)urban areas

Jackals on Pelješac Peninsula, Croatia
(photo credits: Baldo Mirković 2017)

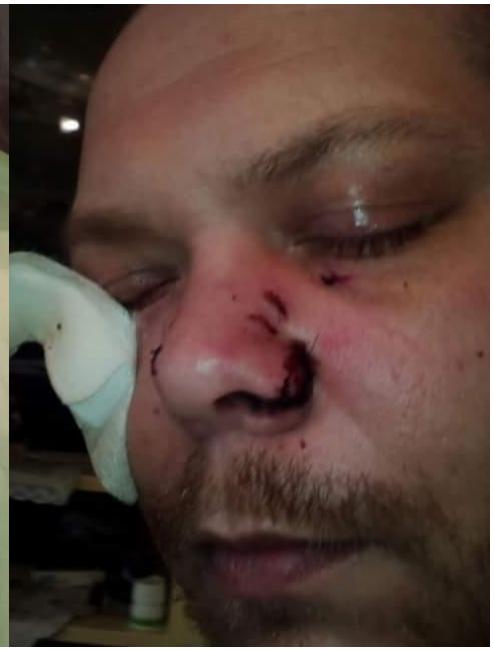
Fact 7: More frequent attacks on livestock

Fact 8: Direct human-jackal conflicts…

Acta Clin Croat 2016; 55:151-155 Review
doi: 10.20471/acc.2016.55.01.20

THE INCIDENCE OF JACKAL BITES AND INJURIES IN THE ZAGREB ANTI RABIES CLINIC DURING THE 1995-2014 PERIOD

Radovan Vodopija[1], Aleksandar Racz[2] and Đana Pahor[3]



… A STRONG NEED FOR POPULATION CONTROL ➔ Active management

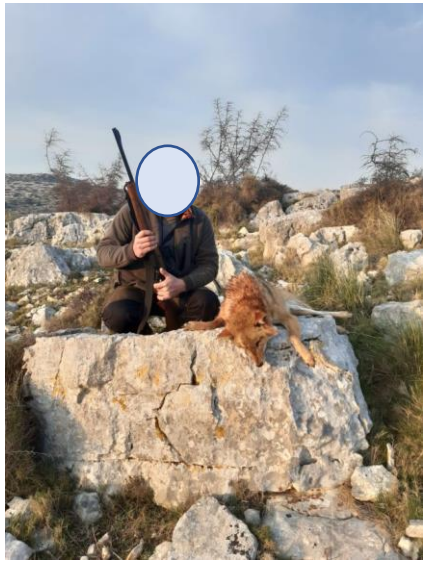
Country	Status
Albania	Protected species
Austria	Game species (but only in some regions)
Belarus	Without status, nonprotected
Bulgaria	Game species
Bosna and Herzegovina	Game species
Czech Republic	Protected species
Montenegro	Game species
Denmark	Protected species
Estonia	Game species
Finland	Not defined[1]
France	Not defined[1]
Greece	Without status, nonprotected
Croatia	Game species
Italy	Protected species
Latvia	Game species
Lichtenstein	Protected species
Lithuania	Game species
Hungary	Game species
Moldova	Game species
Germany	Protected species
Netherland	Protected species
Poland	Game species (since 2017, huntable since 2019)
Romania	Game species
Russia	Game species
North Macedonia	Protected species
Slovakia	Game species
Slovenia	Game species (since 2014, huntable since 2020)
Serbia	Game species
Switzerland	Protected species
Turkey	Game species
Ukraine	Game species

Status of golden jackal in European countries, in 2019 (review in Potočnik et al. 2019)

JACKAL POPULATION MANAGEMENT in CROATIA

- **<u>Jackal hunting is allowed all year around</u>** ➔ hunting is banned for pregnant females or when they lead cubs
- Night vision devices are allowed
- In last years ➔ **<u>the state paid 600-800 HRK (approx. 100 EUR) for each jackal shot</u>**

History of jackal (hunting) on Croatian islands



RAB ISLAND:

- **First record in 2006**
- **Three populistic hypotheses about the origin** ➔ all of them based on speculating about introductions ➔
- By hunters, foresters or NGOs (☺)

KRK ISLAND:

- **First record in 2015** ➔ 3 individuals shot
- In 2019/20 ➔ 20 harvested jackals
- Since 2019 ➔ **monetary award for hunters provided by municipality** ➔ 15,000 HRK (2,000 EUR) per head
- **Award also for road-killed jackal** ➔ 4,500 HRK (600 EUR)

KORNATI ISLANDS:

- **First record in 2020** ➔ predation on sheep ➔ like at all other islands
- **Although being National Park** ➔ **hunting is now allowed** ➔ 15 were shot in 2022
- Also albino jackal ➔ or probably hybrid?

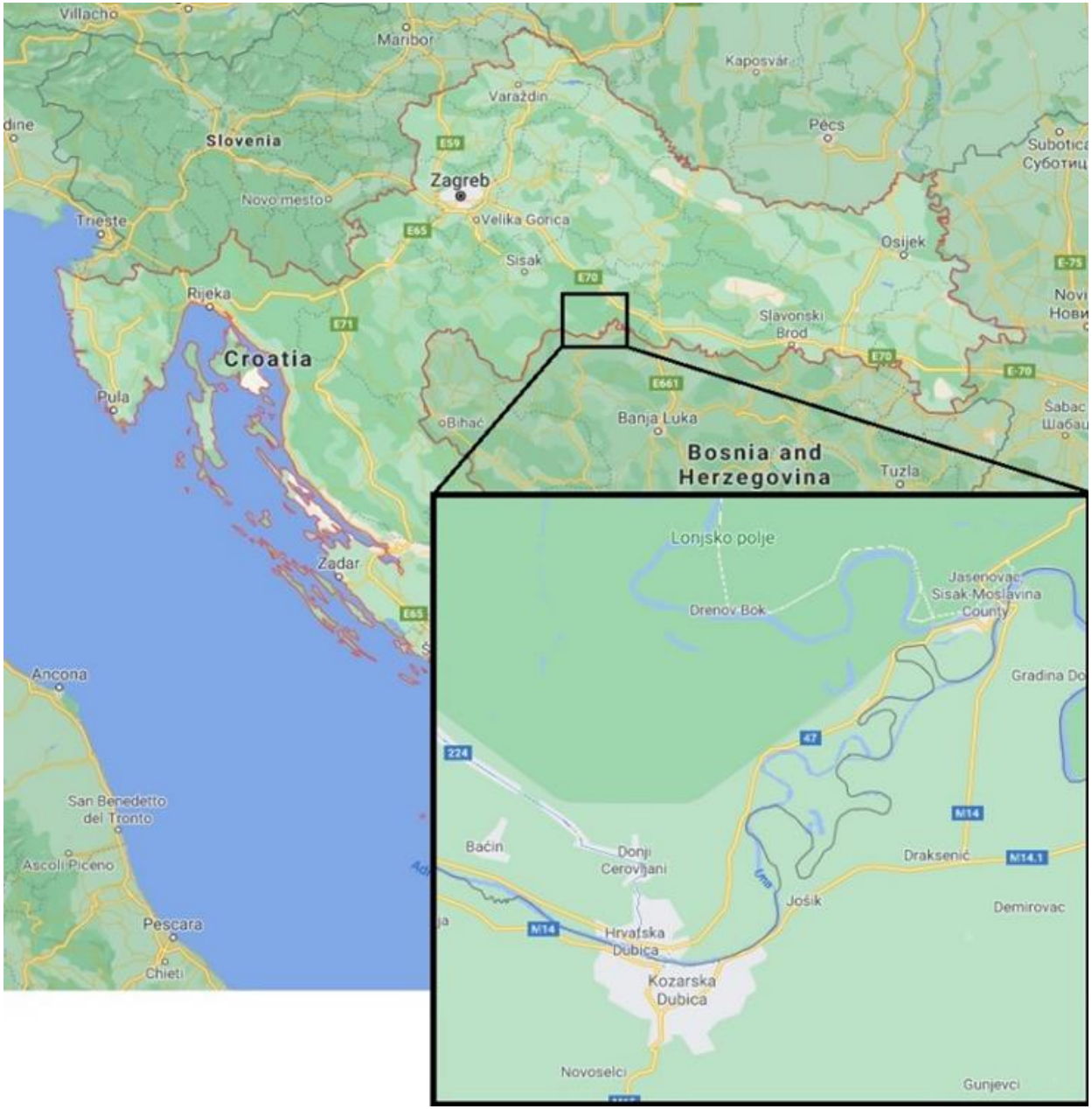
Objectives of this preliminary study ➔ to determine:

- the best hunting method
- hunting effort
- the effect of habitat type
- the effect of weather conditions and moon phase on hunting success

Preliminary study ➔ but, emphasising the importance of hunters as well-skilled CITIZEN SCIENTIST!

Material and methods

- **Study area** ➔ 2,000 ha large model hunting ground in central Croatia
- Along Sava River ➔ (45°16’15”N, 16°54’41”E)
- **Interest and collaboration of individual hunter(s)**
- Croatian hunting records (https://epoljoprivreda.mps.hr/)
- Habitat map of the Republic of Croatia (https://www.bioportal.hr/node/15)
- QGIS 3.4

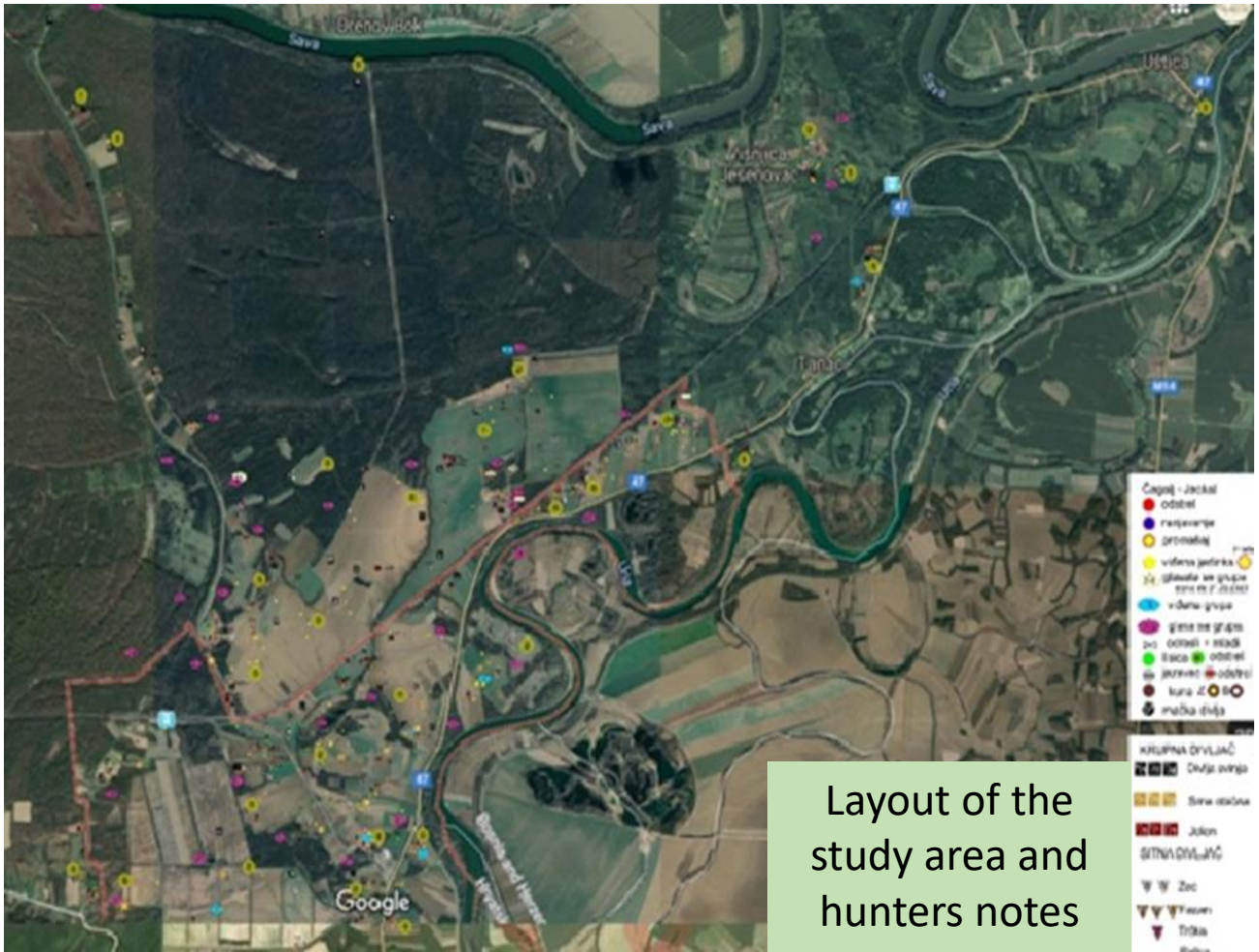


Data collection

- During 2020/2021 ➔ 52 hunting days/nights
- Acoustic method ➔ thermal scope ➔ shot with 222 Remington

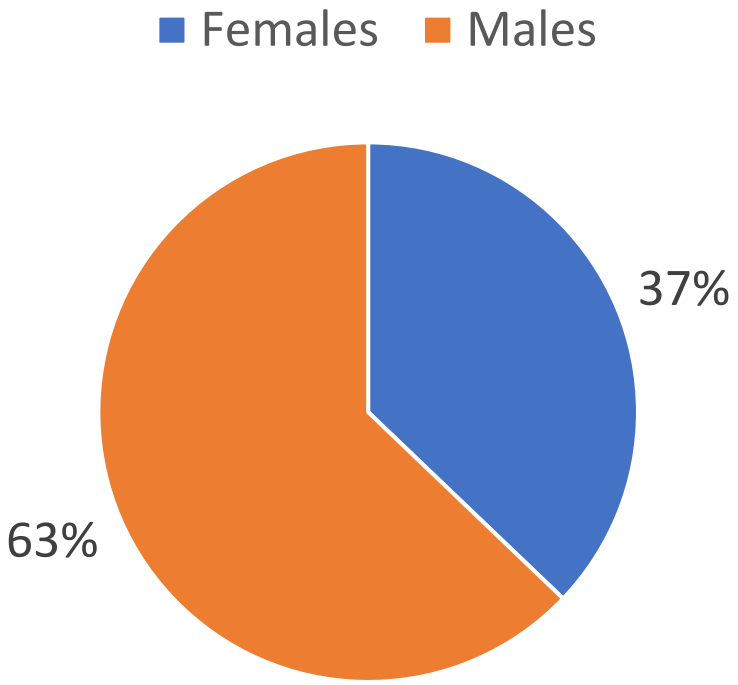
Descriptive results

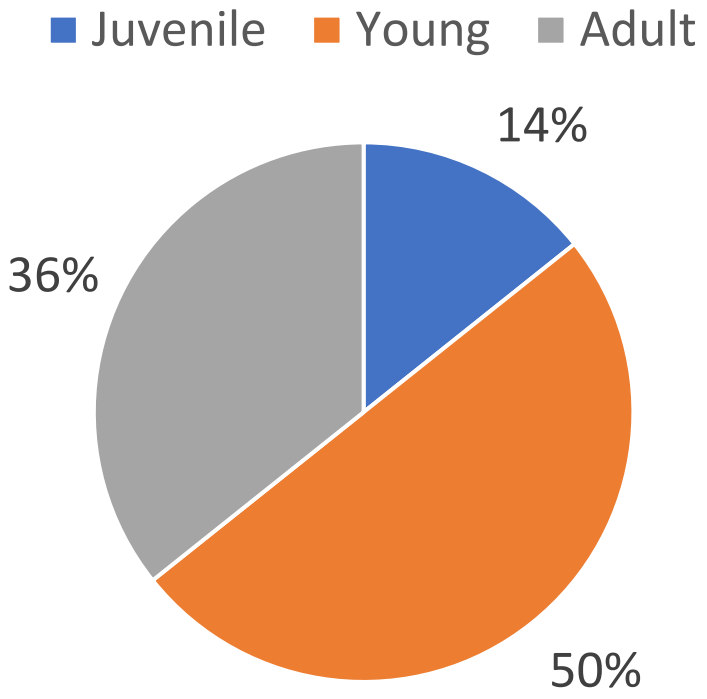
- 191 jackals were sighted
- 70 jackals were culled
- 14 were wounded
- 56 were missed



Layout of the study area and hunters notes

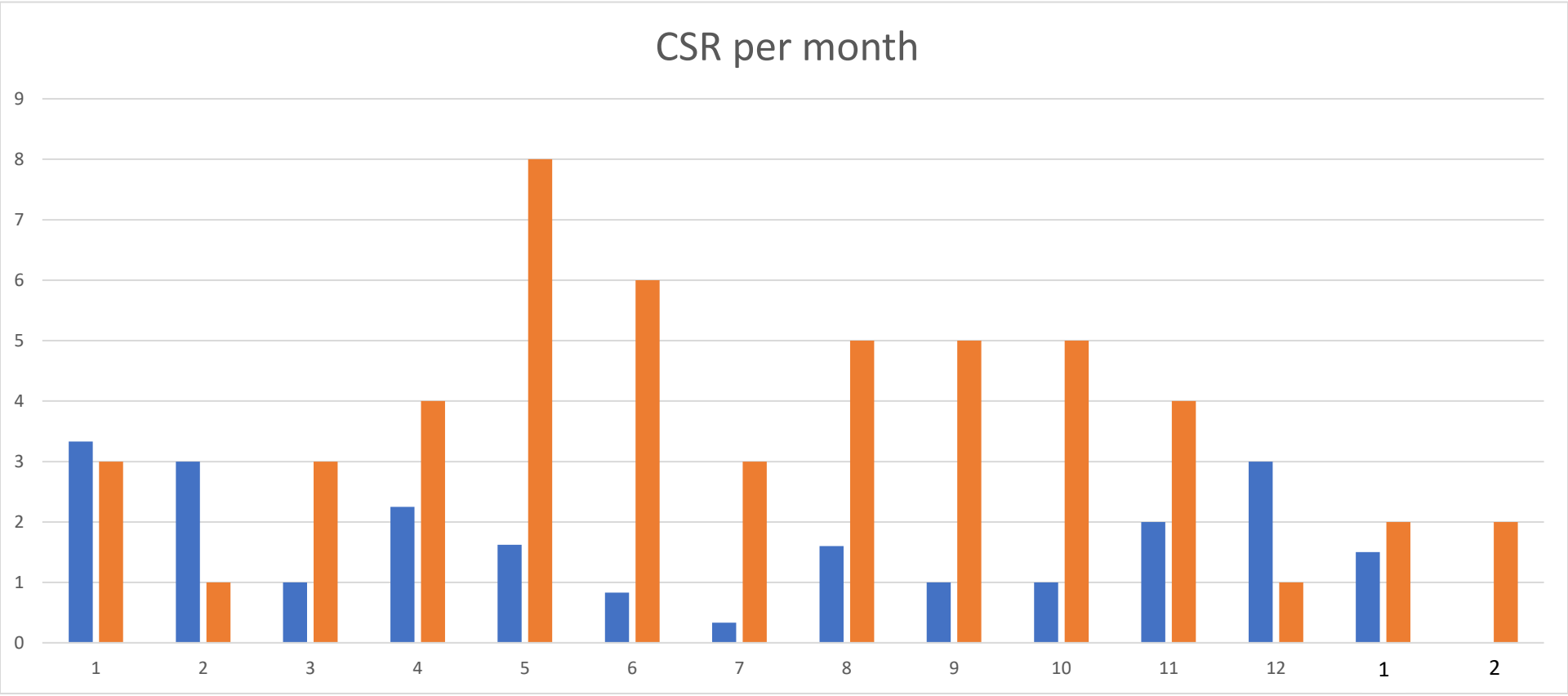
Sex and age categories of culled individuals





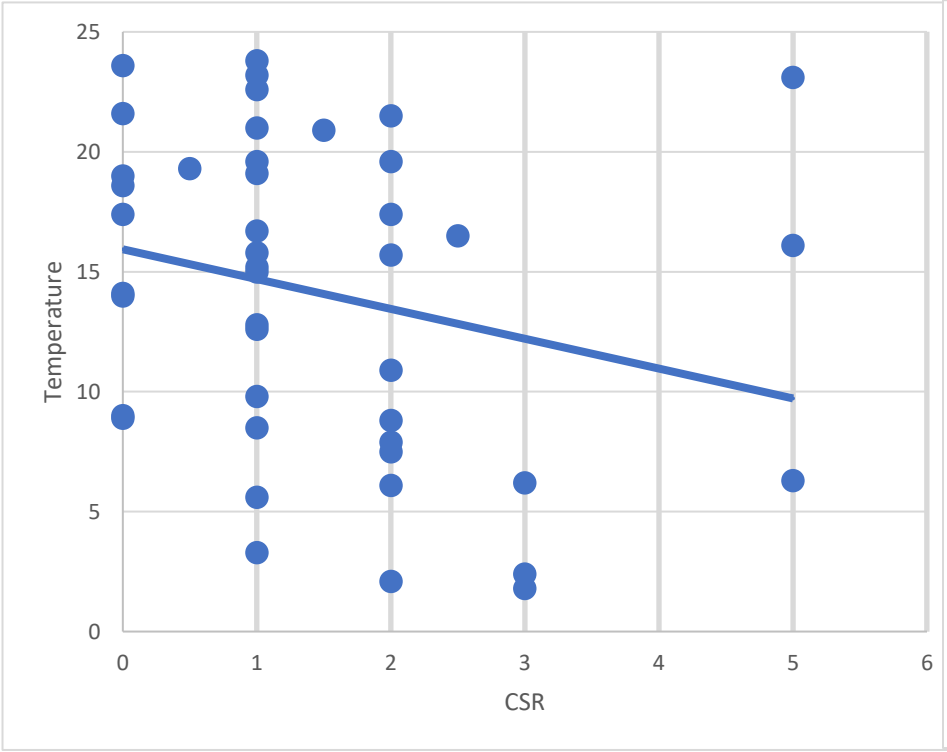
Hunting efficiency per day

Average culling success rate (CSR) = 1.4 shot jackals/hunting day



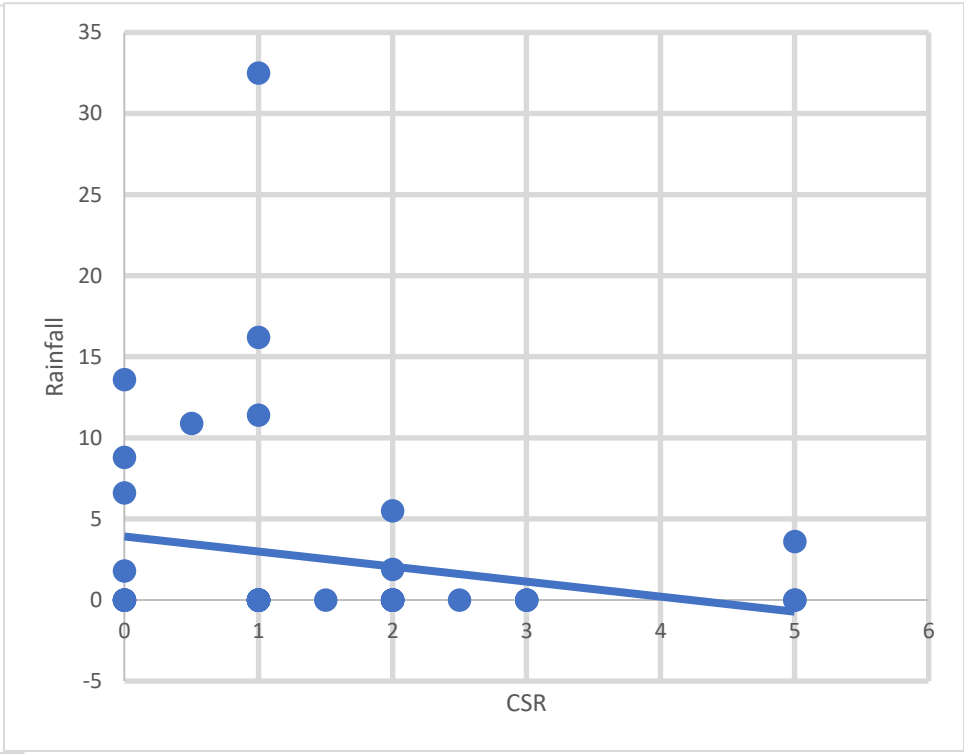
The influence of weather condition

Temperature



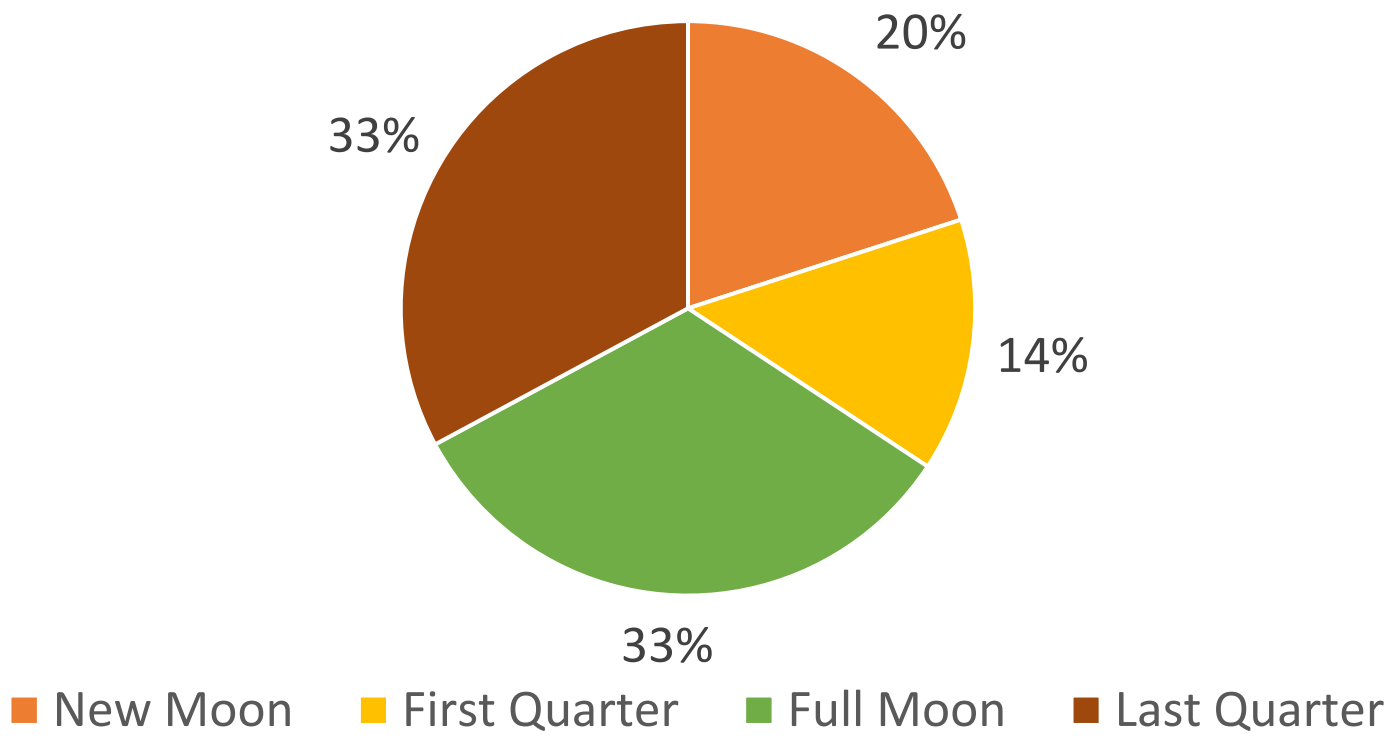
y = -1.2415x + 15.931
R^2 = 0.0597

Rainfall



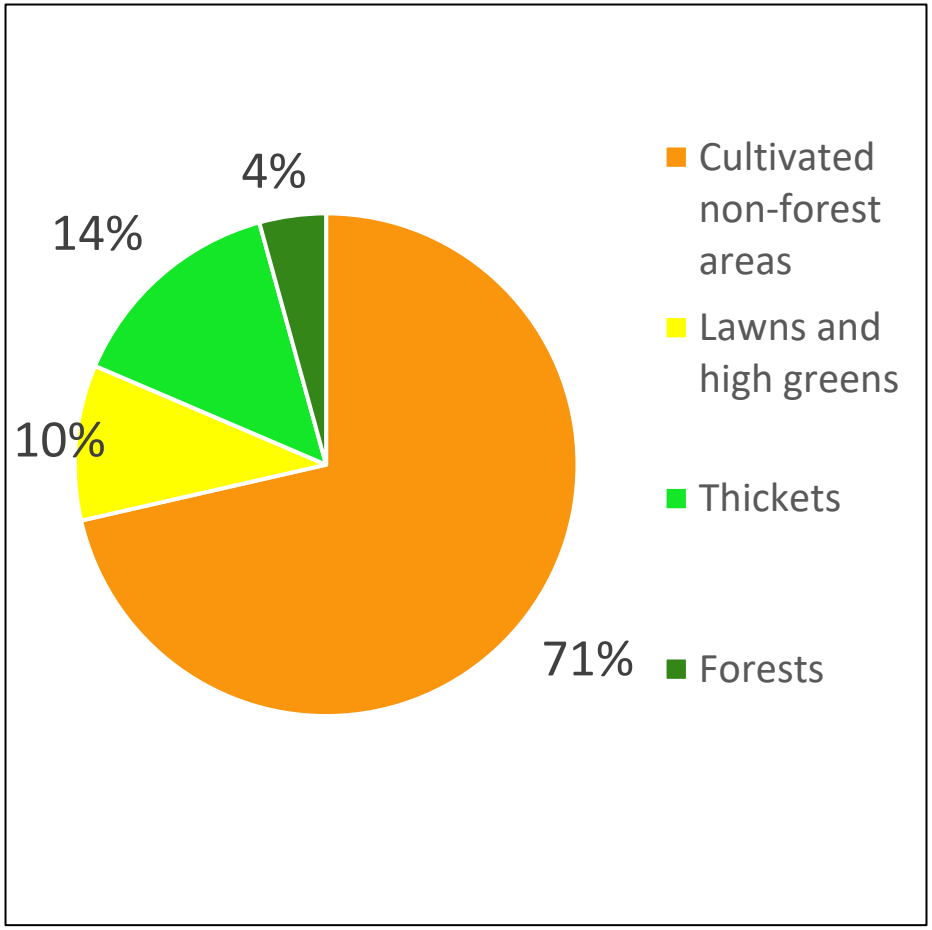
y = -0.9281x + 3.9241
R^2 = 0.038

The influence of moon phase

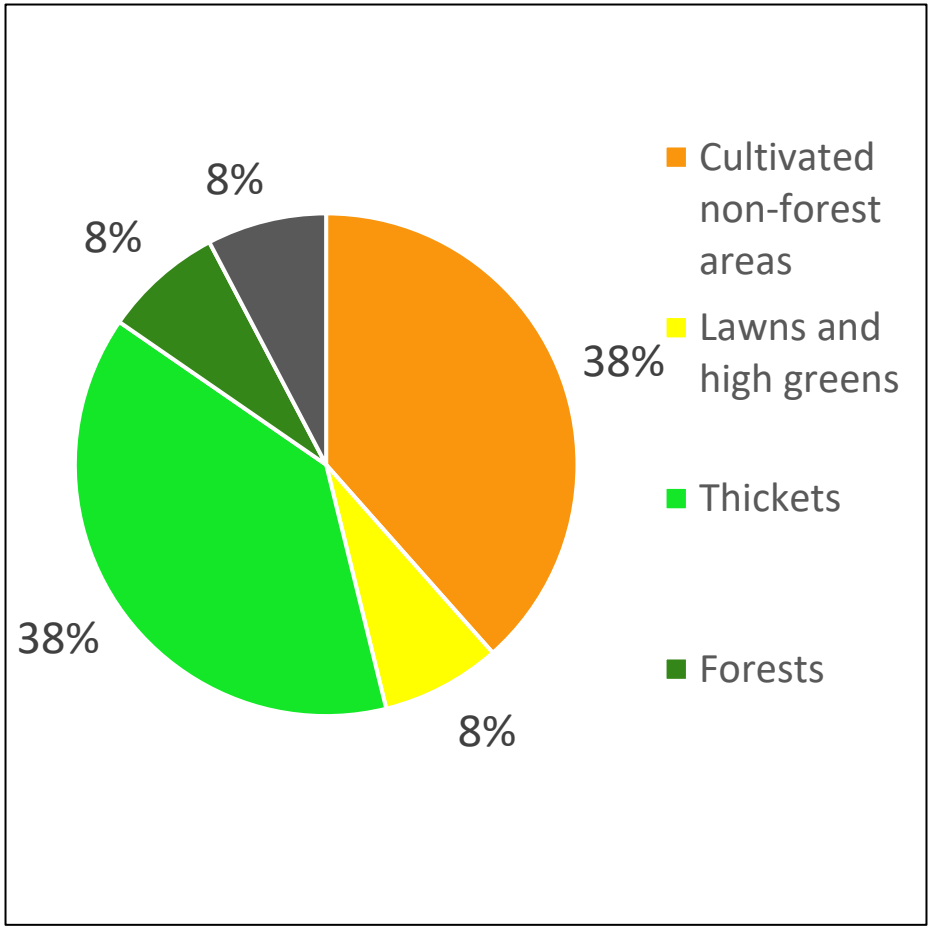


The proportion of culled jackals per moon phase

The shot effectiveness per habitat „type“



Culled individuals



Wounded individuals

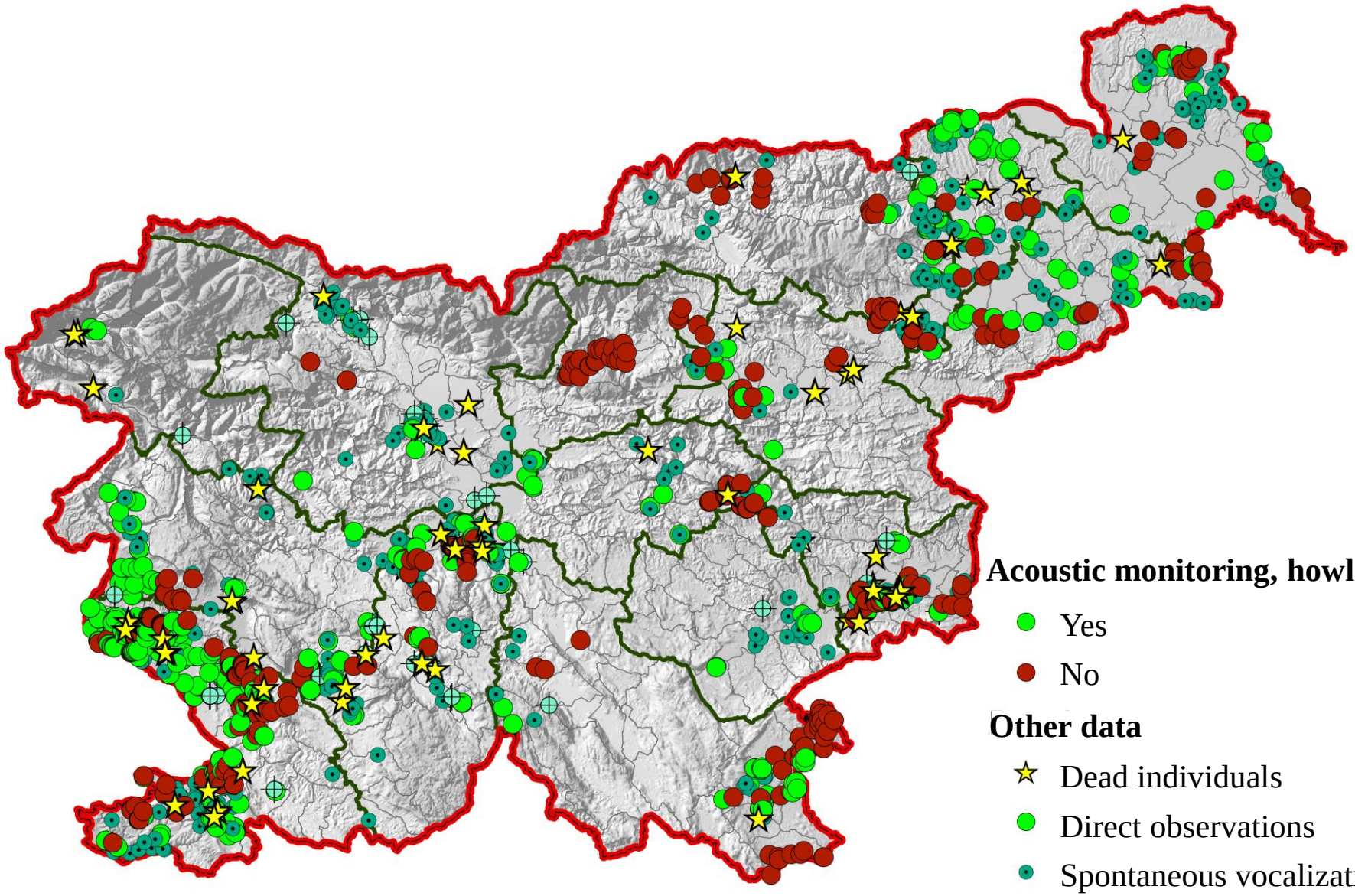
Summary about this preliminary Croatian study

- **Using thermal scopes in combination with the acoustic method** ➔ the best option for efficient jackal hunting
- Acoustic method ➔ imitation of the sound of a hare, a bird or another jackal
- **Average culling success rate** ➔ 1.4 jackals/hunting day
- Young males were culled the most
- **Open, cultivated areas are the best place for successful hunting**
- **Winter months are better for successful hunting**
- Temperature, rainfall, and moon phase ➔ without significant effect on hunting effectiveness

A case study with a very preliminary results ➔ however, it indicates a great potential of HUNTERS as very important CITIZEN SCIENTISTS

MONITORING of GOLDEN JACKAL in SLOVENIA: an important step from passive to active collection of data

GOLDEN JACKAL in Slovenia: monitoring 2016-2019 (Potočnik et al. 2019)



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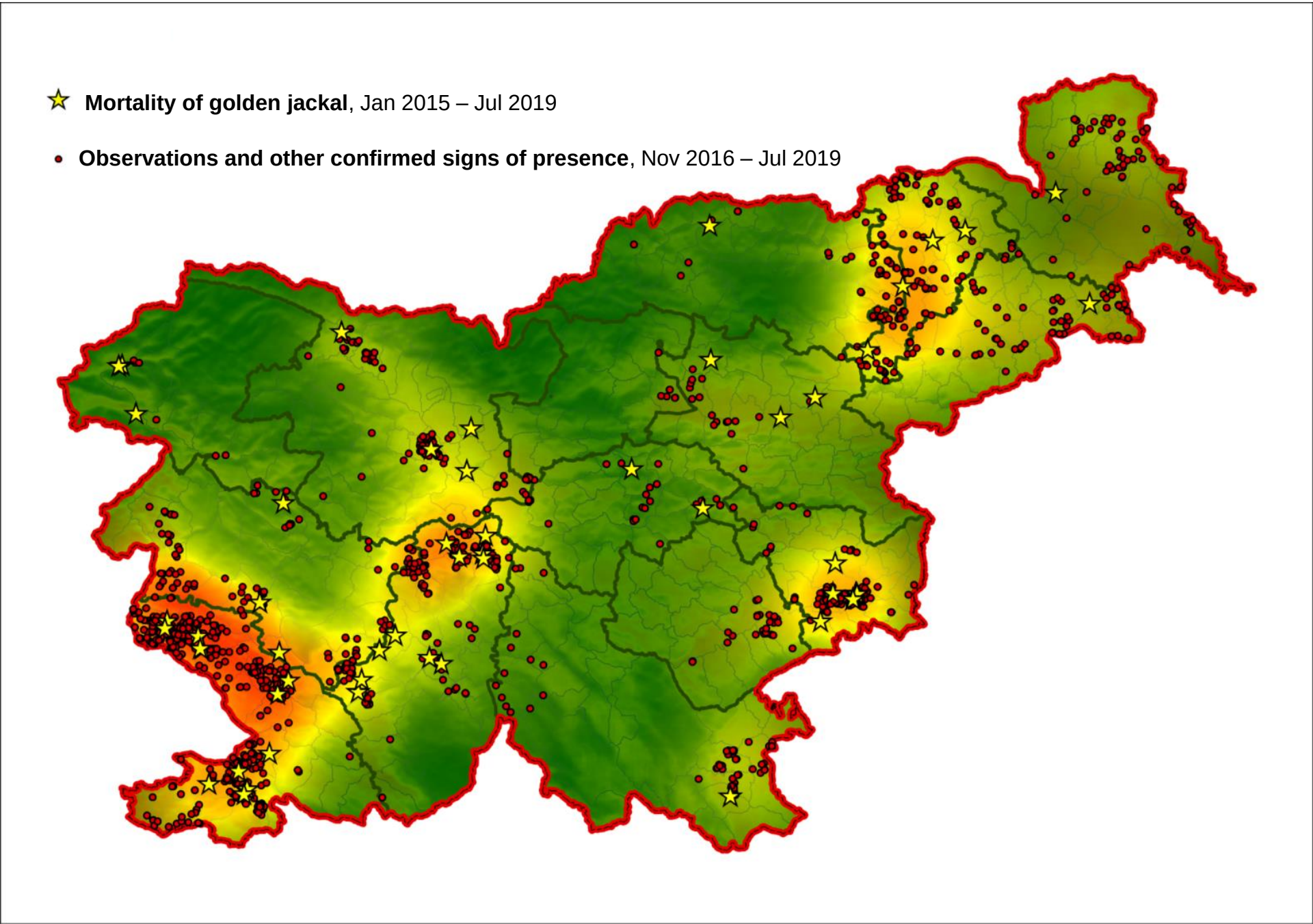
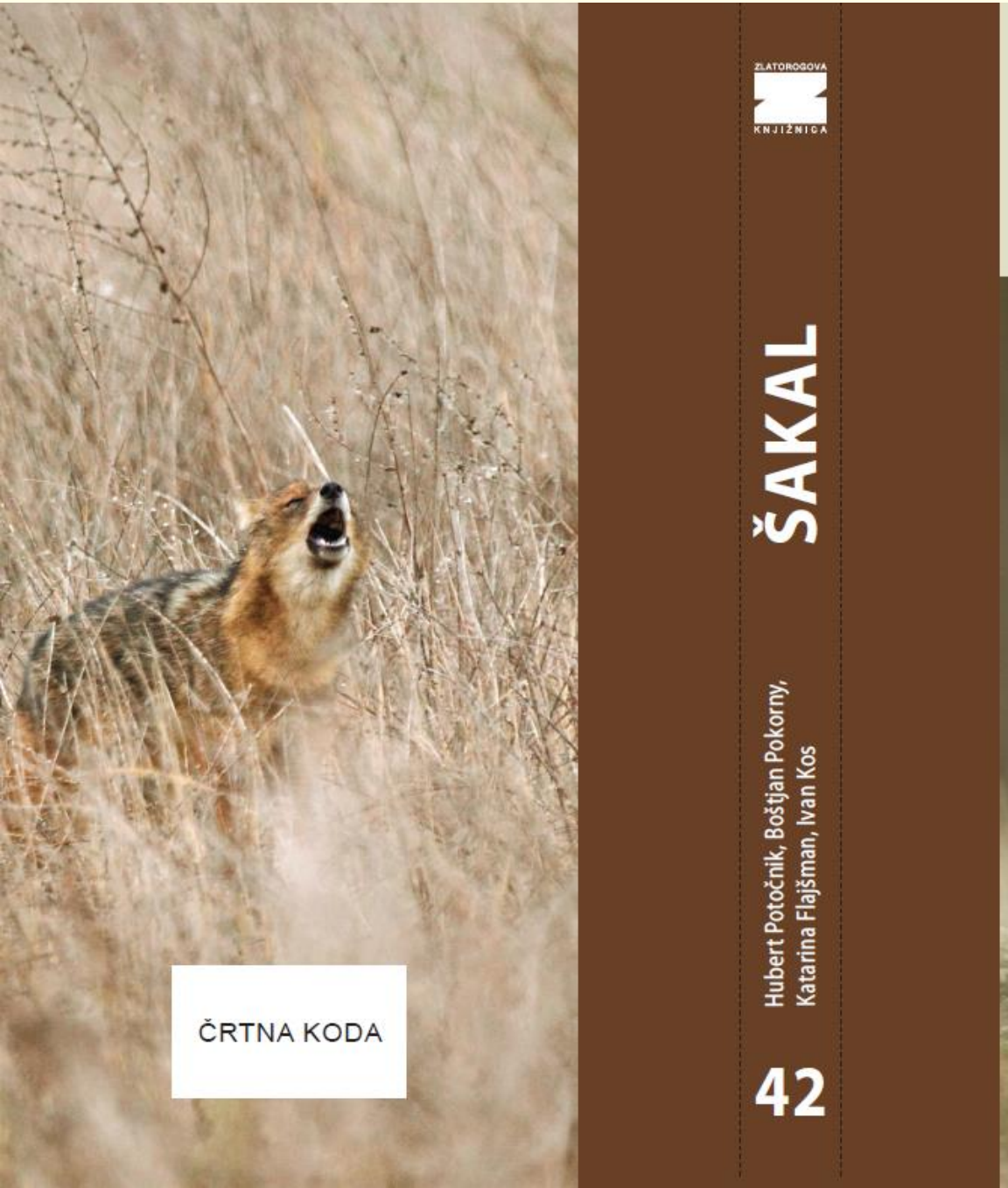


Our work has been implemented in population management…



ZLATOROGOVA KNJIŽNICA

ŠAKAL

Hubert Potočnik, Boštjan Pokorny, Katarina Flajšman, Ivan Kos

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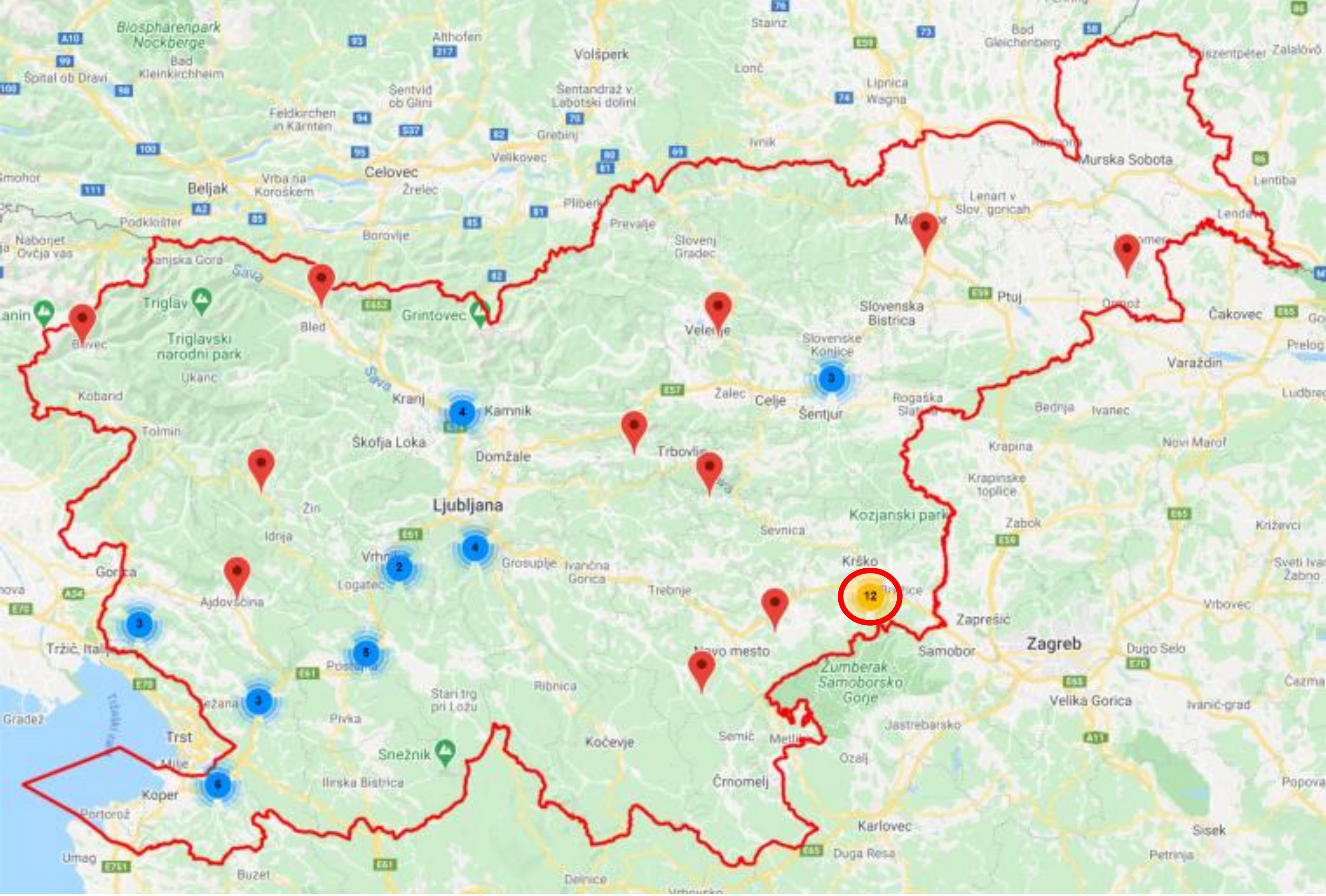
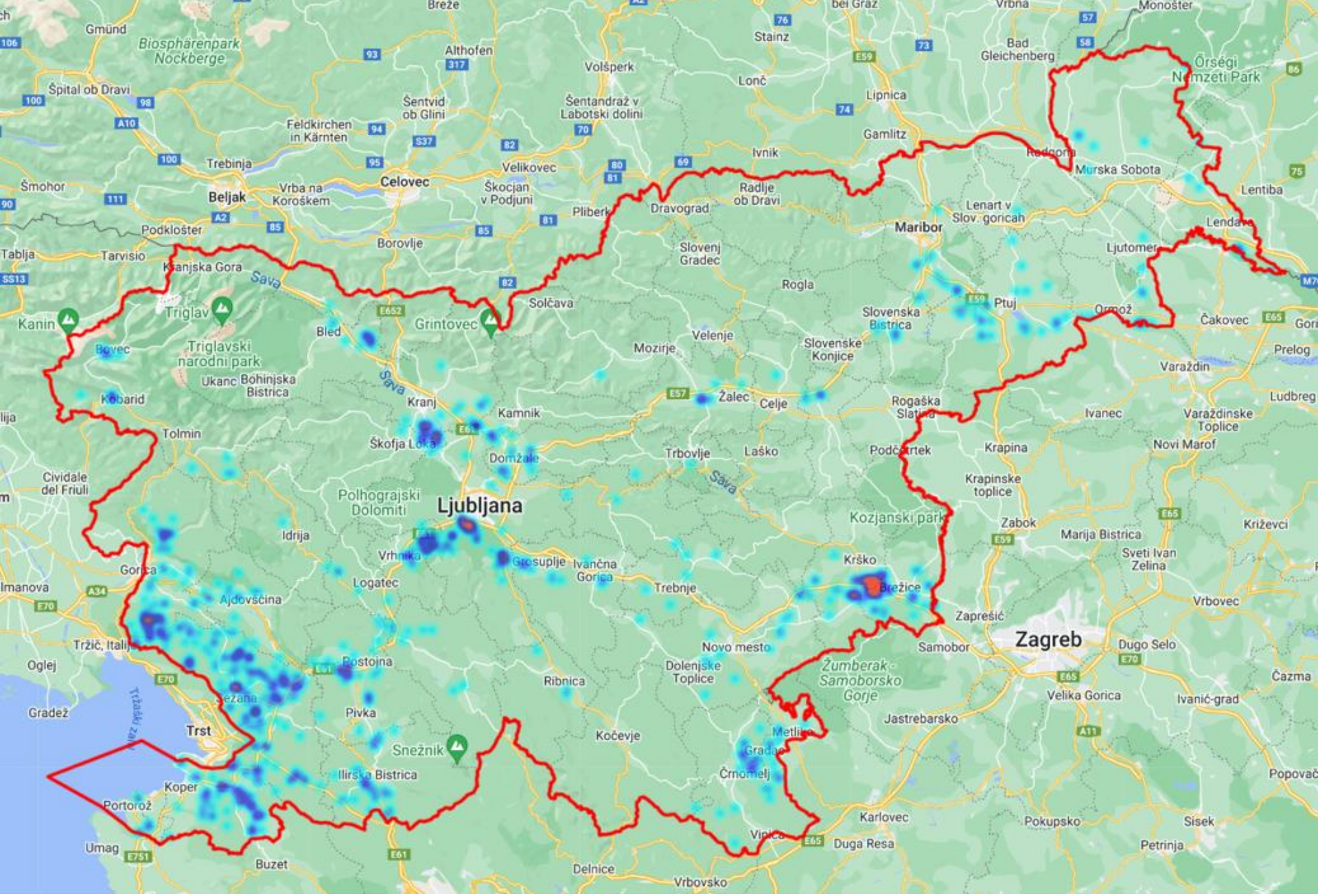
ŠAKAL

Hubert Potočnik, Boštjan Pokorny, Katarina Flajšman, Ivan Kos



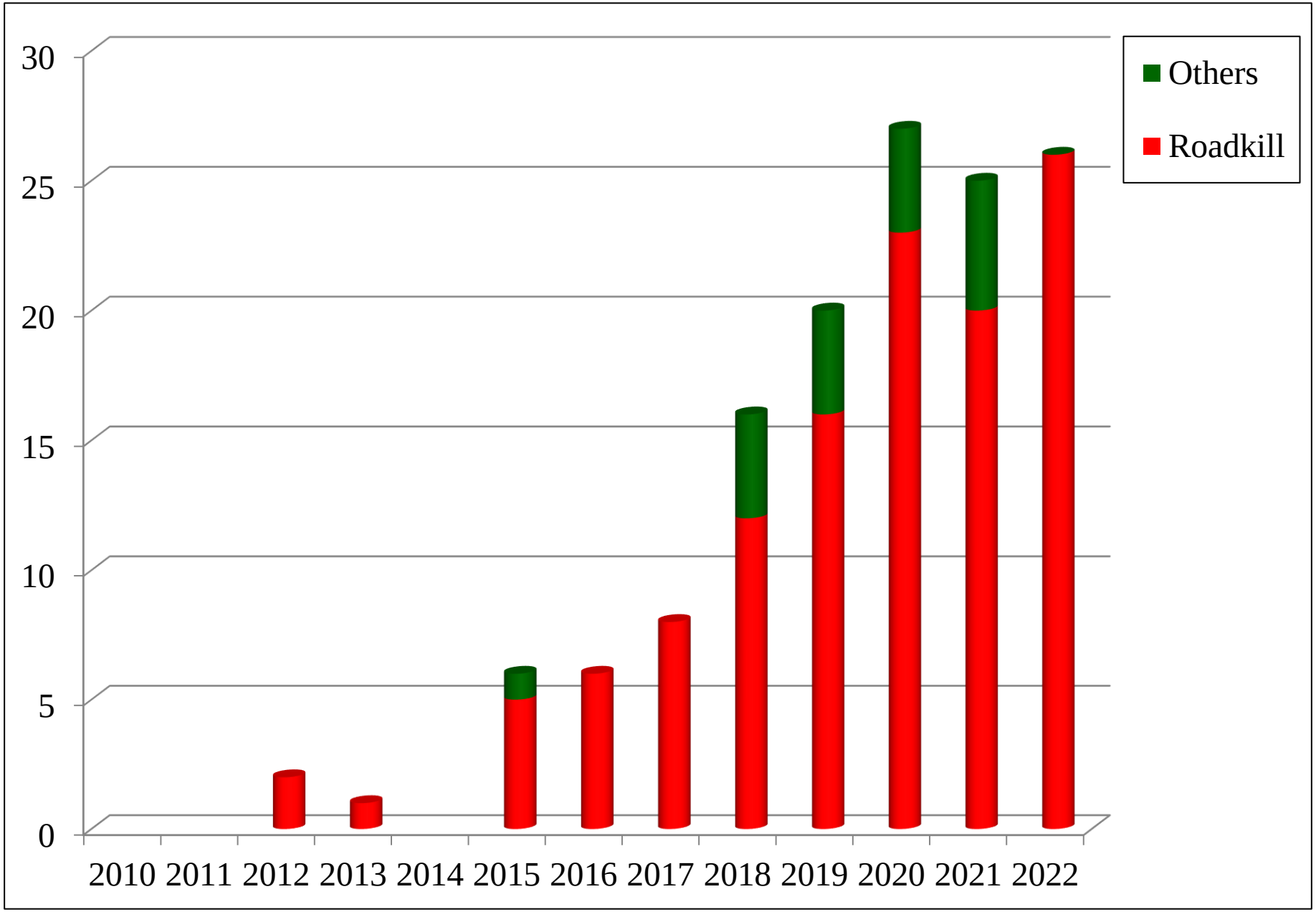
Registered mortality of GOLDEN JACKAL in Slovenia

1 Jan 2015 – 31 Dec 2019 (Oslis 2022)

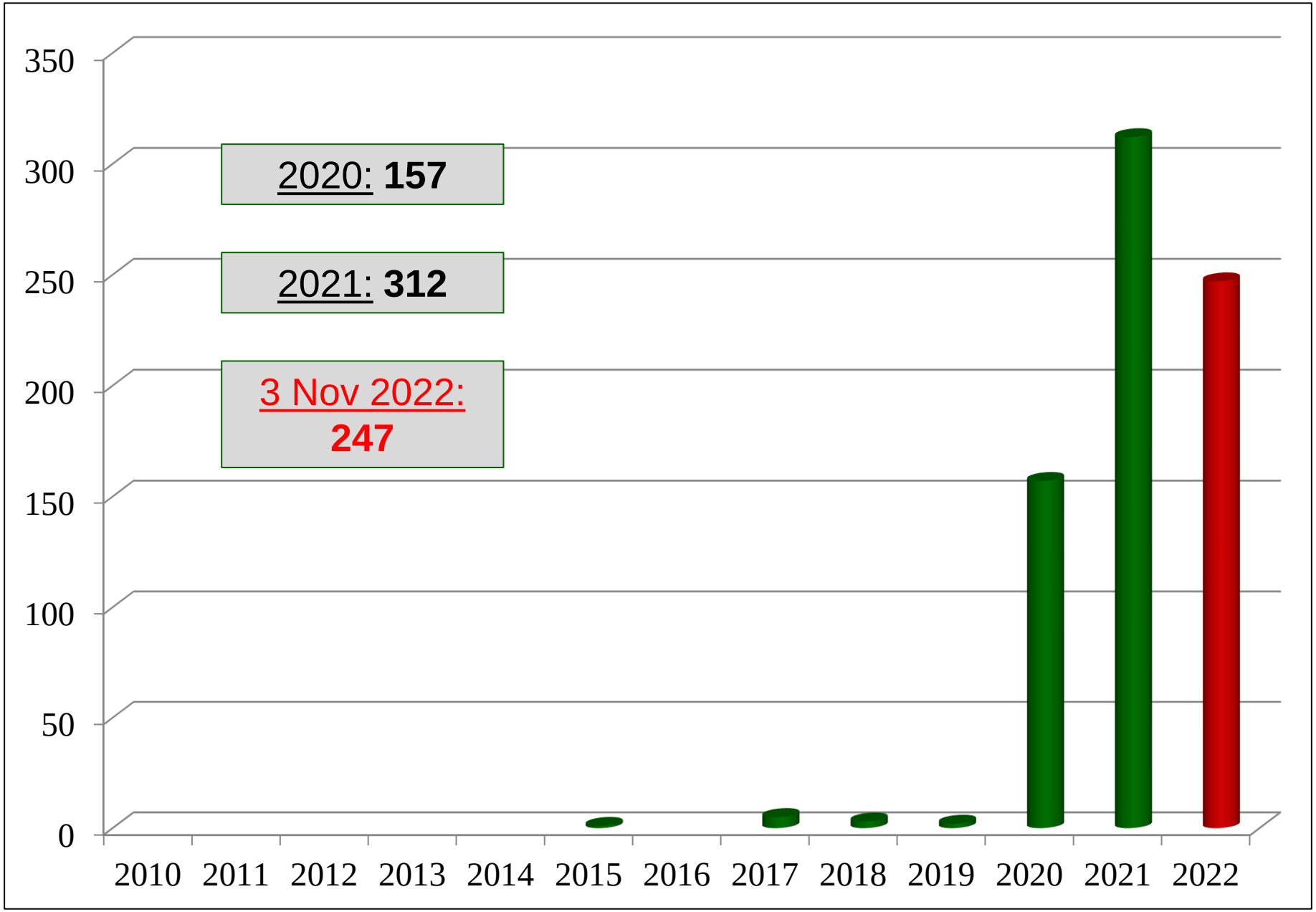


Registered mortality of GOLDEN JACKAL in Slovenia

1 Jan 2020 – 3 Nov 2022 (Oslis 2022)

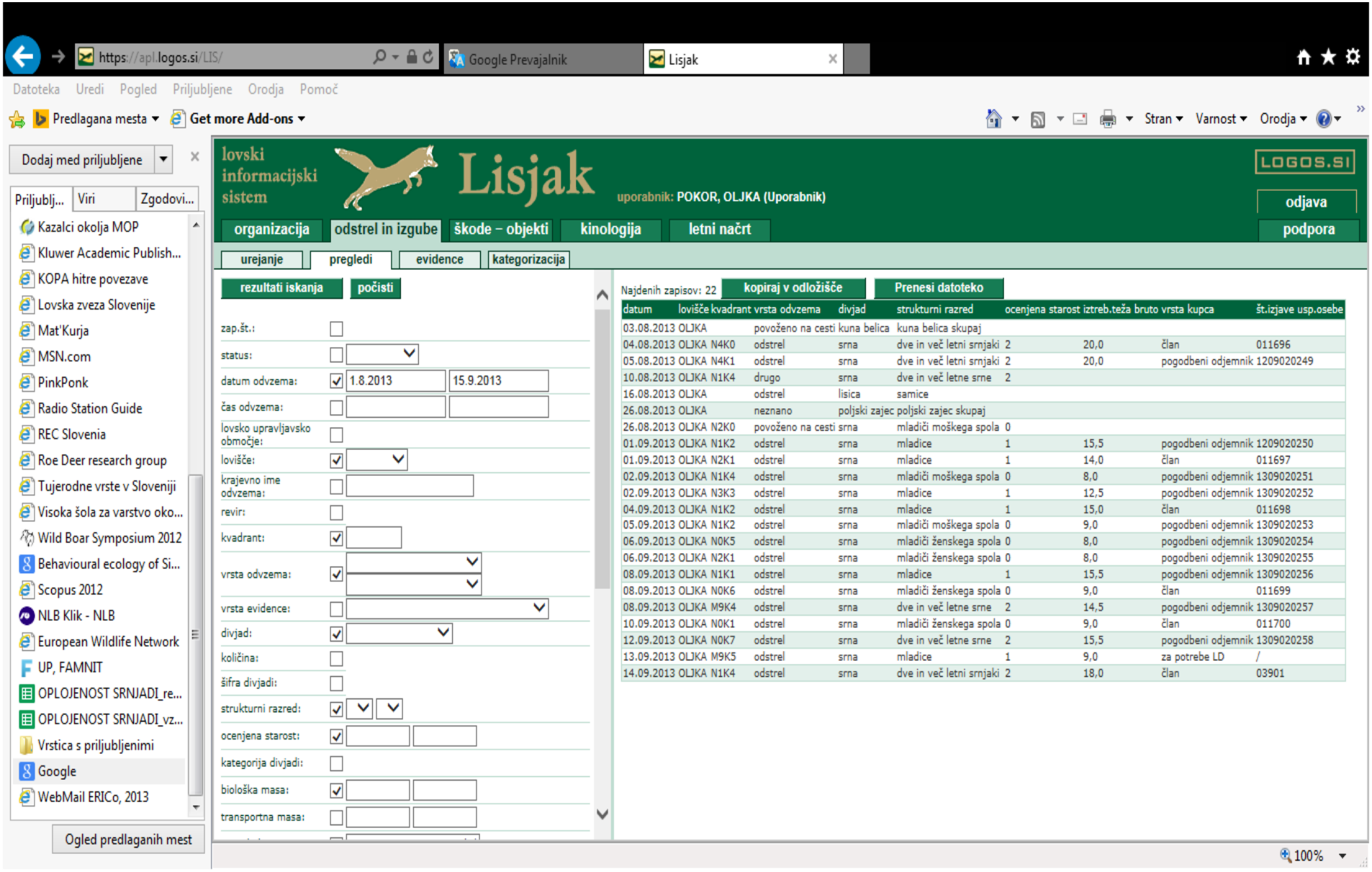


Roadkill and other registered losses of GOLDEN JACKAL in Slovenia 2010-2022 *(Oslis 2022).*



Harvest of GOLDEN JACKAL in Slovenia, 2010-2022 *(Oslis 2022).*

ORIGINAL SLOVENE ON-LINE AVAILABLE DATABASIS (Lisjak)



ON-LINE HUNTING INFORMATION SYSTEM

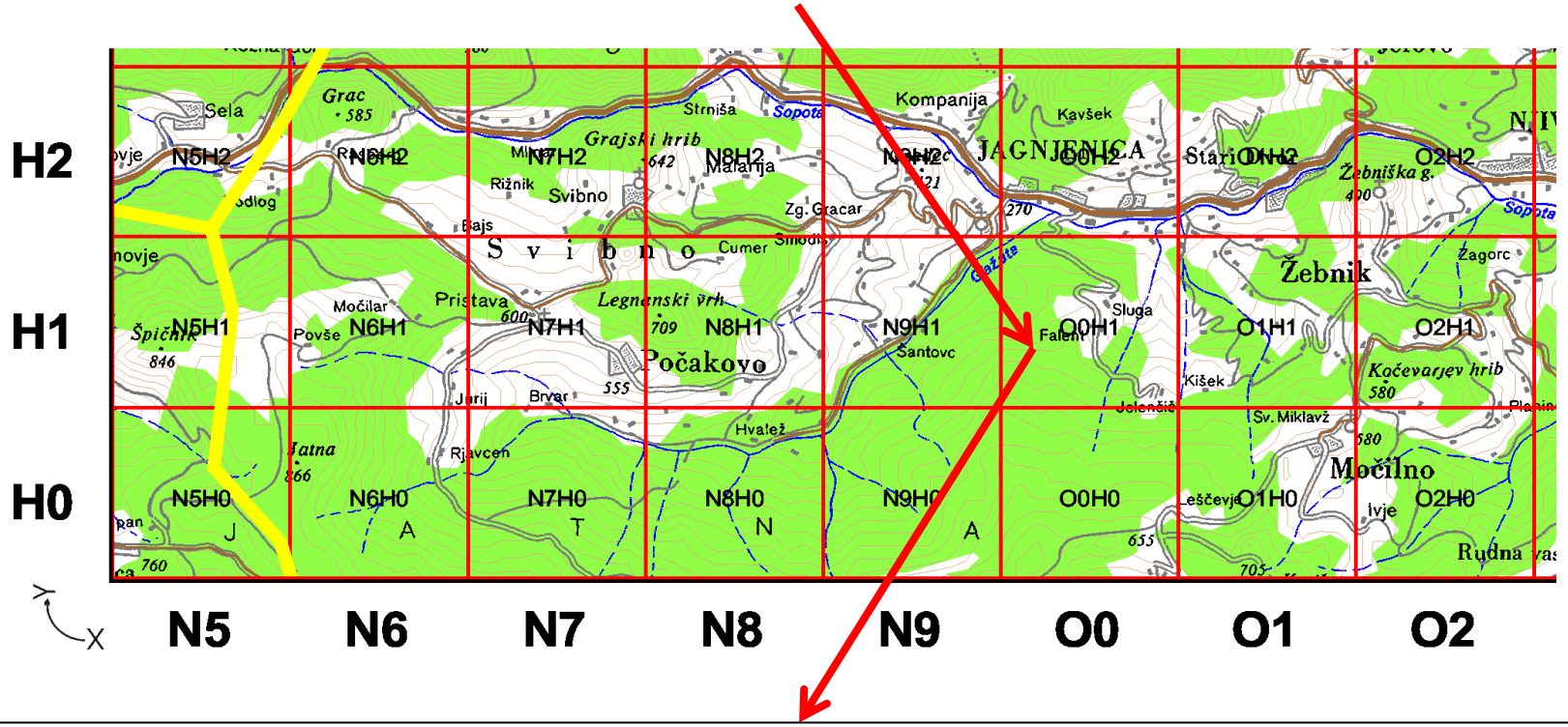
- **Developed by the Slovene Hunters Association** → yearly budget for the system: 5,000-10,000 EUR
- **All data have to be put into the system immediately** → up to end of the month at the latest
- **Many essential data for every ungulate (and large carnivore) shot or died due to any other reasons** → species, sex, assessed age, body mass, antler mass, CIC points, health status, veterinarian number, hunter, area, and location
- Data have been available since 2006 → **>800,000 individuals at the moment**
- **On-line availability** → fantastic opportunity for the science

On-line available hunting information system provides and enables several

SPATIAL INFORMATION and ANALYSES

>800,000 individuals ➔ also geo-referenced in a very high spatial resolution!

- in 1 x 1 km grid (from 2006 to 2014)
- by exact GPS (x,y) coordinates (since 1 January 2015)



Many environmental data available: habitat structure, climate, culling density of wildlife etc.

Step Change

Science Transformation in EuroPe through Citizens involvement in HeAlth, coNservation and enerGy rEsearch

H-2020 Citizen Science project ➔ in Slovenia: WILDLIFE MONITORING in collaboration with HUNTERS

H-2020 StepChange:
MONITORING of WILDLIFE with the help of CS in Slovenia

App SRNA ➔ Monitoring and Research of the Nature with the help of App:

- **In first two months** ➔ 766 registered observation of wildlife by hunters ➔ large mammals and some bird species
- **32 registered observations of golden jackal** ➔ at 7th place considering species frequency ➔ after five ungulates and European hare
- **Much more registered observation of jackals than of other carnivores** ➔ brown bear (18), wolf (5), badger (8), wild cat (3), red fox (28) …

Photo credits: Janez Tarman

Thank you for your attention!