UNGULATES IN EUROPE:

A STORY OF SUCCESS WITH AN UNCERTAIN FUTURE

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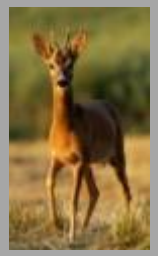
European Ungulates
and their Management in the 21st Century
EDITED BY
Marco Apollonio, Reidar Andersen and Rory Putman
CAMBRIDGE
Ungulate Management in Europe
Problems and Practices
EDITED BY
Rory Putman, Marco Apollonio and Reidar Andersen
CAMBRIDGE
Behaviour and Management of European Ungulates
edited by
Rory Putman and Marco Apollonio

21 UNGULATE SPECIES ARE FOUND IN EUROPE

Native species



Roe deer

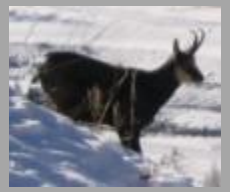
Red deer

European bison

Reindeer

Pyrenean Chamois

Moose



Alpine chamois

Alpine ibex

Wild goat

Spanish ibex

Wild boar

Exotic species

Fallow deer

Muntjac

Muskox

Mouflon

Chinese water deer

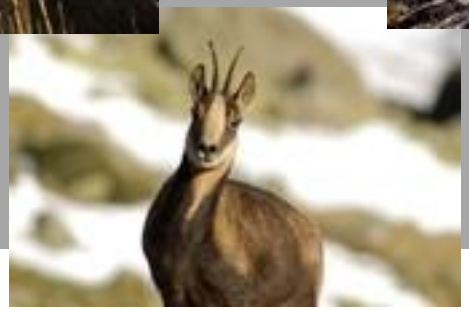
Sika deer

Axis deer

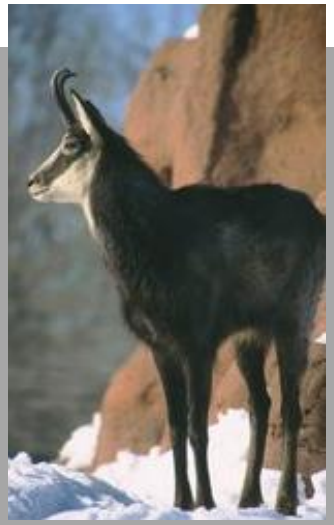
White tailed deer

Barbary sheep

Przewalski horse



NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	EW	EX



European bison was exterminated by uncontrolled poaching during and soon after the World War I

NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	< VULNERABLE >	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	EW	EX

The population was re-established from a few individuals collected from European zoological gardens and private park in 1952 in the Bialowieza Primeval Forest

SOME SUBSPECIES ARE RARE AND NEED EXPLICIT ACTIONS TO SECURE THEIR CONSERVATION

Forest reindeer

Apennine chamois

Sardinian red deer

BUT MOST SPECIES ARE WIDELY WIDESPREAD AND ABUNDANT, AND MAY REACH IN SOME AREAS VERY HIGH DENSITIES

Red deer

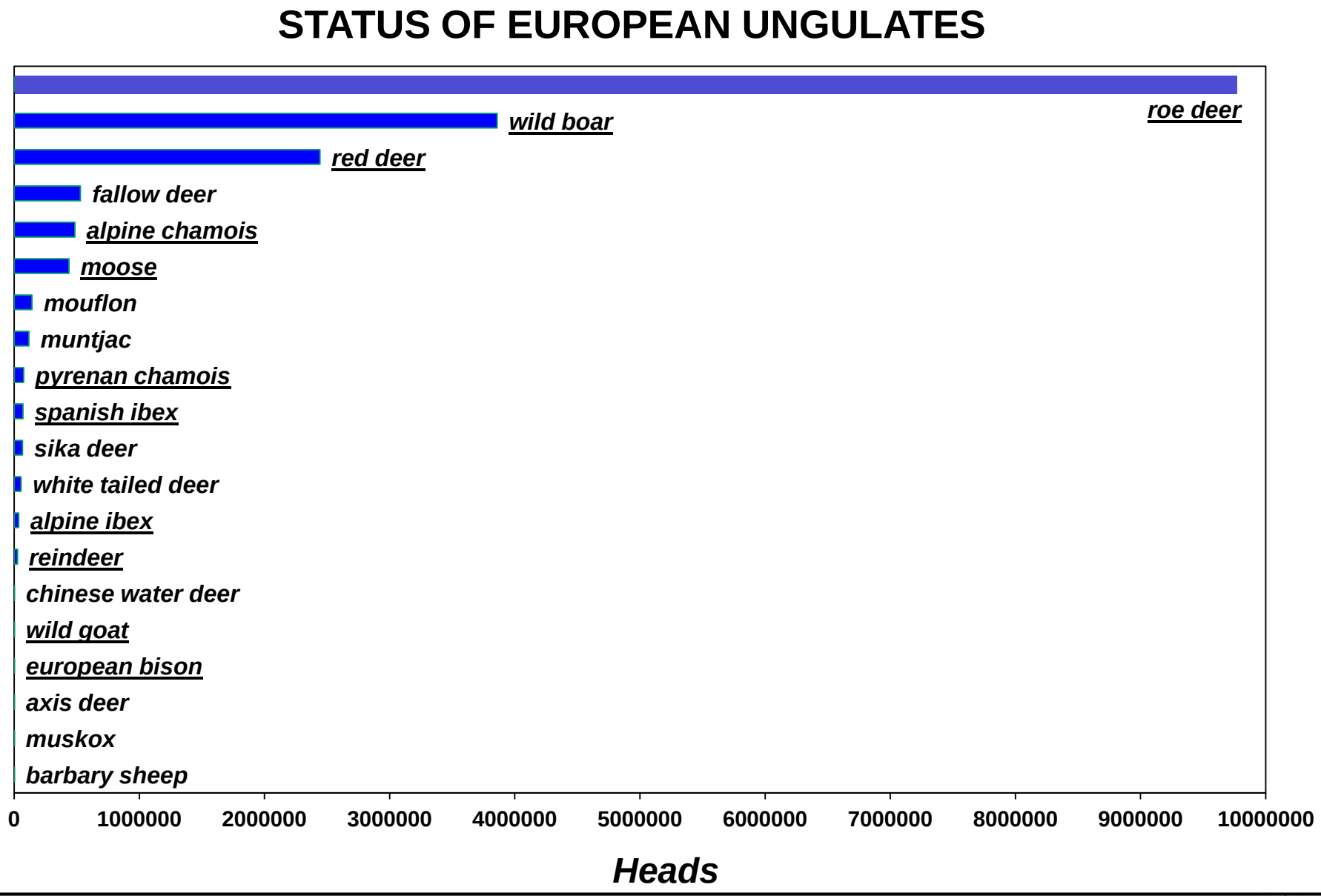
45 heads / km^2

RED DEER SUBSPECIES

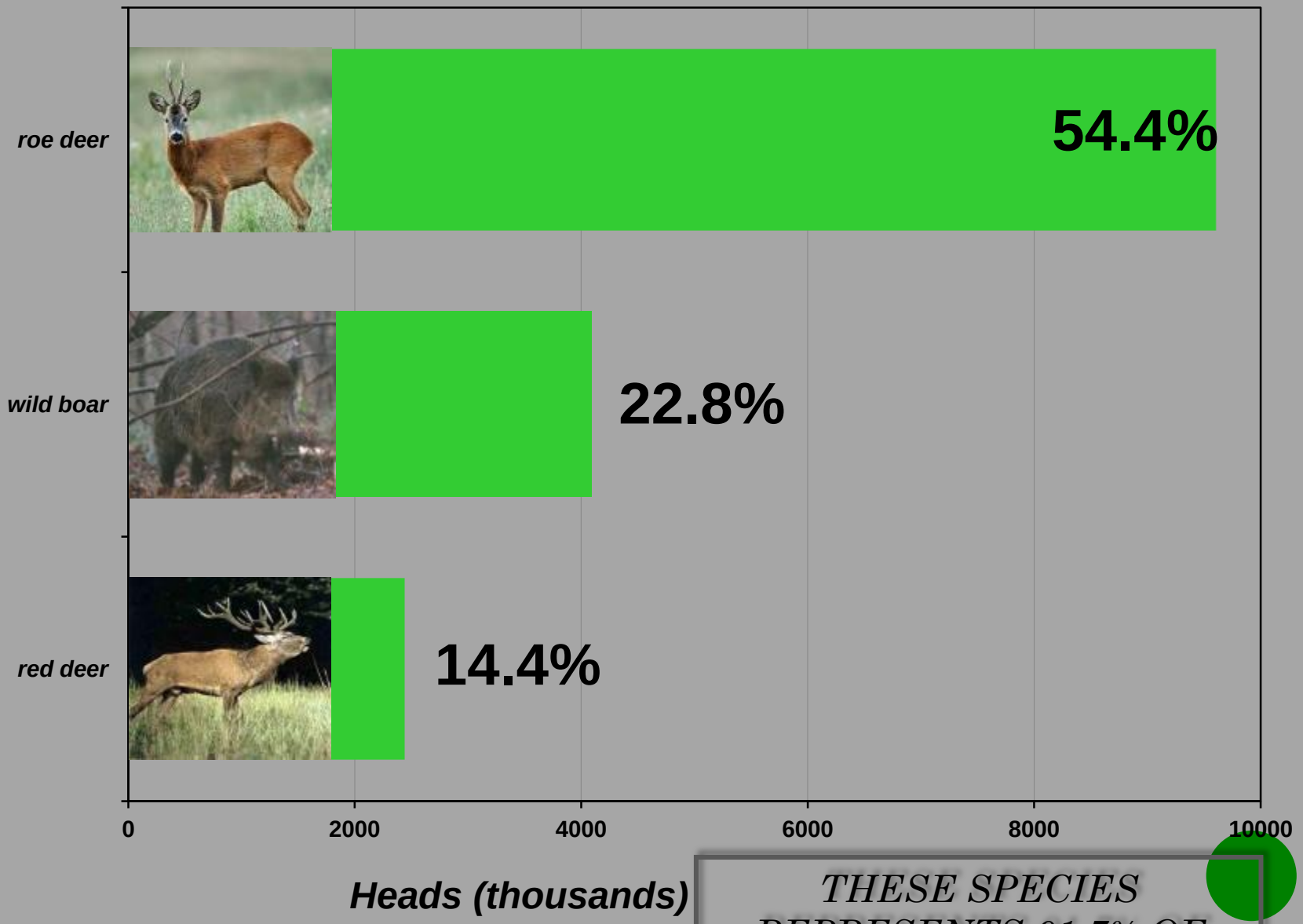
In Europe, **six subspecies** are usually listed (e.g. Dolan, 1988):

1. **Swedish red deer** (*C. e. elaphus*);
2. **Norwegian red deer** (*C. e. atlanticus*);
3. **Central European red deer** (*C. e. hippelaphus*);
4. **British red deer** (*C. e. scoticus*);
5. **Spanish red deer** (*C. e. hispanicus*)
6. **Corsican red deer (*C. e. corsicanus*).**

EUROPEAN UNGULATES AND CONSERVATION

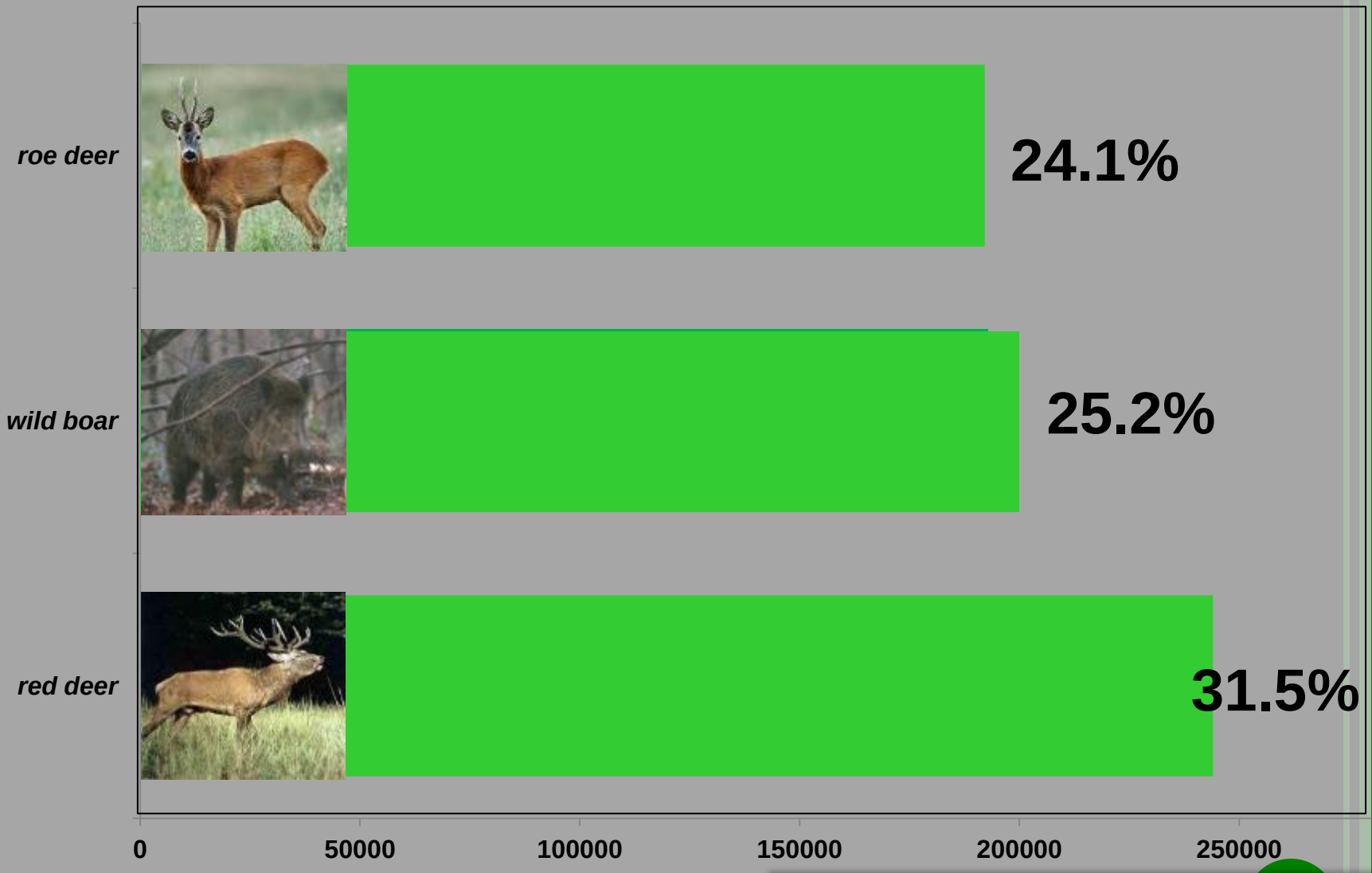


EUROPEAN UNGULATES AND CONSERVATION



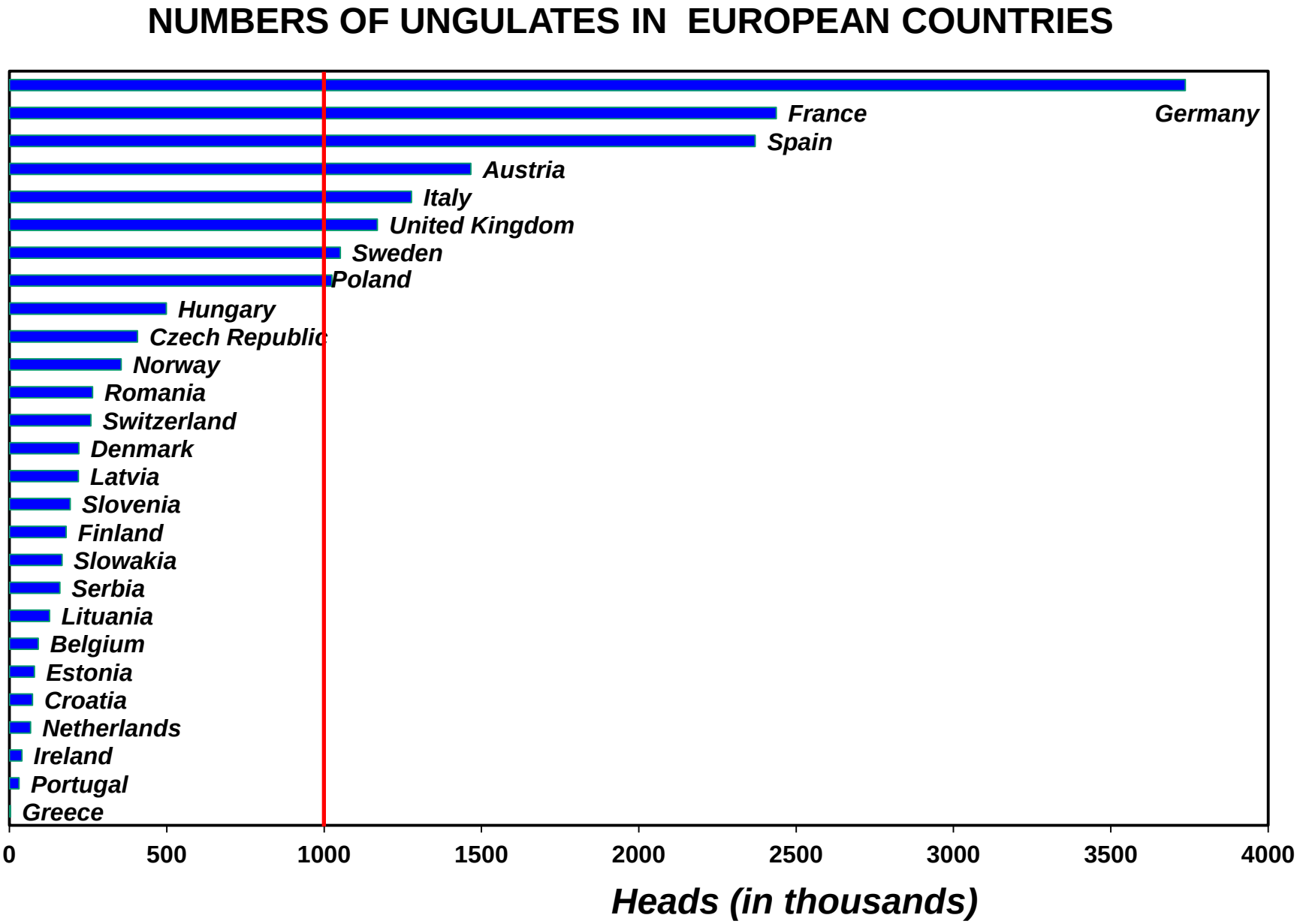
THESE SPECIES REPRESENTS 91,7% OF EUROPEAN UNGULATES

EUROPEAN UNGULATES AND CONSERVATION

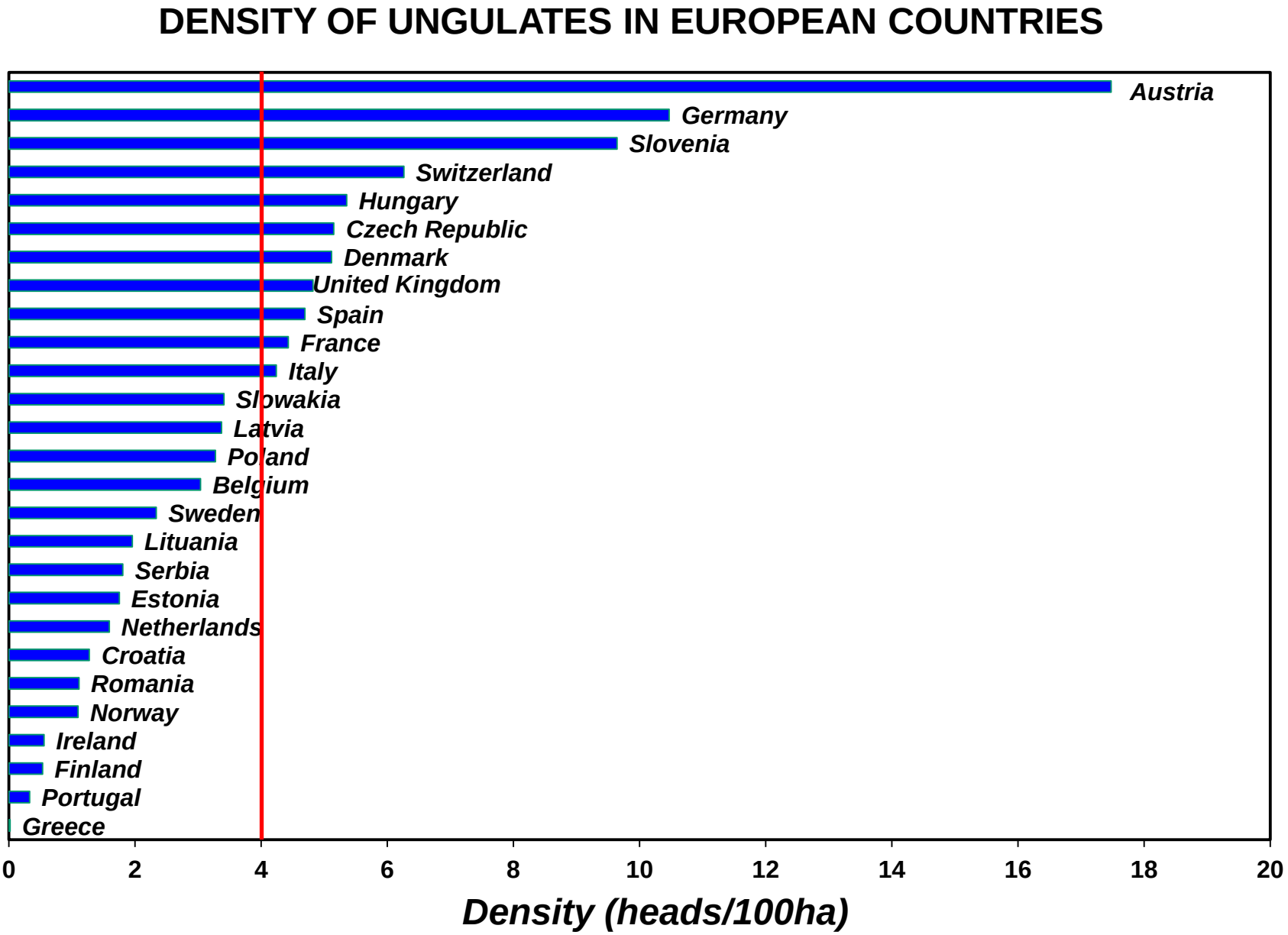


THESE SPECIES REPRESENTS 81% OF UNGULATE BIOMASS

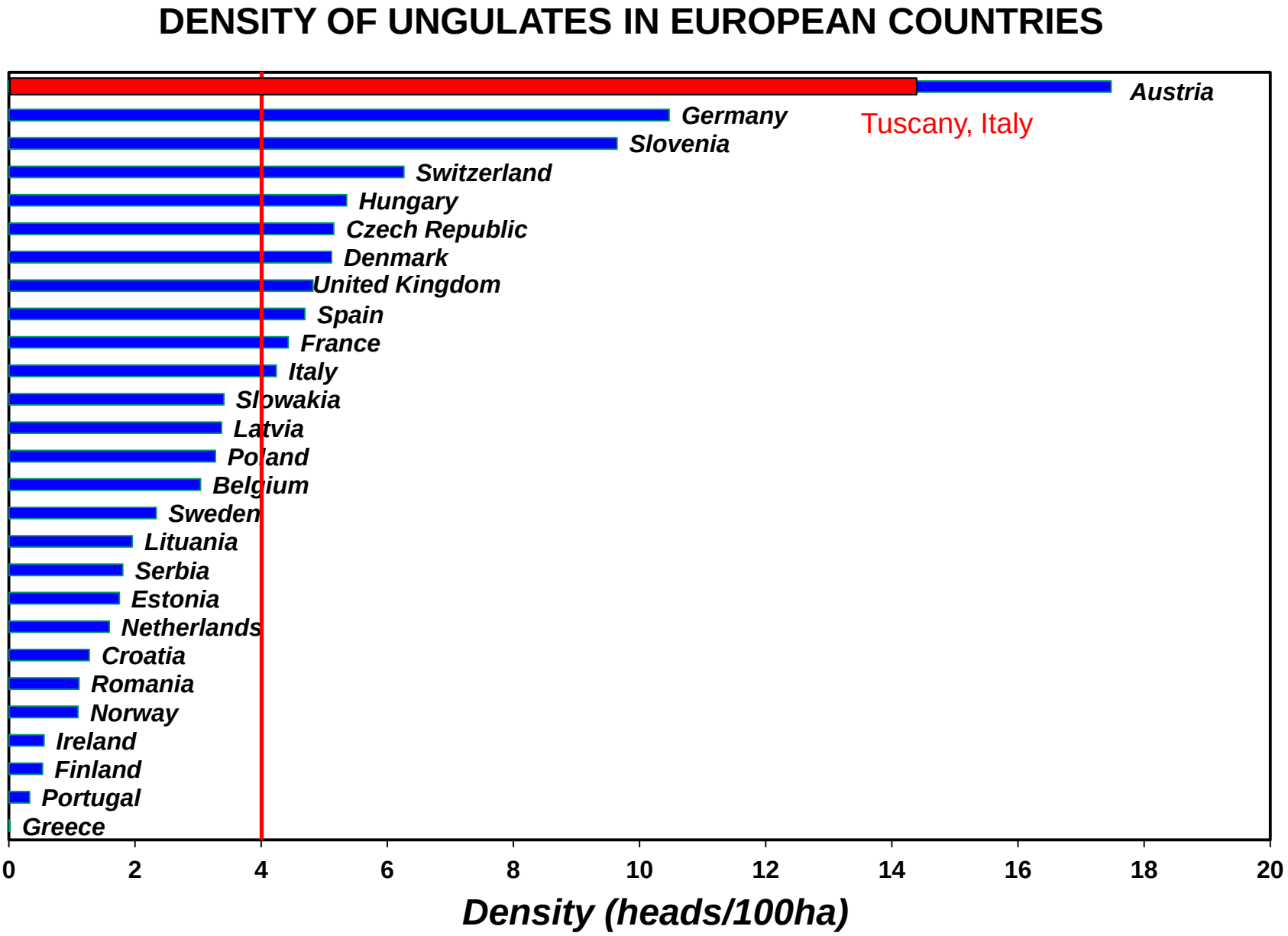
EUROPEAN UNGULATES AND CONSERVATION



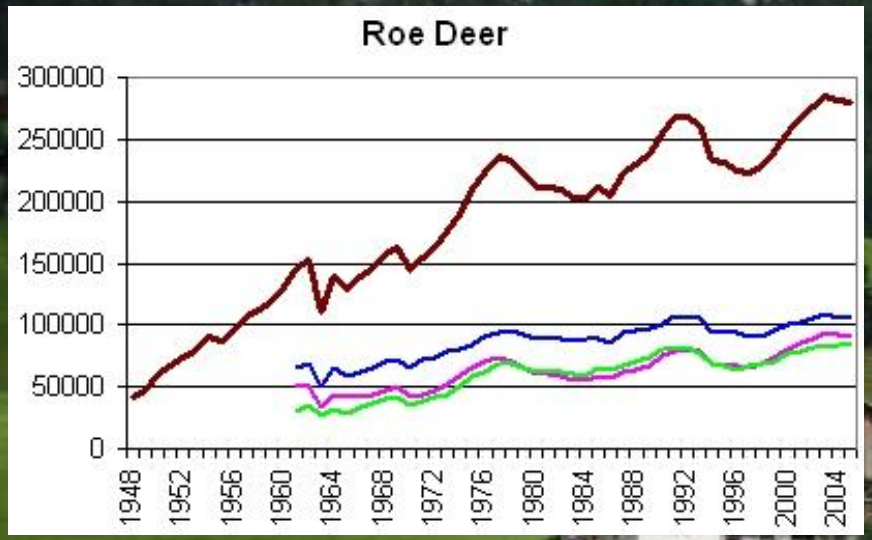
EUROPEAN UNGULATES AND CONSERVATION

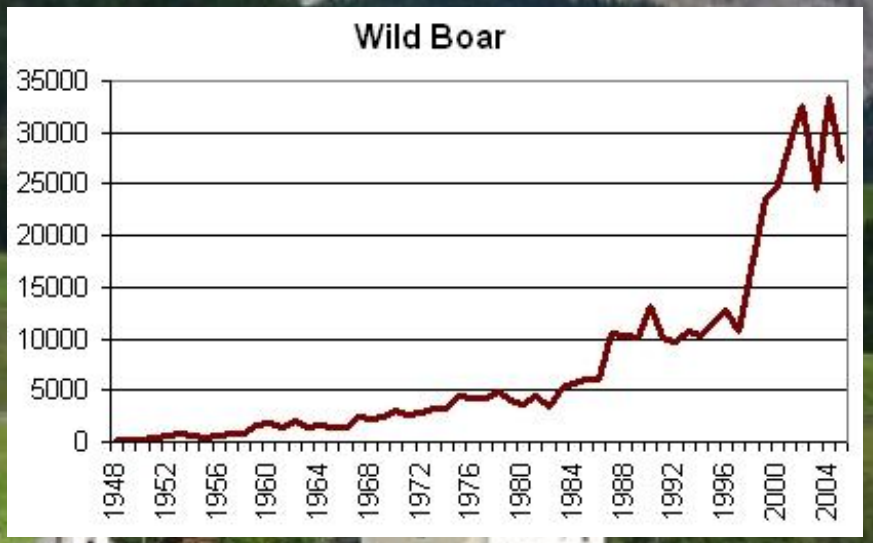


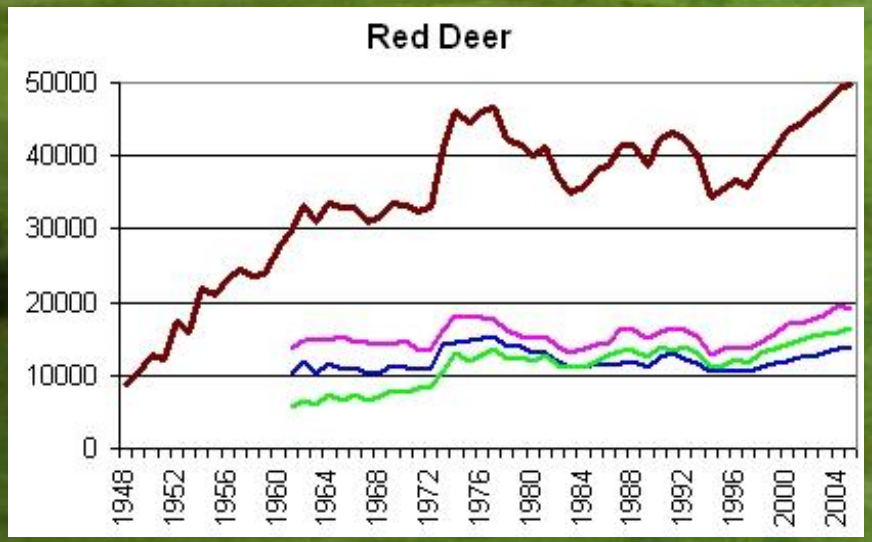
EUROPEAN UNGULATES AND CONSERVATION



THE INCREASE OF UNGULATES IN EUROPE



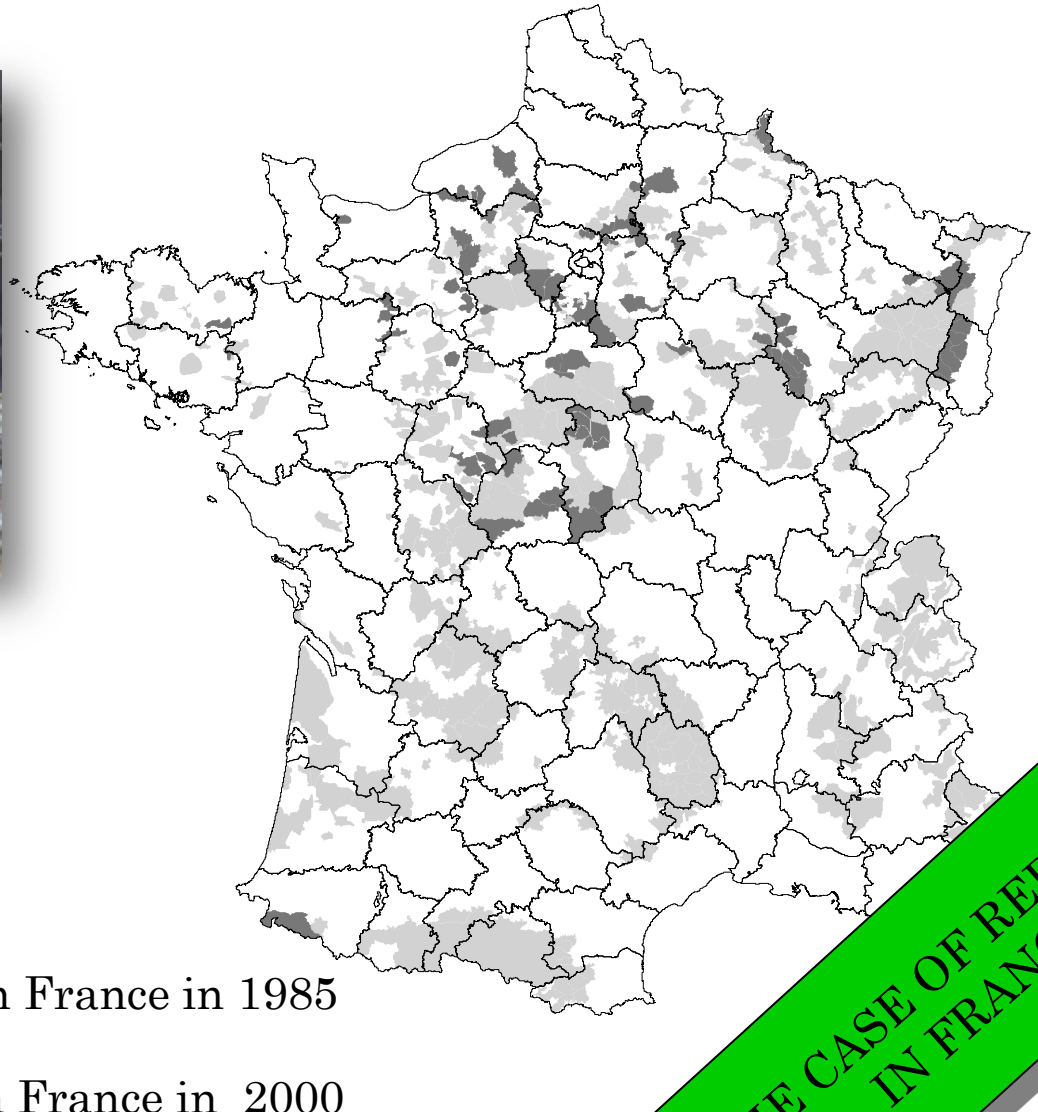




THE CASE OF UNGULATES IN AUSTRIA

HUNTING BAGS

THE INCREASE OF UNGULATES IN EUROPE

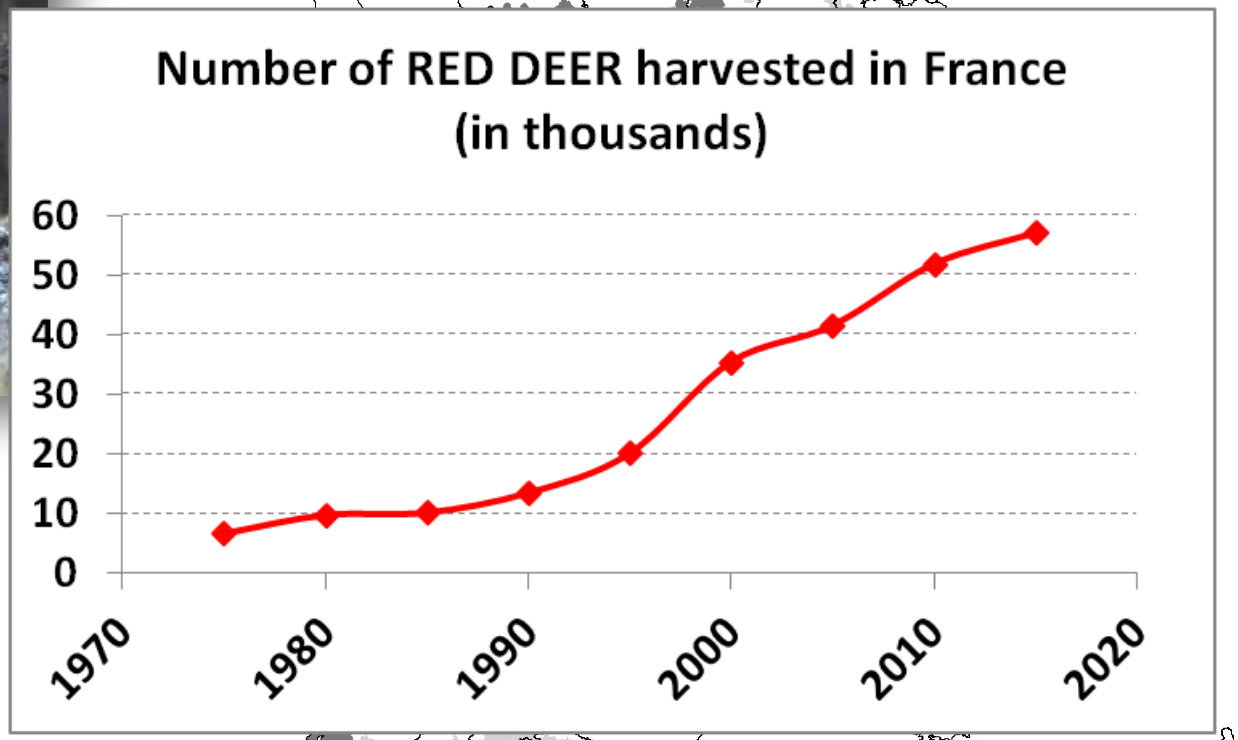


Red deer distribution in France in 1985

Red deer distribution in France in 2000

THE CASE OF RED DEER IN FRANCE

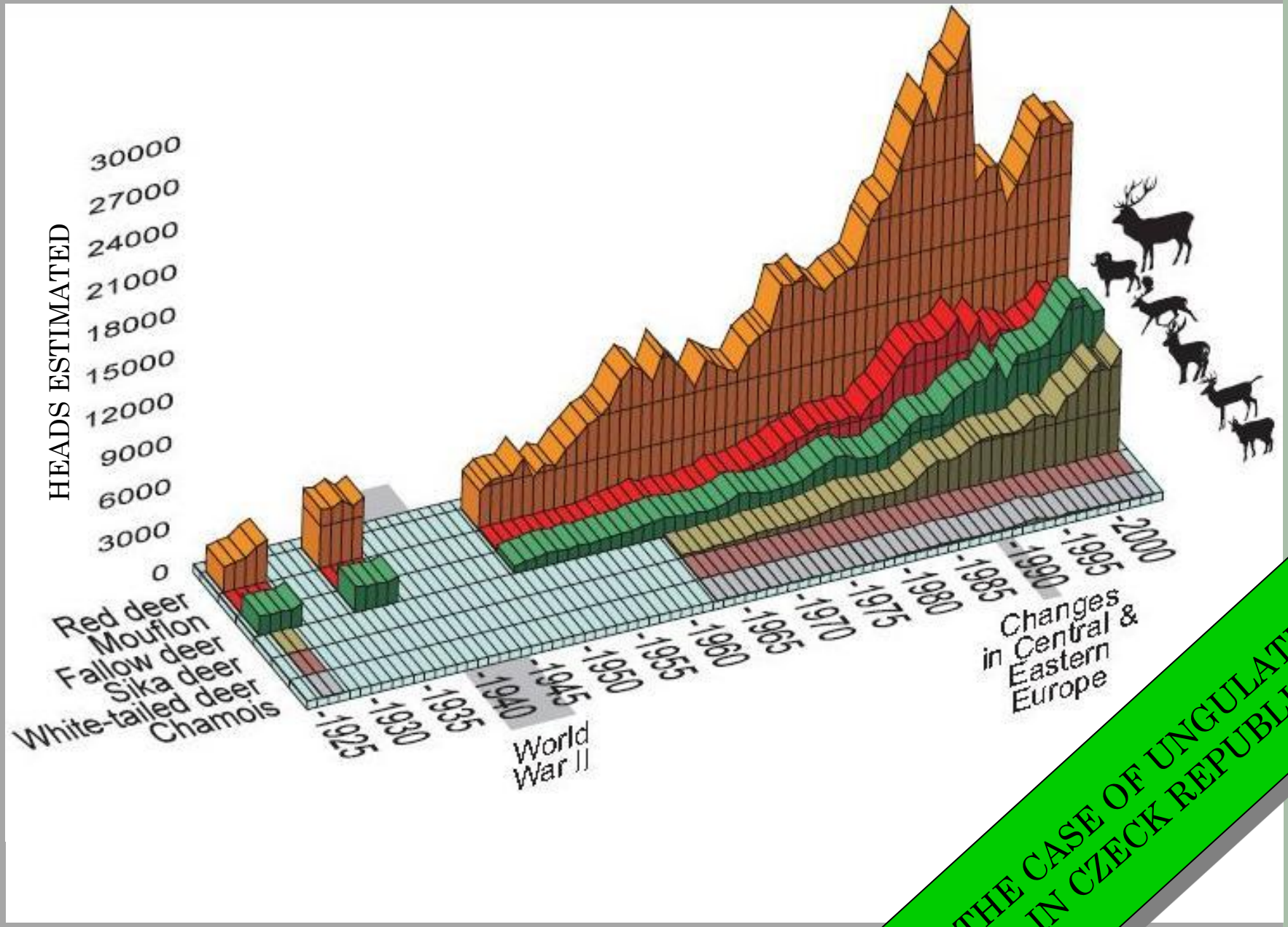
THE INCREASE OF UNGULATES IN EUROPE



Red deer distribution in France in 1985

Red deer distribution in France in 2000

THE INCREASE OF UNGULATES IN EUROPE



THE CASE OF UNGULATES IN CZECK REPUBLIC

THE INCREASE OF UNGULATES IN EUROPE

PERIOD: 1960 - 2015

Spring population

Harvest of red deer

120,000
100,000
80,000
60,000
40,000
20,000
0

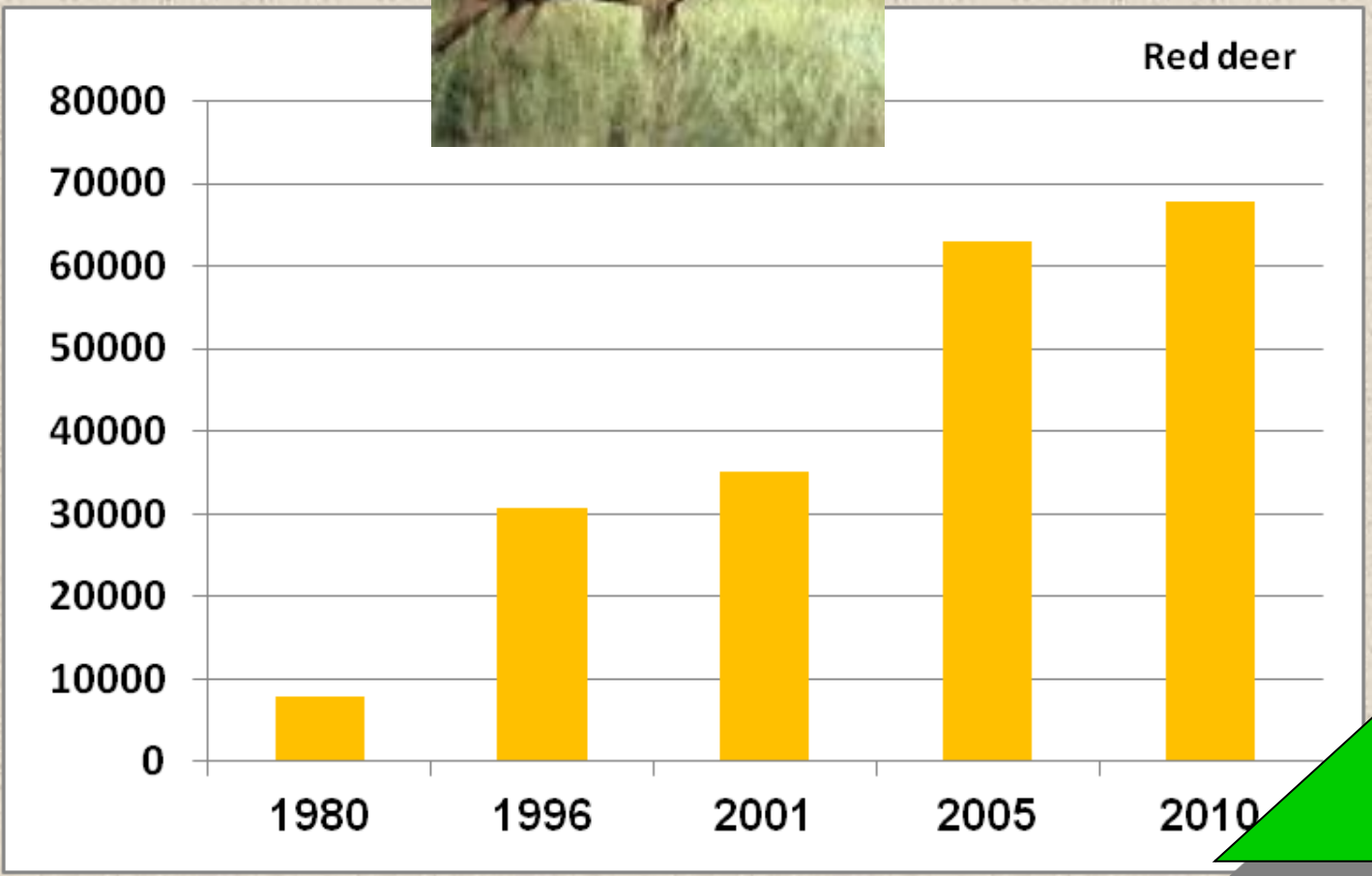
1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004

year

THE CASE OF RED DEER IN HUNGARY

Increase from 1980

769 %



THE CASE OF RED DEER IN ITALY

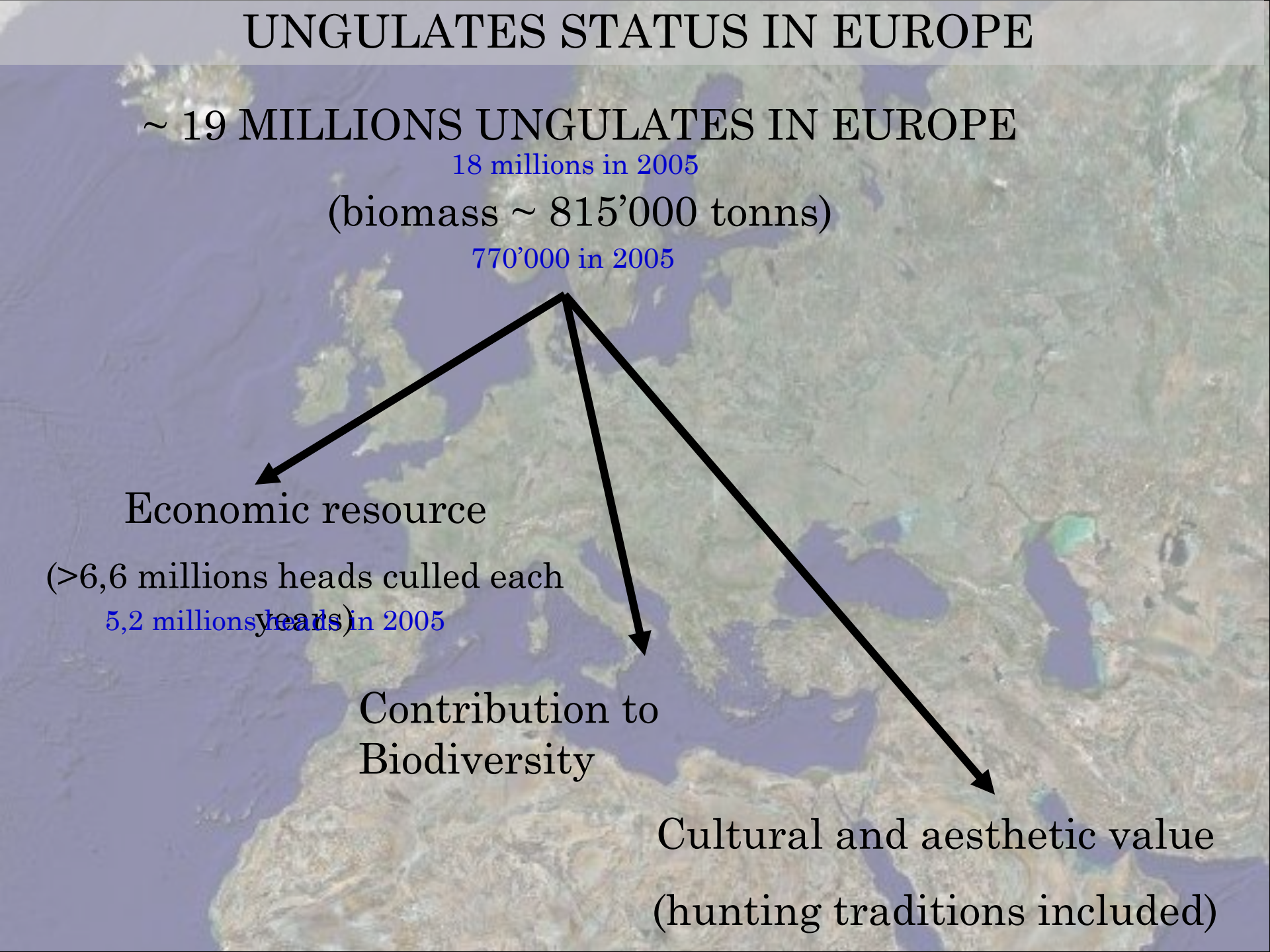
UNGULATES STATUS IN EUROPE

~ 19 MILLIONS UNGULATES IN EUROPE

18 millions in 2005

(biomass ~ 815'000 tonns)

770'000 in 2005



Economic resource

(>6,6 millions heads culled each year)

5,2 millions heads in 2005

Contribution to Biodiversity

Cultural and aesthetic value

(hunting traditions included)

THE INCREASE OF UNGULATES IN EUROPE

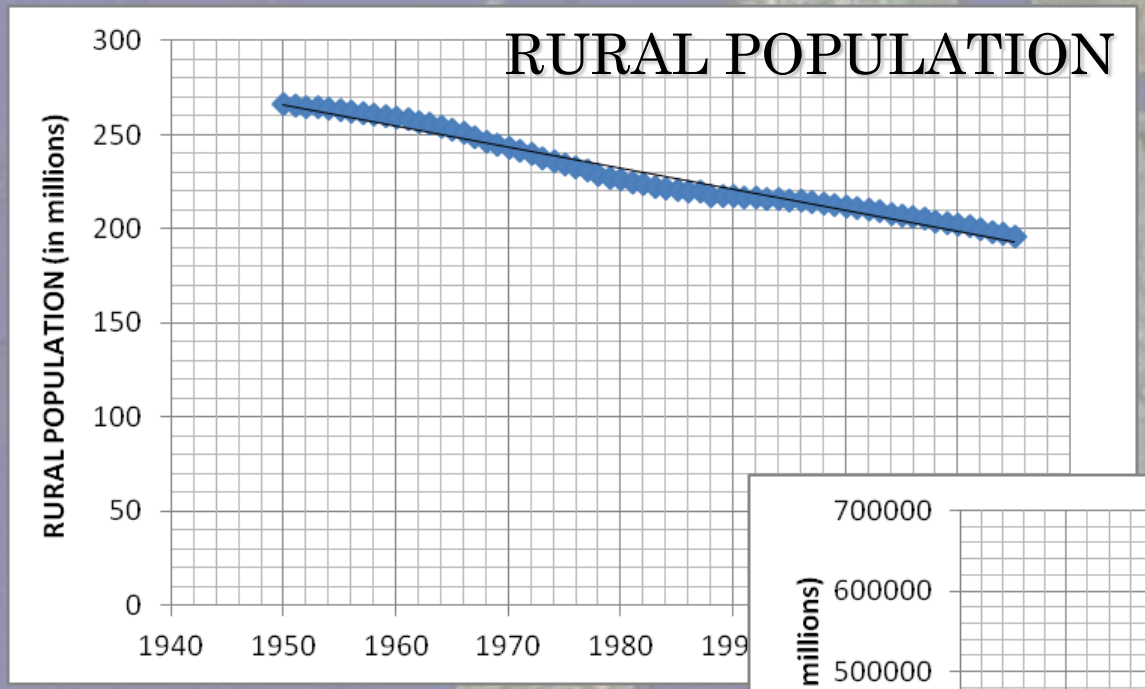
	2014/2015	2004/2005
ROE DEER		
	9,8 millions (196'000 tonns)	9,6 millions (192'000 tonns)
	3 millions/year culled	2,8 millions/year culled
RED DEER		
	2,6 millions (257'000 tonns)	2,4 millions (244'000 tonns)
	0,7 millions/year culled	0,5 millions/year culled
WILD BOAR		
	4,1 millions (205'000 tonns)	3,9 millions (193'000 tonns)
	2,3 millions/year culled	1,7 millions/year culled

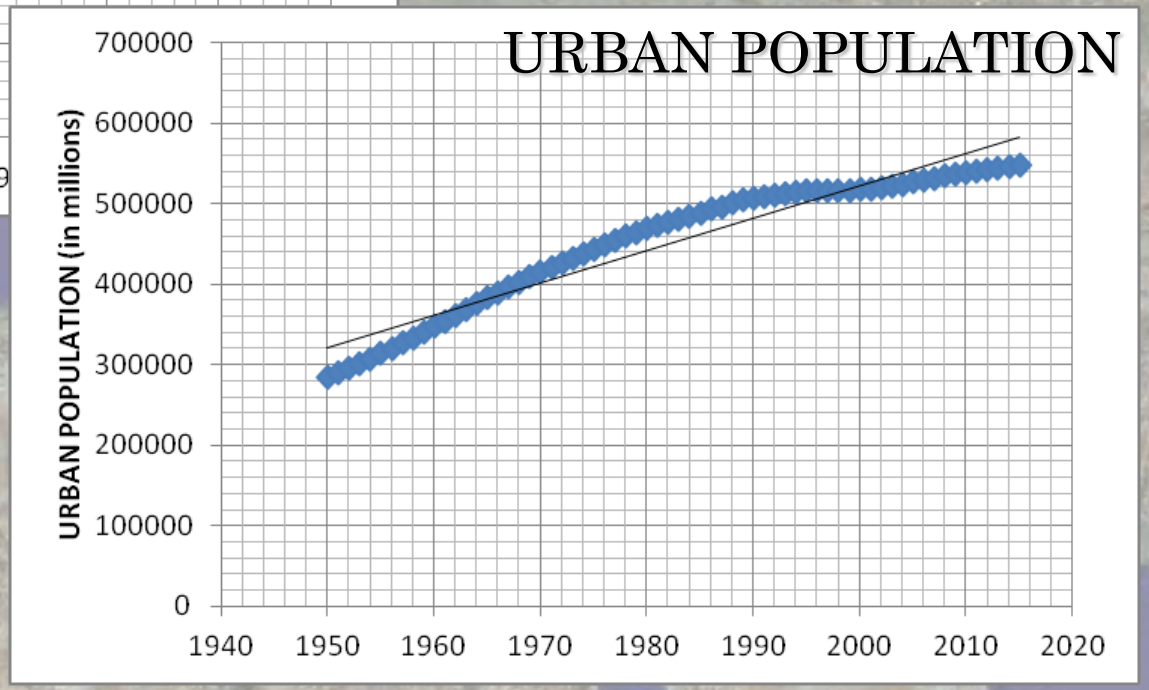
WHY UNGULATES INCREASED? HUMANS RULE

25 : 1

REASONS OF THE INCREASE OF UNGULATES IN EUROPE

CHANGES IN HUMAN SETTLEMENT

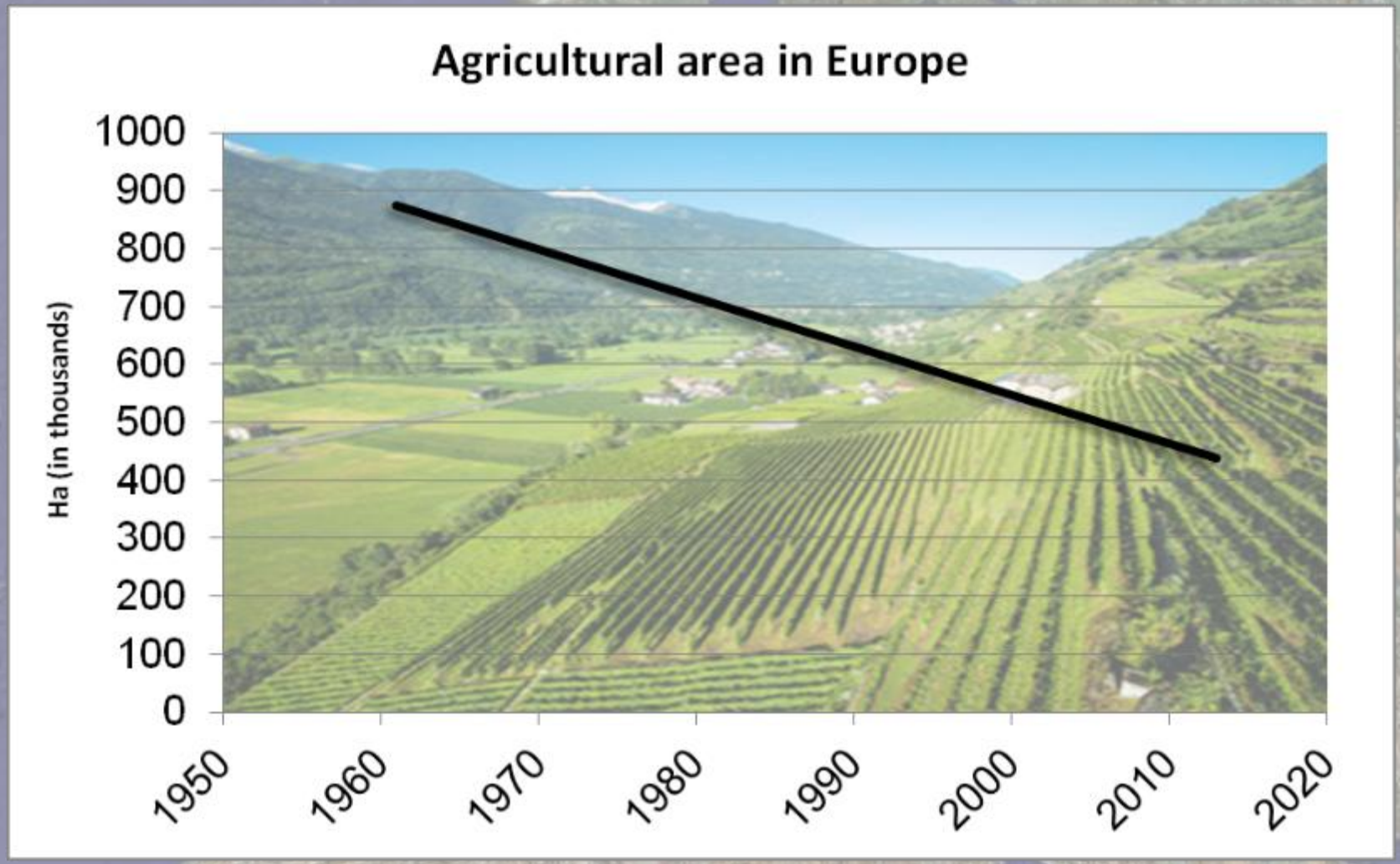




http://faostat3.fao.org

REASONS OF THE INCREASE OF UNGULATES IN EUROPE

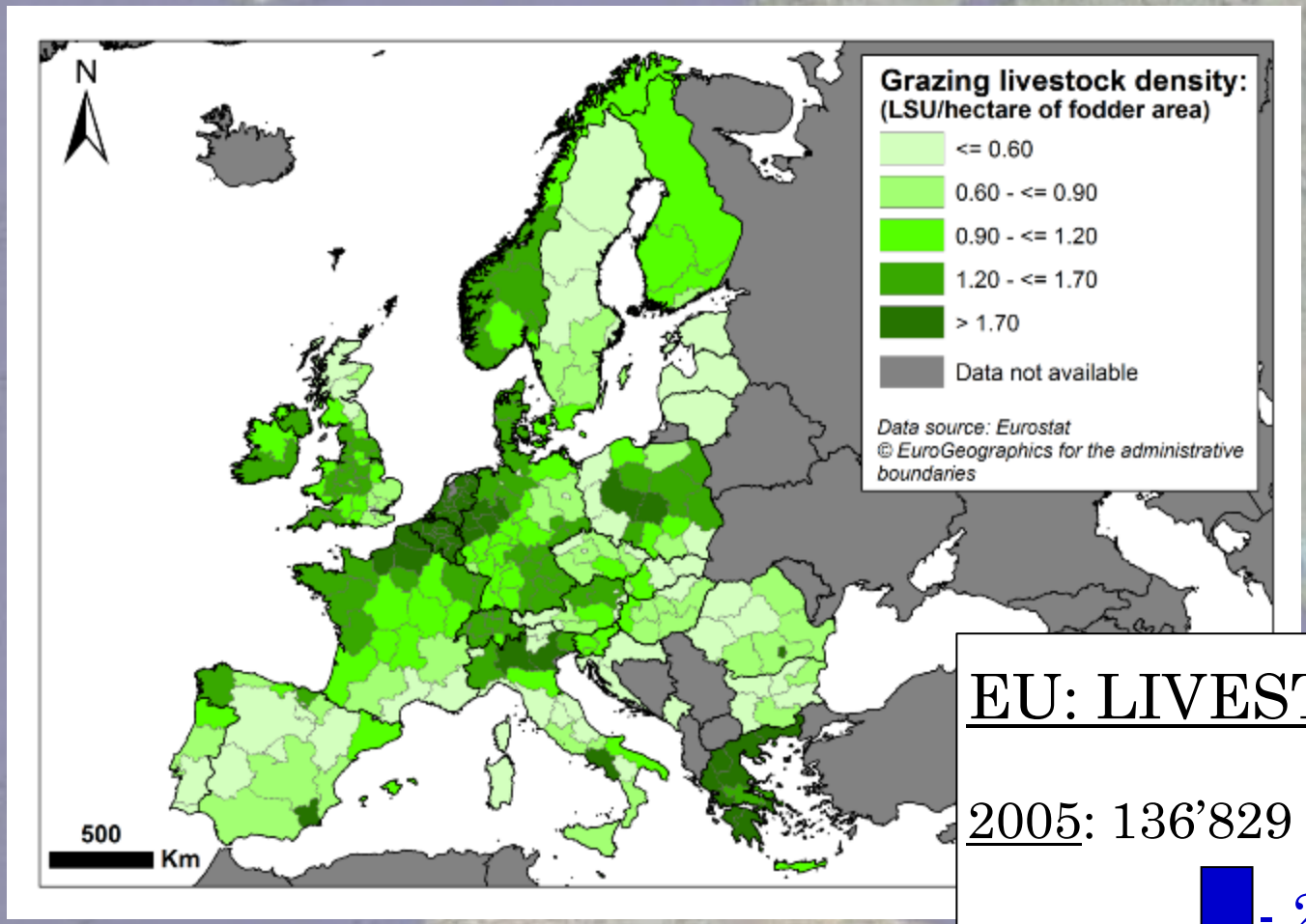
REDUCTION OF AGRICOLTURAL AREAS



http://faostat3.fao.org

REASONS OF THE INCREASE OF UNGULATES IN EUROPE

REDUCTION OF FREE RANGING LIVESTOCK BREEDING



EU: LIVESTOCK (1000 LSU)

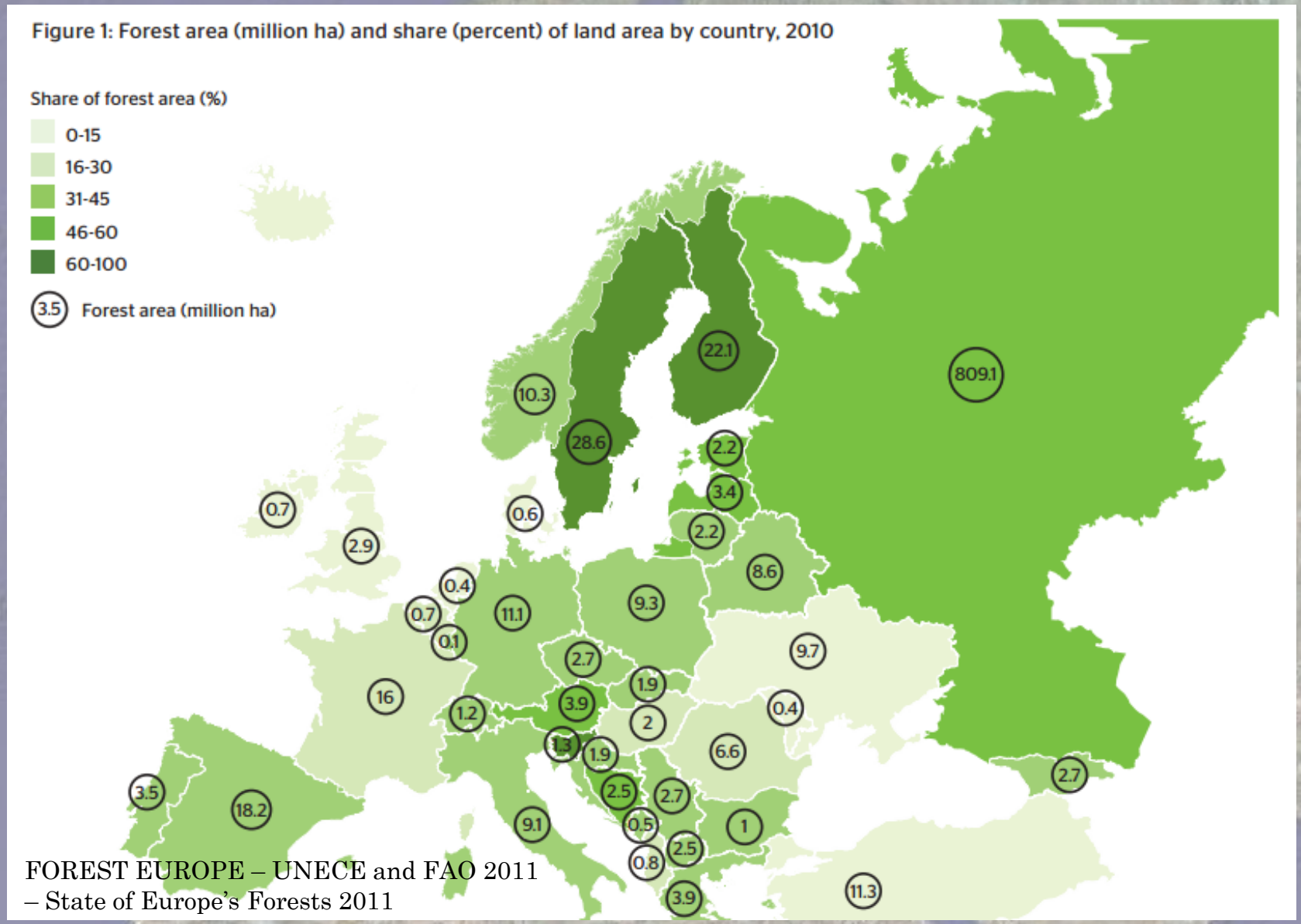
2005: 136'829 (80'173 grazing)

- 2% - 4%

2010: 134'192 (77'226 grazing)

REASONS OF THE INCREASE OF UNGULATES IN EUROPE

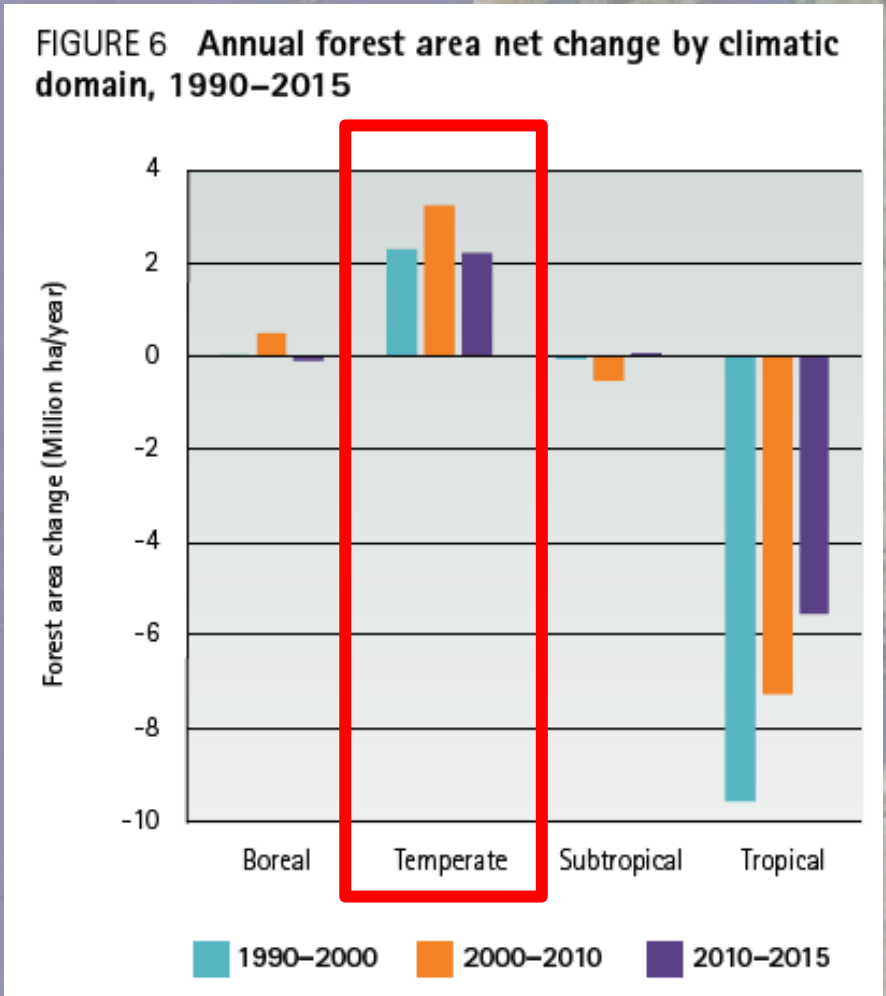
INCREASE OF FORESTS



FOREST EUROPE – UNECE and FAO 2011 – State of Europe's Forests 2011

REASONS OF THE INCREASE OF UNGULATES IN EUROPE

INCREASE OF FORESTS



1990 - 2015

Food and Agriculture Organization of the United Nations

Global Forest Resources Assessment 2015

How are the world's forests changing?

THE ROLE OF REINTRODUCTIONS

For wild ungulates, the recolonisation of former range resulted from two processes: a natural expansion of remnant populations due to legal protection and/or increased availability of suitable habitats, and direct human intervention by reintroduction or restocking. The balance of importance of these two processes varied both with region and species. In some countries the bulk of the recovery was through natural processes; in others the recovery was effected primarily by human activities. In the same way, some species recovered mostly naturally, some others would have not recovered without active human intervention.

Chapter 3

Reintroductions as a Management Tool for European Ungulates

Marco Apollonio, Massimo Scandura and Nikica Šprem

THE ROLE OF REINTRODUCTIONS

Number of countries with releases (reintroductions) ascertained:

RED DEER: 27 (21) / 28

ROE DEER: 15 (7) / 28

WILD BOAR: 11 (4) / 28

ALPINE CHAMOIS: 10 (6) / 28

INTERNATIONAL JOURNAL OF BIODIVERSITY SCIENCE, ECOSYSTEM SERVICES & MANAGEMENT, 2017
VOL. 13, NO. 1, 134–138
http://dx.doi.org/10.1080/21513732.2016.1277265

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SHORT COMMUNICATION

OPEN ACCESS

The success of species reintroductions: a case study of red deer in Portugal two decades after reintroduction

Ana Valente [a], Jorge Valente [a], Carlos Fonseca[a] and Rita Torres[a]

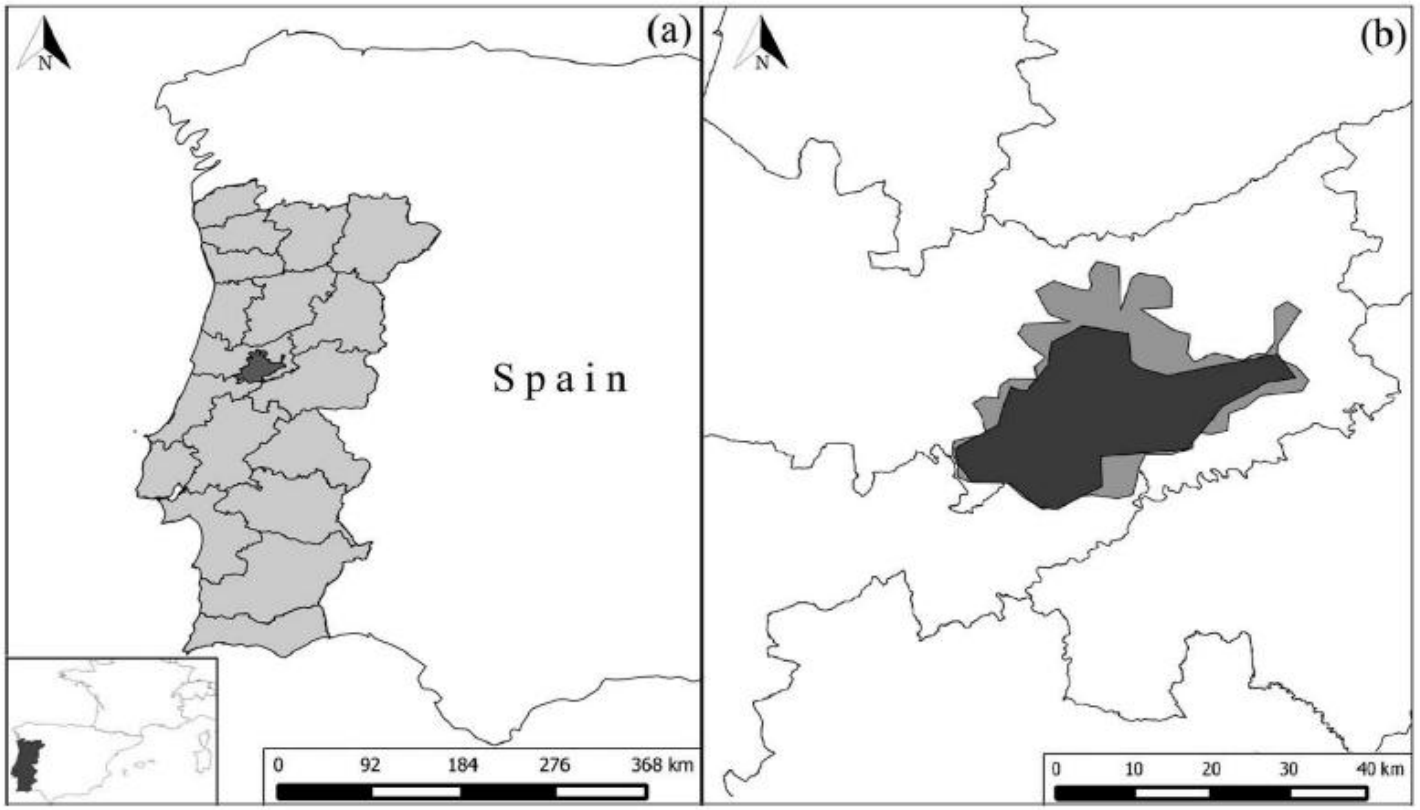

Figure 1. Study area location. (a) Map of continental Portugal highlighting the full study area. (b) Full study area in light gray (total sampling area) and distribution area of red deer in dark grey.

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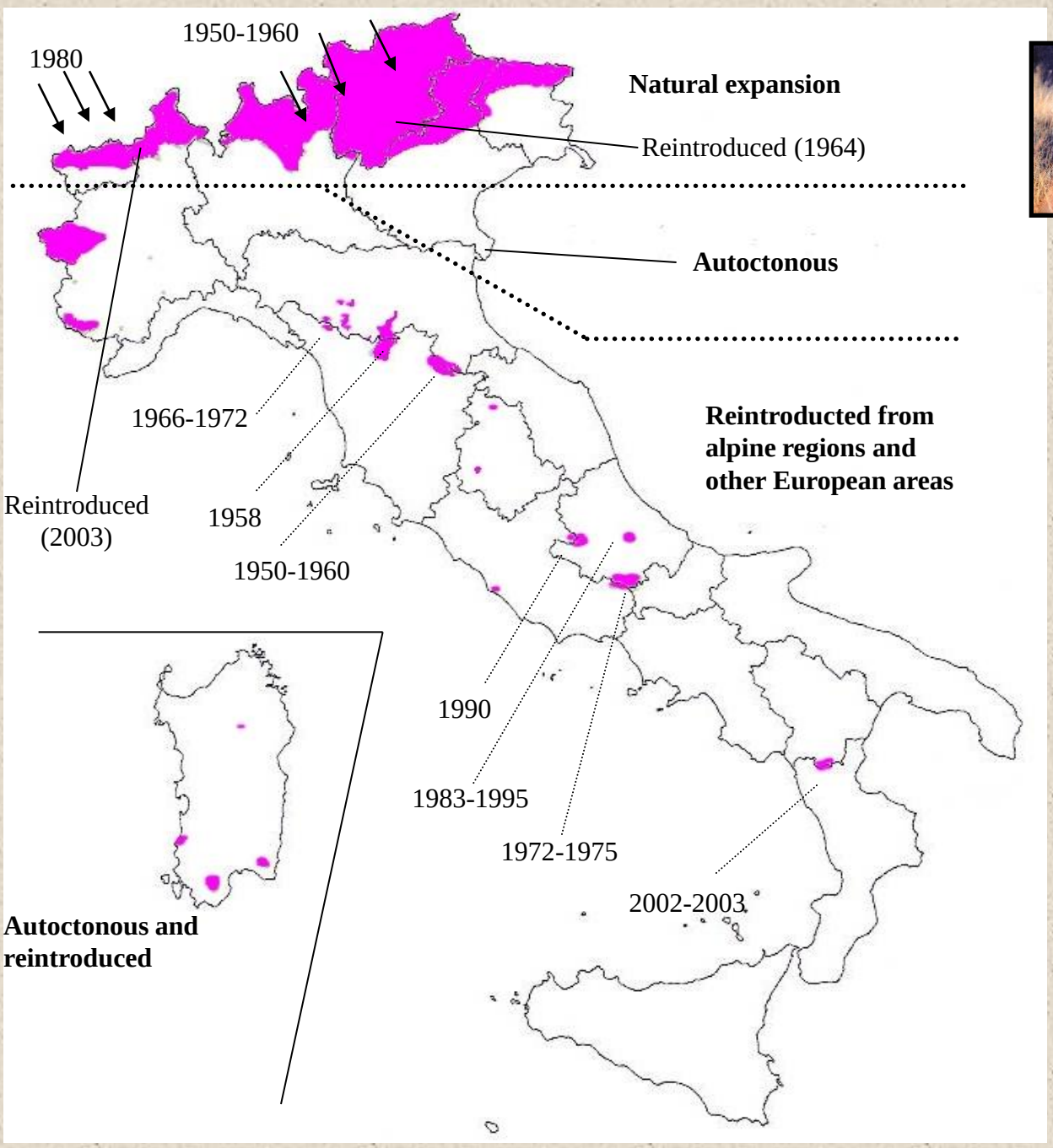
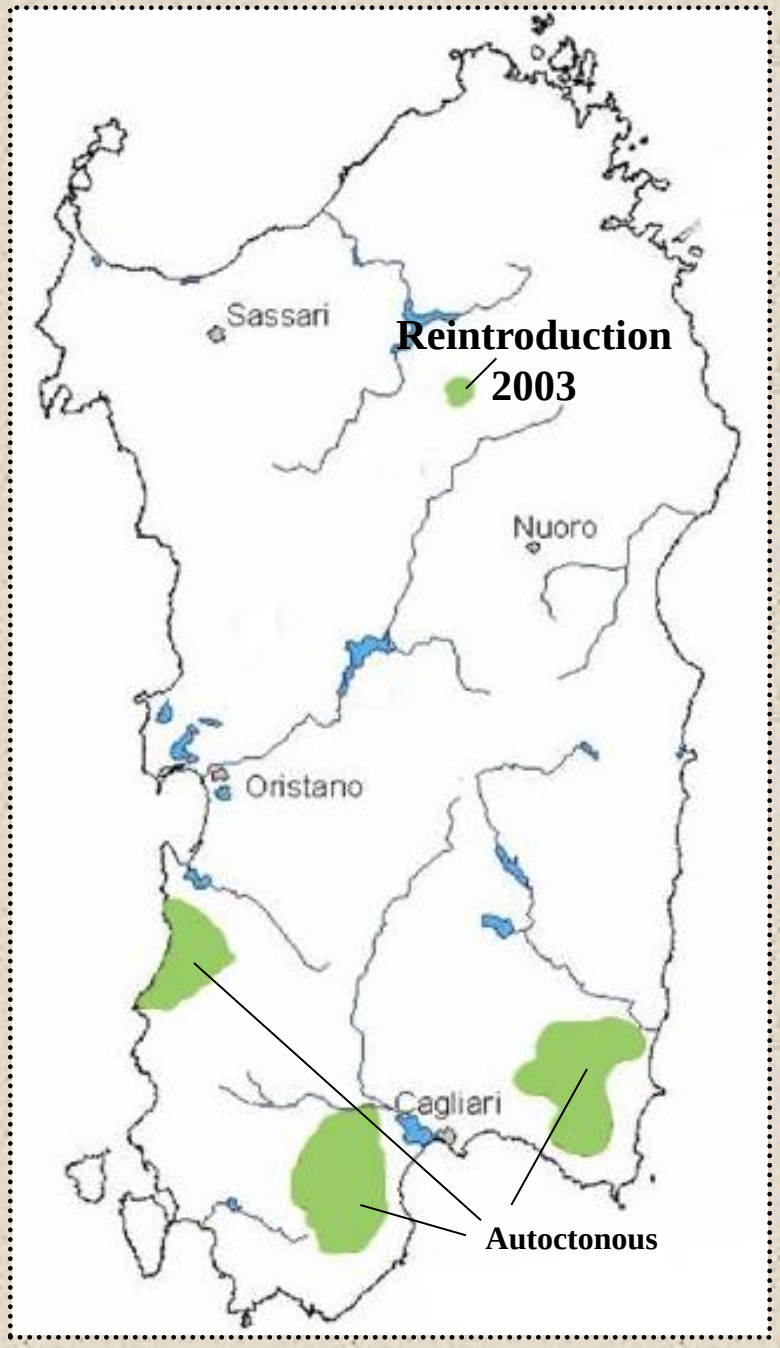
ABSTRACT

Reintroduction programs are important tools in the recovery or establishment of animal populations, but post-release monitoring, essential to evaluate their success, generally lacks in most projects. During the 1990s, a red deer (*Cervus elaphus*) reintroduction program took place in central Portugal. Almost two decades after the reintroduction, this study aimed to establish the current state of red deer populations. Density estimates were obtained through pellet group counts coupled with distance sampling using 61 linear transects. The results showed that red deer densities are of 3.10 ind./100 ha (95% confidence interval: 1.6–5.9) and this species is widely distributed throughout the area. Due to increase in numbers and range since the beginning of the reintroduction, this program can be considered a case of success; however, future monitoring programs should continue to be developed.



Cervus elaphus elaphus

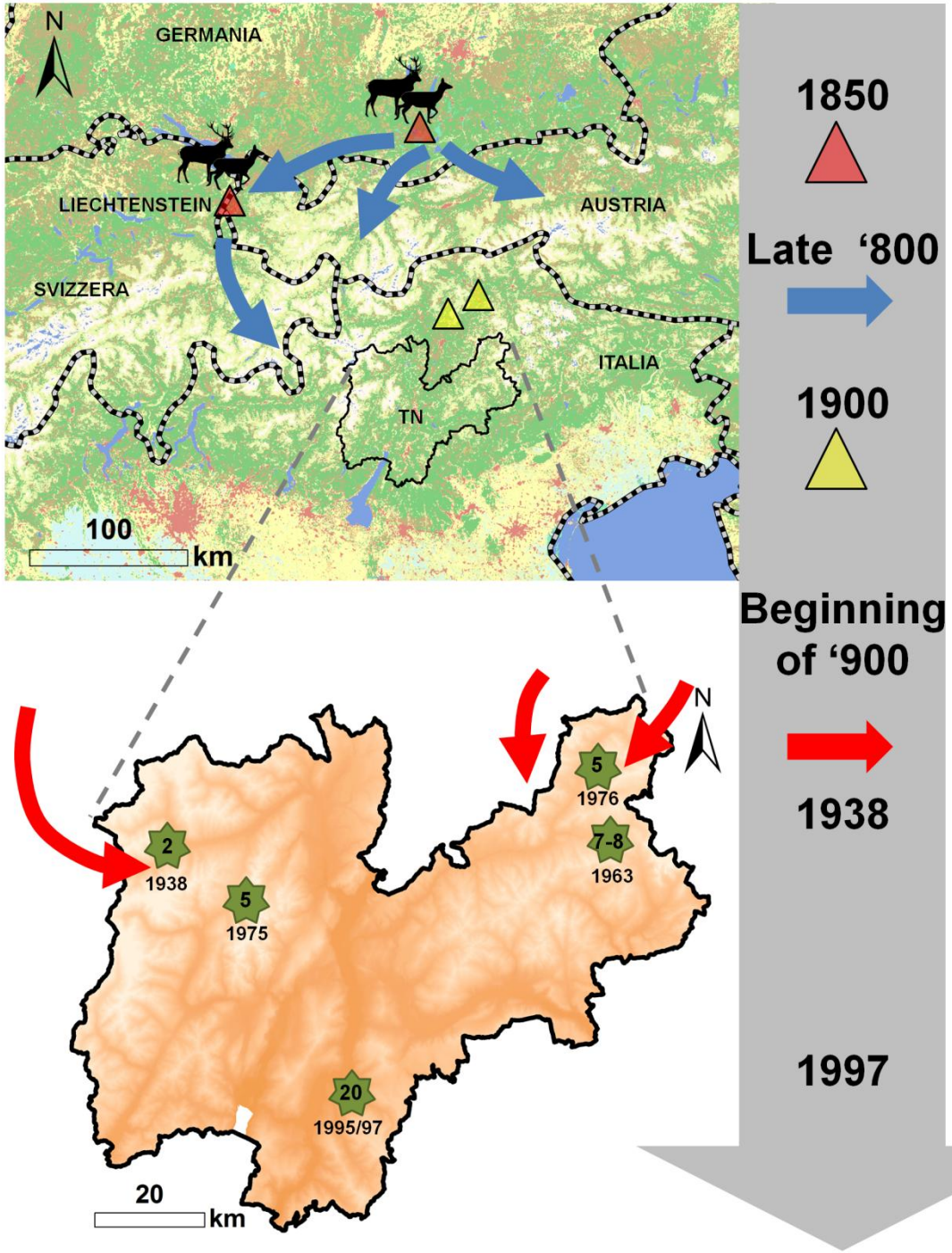
Cervus elaphus corsicanus

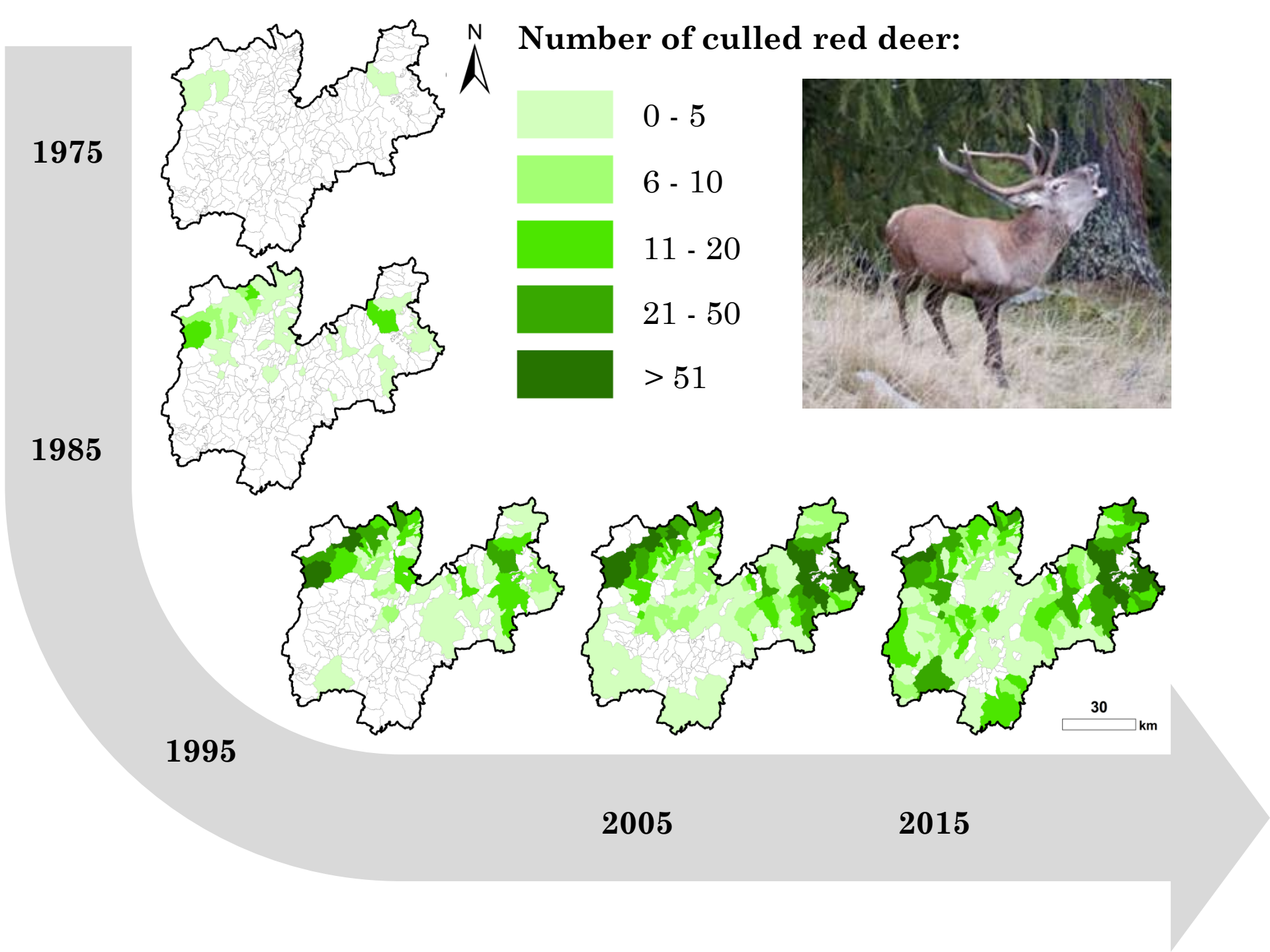


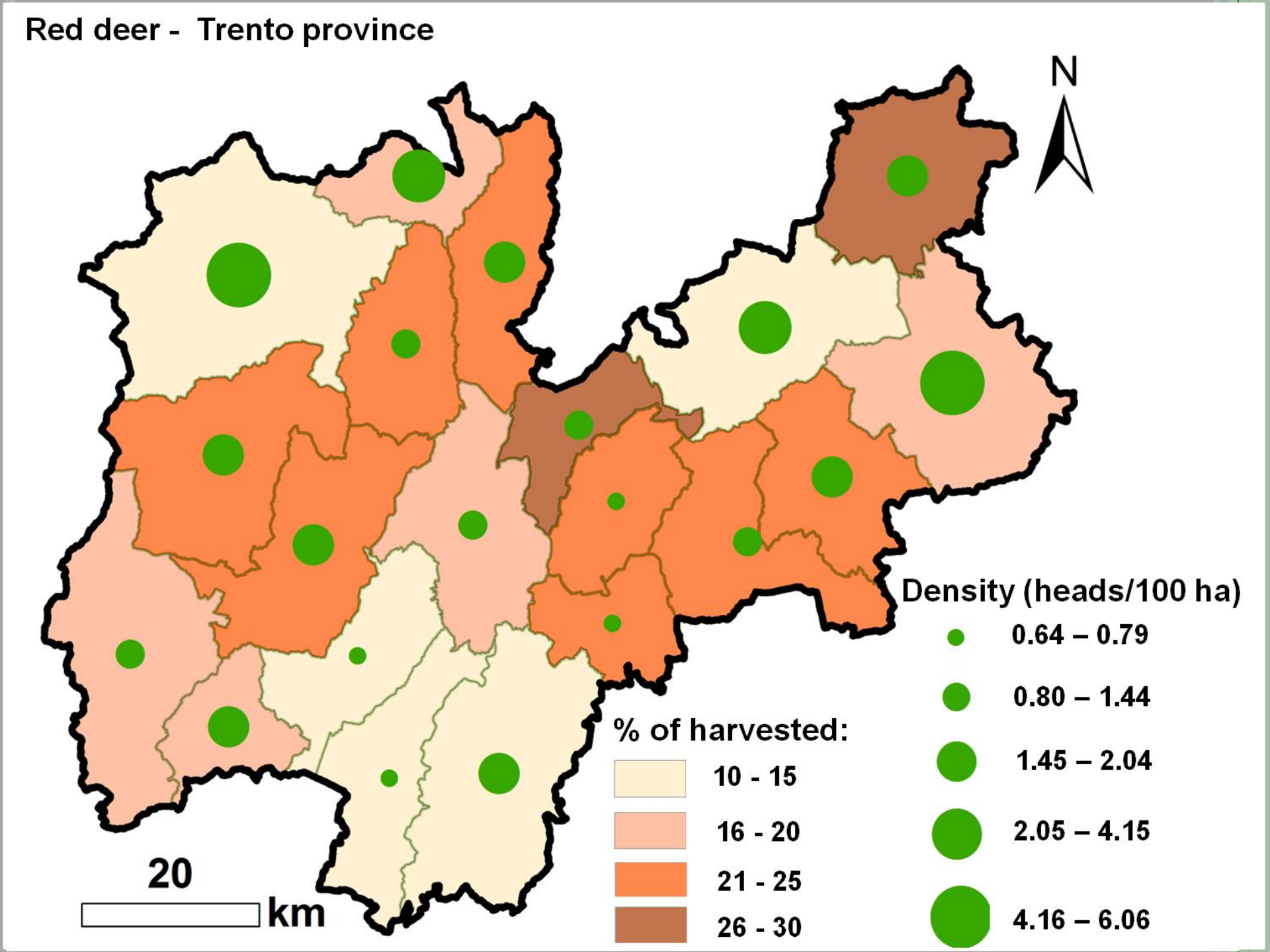
Present Sardinian red deer distribution

Cervus elaphus corsicanus

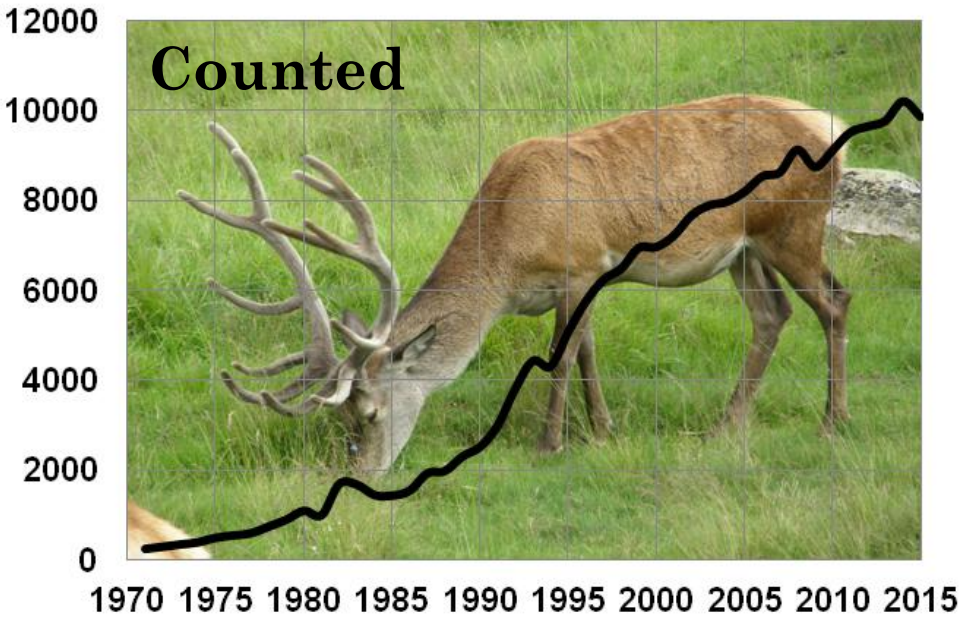
IUCN status *ENDANGERED*

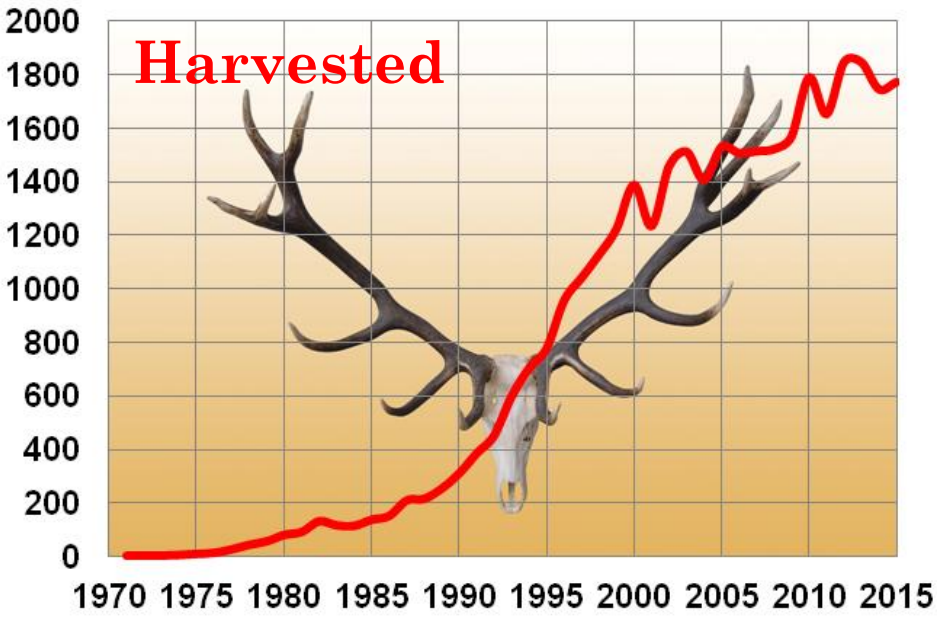

N
GERMANIA
LIECHTENSTEIN
AUSTRIA
SVIZZERA
ITALIA
TN
100
km
1850
Late '800
1900
Beginning of '900
1938
1997
N
5
1976
2
1938
7-8
1963
5
1975
20
1995/97
20
km


Number of culled red deer:
0 - 5
6 - 10
11 - 20
21 - 50
> 51
N
1975
1985
1995
2005
2015
30
km


Red deer - Trento province
N
Density (heads/100 ha)
0.64 – 0.79
0.80 – 1.44
1.45 – 2.04
2.05 – 4.15
4.16 – 6.06
% of harvested:
10 - 15
16 - 20
21 - 25
26 - 30
20
km

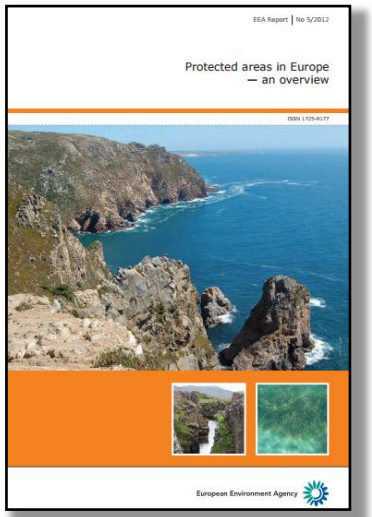
Management period: 1970-TODAY





…A STORY OF SUCCESS AND THE ROLE OF PROTECTED AREAS…

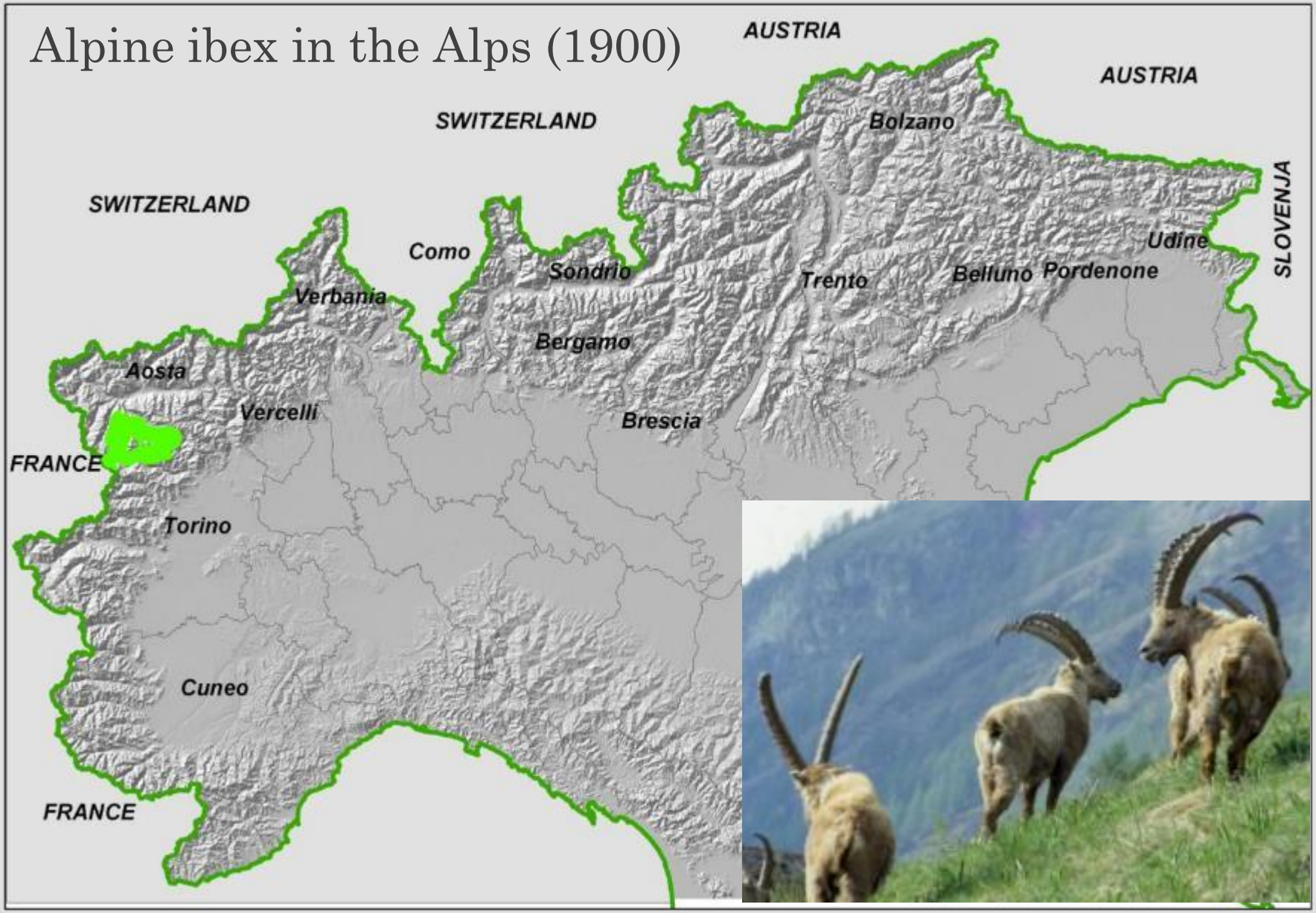
Cumulative number and surface area of protected areas
(39 EEA countries)



SUCCESSES OF UNGULATE CONSERVATION IN EUROPE

THE CASE OF ALPINE IBEX CONSERVATION

Alpine ibex in the Alps (1900)



FROM THE COLONY OF PNGP

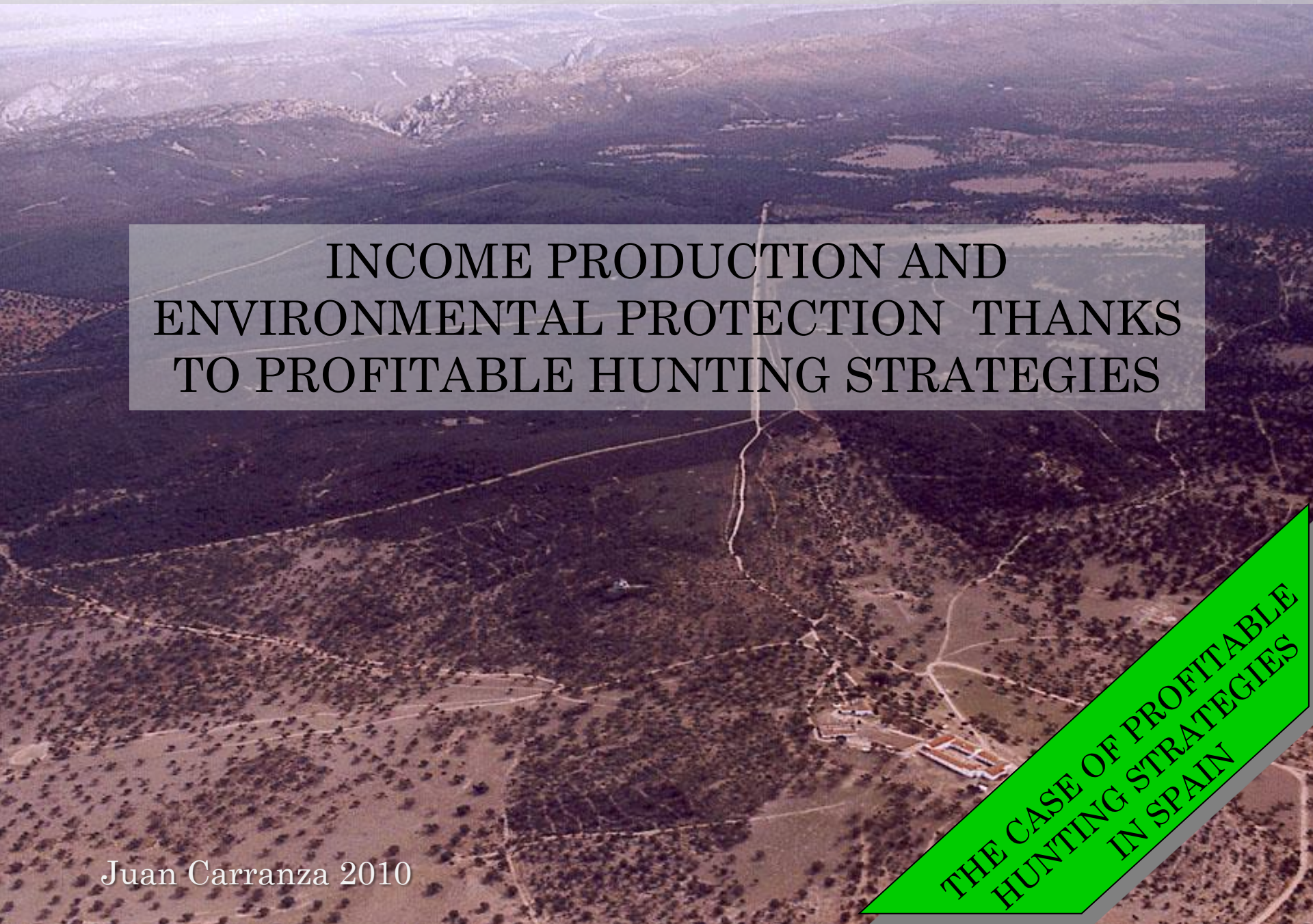
130 COLONIES

(ITALY, FRANCE, SWITZERLAND, GERMANY, AUSTRIA, SLOVENIA)

≅50 000 HEADS

Photo: D. De Siena

SUCCESSES OF UNGULATE MANAGEMENT IN EUROPE



INCOME PRODUCTION AND ENVIRONMENTAL PROTECTION THANKS TO PROFITABLE HUNTING STRATEGIES

THE CASE OF PROFITABLE HUNTING STRATEGIES IN SPAIN

Juan Carranza 2010

Private hunting estates in Spain practices monterias to hunt ungulates

Profitability and conservation → Environmental diversity

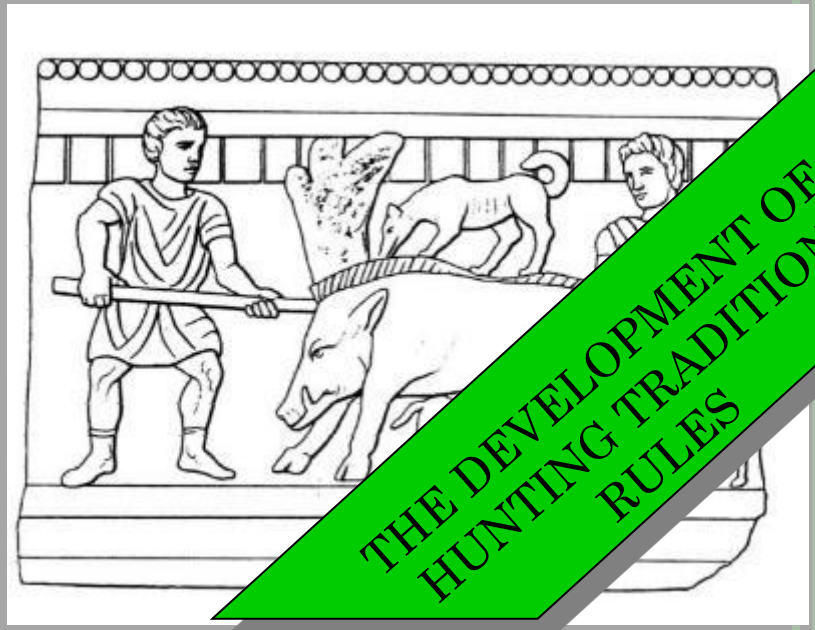
SUCCESSES OF UNGULATE MANAGEMENT IN EUROPE

Ancient Greeks
(V century B.C.)

Greece

Etruscan
(II century B.C.)

Italy



THE DEVELOPMENT OF HUNTING TRADITION RULES

SUCCESSES OF UNGULATE MANAGEMENT IN EUROPE

SUCCESSES OF UNGULATE MANAGEMENT IN EUROPE

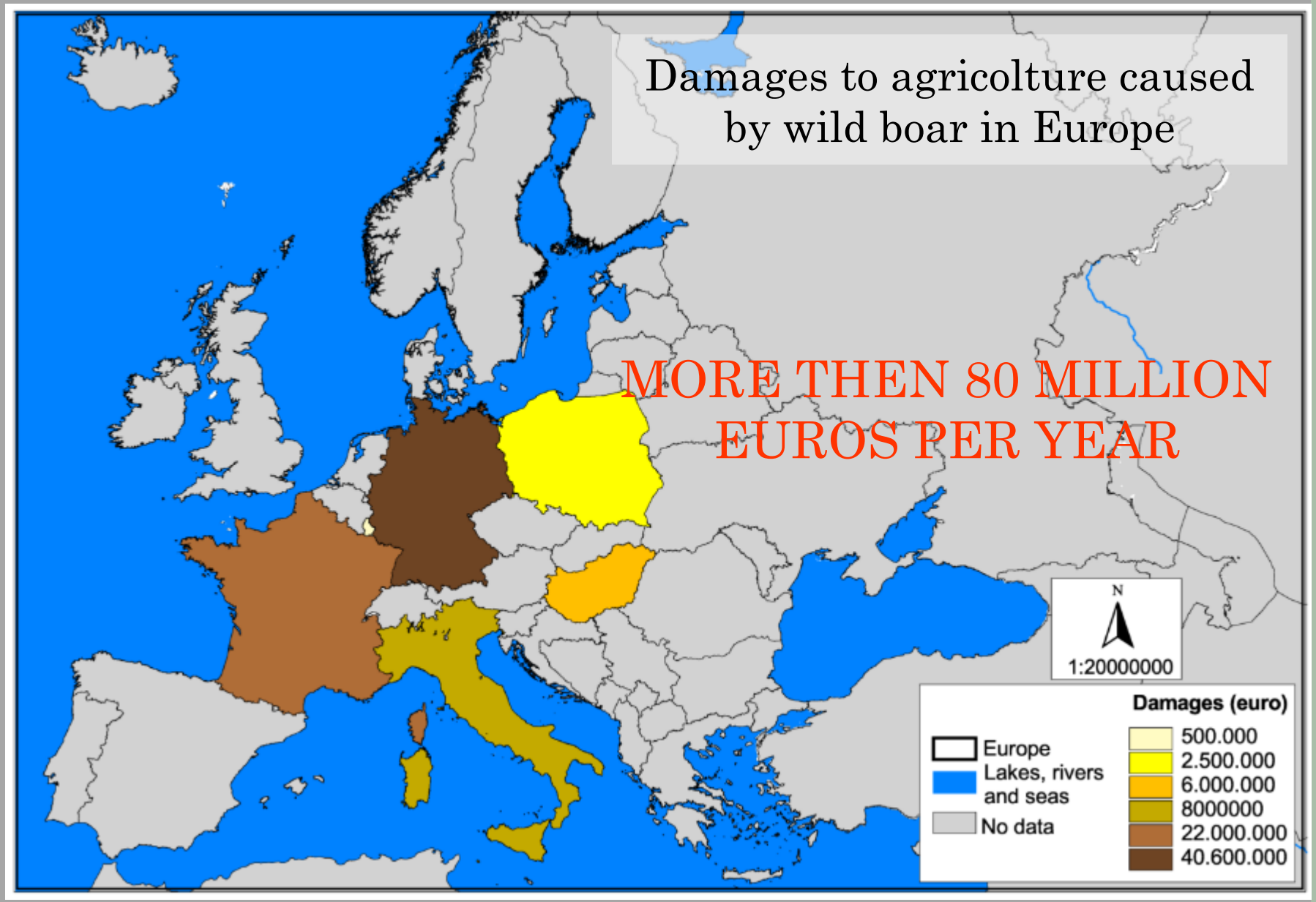
SUCCESSES OF UNGULATE MANAGEMENT IN EUROPE

THE DEVELOPMENT OF UNGULATES WATCHING

… WITH SOME PROBLEMS …

MANAGEMENT PROBLEMS

THE CASE OF DAMAGES TO AGRICOLTURE


Damages to agricolture caused by wild boar in Europe
MORE THEN 80 MILLION EUROS PER YEAR
N
1:20000000
Damages (euro)
Europe
Lakes, rivers and seas
No data
500.000
2.500.000
6.000.000
8000000
22.000.000
40.600.000

Damages to agricolture caused by wild boar in Europe

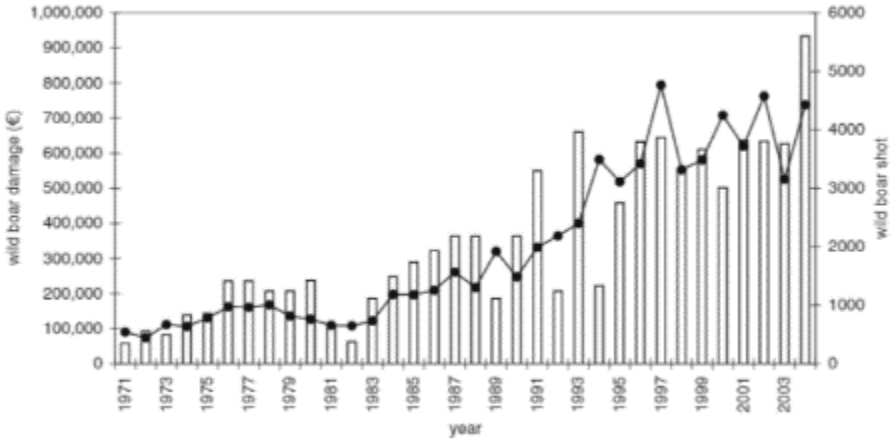
Luxembourg

Eur J Wildl Res (2008) 54:589–599
DOI 10.1007/s10344-008-0183-x

ORIGINAL PAPER

Patterns of crop damage by wild boar (*Sus scrofa*) in Luxembourg over a 10-year period

Laurent Schley · Marc Dufrêne · Ady Krier · Alain C. Frantz



France (ONCFS)

Poland

Research Article

SCI

(wileyonlinelibrary.com) DOI 10.1002/ps.3368

Factors affecting the level of damage by wild boar in farmland in north-eastern Poland

Witold Frackowiak,[a]* Stanislaw Gorczyca,[b] Dorota Merta[a] and Marta Wojciuch-Ploskonka[a]

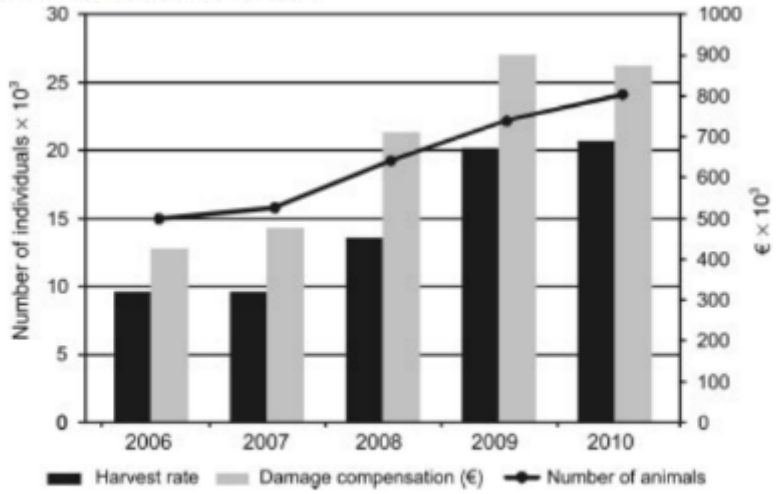


Figure 2. Population dynamics, harvest rate and damage compensation of wild boar in north-eastern Poland (data represent 33 forest districts in the Regional State Forests Directorate in Olsztyn).

MANAGEMENT PROBLEMS

Chapter 6

Impacts of wild ungulates on vegetation: costs and benefits

Friedrich Reimoser and Rory Putman

THE IMPACTS ON FORESTS

MANAGEMENT PROBLEMS

Browsing

Bark stripping

Table 6.1 *Existing national schemes of countrywide monitoring systems for recording impacts (or monetary damage) by wild ungulates (at least for one species)*

Country	Agriculture	Forest	Vehicle collisions	Source
Austria		X	X	Reimoser and Reimoser (2010)
Baltic countries			X	Andersone-Lilley *et al.* (2010)
Belgium				Casaer and Licoppe (2010)
Croatia				Kusak and Krapinec (2010)
Czech Republic				Bartoš *et al.* (2010)
Denmark				Andersen and Holthe (2010)
Finland	X	X	X	Ruusila and Kojola (2010)
France	X		X	Maillard *et al.* (2010)
Germany			X	Wotschikowsky (2010)
Great Britain				Putman (2010)
Greece				Papaioannou (2010)
Hungary	X	X		Csányi and Lehoczki (2010)
Italy				Apollonio *et al.* (2010c)
Netherlands			X	van Wieren and Groot Bruinderink (2010)
Norway			X	Andersen *et al.* (2010)
Poland				Wawrzyniak *et al.* (2010)
Portugal				Vingada *et al.* (2010)
Romania				Micu *et al.* (2010)
Slovakia	X	X		Findo and Skuban (2010)
Slovenia	X	X	X	Adamic and Jerina (2010)
Spain				Carranza (2010)
Sweden		X	X	Liberg *et al.* (2010)
Switzerland	X		X	Imesch-Bebié *et al.* (2010)

EUROPEAN COUNTRIES (n= 25) WHERE DAMAGE TO FOREST ARE COMPENSATED

•**AUSTRIA**, Compensation is responsibility of the hunters of the hunting district where damage arises.

•**BELGIUM**, Compensation is payable by those having the hunting rights.

•**CZECK REPUBLIC**, Hunting ground user is responsible for compensation of damages.

•**FINLAND,** Government compensation is paid to private land owners, but not to State-owned forestry (money comes from licence fees charged to hunters).

•**HUNGARY,** The party exercising hunting right is responsible for damages compensation

•**FRANCE**, Compensation given by the government from 2005

•**POLAND (protection),** The protecting costs against ungulates are covered by State Forests

MANAGEMENT PROBLEMS

CAR ACCIDENTS:

750 000 / 1 000 000 per YEAR

About 150 human fatalities per YEAR in 5 European countries in 2000' (ES,F,UK,F,D)

CAR COLLISIONS

Table 8.1 *Number of traffic accidents causing death of deer (all species) in different European countries. In almost all cases numbers are dominated by roe deer*

Country	Years	Average numbers of ungulates killed per year	Source
Austria	2000–2006	40 500	Austrian national statistics
Switzerland	2000–2006	8000–10 000	Imesch-Bebié *et al.*, 2010
Slovenia	2001–2006	5970	Slovene Hunters Association
Croatia	2002–2005	960	Official Croatian statistics
Hungary	2000–2005	3670	Official Hungarian hunting statistics
Finland[a]	2000–2005	5000	Ruusila and Kojola, 2010
Denmark	2003–2006	6000	Andersen and Madsen, 2007
Norway[a]	2000–2005	8870	Andersen *et al.*, 2010
Sweden[a]	2005	[illegible]	Seiler, 2004
Germany	2005	227 000	Kerzel, 2005
Netherlands	2000–2004	[illegible]	van Wieren and Groot Bruinderink, 2010; S.E. van Wieren, pers. comm.
England/Wales	2000–2005	31 000–45 000	Langbein, 2007a
Scotland	2000–2005	[illegible] 10 000	Langbein and Putman, 2006
France	2004	23 500	Maillard *et al.*, 2010
Spain	2003–2004	>[illegible]	

[a]includes moose.

Chapter 8

Traffic collisions involving deer and other ungulates in Europe and valiable measures for mitigation

Jochen Langbein, Rory Putman and Bostjan pokorny

Proportion of national spring population size killed in the vehicle collisions in UK

1-3% of RED DEER

3-7% of ROE DEER

7-13% of FALLOW DEER

MANAGEMENT PROBLEMS

Chapter 7

The Management of Urban Populations of Ungulates

Rory Putman, Jochen Langbein, Peter Watson, Peter Green and Sean Cahill

URBAN UNGULATES

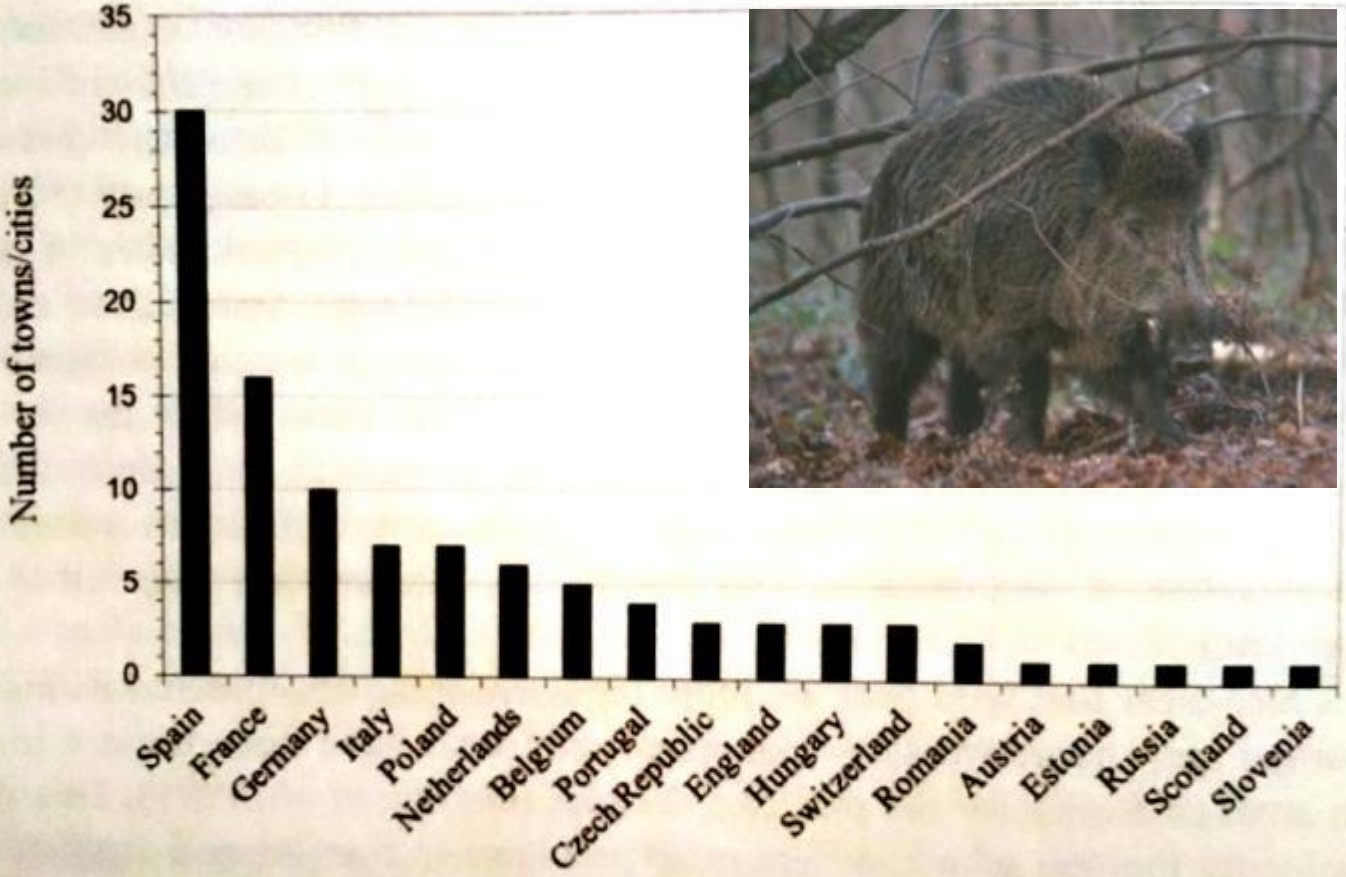


Figure 7.1 Number of towns and cities reporting incidents with wild boar within their (peri-) urban area by 2012. *Source*: From Licoppe *et al.* (2013), with permission.

MANAGEMENT PROBLEMS

20-64% of ungulate species present in each European country are exotic

Chapter 4

Introducing Aliens: Problems Associated with Invasive Exotics

Francesco Ferretti and Sandro Lovari

INTRODUCTION OF EXOTIC SPECIES

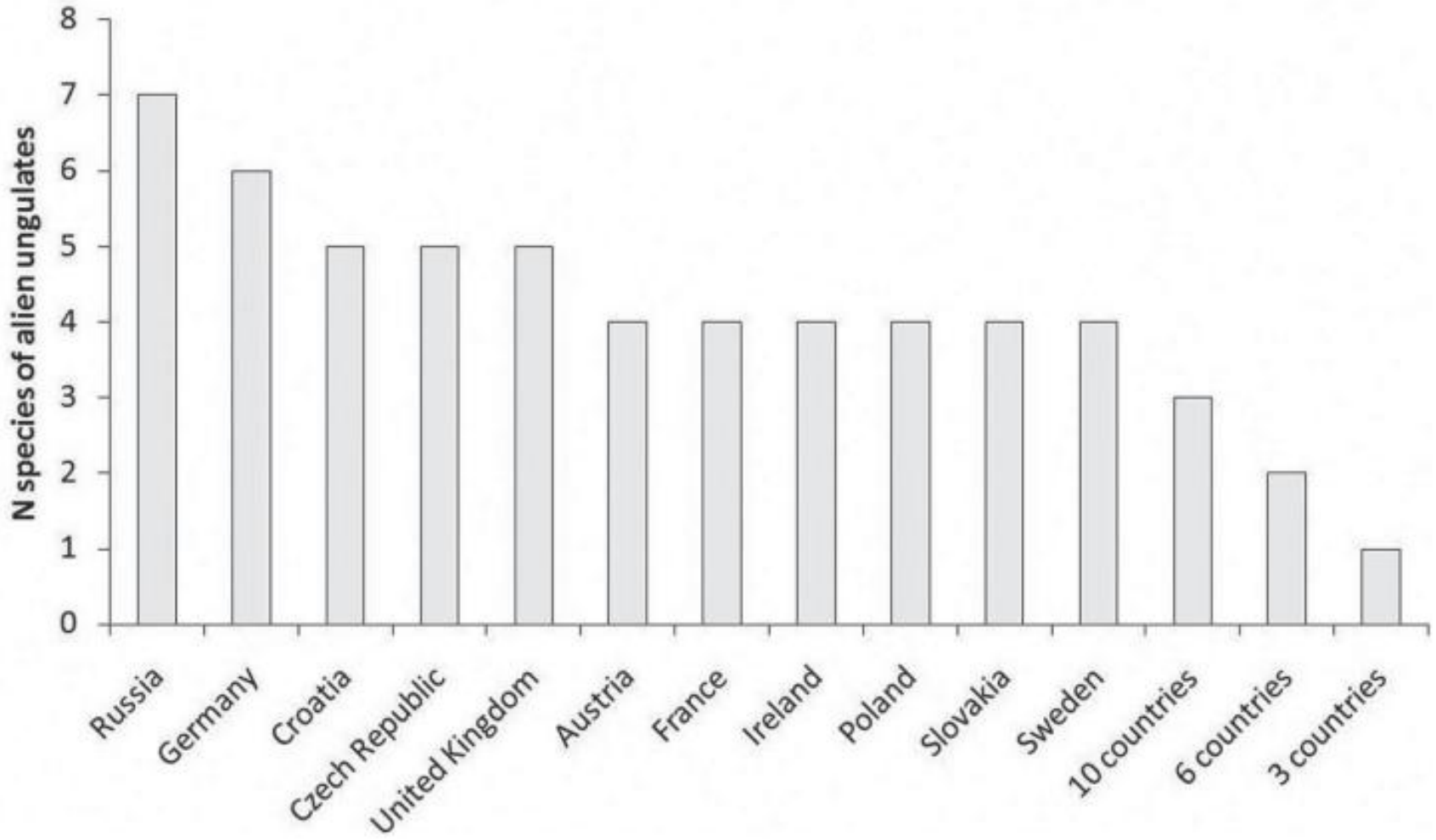


Figure 4.1 Number of species of alien ungulates present in European countries.

Sources: Delivering Alien Invasive Species Inventories for Europe: http://www.europe-aliens.org; *IUCN Red List*: www.iucnredlist.org; *Invasive Species Compendium*: http://www.cabi.org/isc/.


ROAD BUYING VELVET
TROPHIES
SIRES
DEER SEMEN
LIVE SAL
Adonis World SCI No1 at 6yrs. Semen available from us
ALTERATION OF THE
ORIGINAL GENOTYPE BY
ARTIFICIAL SELECTION

Genetic test for Iberian red deer

Prerequisite for trophies before they can be accepted by the Spanish Trophy Commission

Carranza et al., 2003 (Anim Biodiv Cons)

Las pruebas de ADN certifican que el venado que abatió en septiembre es ibérico

El Rey apuesta por lo autóctono

Juan CARRANZA ALMAIDA
Catedrático de Zoología
Universidad de Extremadura
José Luis FERNÁNDEZ GARCÍA
Profesor Titular de Genética
Universidad de Extremadura

El Rey con el venado que abatió a mediados de septiembre en una finca madrileña. Dio 225 puntos y superaría el propio récord personal del monarca, que es a su vez el actual récord de España.

El pasado mes de octubre TROFEO publicó en exclusiva la foto de Su Majestad El Rey con el venado que abatió a mediados de septiembre en la finca madrileña de los hermanos Santos Tejedor. Dicho venado, por iniciativa de Don Juan Carlos, se analizó genéticamente para certificar que se trataba de un auténtico venado ibérico o "español", como así ha confirmado la Universidad de Extremadura. Dada la transcendencia de este análisis, pues se trata de un venado abatido por el Rey que podría superar el actual récord de España, también en su poder, los científicos que han estudiado este ejemplar explican en qué consisten estas pruebas genéticas, su absoluta fiabilidad y otros detalles biométricos de este venado, como su edad o que su madre posiblemente era "cordobesa".

… AND AN UNCERTAIN FUTURE …

FUTURE CHALLENGES IN UNGULATE MANAGEMENT IN EUROPE

1- CLIMATE CHANGES AND THEIR EFFECTS ON LARGE HERBIVORE POPULATIONS

2- THE INCREASE IN NUMBER AND DISTRIBUTION OF LARGE CARNIVORES AND THEIR IMPACT ON LARGE HERBIVORES

3- CHANGES IN LAND USE PATTERNS AND PRIORITIES ACROSS EUROPE

1 - CLIMATE CHANGES AND THEIR EFFECTS ON LARGE HERBIVORE POPULATIONS

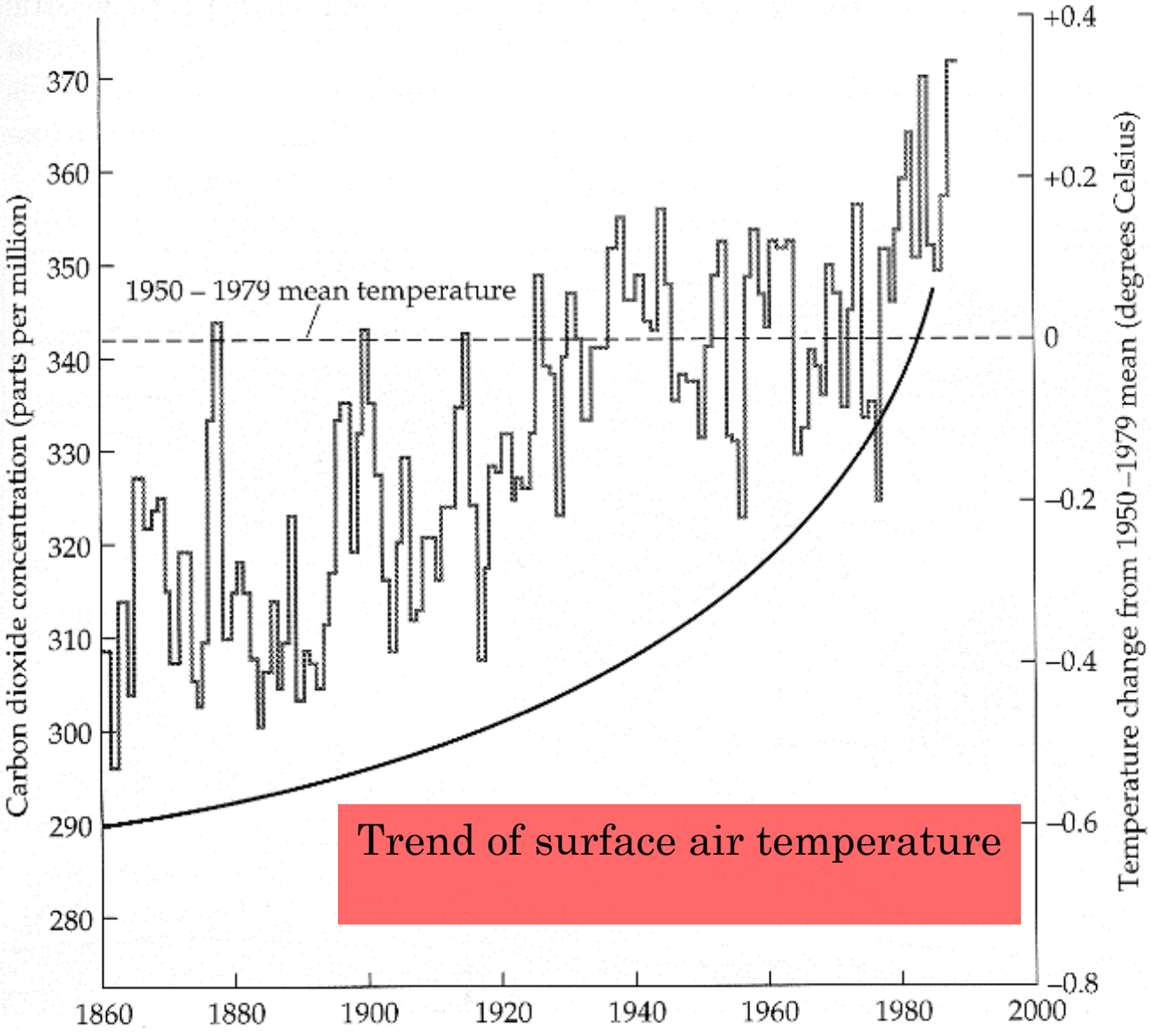
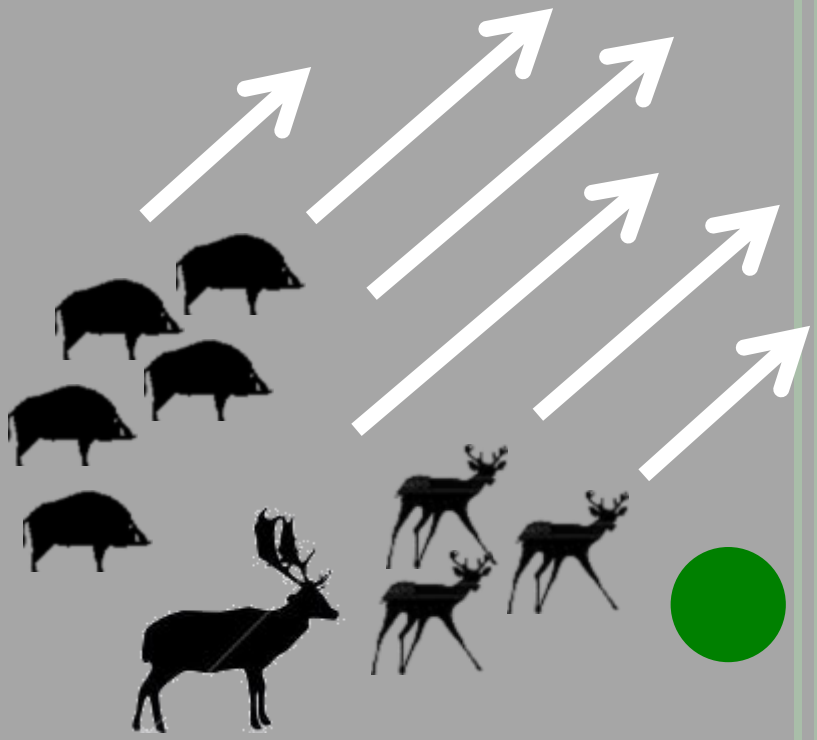


Figure 9.25 During the last 130 years, carbon dioxide concentrations (black curve) and other greenhouse gases in the lower atmosphere have been steadily increasing as a result of human activities. There is also evidence of a global increase in surface air temperatures. Most scientists now believe that the observed temperature increases (the "skyline") are being caused by these increased concentrations of greenhouse gases. (From Schneider 1989.)

Temperate ungulates may profit from temperature increase and will expand their range northwards



RESEARCH ARTICLE

What Is a Mild Winter? Regional Differences in Within-Species Responses to Climate Change

Sebastian G. Vetter*, Thomas Ruf, Claudia Bieber, Walter Arnold

Department of Integrative Biology and Evolution, Research Institute of Wildlife Ecology, University of Veterinary Medicine, Vienna, Savoyenstraße 1, Vienna, Austria

* sebastian.vetter@vetmeduni.ac.at

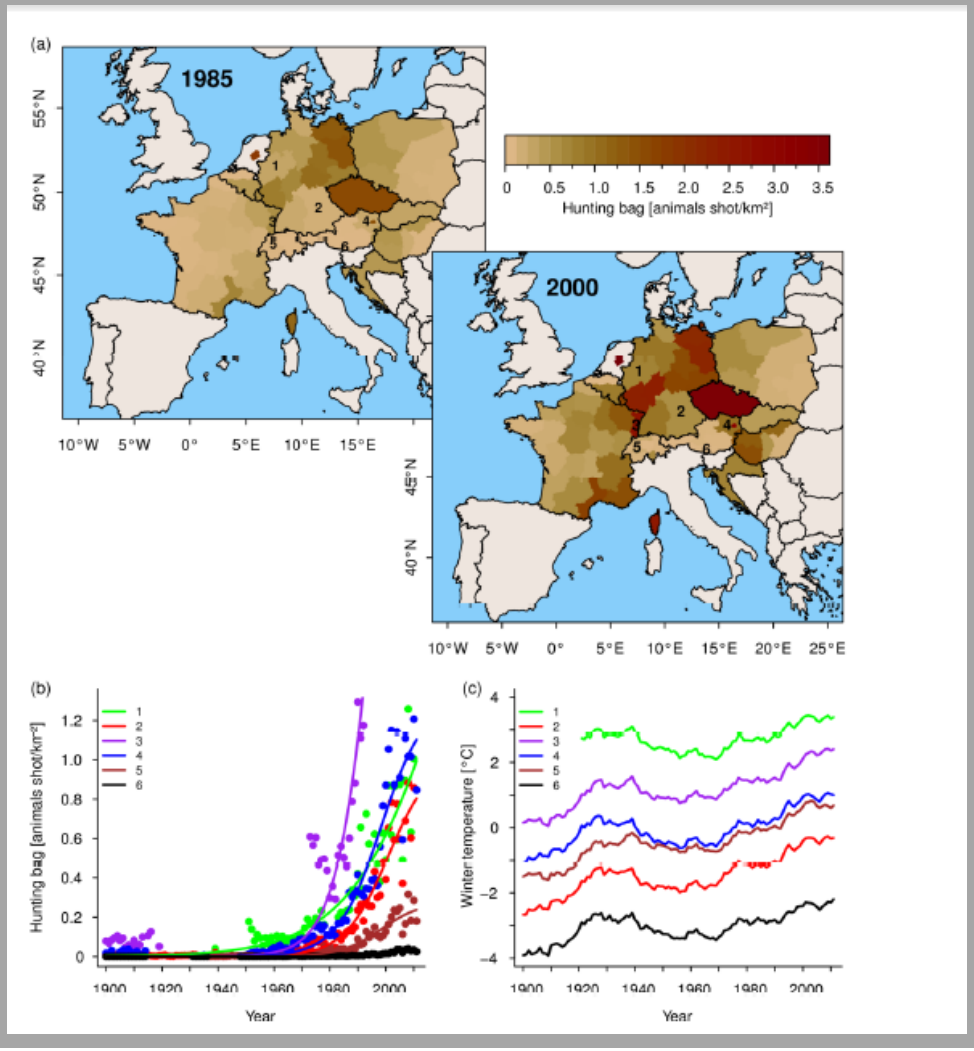


Figure 1 Increase of European wild boar populations and mean winter temperatures. (a) Color-coded wild boar densities in various regions 1985 and 2005, respectively. For six exemplary regions time courses of wild boar hunting bags (b) as well as corresponding changes in long-term mean winter temperatures (30-year means, 1973-2002) (c) are shown: 1 = North-Rhine Westphalia (DE), 2 = Bavaria (DE), 3 = Alsace (FR), 4 = Lower Austria (AT), 5 = Espace Mittelland (CH), 6 = Carinthia (AT).

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PLOS | BIOLOGY

Mismatch Between Birth Date and Vegetation Phenology Slows the Demography of Roe Deer

Floriane Plard[1], Jean-Michel Gaillard[1]*, Tim Coulson[2], A. J. Mark Hewison[3], Daniel Delorme[4], Claude Warnant[4], Christophe Bonenfant[1]

1 Laboratoire "Biométrie et Biologie Évolutive," Unité Mixte de Recherche 5558, Université Claude Bernard Lyon 1, Lyon, France, **2** Department of Zoology, The Tinbergen Building, University of Oxford, Oxford, United Kingdom, **3** INRA, UR035 CEFS, B.P. 52627, Castanet-Tolosan cedex, France, **4** Centre National d'Études et de Recherches Appliquées Cervidés-Sangliers, Office National de la Chasse et de la Faune Sauvage, Paris, France

Abstract

Marked impacts of climate change on biodiversity have frequently been demonstrated, including temperature-related shifts in phenology and life-history traits. One potential major impact of climate change is the modification of synchronization between the phenology of different trophic levels. High phenotypic plasticity in laying date has allowed many bird species to track the increasingly early springs resulting from recent environmental change, but although changes in the timing of reproduction have been well studied in birds, these questions have only recently been addressed in mammals. To track peak resource availability, large herbivores like roe deer, with a widespread distribution across Europe, should also modify their life-history schedule in response to changes in vegetation phenology over time. In this study, we analysed the influence of climate change on the timing of roe deer births and the consequences for population demography and individual fitness. Our study provides a rare quantification of the demographic costs associated with the failure of a species to modify its phenology in response to a changing world. Given these fitness costs, the lack of response of roe deer birth dates to match the increasingly earlier onset of spring is in stark contrast with the marked phenotypic responses to climate change reported in many other mammals. We suggest that the lack of phenotypic plasticity in birth timing in roe deer is linked to its inability to track environmental cues of variation in resource availability for the timing of parturition.

Ecology, 88(2), 2007, pp. 381–390

EARLY ONSET OF VEGETATION GROWTH VS. RAPID GREEN-UP: IMPACTS ON JUVENILE MOUNTAIN UNGULATES

NATHALIE PETTORELLI,[1] FANIE PELLETIER,[2,3] ACHAZ VON HARDENBERG,[4] MARCO FESTA-BIANCHET,[2] AND STEEVE D. CÔTÉ[1,5]

[1]*Département de Biologie and Centre d'études nordiques, Université Laval, Québec G1K 7P4 Canada*
[2]*Département de Biologie, Université de Sherbrooke, 2500 Boul. de l'Université, Sherbrooke, QC J1K 2R1 Canada*
[3]*Division of Biology, Faculty of Life Sciences, Imperial College London, Silwood Park, Ascot, Berkshire SL5 7PY UK*
[4]*Alpine Wildlife Research Centre, Parco Nazionale Gran Paradiso, via della Rocca 47, 10123 Torino, Italy*

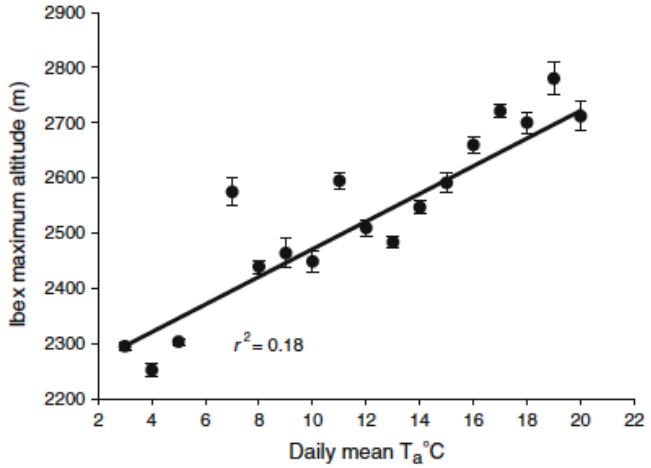


Fig. 3 Mean daily maximum altitude (±SE) reached by male Alpine ibex under different ambient temperature (T_a) conditions in their summer range in 2003–2004, Levionaz, Italy. Although points show averages for each degree, the r^2 and the regression line are for all observations

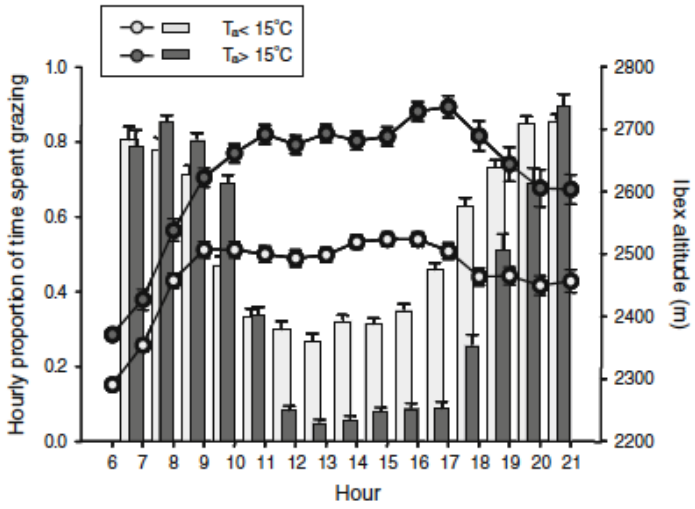


Fig. 1 Mean ± SE hourly proportion of time spent grazing (*histograms*) and mean ± SE hourly altitude (*circles*) of male Alpine ibex between 06:00 and 21:00 h for days when mean ambient temperature (T_a) was below (*light grey*) and above (*dark grey*) 15°C. Data from summers 2003–2004 at Levionaz, Italy

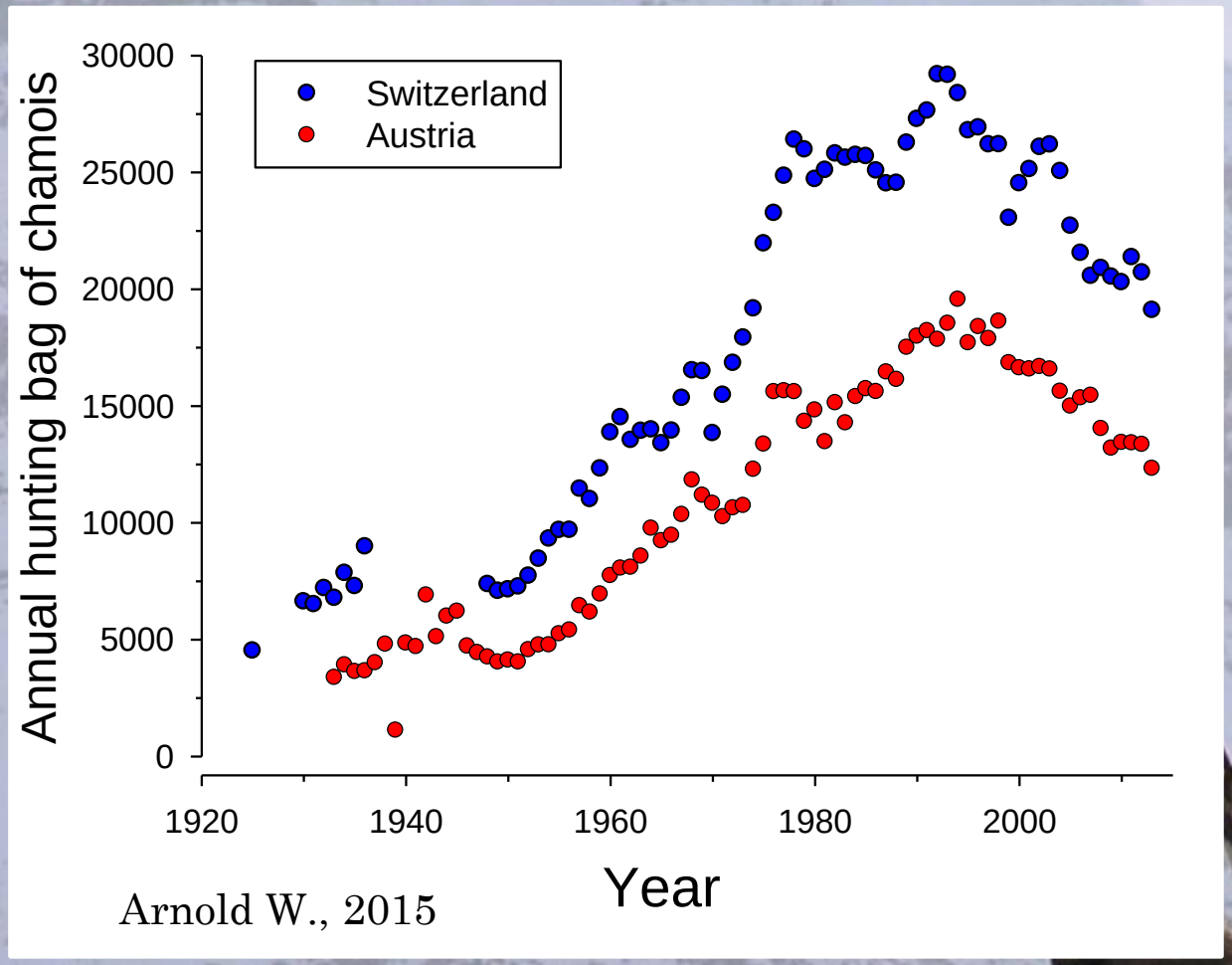
Oecologia (2009) 159:237–247
DOI 10.1007/s00442-008-1198-4

BEHAVIORAL ECOLOGY - ORIGINAL PAPER

Temperature constraints on foraging behaviour of male Alpine ibex (*Capra ibex*) in summer

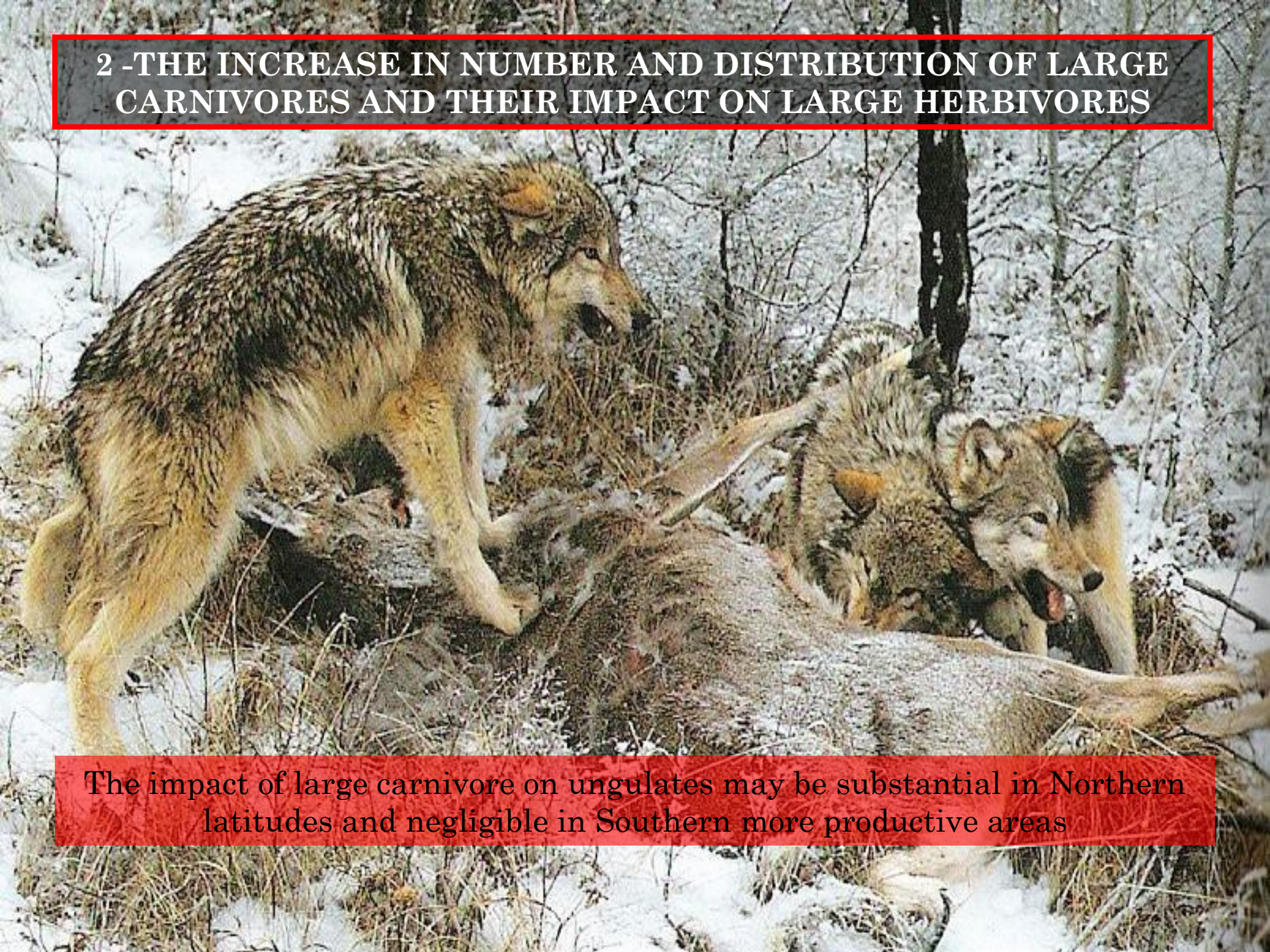
Jean-François Aublet · Marco Festa-Bianchet · Domenico Bergero · Bruno Bassano

THE CASE OF ALPINE IBEX



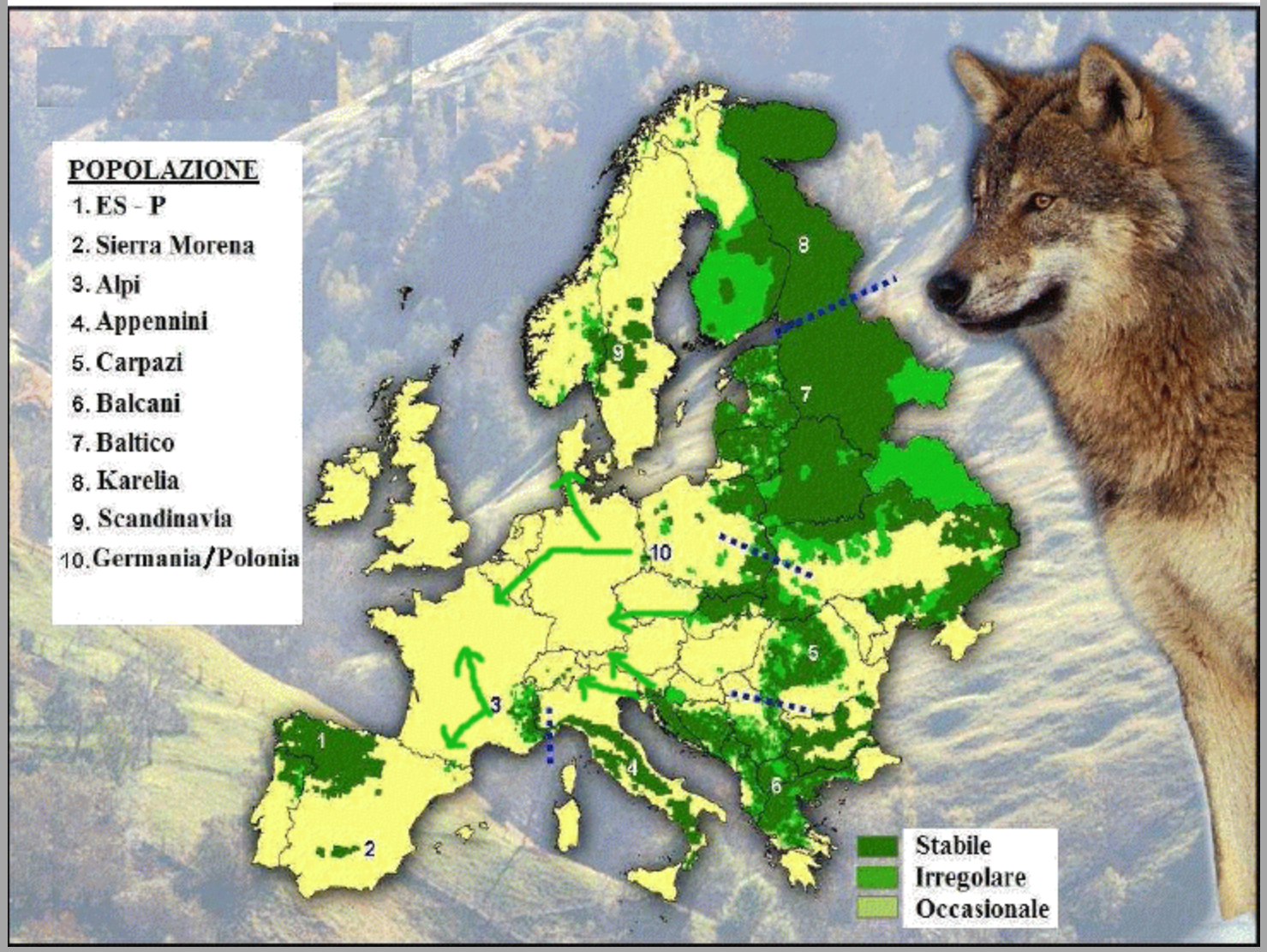
THE CASE OF ALPINE CHAMOIS

2 -THE INCREASE IN NUMBER AND DISTRIBUTION OF LARGE CARNIVORES AND THEIR IMPACT ON LARGE HERBIVORES



The impact of large carnivore on ungulates may be substantial in Northern latitudes and negligible in Southern more productive areas

Fig. 1.1 – Distribuzione del lupo in Europa (LCIE, modificata)

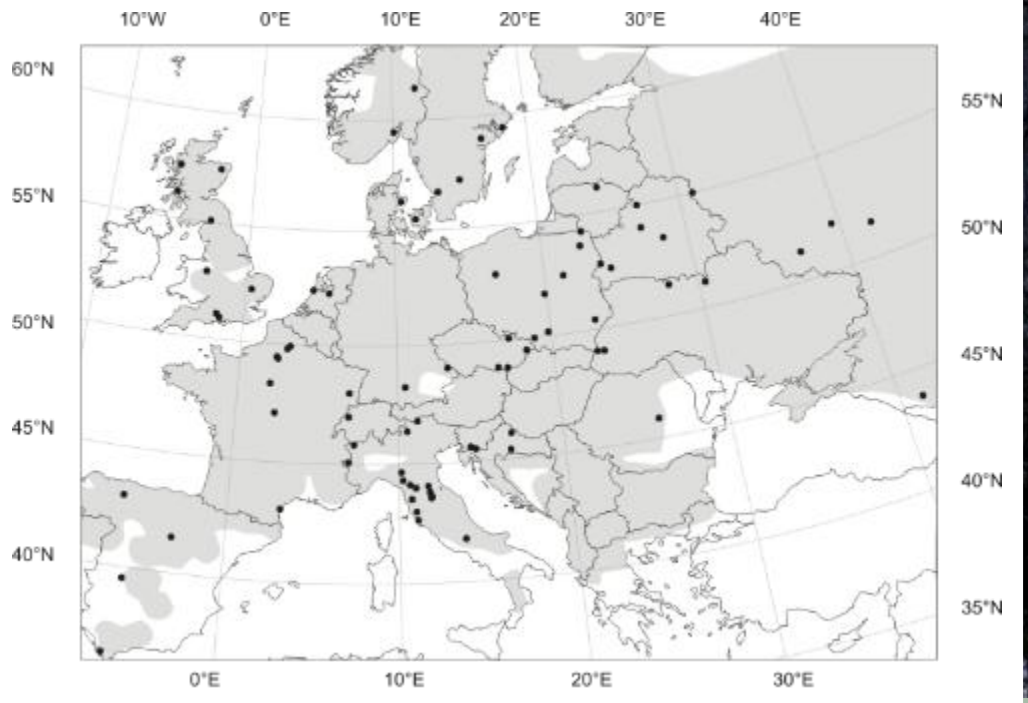


Global Ecology and Biogeography, (Global Ecol. Biogeogr.) (2009) 18, 724–734

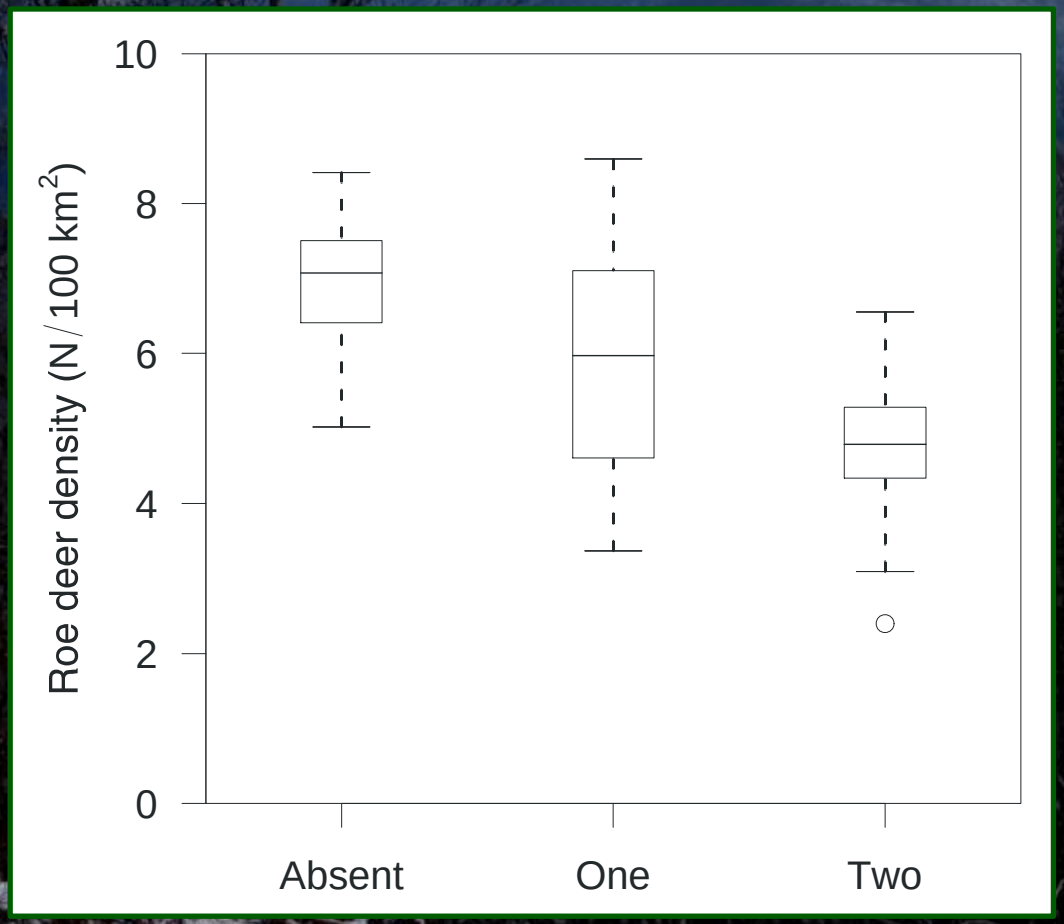
RESEARCH PAPER

Predation has a greater impact in less productive environments: variation in roe deer, *Capreolus capreolus*, population density across Europe

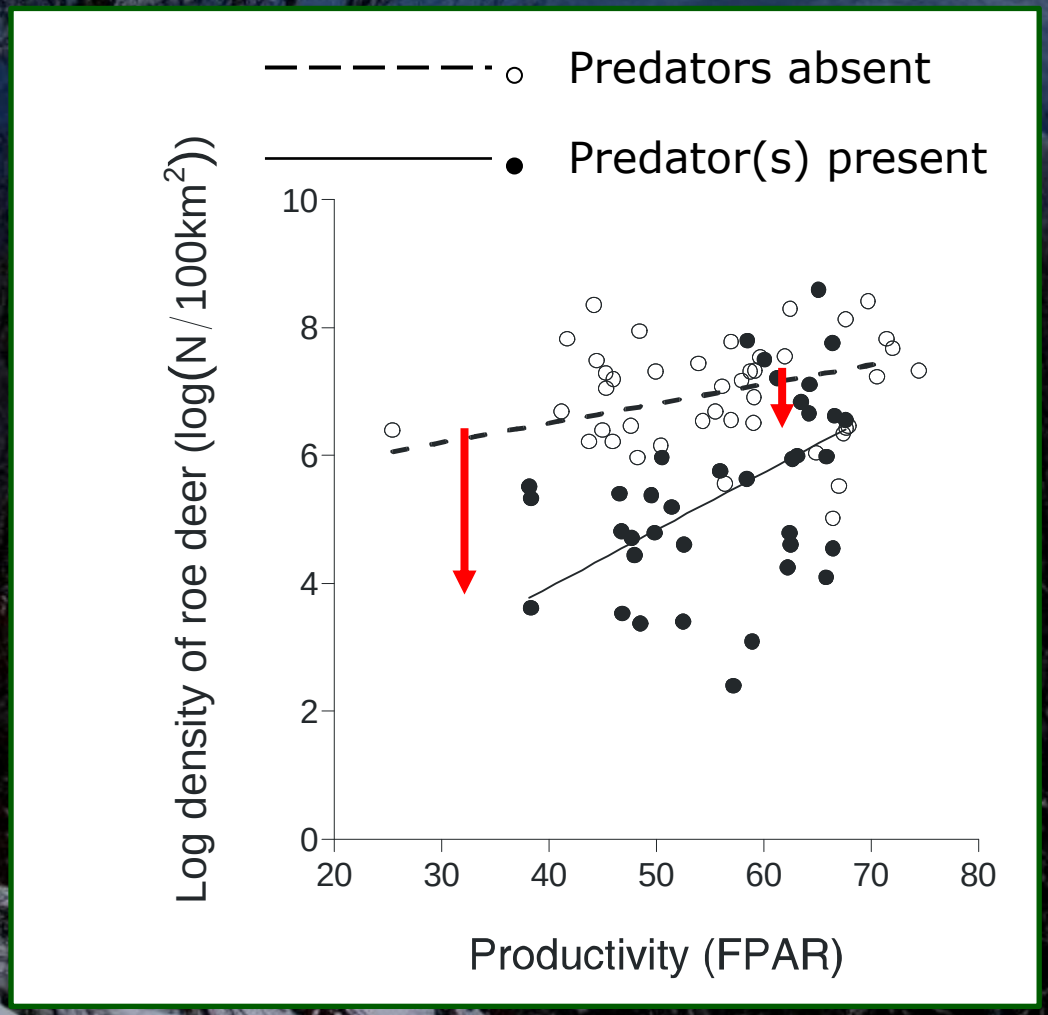
Claudia Melis[1*†], Bogumiła Jędrzejewska[1], Marco Apollonio[2], Kamil A. Bartoń[1], Włodzimierz Jędrzejewski[1], John D.C. Linnell[3], Ilpo Kojola[4], Josip Kusak[5], Miha Adamic[6], Simone Ciuti[2], Ivan Delehan[7], Ihor Dykyy[8], Krešimir Krapinec[9], Luca Mattioli[10], Andrey Sagaydak[7], Nikolay Samchuk[7], Krzysztof Schmidt[1], Maryna Shkvyrya[11], Vadim E. Sidorovich[12], Bernadetta Zawadzka[1‡] and Sergey Zhyla[13]



Densities of roe deer (log-transformed) in populations subject to varying predation impact



Population density of roe deer in relation to vegetation productivity

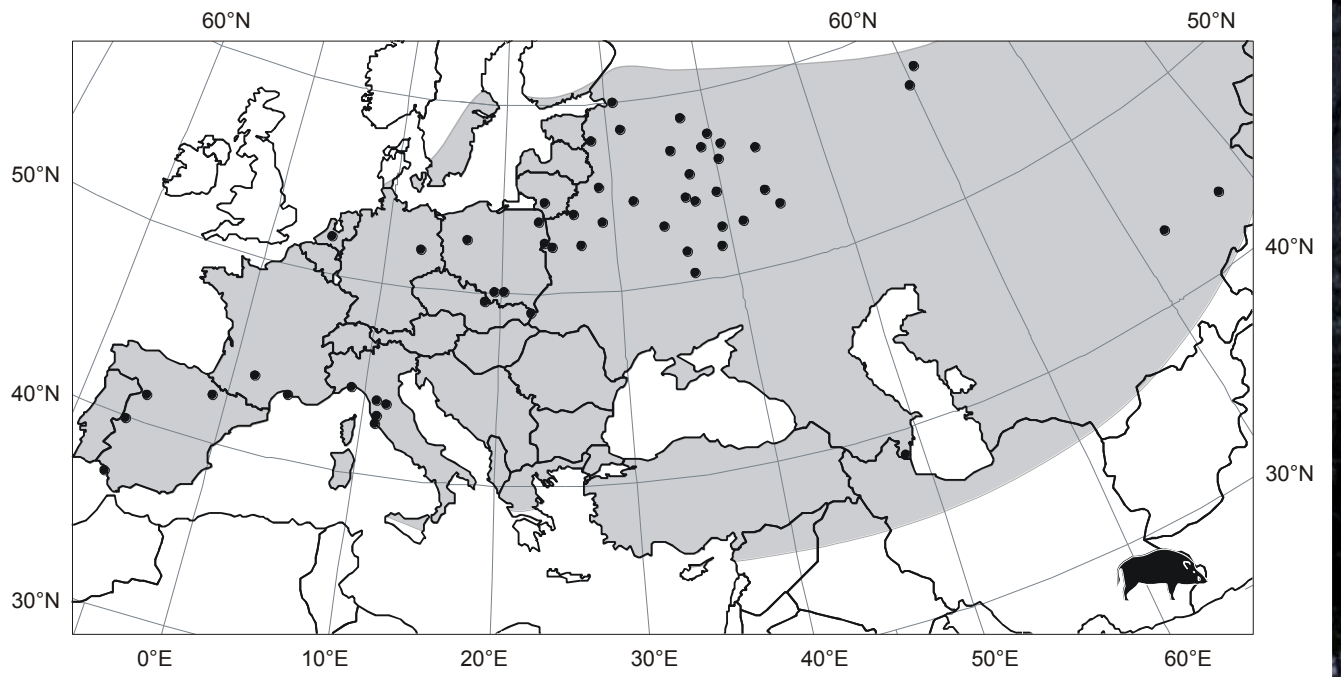


Journal of Biogeography (*J. Biogeogr.*) (2006) **33**, 803–811

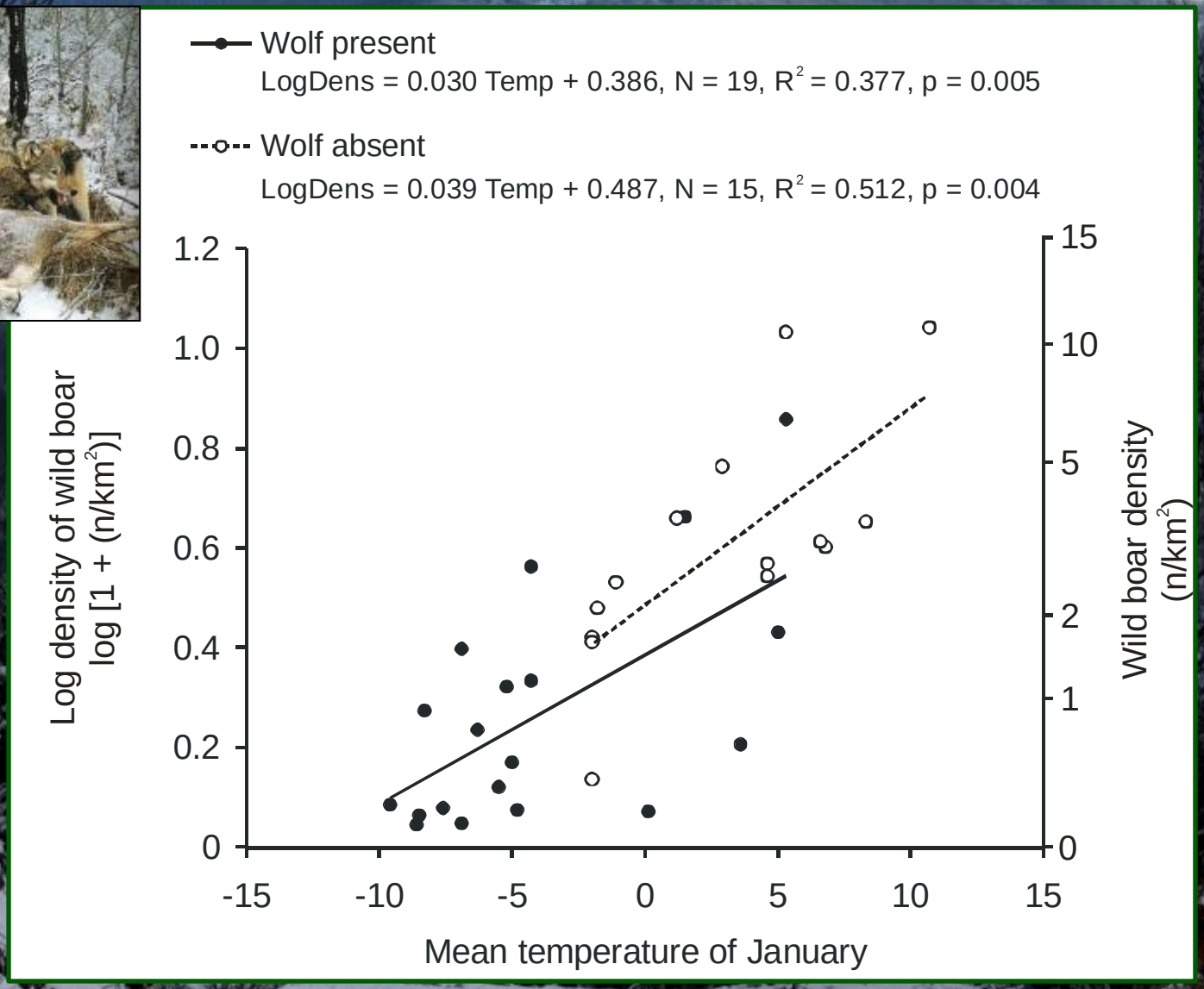
ORIGINAL ARTICLE

Biogeographical variation in the population density of wild boar (*Sus scrofa*) in western Eurasia

Claudia Melis*, Paulina A. Szafrańska, Bogumiła Jędrzejewska and Kamil Bartoń



Predation by wolves has a weak limiting effect on populations of wild boar



3 - CHANGES IN LAND USE PATTERNS AND PRIORITIES ACROSS EUROPE AND ECOSYSTEMS DYNAMICS

?

PAN EUROPEAN COOPERATION IN UNGULATE MANAGEMENT IS NEEDED

Thanks for attention