

# **HORNS, WEAPONS AND WEATHER**

## **NORTHERN CHAMOIS CONSERVATION AND SUSTAINABLE MANAGEMENT IN ITALY**



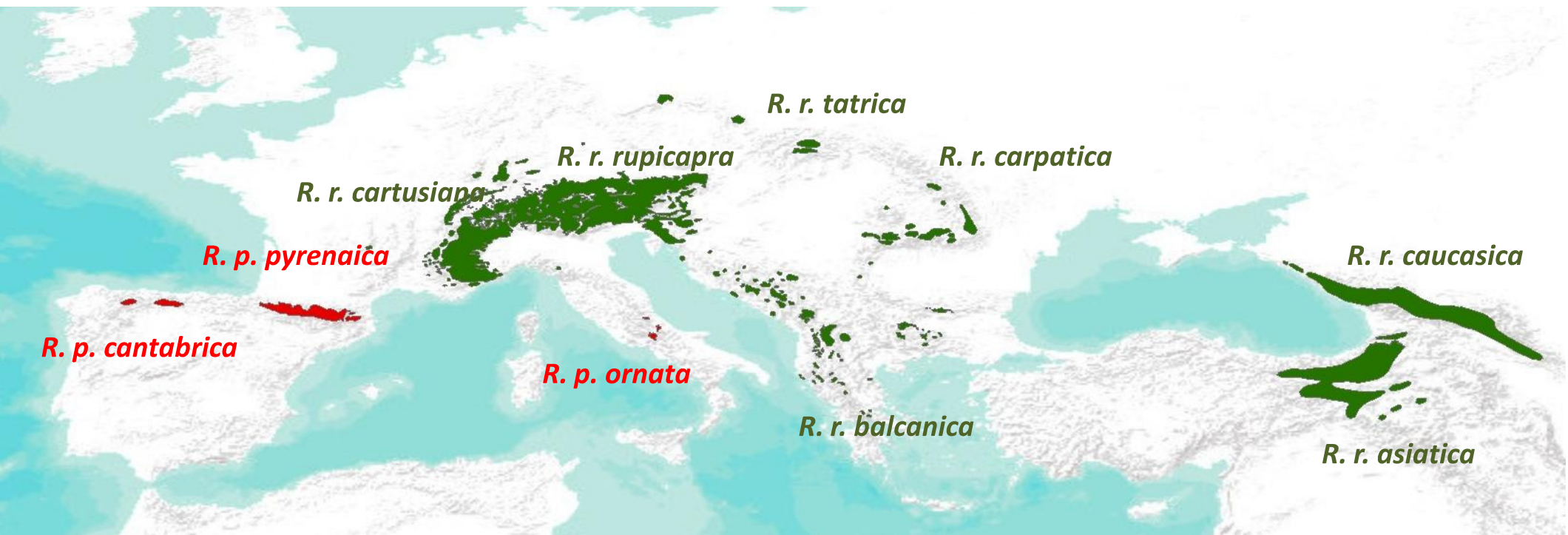
Foto Di Luzio

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Istituto Superiore per la Ricerca e la Protezione Ambientale

The classification of *Rupicapra* genus is unsettled. *Rupicaprinae* ancestor probably originated in Asia and spread to Europe during the Middle Pleistocene before the Riss Glaciation (200.000 – 130.000 y.a.). Ice sheets during glacial maxima in the Alps and Pyrenees isolated chamois populations, resulting in genetic differentiation.

### *Rupicapra pyrenaica*

### *Rupicapra rupicapra*



Excluding the Caucasus population, there are an estimated 440,000 individuals in Europe, and in some protected areas densities may exceed 20 individuals per, however, with the exception of the Alpine subspecies *R. r. rupicapra*, many subspecies are rare and/or declining.

A typical inhabitant of the mountain, subalpine and alpine horizon, the Alpine chamois frequents coniferous and broad-leaved forest areas with rich undergrowth and interspersed with steep rock faces, clearings and gullies, shrubwoods of green alder and rhododendron with sparse larches, thickets of mountain pine, grasslands, borders of rock piles and especially rock ledges above the limits of arboreal vegetation, up to the snow horizon.



Foto Di Luzio

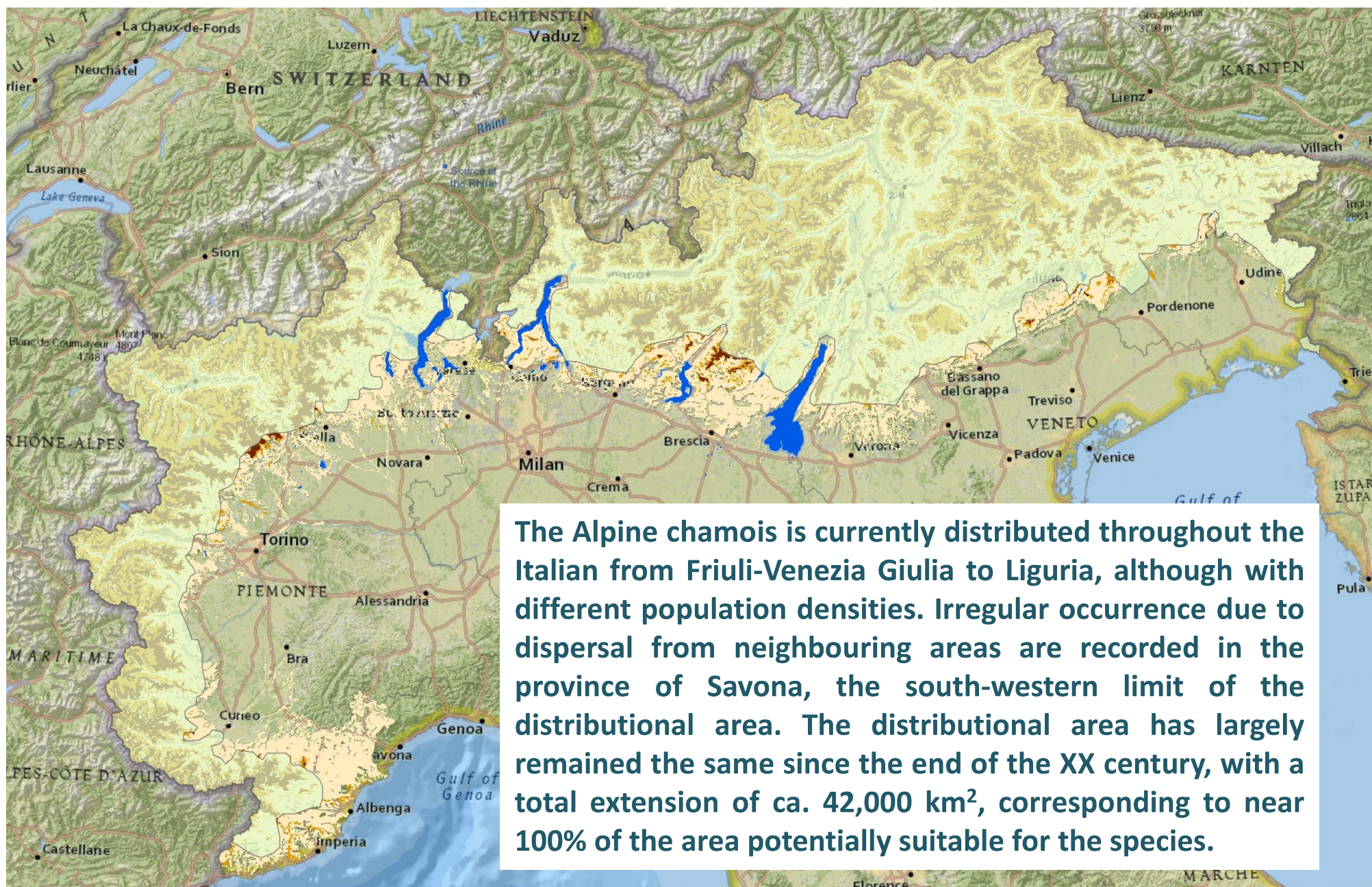
The areas frequented are generally between 1,000 and 2,500 m altitude, but spontaneous colonizations of wooded areas in low mountains, down to 400-500 m a.s.l., are also known in Italy, with the extreme situation of a small group in the Trieste Karst at only a few tens of metres above sea level.



## Habitat suitability model







The Alpine chamois is currently distributed throughout the Italian from Friuli-Venezia Giulia to Liguria, although with different population densities. Irregular occurrence due to dispersal from neighbouring areas are recorded in the province of Savona, the south-western limit of the distributional area. The distributional area has largely remained the same since the end of the XX century, with a total extension of ca. 42,000 km<sup>2</sup>, corresponding to near 100% of the area potentially suitable for the species.



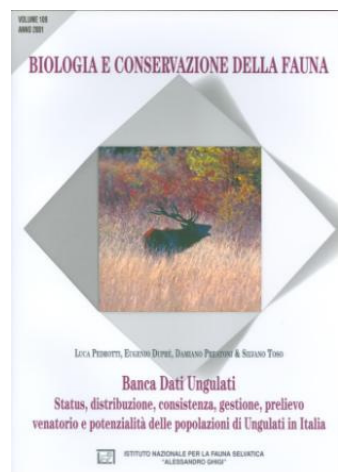




In the period 2000-2006, two reintroductions were carried out in the eastern sector of the Alps. One was in the province of Trento (12 animals released in a hunting estate). The other, in the Monte Grappa area on the border between the provinces of Treviso, Vicenza and Belluno, completed an operation started in 1998 involving the release of 53 individuals in the provinces of Belluno and Vicenza; another 82 chamois, all deriving from the Alpi Marittime Regional Park, were released on the Treviso side of Monte Grappa (for a total of 137 individuals). This neo-colony appears to be increasing, since there are currently an estimated 480 individuals in the area of the province of Treviso alone.



## Collecting data it's a dirty job .... but somebody's gotta do it

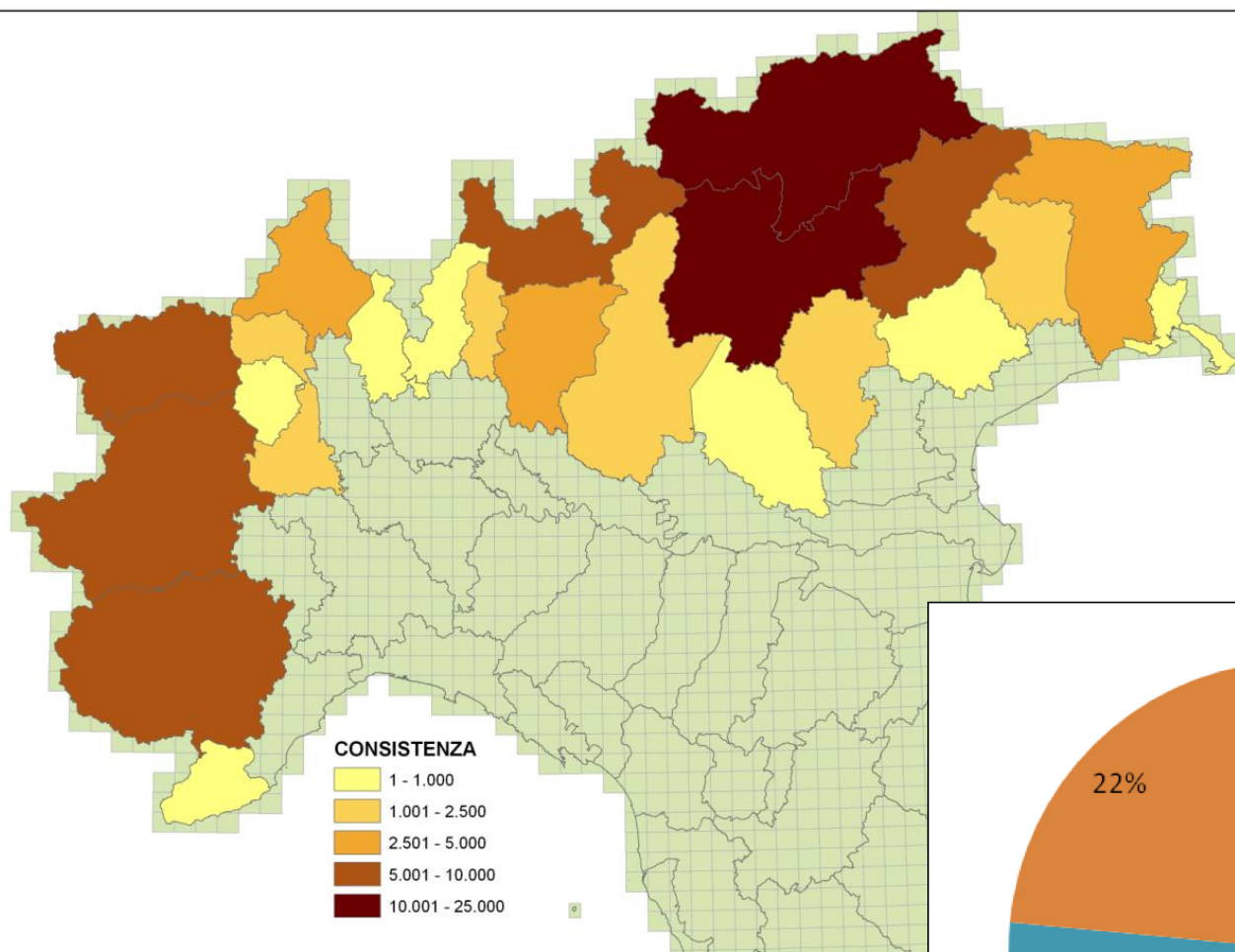


Regional districts	Abundance 2000	Abundance 2005	Abundance 2010	Abundance* 2019
Friuli-Venezia Giulia	5.950	9.309	6.812	9.456
Veneto	11.560	11.267	11.995	12.256
Trentino-Alto Adige	45.700	46.843	46.439	29.946 <sup>a</sup>
<b>CENTRAL EASTERN ALPS</b>	<b>63.210</b>	<b>67.419</b>	<b>65.246</b>	<b>51.658</b>
Lombardia	16.650	16.467	17.752	17.678
Val d'Aosta	12.200	14.022	17.749	11.798
Piemonte	30.800	37.982	28.942*	n.a.
Liguria	550	880	n.a.	658
<b>CENTRAL WESTERN ALPS</b>	<b>60.200</b>	<b>69.350</b>	<b>64.443</b>	<b>30.134</b>
<b>TOTAL</b>	<b>123.410</b>	<b>136.769</b>	<b>129.689</b>	<b>81.792</b>

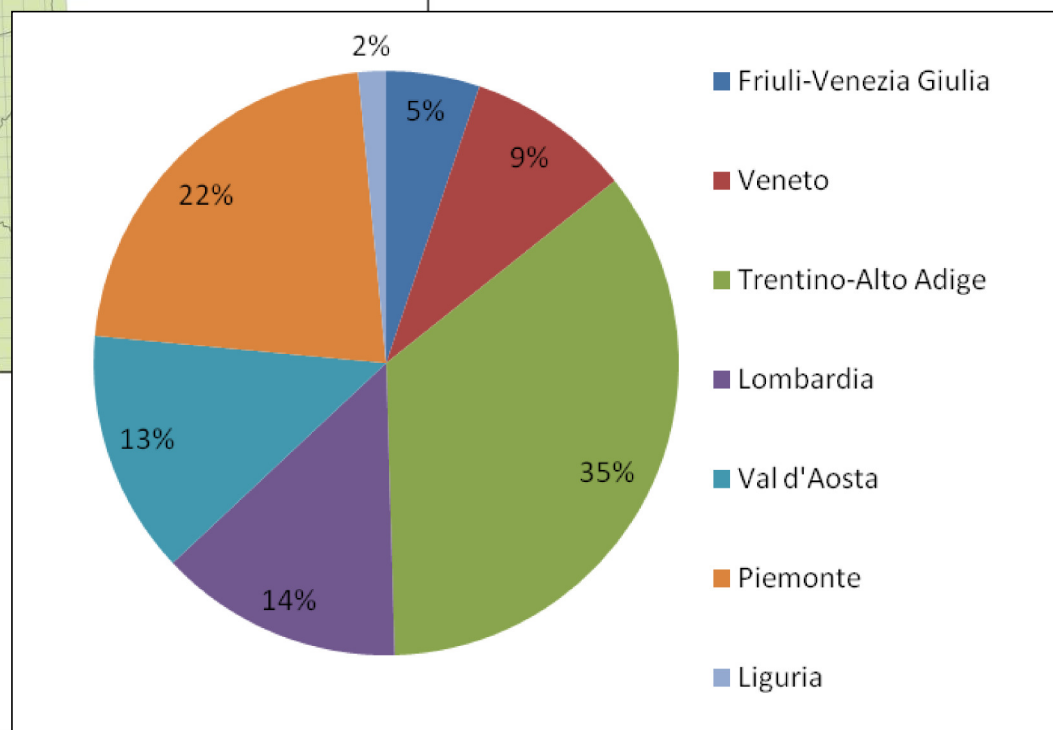
\* Missing data of protected areas

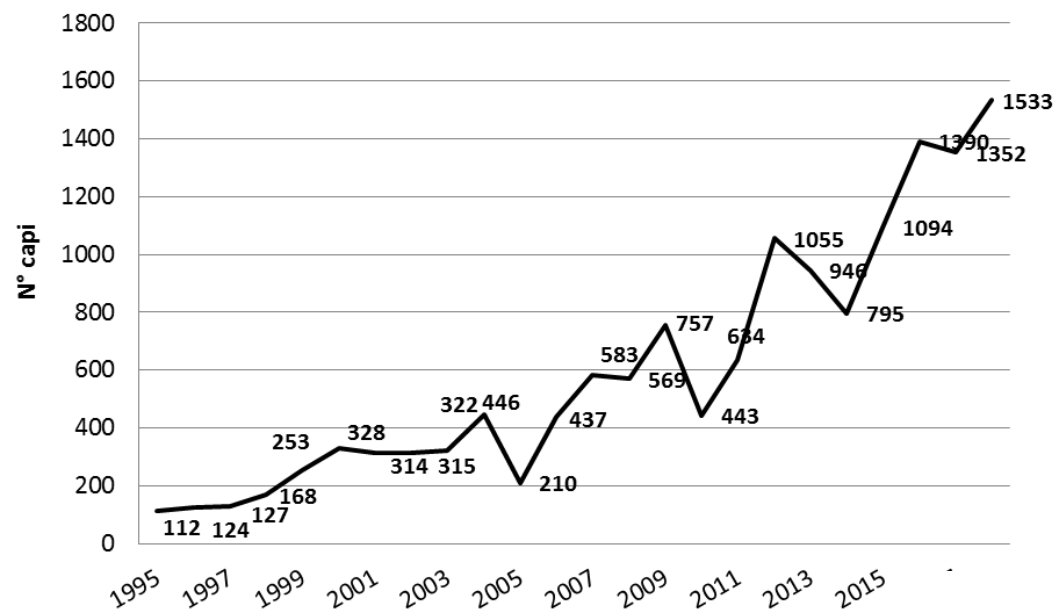
<sup>a</sup> Alto Adige data missing



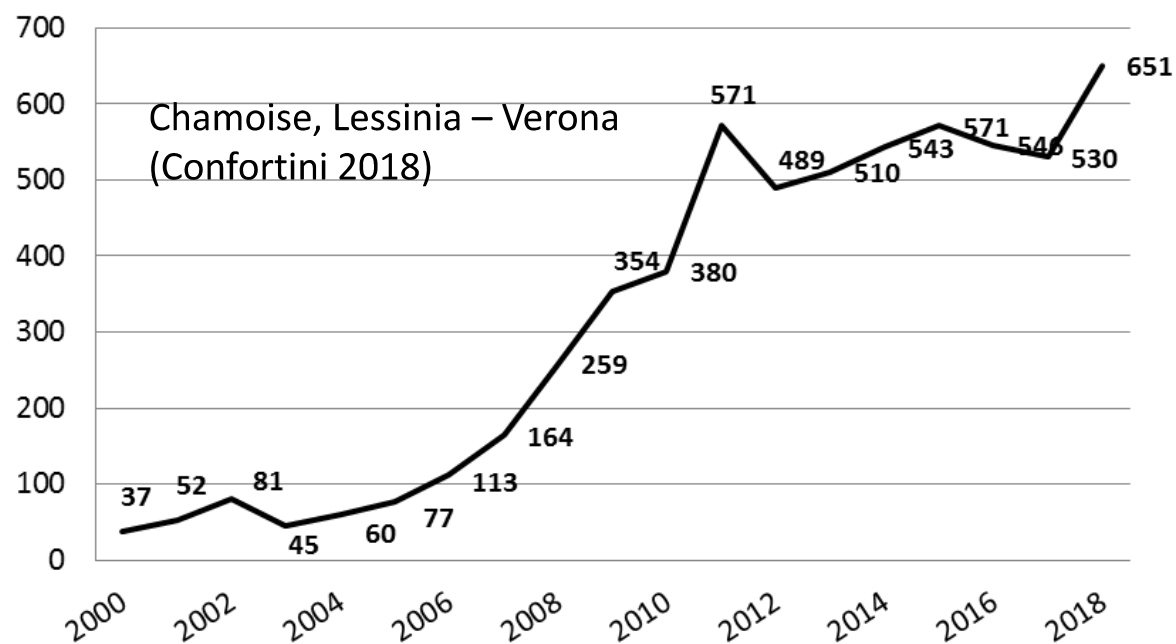


In 2010 the largest populations occur in the provinces of Trento (24,795 individuals), Bolzano (22,048 individuals), Turin (14,967 individuals), Aosta (14,022 individuals) and Cuneo (12,308 individuals). The populations in the provinces of Udine, Vercelli, Sondrio and Belluno number between 5,000 and 10,000 individuals.



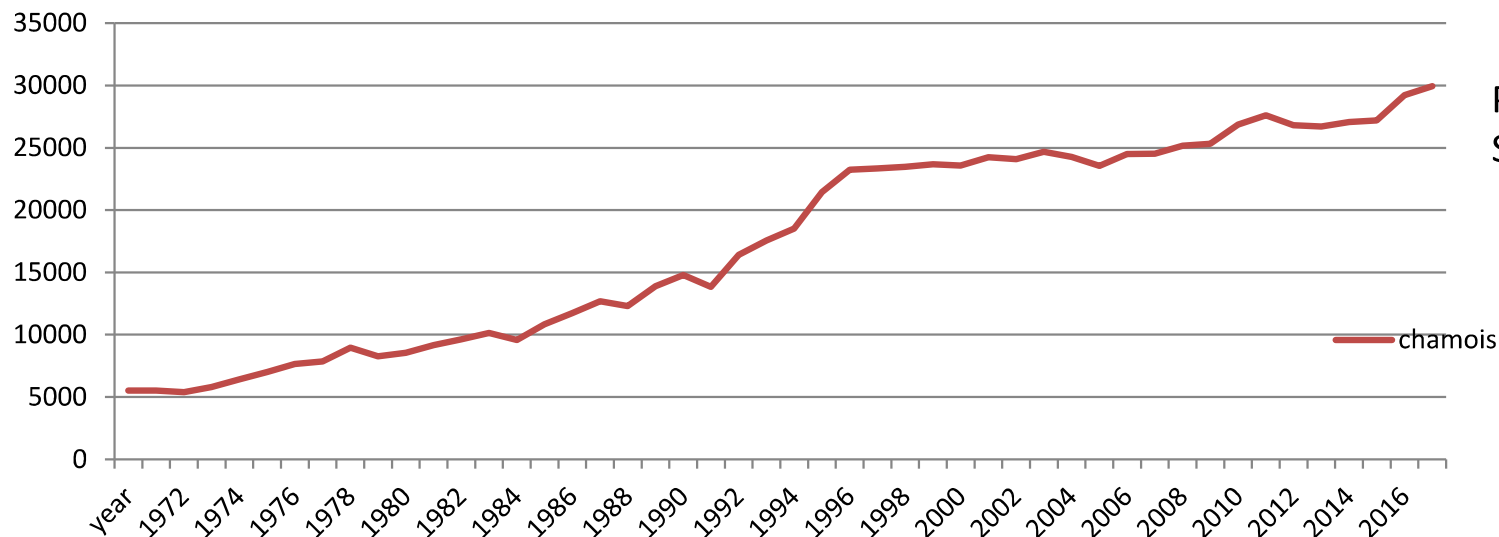


Chamoise, Monte Baldo – Verona  
(Confortini 2018)

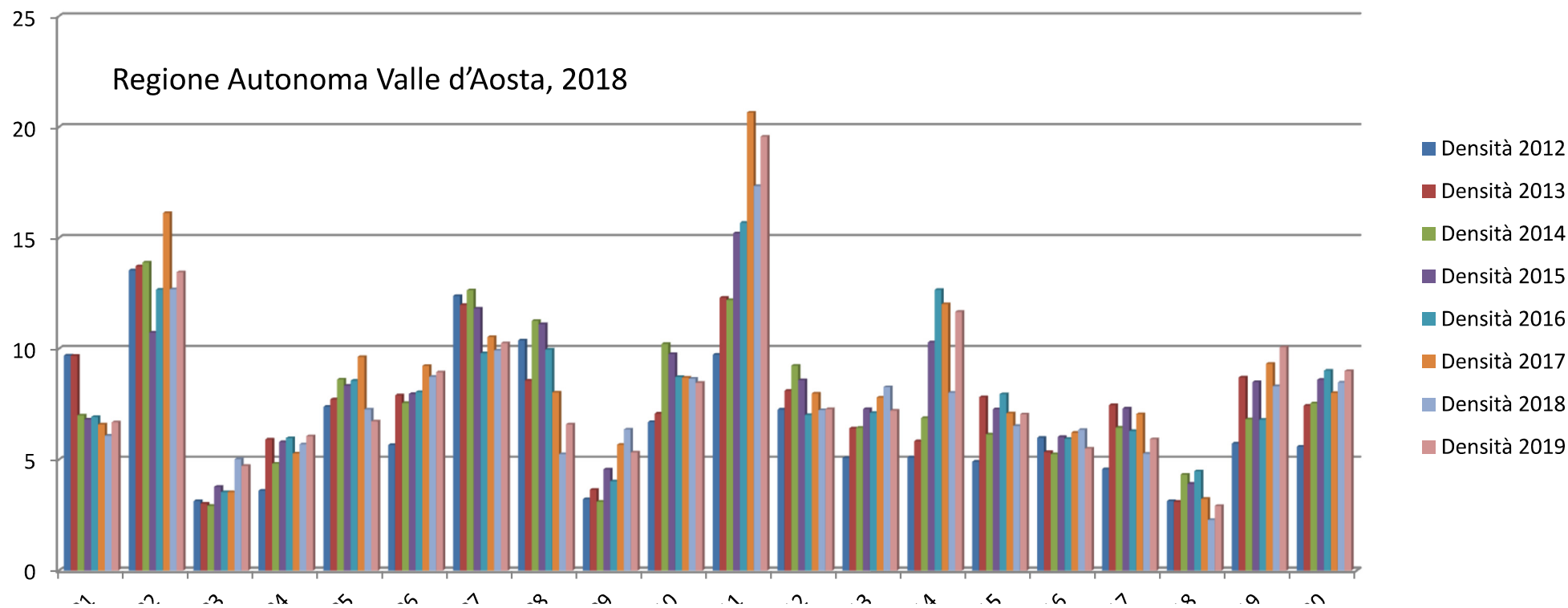


Chamoise, Lessinia – Verona  
(Confortini 2018)





Provincia Autonoma di Trento,  
Servizio Foreste e Fauna, 2018



Since the 1950s, the progressive abandonment of the medium and high mountain bands caused an inversion of the tendency and the Chamois populations began to increase and to expand their distributional area; after the 1960s, the status of the species has continually improved and its general expansion is still in progress.

The creation of parks and other protected areas has been crucial for this positive development, as they have favoured a more rapid increase and stabilization of the existing populations.

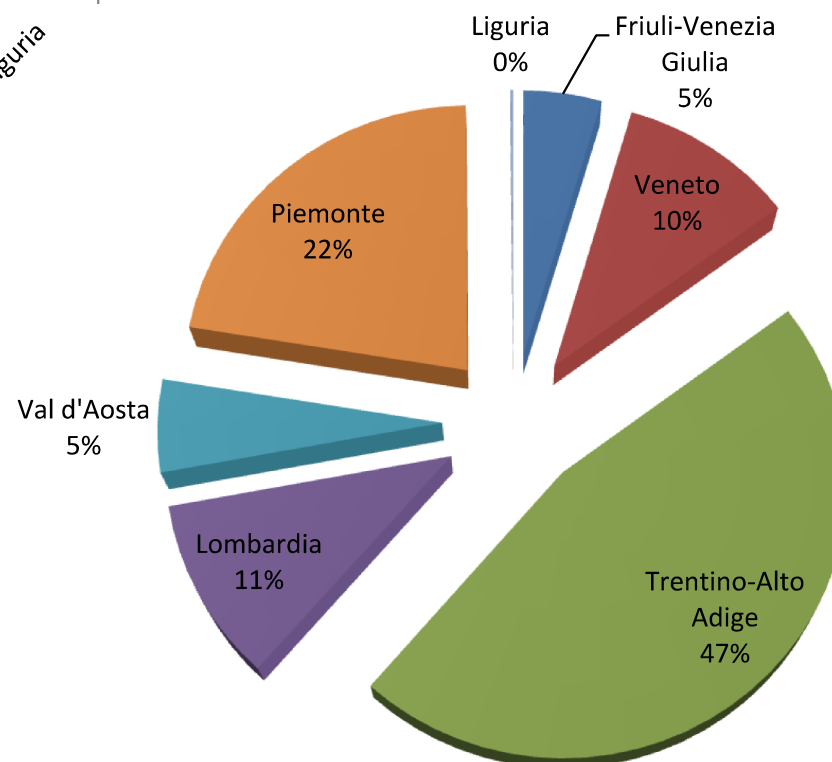
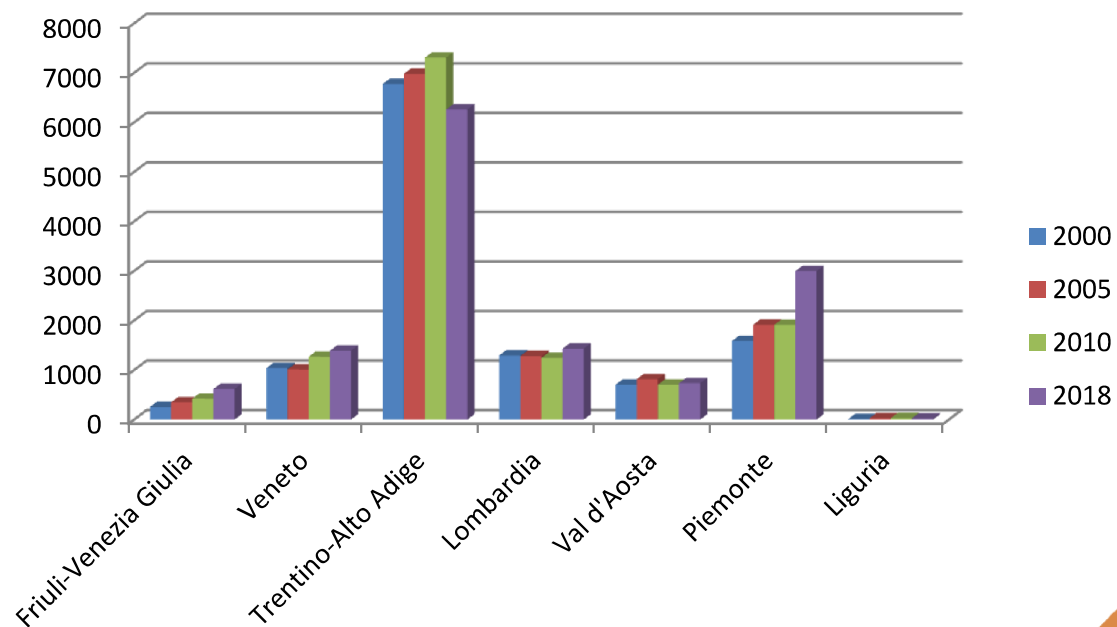
Important was also the substantial and progressive improvement of hunting management, based on assessment of the population numbers, planning of the annual harvest and application of the basic concepts of selective stalking, as well as numerous reintroduction and restocking projects in the marginal parts of the distribution range (Brescia, Sondrio, Treviso, Verona, Vicenza, Udine).

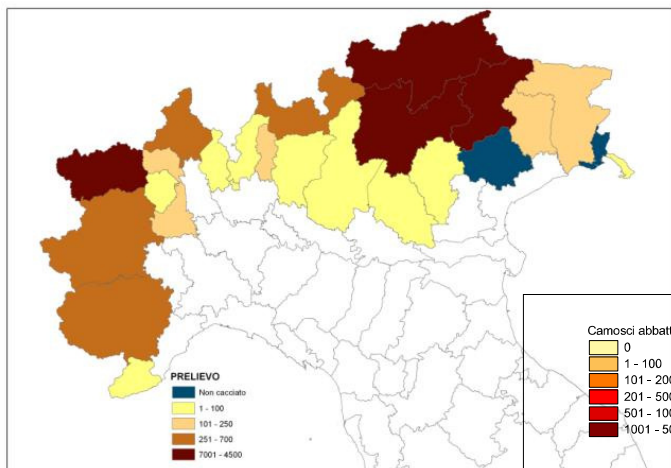
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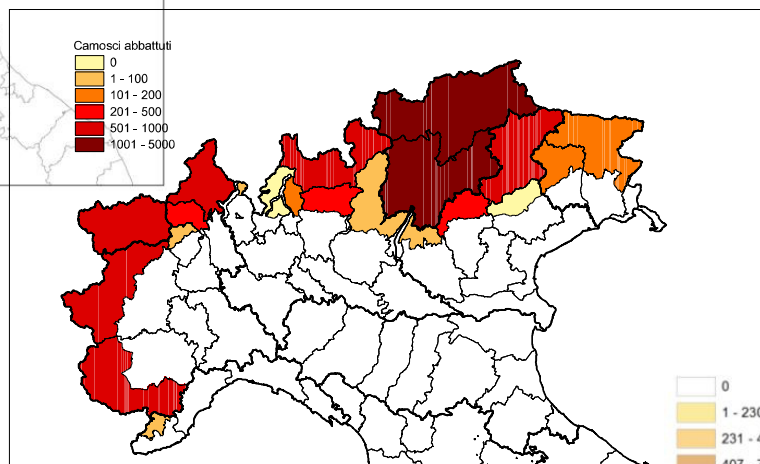
Regional districts	Harvest 2000	Harvest 2005	Harvest 2010	Harvest 2018
Friuli-Venezia Giulia	255	348	422	617
Veneto	1.038	1.011	1.268	1.389
Trentino-Alto Adige	6.777	6.979	7.309	6.262
<b>CENTRAL EASTERN ALPS</b>	<b>8.070</b>	<b>8.338</b>	<b>8.999</b>	<b>8.268</b>
Lombardia	1.294	1.281	1.244	1.433
Val d'Aosta	703	815	705	733
Piemonte	1585	1.913	1.912	2.998 <sup>a</sup>
Liguria	11	26	29	22
<b>CENTRAL WESTERN ALPS</b>	<b>3.593</b>	<b>4.035</b>	<b>3.890</b>	<b>5.168</b>
<b>TOTAL</b>	<b>11.663</b>	<b>12.373</b>	<b>12.889</b>	<b>13.454</b>

<sup>a</sup> Hunting plan 2019

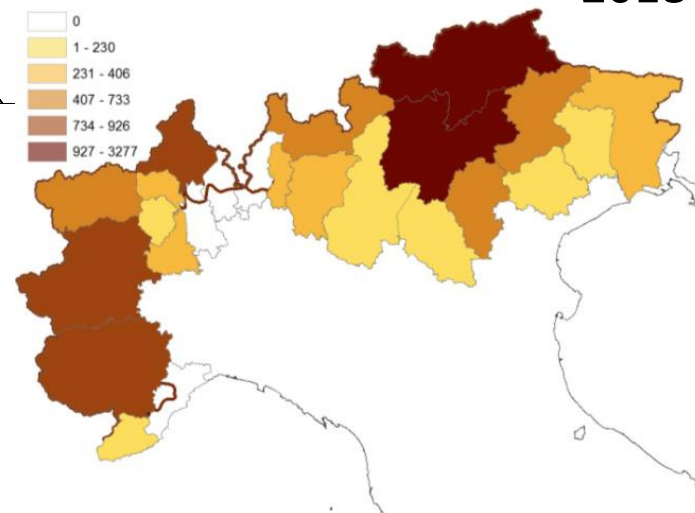




2004



2009



2018



**The Alpine chamois is one of the species subject to hunting on the basis of Law 157/92, and it appears in Appendix E of D.P.R. 8 September 1997, no. 357 “Regulations bearing on the execution of Directive 92/43/EEC relative to the conservation of natural and seminatural habitats, as well as wild flora and fauna”.**

**However, although much improved with respect to the past (even the recent past), the current game management still partially influences the distribution and especially the structure and dynamics of the populations, because the culling is not always biologically correct and tends to modify the natural numerical ratios between the sexes and the age classes of the population.**


**There are still significant differences between the hunting areas and the protected ones; the latter have greatly contributed to the recovery of the species and they generally contain the highest population numbers and densities.**

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Block count census method to estimate population abundance

Population composition in age classes


		0	I	II	III	IV
	M	<1	1	2-3	4-10	≥11
	F		1	2-3	4-10	≥11

Management district: 5 – 10.000 ha

## Harvest rate prortional to population density

	$d.s. < D < 5$	$6 \leq D \leq 10$	$10 < D \leq 15$
Minimum density	$\leq 5\%$	$\leq 15\%$	$\leq 18\%$

## Harvest composition

		classe 0	classe I	classe II	classe III	classe IV	Totale
	♂	(2,5%)	15%	10%	15%	5%	
	♀	(2,5%)	15%	10%	10%	15%	
	M/F	5%					
	totale	5%	30%	20%	25%	20%	100%



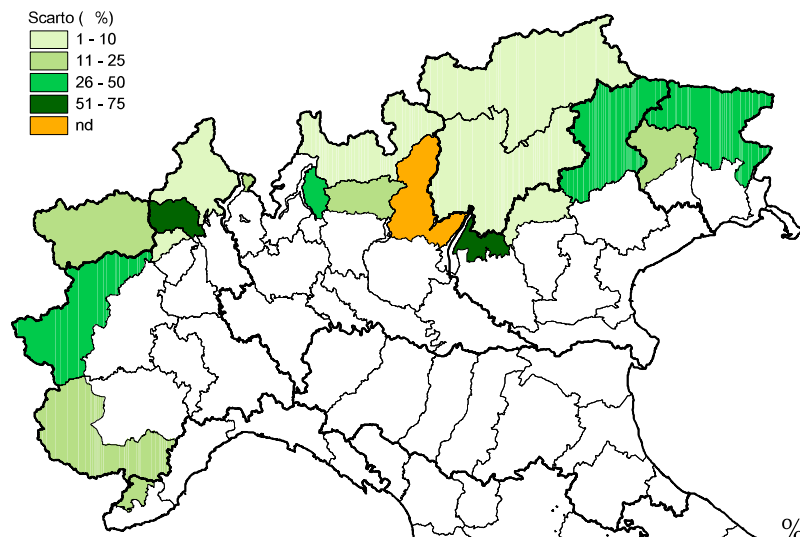


## Hunting period

- Preserve wintering areas
- Preserve births ad parental care period



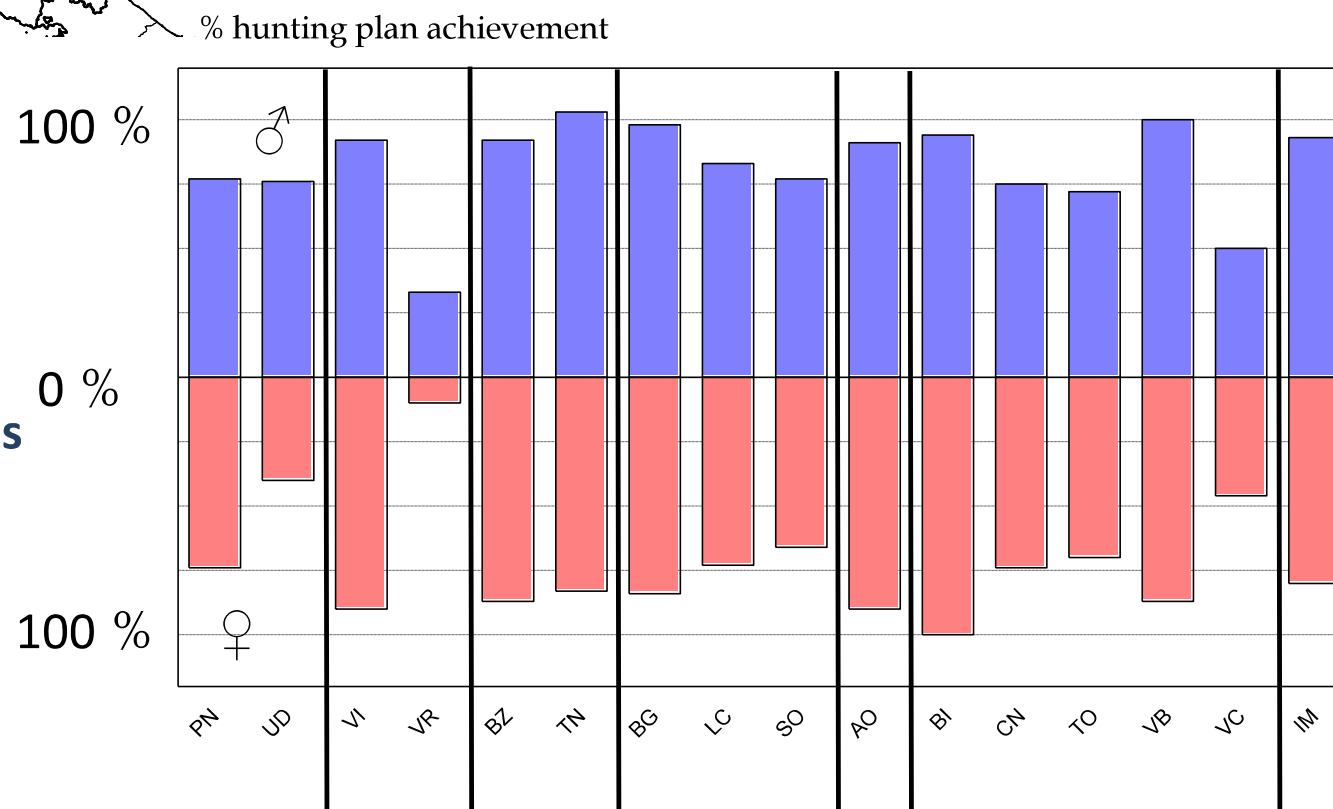
		maggio	Giugno	luglio	agosto	settembre	ottobre	novembre	dicembre	gennaio	febbraio	marzo	aprile
0	M												
	F												
I	M												
	F												
II	M												
	F												
III	M												
	F												
IV	M												
	F												
		Nascite				Riproduzione				Presenza presso i quartieri di svernamento			



## HOUSTON, WE HAVE A PROBLEM...

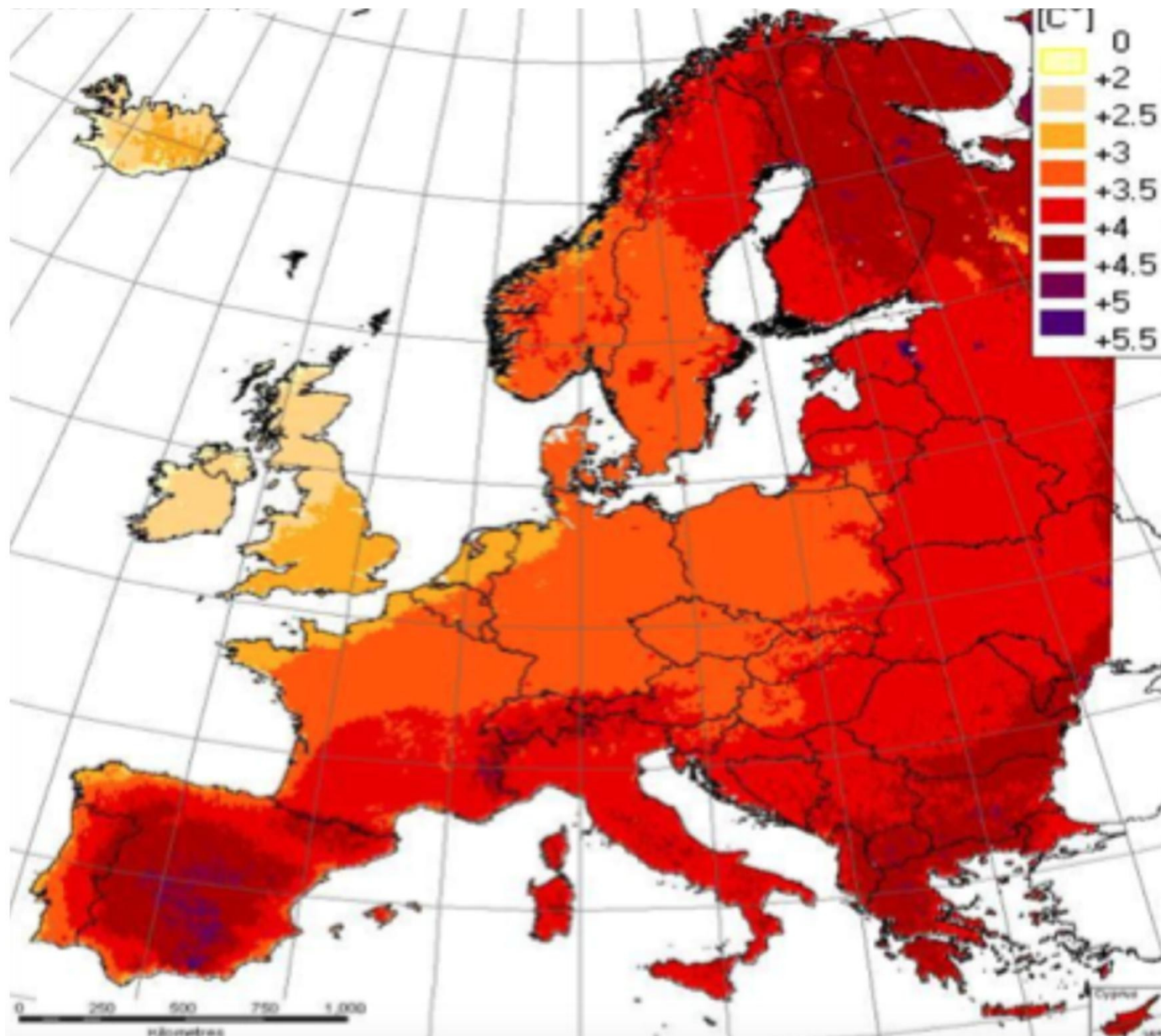
Percentage difference between the planned and effective numbers of Alpine chamois killed in the 2004-2005 season in the Italian provinces.

Percentage achievement of the planned harvest of males and females in the Italian provinces.

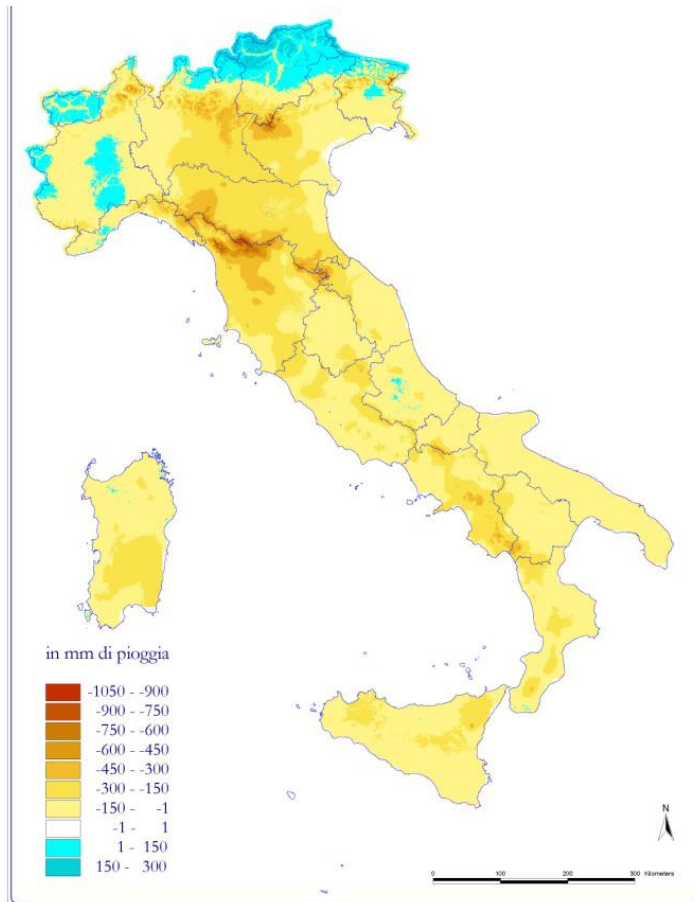


- **Tourism and recreational area development**
  - **Non sustainable hunting**
  - **Non native species**
  - **Problematic native species**
  - **Recreational activities**
  - **Livestock rancing**
  - **Climatic change**
  - **Desease**
-

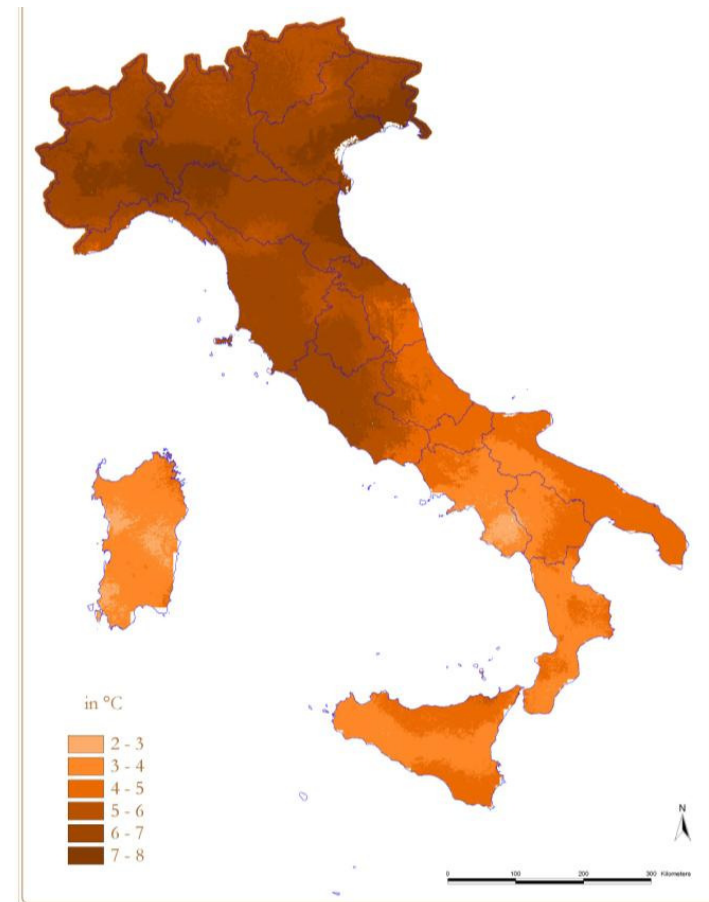










## Rain variation 1969-1990 vs 2070-2100

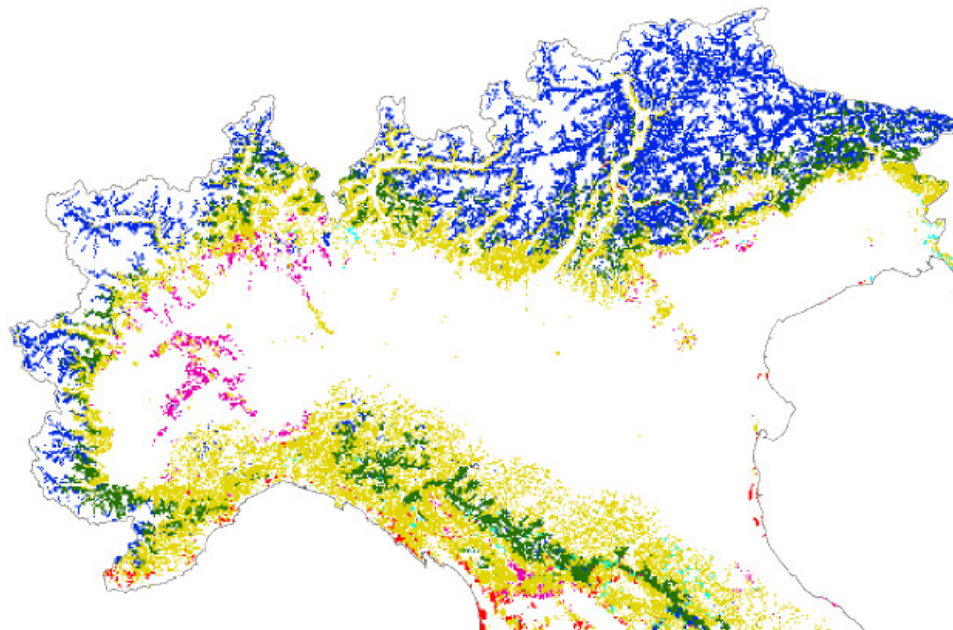


## Temperature variation 1969-1990 vs 2070-2100

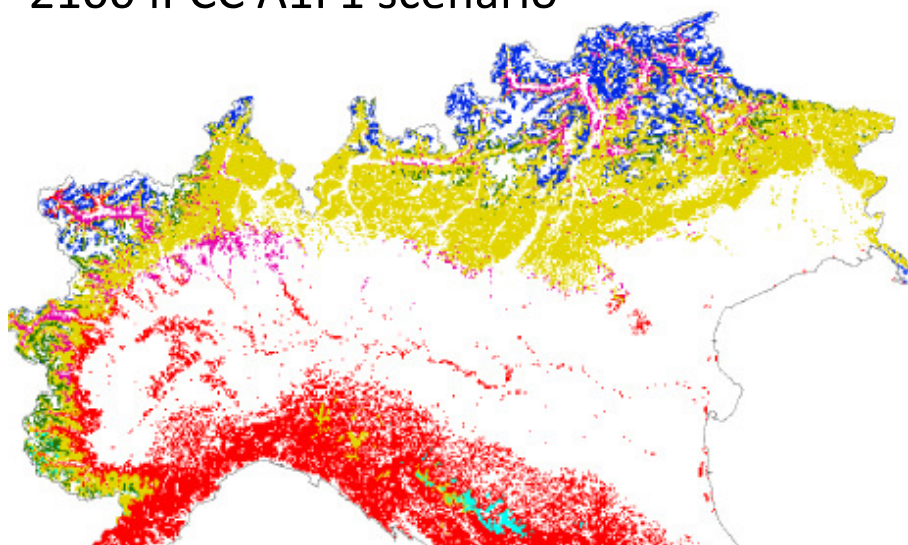




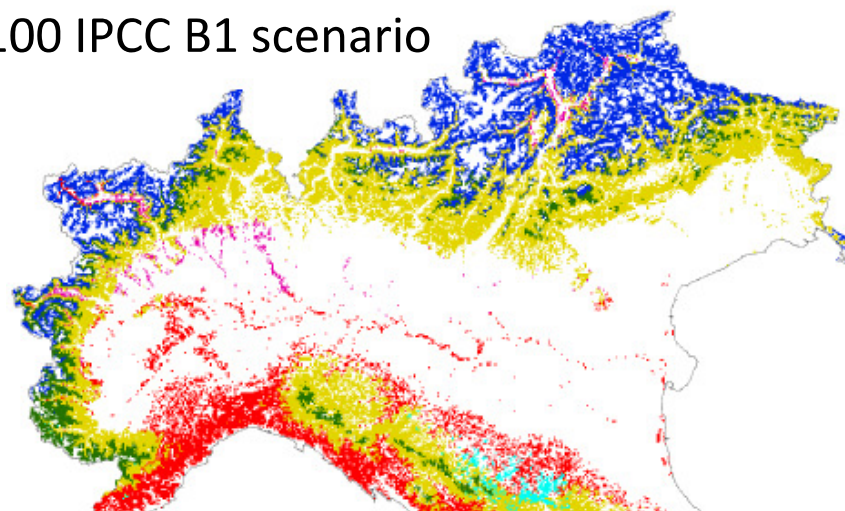
-  Mediterranean woods
-  Mixed oaks, Apennine holms, chestnut
-  Beeches
-  Alpine and Apenninine pine trees
-  Boreal conferous and *Pinus sylvestris*
-  Alien species



2100 IPCC A1F1 scenario



2100 IPCC B1 scenario



**Species' distributions are strongly affected by climate, and climate change is affecting species and populations. Thermal niches are widely used as proxies for estimating thermal sensitivity of species, and have been frequently related to community composition, population trends and latitudinal/elevational shifts in distribution.**

**Recent climatic warming favours species of warmer climates and adversely affected species occupying colder areas.**

RESEARCH ARTICLE

## Heterogeneity in Primary Productivity Influences Competitive Interactions between Red Deer and Alpine Chamois

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The high spatial habitat and resource heterogeneity in Il Fuorn and Val Trupchun appears to promote the coexistence of these two herbivores with different metabolic requirements, of which one is more limited by resource quantity (red deer) and the other by resource quality (chamois).

However, local interactions between the two species may be altered by climate change over the longer term. At a continental scale, mountain plant communities above the treeline are gradually being transformed, with cold-adapted species declining and warm-adapted species increasing .

Moreover, the increasing temperatures will lead to earlier snow melt in spring and thus earlier plant growth with increasing plant height and above-ground. An increase in both the length of the growing season and primary productivity on alpine meadows may result in red deer arriving on their summer feeding grounds earlier, staying longer and gradually expanding their summer ranges to higher elevations, which may reduce the availability of refuge areas for chamois in the long term.



### DO YOU REMEMBER ANYTHING ?



**Local population declines of the threatened Apennine chamois in Italy have been linked to an increasing population size of red deer, with chamois suffering from decreases in diet quality and foraging efficiency, and resulting declines in kid survival, in areas with high red deer density [Ferretti *et al.*, 2015; Lovari *et al.*, 2014].**

## CASCADE EFFECTS OF CLIMATE CHANGES

More accessible Alpine habitat

Human recreational activities

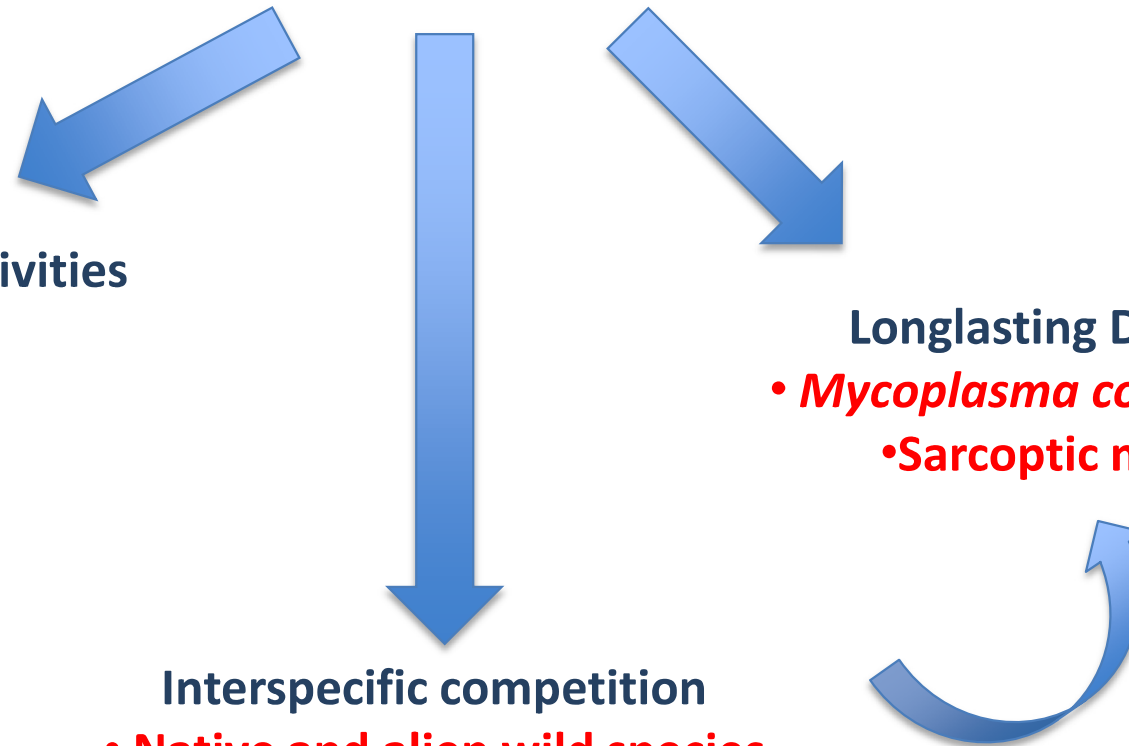
- Ski
- Trekking
- MTB

Longlasting Desease

- *Mycoplasma conjunctivae*
- Sarcoptic mange

Interspecific competition

- Native and alien wild species
- Multi-specific livestock





**GRAZIE DELL'ATTENZIONE**