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DIPARTIMENTO
DI SCIENZE DELLA VITA

UNIVERSITÀ
DEGLI STUDI DI TRIESTE

Riflessi dei cambiamenti climatici sull'avifauna

Matteo De Luca

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Dalla laurea, alla libera professione, a For Nature S.r.l.

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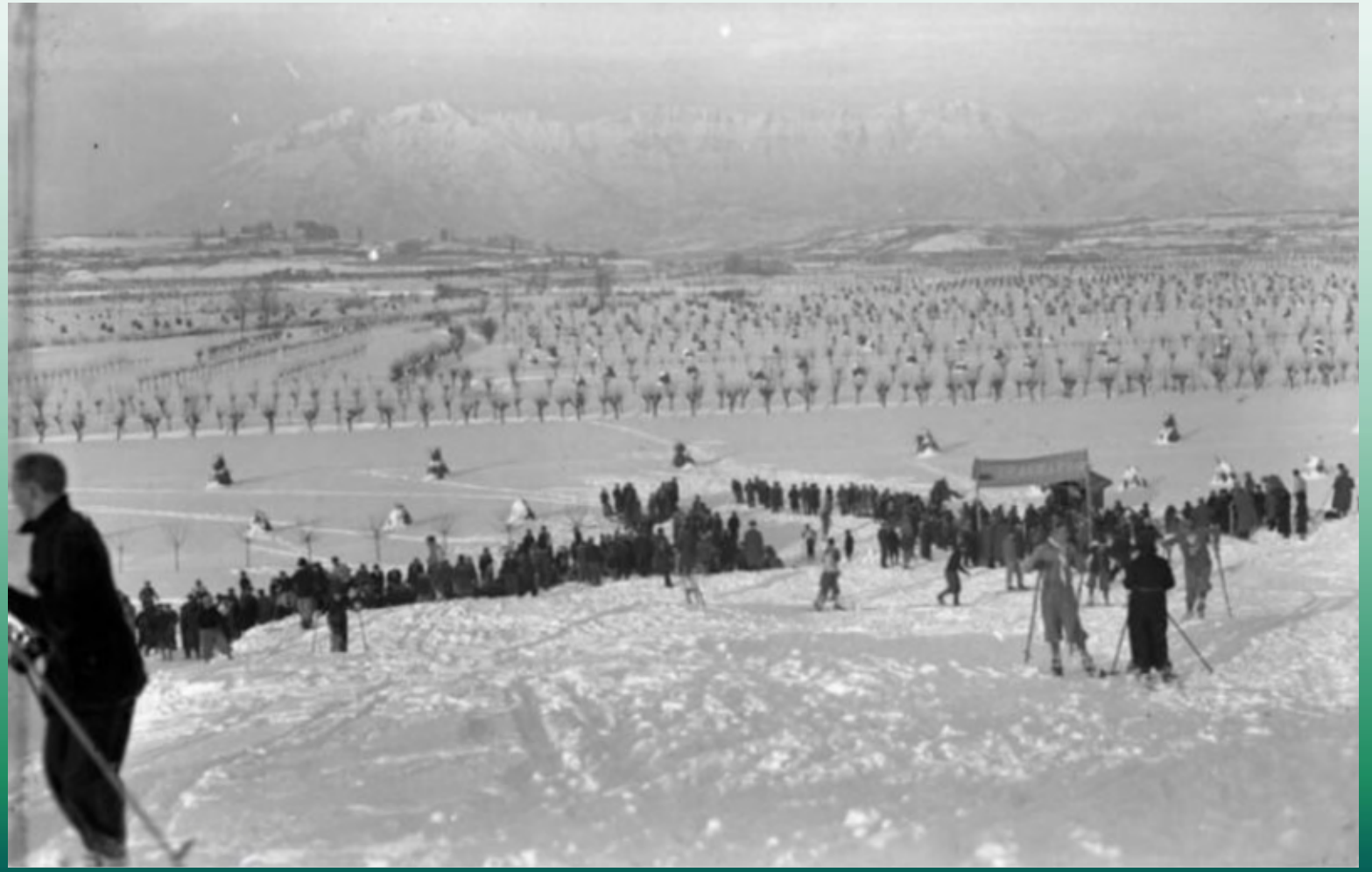
Cambiamento dello stato del clima… evidenze empiriche



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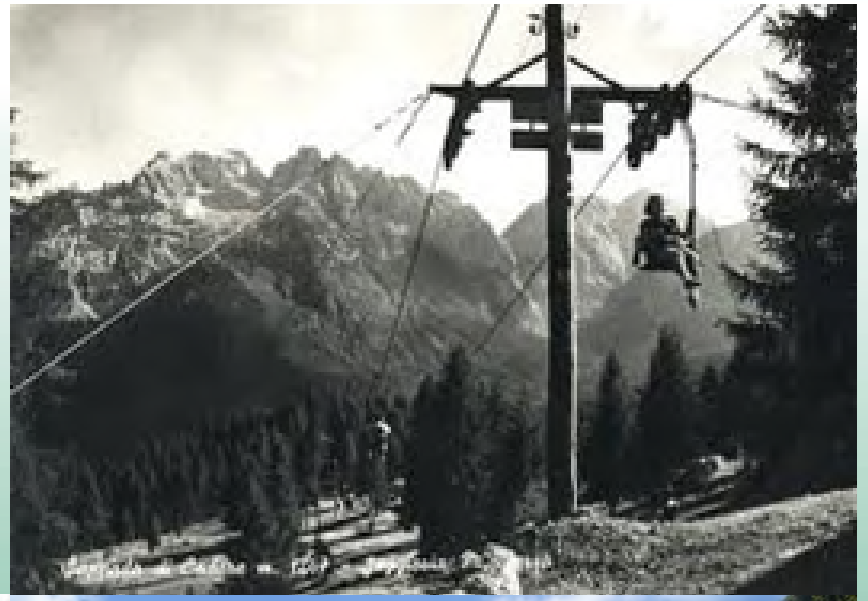
Cambiamento dello stato del clima… evidenze empiriche



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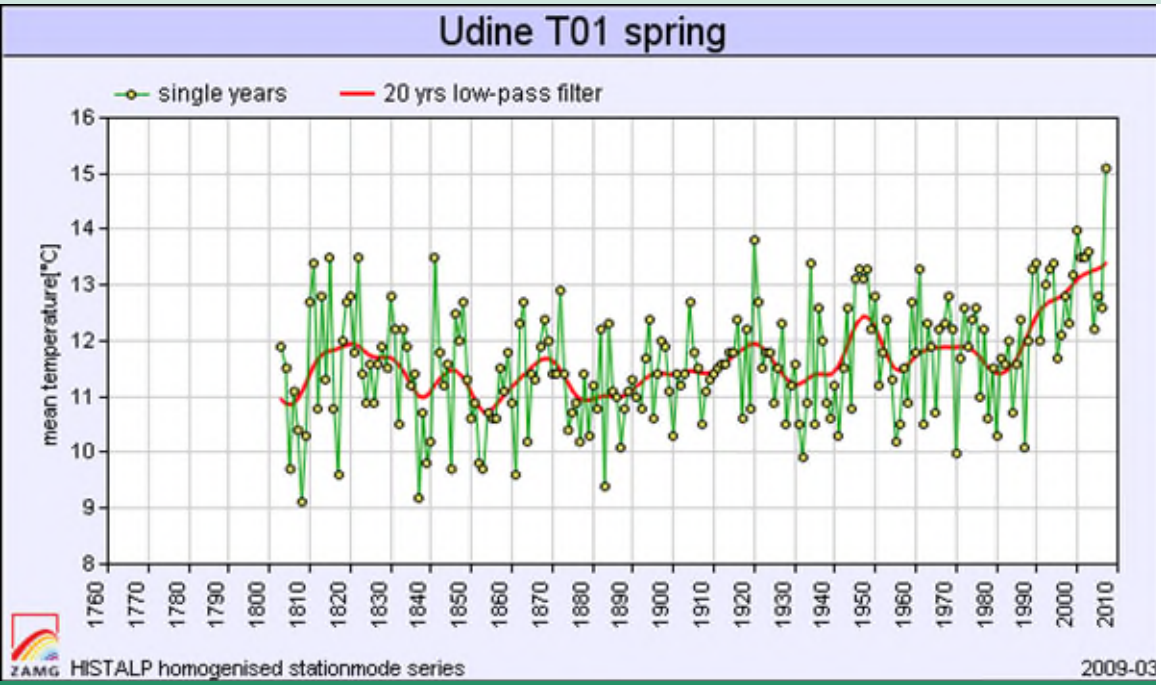
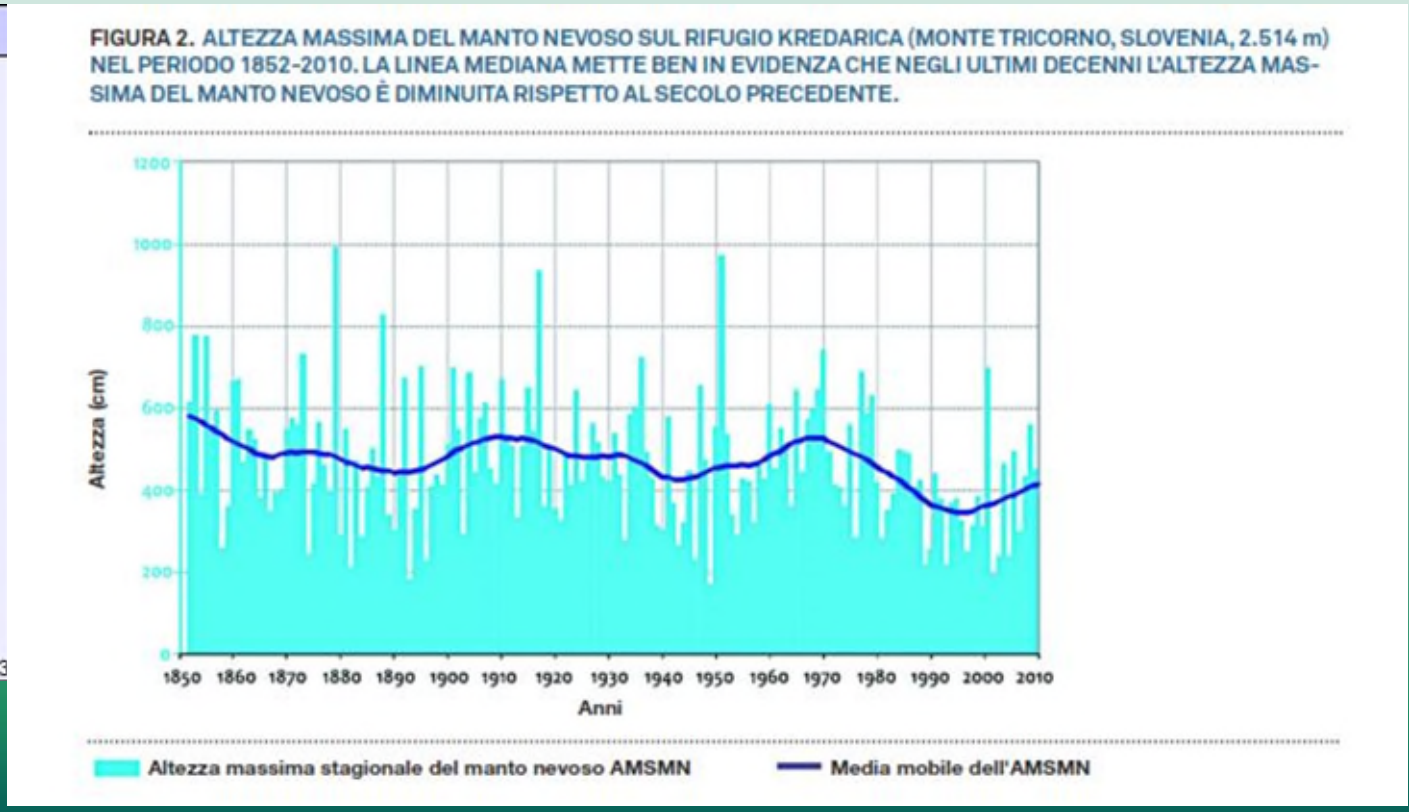
Cambiamento dello stato del clima nei valori medi o nella variabilità delle caratteristiche dello stesso (indipendentemente dalla causa, naturale o umana) IPPC 2007





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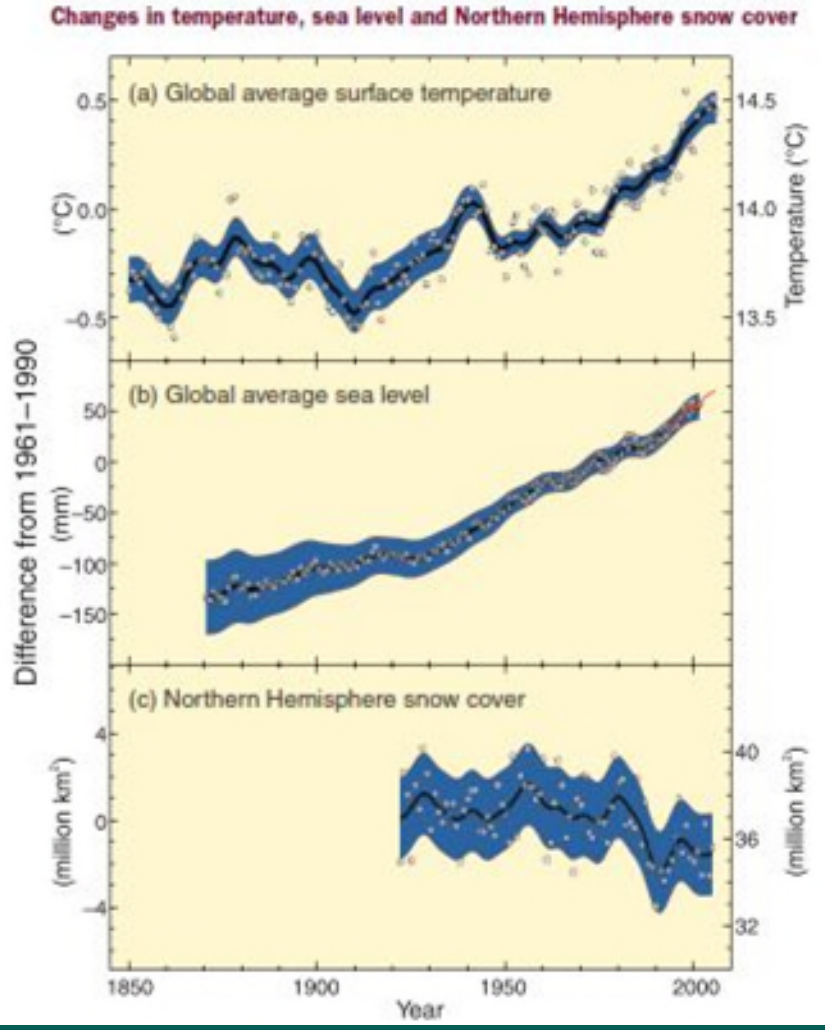

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Effetti diretti nei confronti della **fauna:**

Modificazioni ecosistemi

Espansione specie termofile

Regressione specie microterme

Modificazioni delle zoocenosi

Perdita di diversità

Perdita di specie

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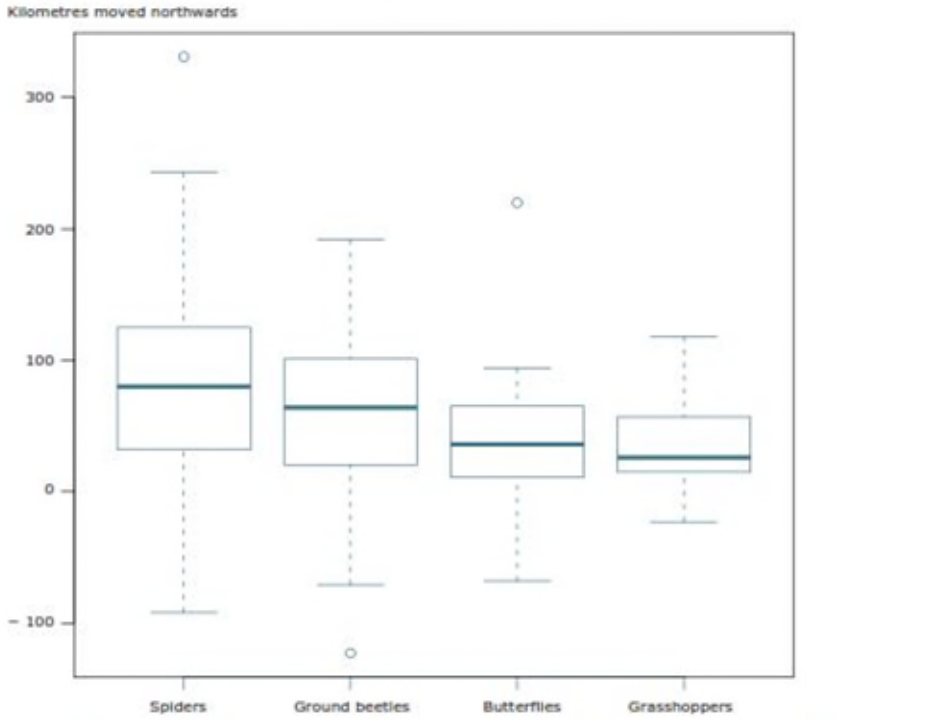
Effetti diretti nei confronti della **fauna** espansione specie termofile

Figure 3.13 Observed latitudinal shifts of four species groups over 25 years in Britain



Note: Observed latitudinal shifts of the northern range boundaries of species within 4 exemplar taxonomic groups, studied over 25 years in Britain. (A) Spiders (85 species), (B) ground beetles (59 species), (C) butterflies (29 species), and (D) grasshoppers and allies (22 species). Positive latitudinal shifts indicate movement toward the north (pole); negative values indicate shifts toward the south (Equator). Horizontal lines mark the Median, boxes the 25 to 75 % quartile and whisker the range (up to 1.5 times the interquartile distance). Open circles are outliers.

Source: Modified after Chen et al., 2011.

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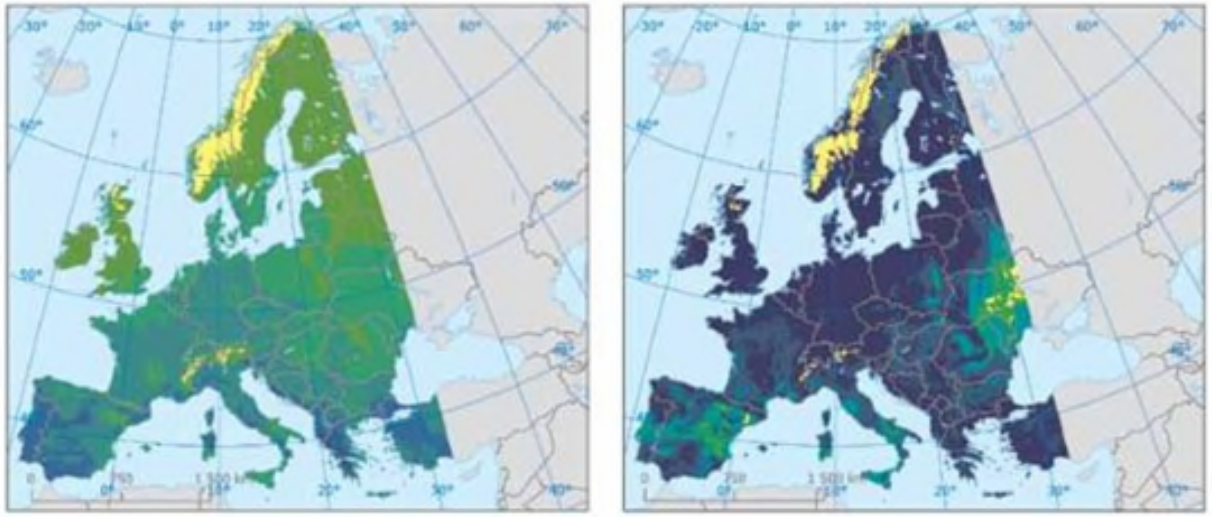
Effetti diretti nei confronti della **fauna** espansione specie termofile

Map 3.16 **Projected impact of climate change on the potential distribution of reptiles and amphibians in 2050**



Potential changes in climate space of reptiles and amphibians in 2050

Current number of species

0 1 10 20 30 40 50 60

Outside coverage

Percentage of stable species in 2050

0 20 40 60 80 100

Note: Projected data based on the Generalised Linear Model map using the HadCM3 A2 scenario for 2020–2050 are compared with the current situation.

Source: Data based on Araújo et al., 2006.

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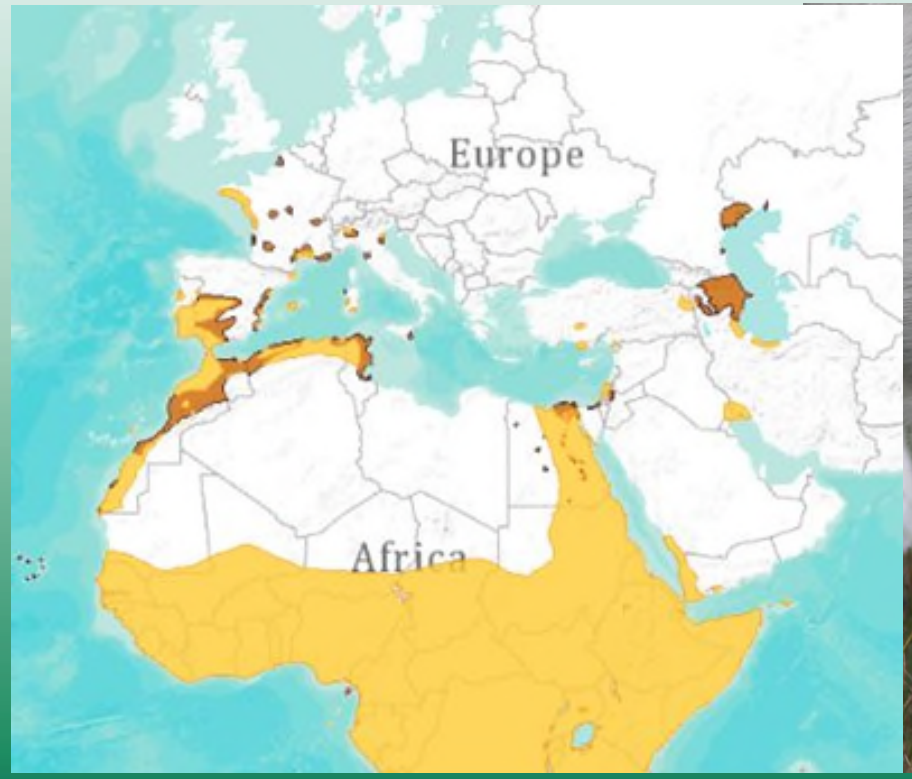
Effetti diretti nei confronti della **fauna** espansione specie termofile



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Effetti diretti nei confronti della **fauna** regressione specie microterme

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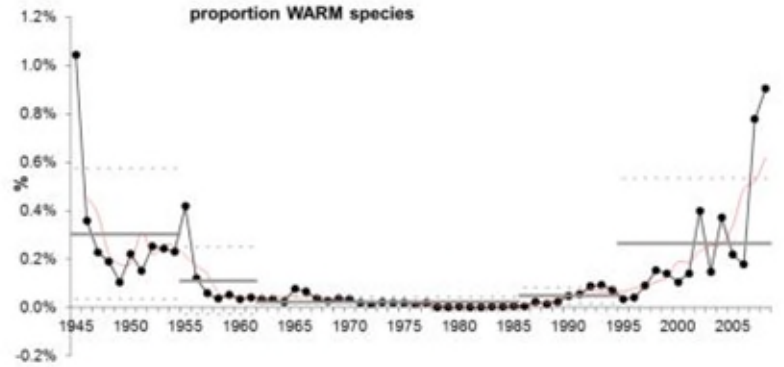
Effetti diretti nei confronti della **fauna** modifiche alle zoocenosi

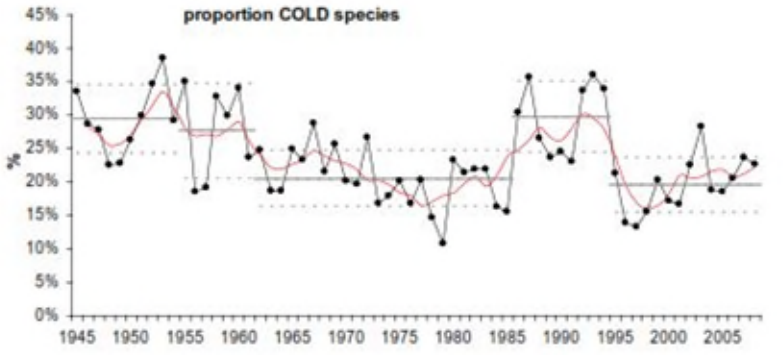
Thermal preference of species

•Species were assigned to a thermal preference category (warm, warm/temperate, temperate, temperate/cold, cold) by latitudinal ranges of presence

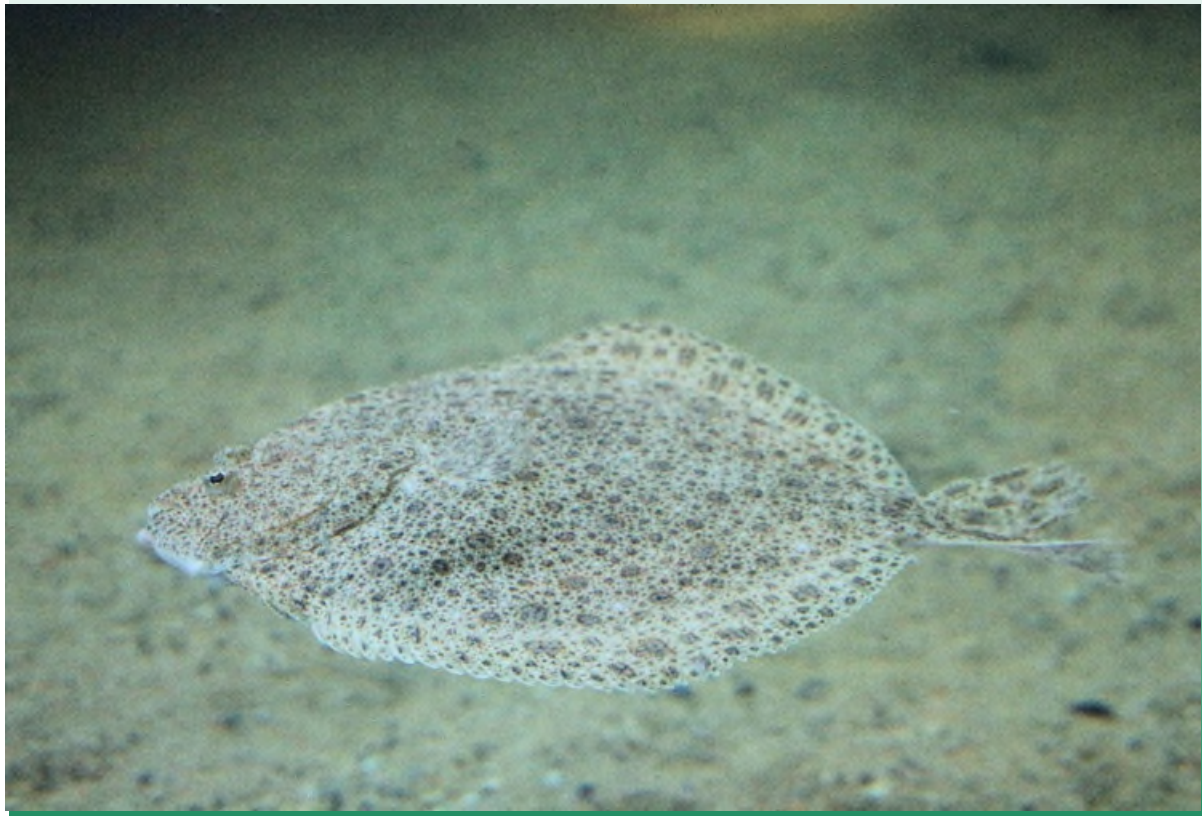


Sardinella aurita, Sciaena umbra, Umbrina cirrosa, Sarda sarda, Seriola dumerilii, Epinephelus marginatum

.....



Sprattus sprattus, Platichthys flesus, Psetta maxima, Scophthalmus rhombus, Sepia officinalis, Solea solea...



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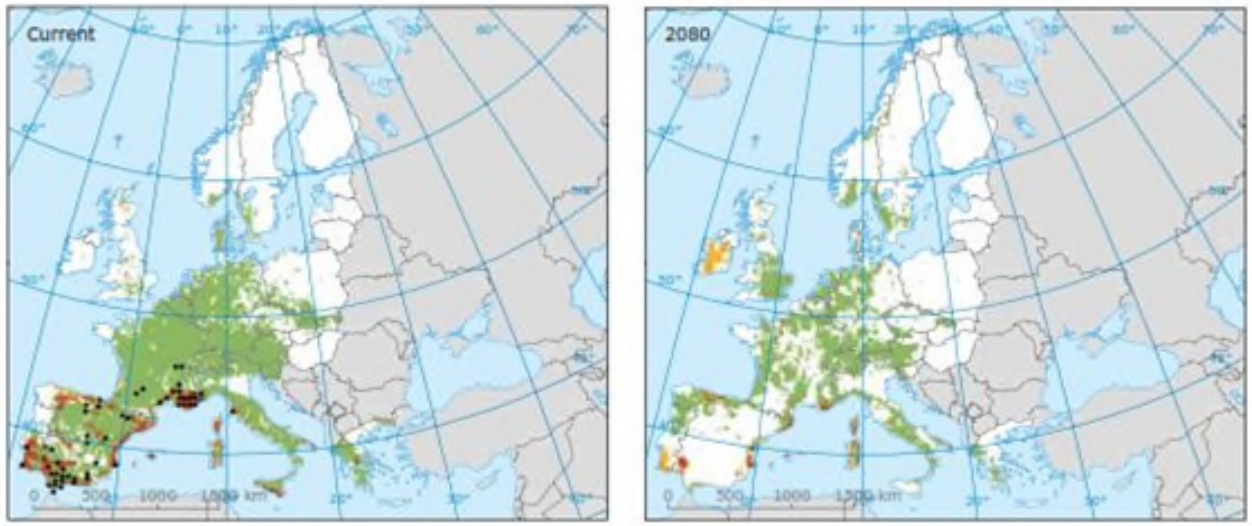
Effetti diretti nei confronti della **fauna** perdita di diversità e di specie

Map 3.19 Projected spatial mismatches of the Portuguese Dappled White butterfly and its host plants



Projected spatial mismatches of the Portuguese Dappled White butterfly (*Euchloe tagis*) and its host plants

- Suitable climate space for the host plants
- Suitable climate space for the butterfly
- Suitable area for both (butterfly and host plant)
- Currently observed distribution
- Not suitable
- Outside coverage

Note: Spatial mismatches of the Portuguese Dappled White butterfly (*Euchloe tagis*) and its host plants under the BAMBU scenario (climate: A2) for 2050–2080. Green, suitable climate space for the host plants; yellow, suitable climate space for the butterfly; orange, suitable area for both butterfly and host plants; open circles, currently observed distribution. BAMBU: Business-As-Might-Be-Usual scenario.

Source: Schweiger et al., 2012.

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Effetti dei cambiamenti climatici nei confronti degli uccelli

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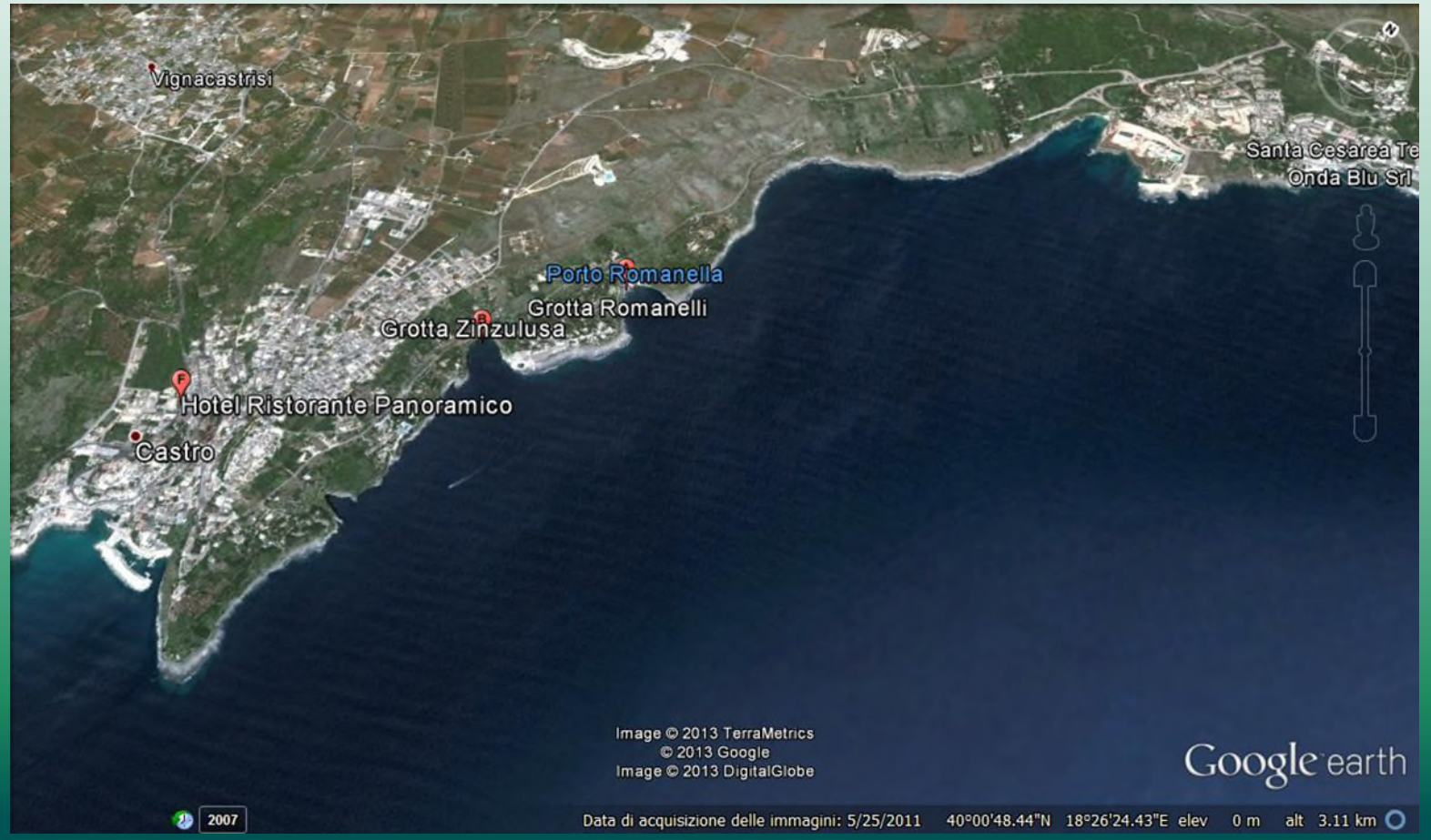
Glaciazioni quaternarie discesa delle specie artiche (l'esempio di grotta Romanelli)

Figure 1. Map of Italy showing location of Grotta Romanelli (Lecce, Apulia).



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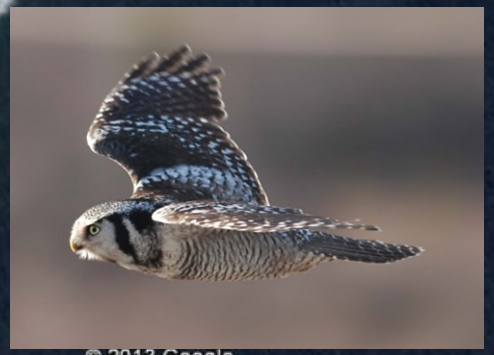
Phyrrocorax phyrrocorax
Nyctea scandica
Aegolius funereus
Strix uralensis
Surnia ulula
Lagopus lagopus
Plectorphenax nivalis
Montifringilla nivalis
Loxia curvirostra



Cassoli, 1992

11000 -9000 bp

Porto Romanella
Grotta Romanelli
Santa Cesarea Term
© 2013 Google
Image © 2013 DigitalGlobe
Data di acquisizione delle immagini: 4/10/2013 40°01'27.77"N 18°26'15.91"E elev 8 m alt 1.03 km
Google earth

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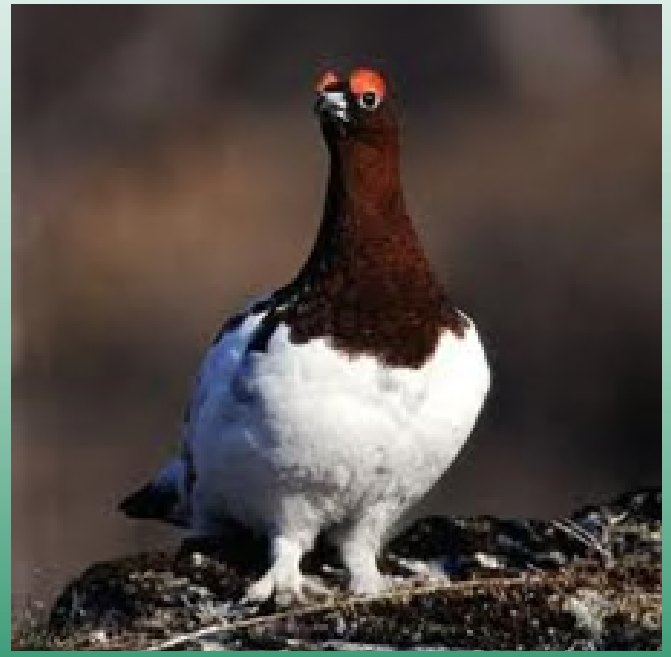
Postglaciale e risalita delle specie artico - alpine



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A livello locale quali sono le specie di uccelli che soffrono maggiormente i cambiamenti climatici?

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Ai cambiamenti climatici si associano le modifiche del territorio indotte dalle attività antropiche:

- **Allevamento bestiame**
- **Pascolo**
- **Gestione forestale**

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1973

2000

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1954

2012

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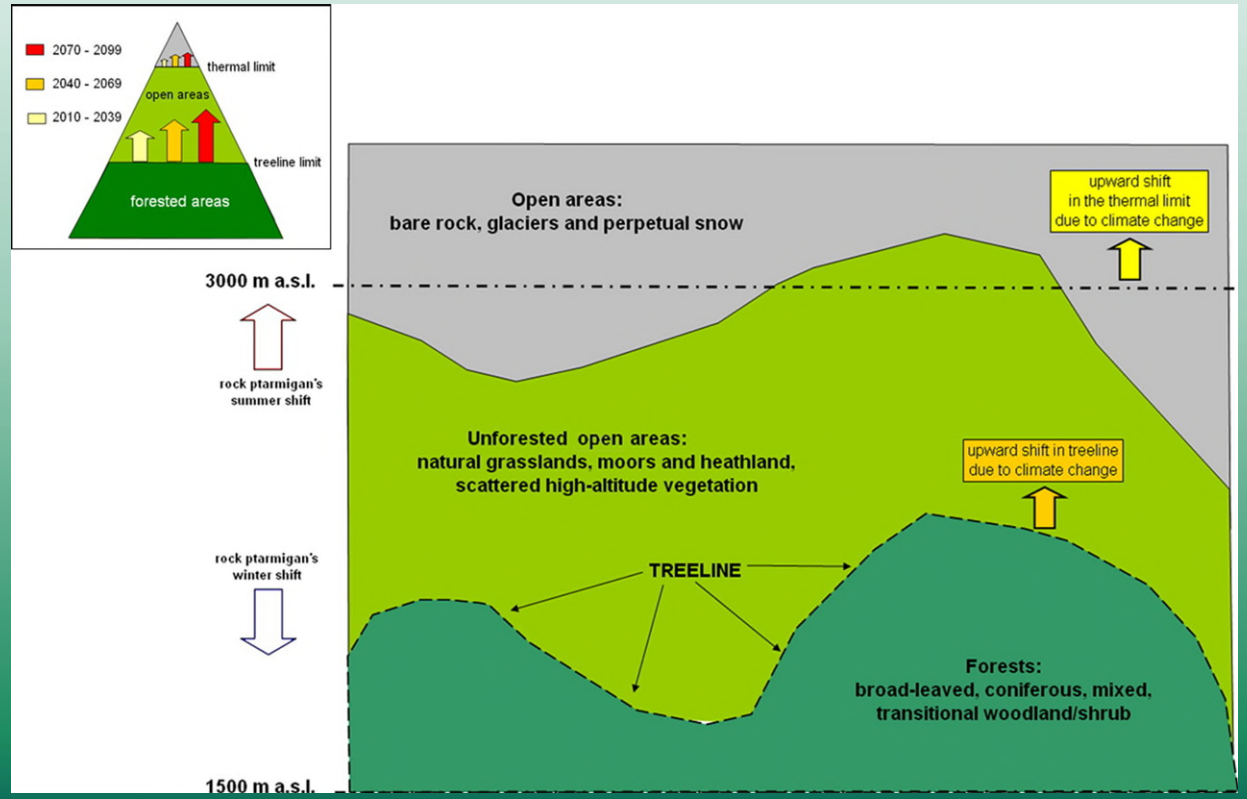

Received: 7 September 2018 | Revised: 7 November 2018 | Accepted: 28 November 2018

DOI: 10.1002/ece3.4838

ORIGINAL RESEARCH

WILEY Ecology and Evolution Open Access

Winners and losers: How the elevational range of breeding birds on Alps has varied over the past four decades due to climate and habitat changes

Luciano Bani | Massimiliano Luppi | Emanuel Rocchia | Olivia Dondina | Valerio Orioli

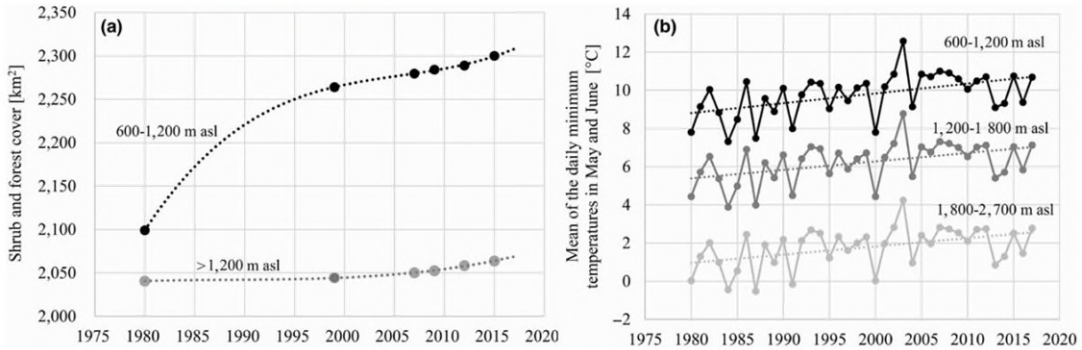

FIGURE 2 Descriptive statistics between 1980 and 2017 of (a) the shrub and forest cover [km^2] and their trend (between 600 m and 1,200 and above 1,200 m asl), and (b) the average of daily minimum temperatures [°C] in the months of May and June and their trend in three elevational belts, in the Alpine areas of the Lombardy Region. For the shrub and forest cover, data were interpolated using a generalized additive model on available survey data (filled circles). For temperatures, data were derived from the E-OBS dataset. See the text for details on data sources

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I tetraonidi sono verosimilmente il gruppo a maggior rischio

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I tetraonidi sono verosimilmente il gruppo a maggior rischio

Non migrano

Presentano tarsi piumati e dita con scaglie o piumate

Metabolismo elevato

Roost sotto la neve

Alimentazione costituita da sostanze povere presenti in abbondanza (es aghi delle conifere)

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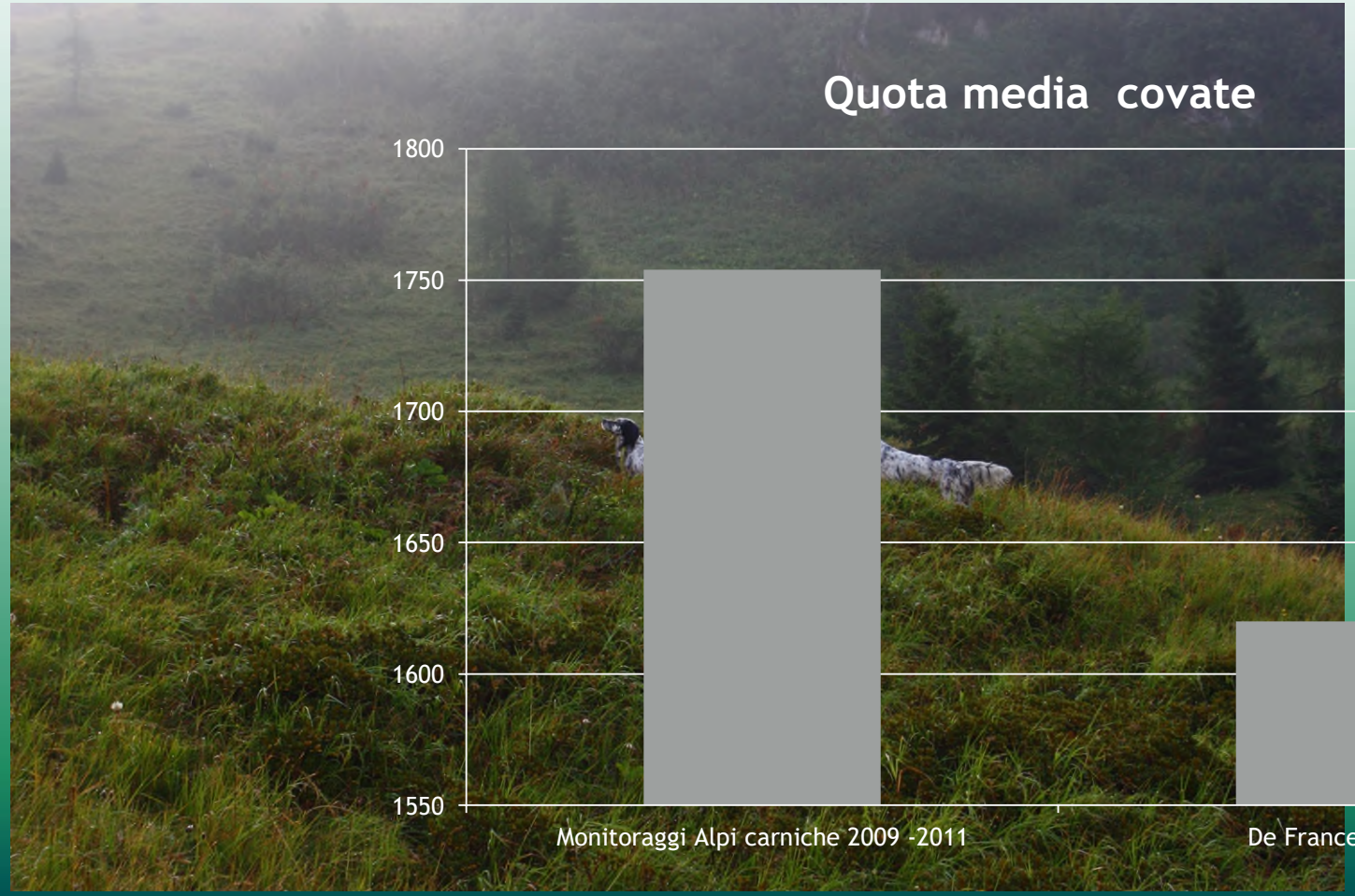
Fagiano di monte a livello regionale: quota media delle covate



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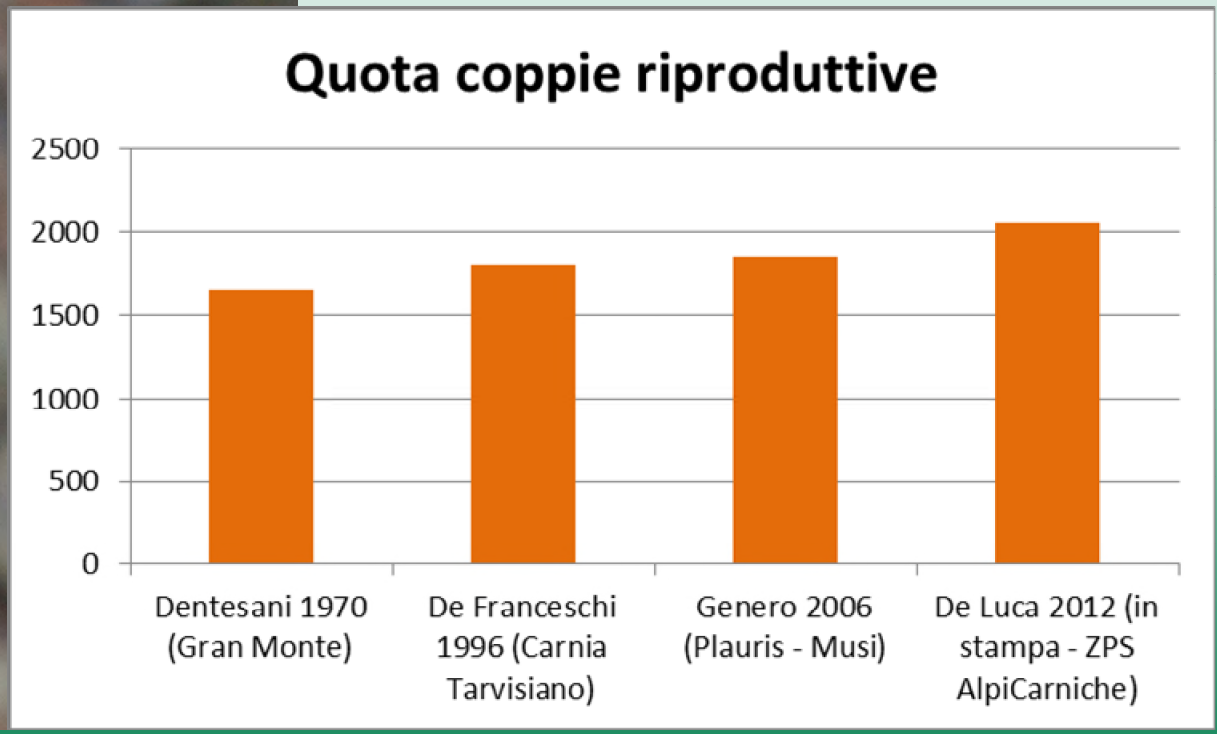
Pernice bianca : quota delle coppie riproduttive



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Pernice bianca : distribuzione sul territorio regionale anni 2010

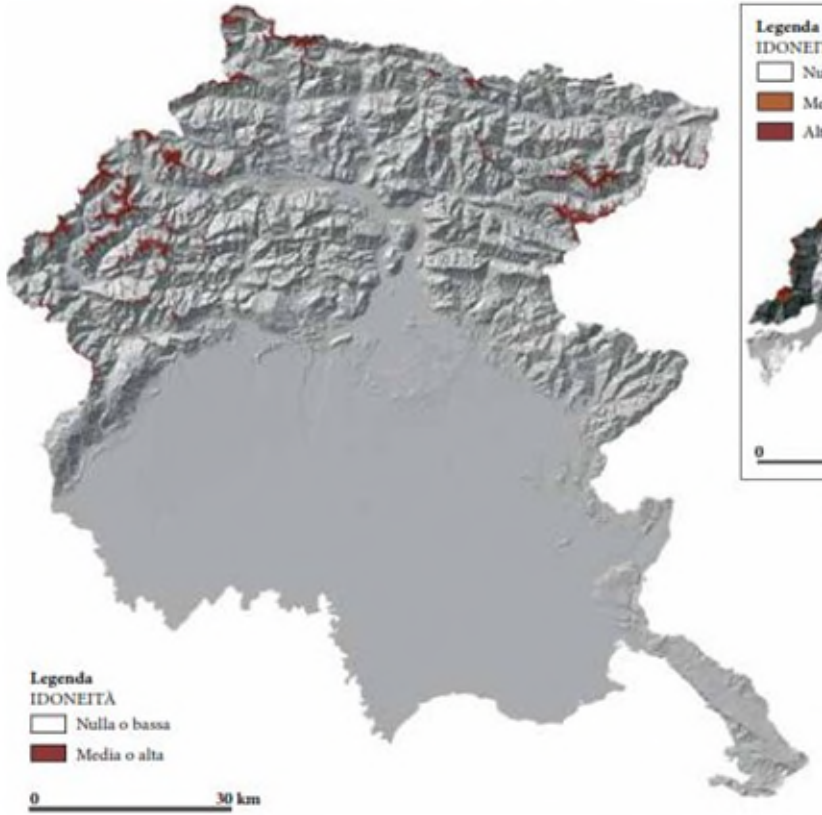

Fig. 8 - Carte preliminari della distribuzione potenziale della Pernice bianca in Friuli Venezia Giulia e nel Parco Naturale Dolomiti Friulane in relazione alla disponibilità di habitat potenzialmente idoneo alla specie.
- *Preliminary maps of the potential distribution in the Friuli Venezia Giulia region and in the Dolomiti Friulane Natural Park of Rock Ptarmigan following the availability of potentially suitable habitat for the species.*

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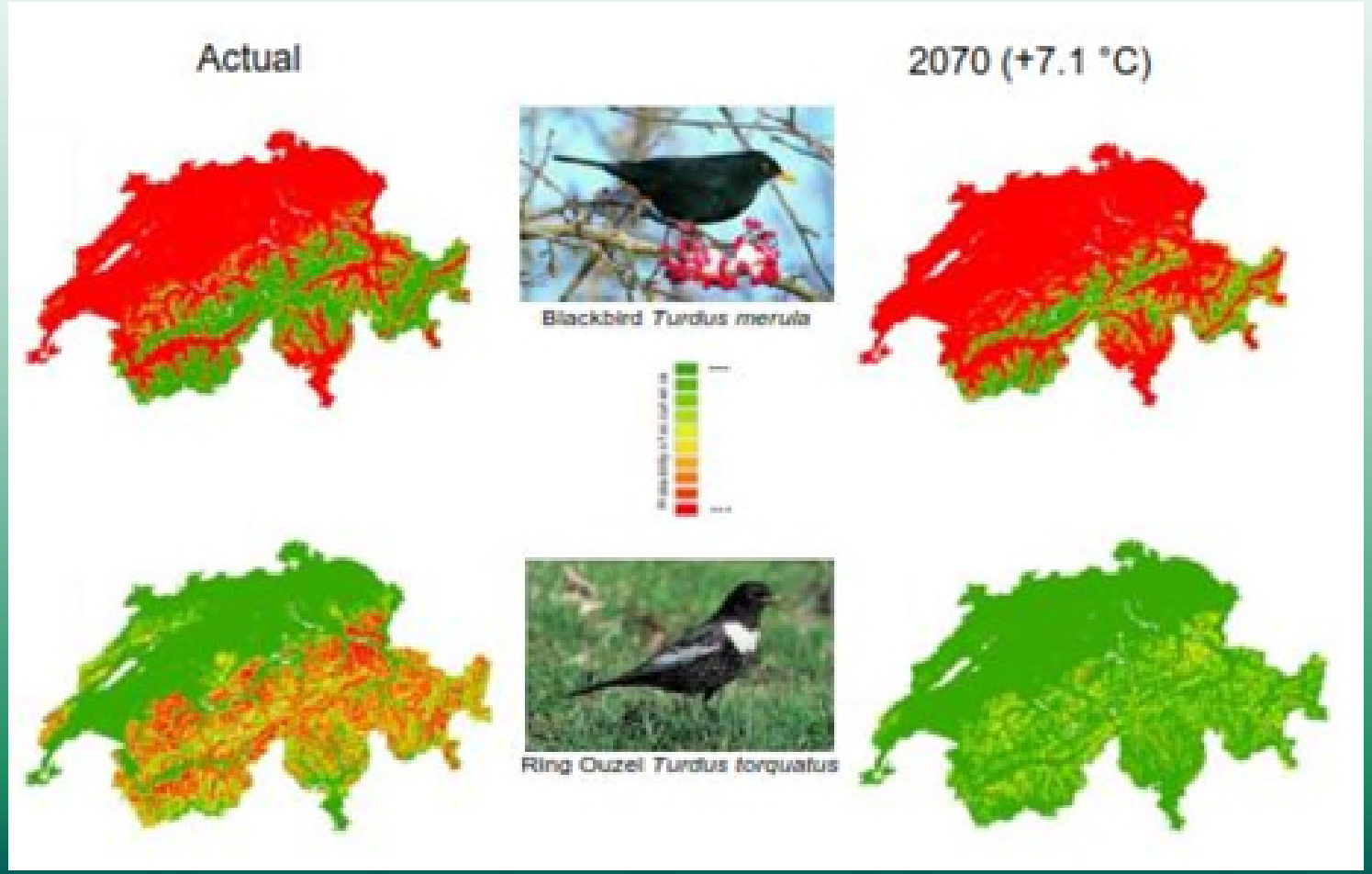
Zbinden et al., 2010: modelli sulle modificazioni delle comunità ornitiche



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WILEY Ecology and Evolution

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			OPT	0.741	0.846	
			CBL	0.388	0.822	
Dunnock *Prunella modularis*	Edge	sdm	OBR	7.040	0.023	Lower boundary contraction
			CBR	7.682	<0.001	
			OPT	6.944	<0.001	
			CBL	8.778	0.013	
			OBL	11.38*	0.004	
European Robin *Erithacus rubecula*	Forest	sdm	OBR	6.202	0.092	Upward shift
			CBR	5.766	0.015	
			OPT	3.574	0.002	
			CBL	2.361	0.280	
Black Redstart *Phoenicurus ochruros*	Open	sdm	OBR	3.878	0.457	None
			CBR	2.927	0.630	
			OPT	13.13	0.071	
			CBL	−0.115	0.982	
			OBL	0.391	0.944	
Northern Wheatear *Oenanthe oenanthe*	Open	ldm	OBR	−2.416	0.932	Lower boundary contraction
			CBR	11.87	0.527	
			OPT	−4.767	0.247	
			CBL	9.626	0.186	
			OBL	11.01	<0.001	
Eurasian Blackbird *Turdusmerula*	Forest	sdm	OBR	10.41*	<0.001	Upper boundary expansion
			CBR	12.69	<0.001	
			OPT	2.187	0.358	

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TABLE 3 Average elevation (m asl) of suitable habitats (all sites with environmental suitability higher than the 10th percentile threshold) from current to alternative future (2041–2070) conditions

	Average elevation of suitable areas (m asl)				
Species	1980–2010	IPSL_CM6A_LR	GFDL_ESM4	MRI_ESM2_0	UKESM1_0_LL
Rock ptarmigan	2187	2493	2433	2424	2644
Water pipit	1924	2220	2180	2161	2335
Alpine accentor	2214	2466	2416	2416	2584
Snowfinch	2301	2538	2507	2491	2653

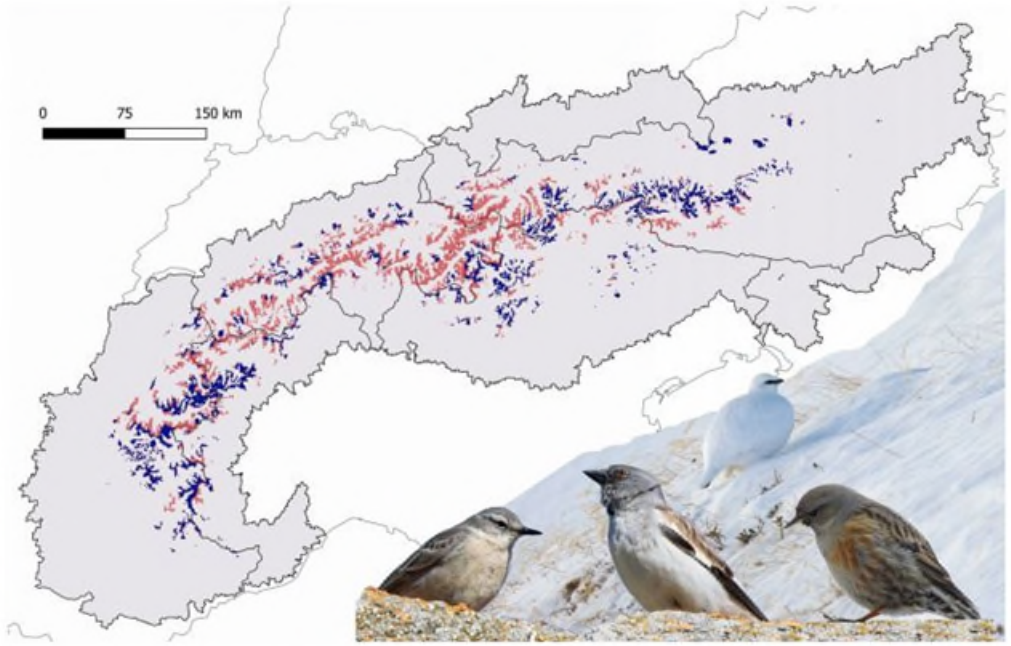

FIGURE 3 Multispecies type 1 refugia (i.e., areas suitable under current and all future conditions effective for at least three out of four target species, whatever the future climate) within (dark blue) and outside (light red) protected areas

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DOI: 10.1111/gcb.16187

Global Change Biology WILEY

RESEARCH ARTICLE

Identifying climate refugia for high-elevation Alpine birds under current climate warming predictions

Mattia Brambilla[1,2,3,4] | Diego Rubolini[4,5] | Ojan Appukuttan[4] | Gianpiero Calvi[6] | Dirk Nikolaus Karger[7] | Primož Kmecl[8] | Tomaž Mihelič[8] | Thomas Sattler[9] | Benjamin Seaman[10] | Norbert Teufelbauer[10] | Johannes Wahl[11] | Claudio Celada[1]

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Effetti dei cambiamenti climatici sugli uccelli migratori

See discussions, stats, and author profiles for this publication at: https://www.researchgate.net/publication/241065803

Using Large-Scale Data from Ringed Birds for the Investigation of Effects of Climate Change on Migrating Birds: Pitfalls and Prospects

Article *in* Advances in Ecological Research · December 2004
DOI: 10.1016/S0065-2504(04)35003-8

(1) changes in migration status (like the proportion of non-migrants in a population),
(2) changes in migration distance,
(3) changes in migration direction,
(4) changes in timing and speed of migration

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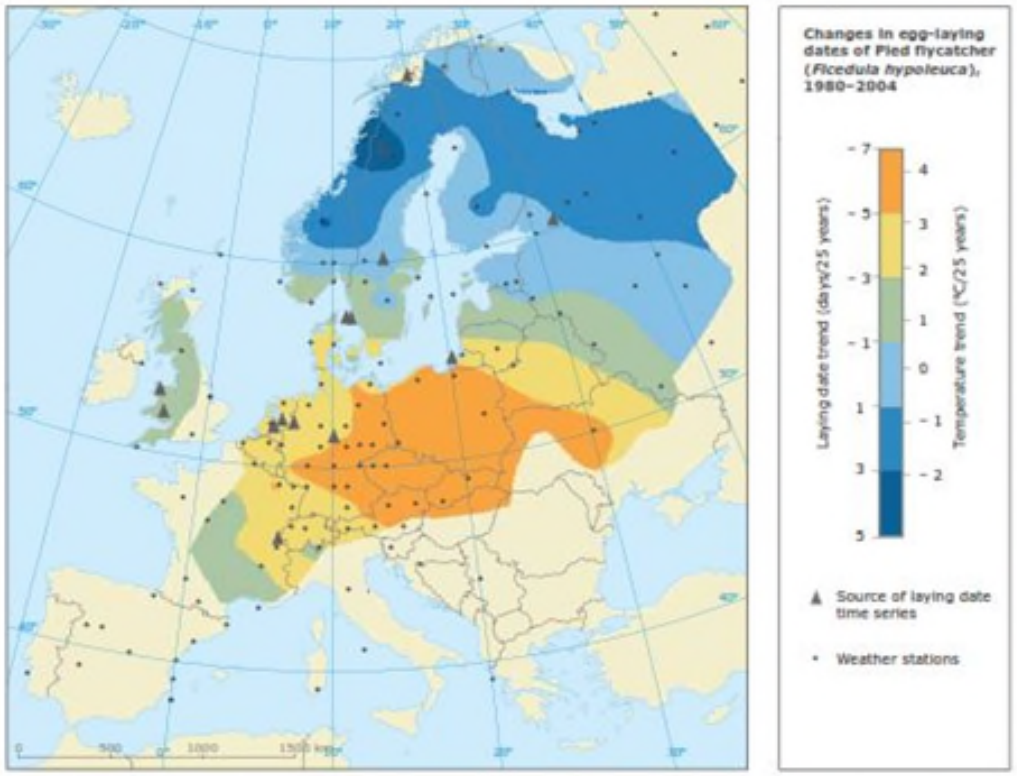
Map 3.12 Trend in egg-laying dates of the Pied flycatcher across Europe (1980–2004)



Note: Dots: weather stations used to calculate changes in local egg-laying dates (derived from temperature data); triangles: location of Pied flycatcher laying date time series.

Source: Both and Marvelde, 2007.

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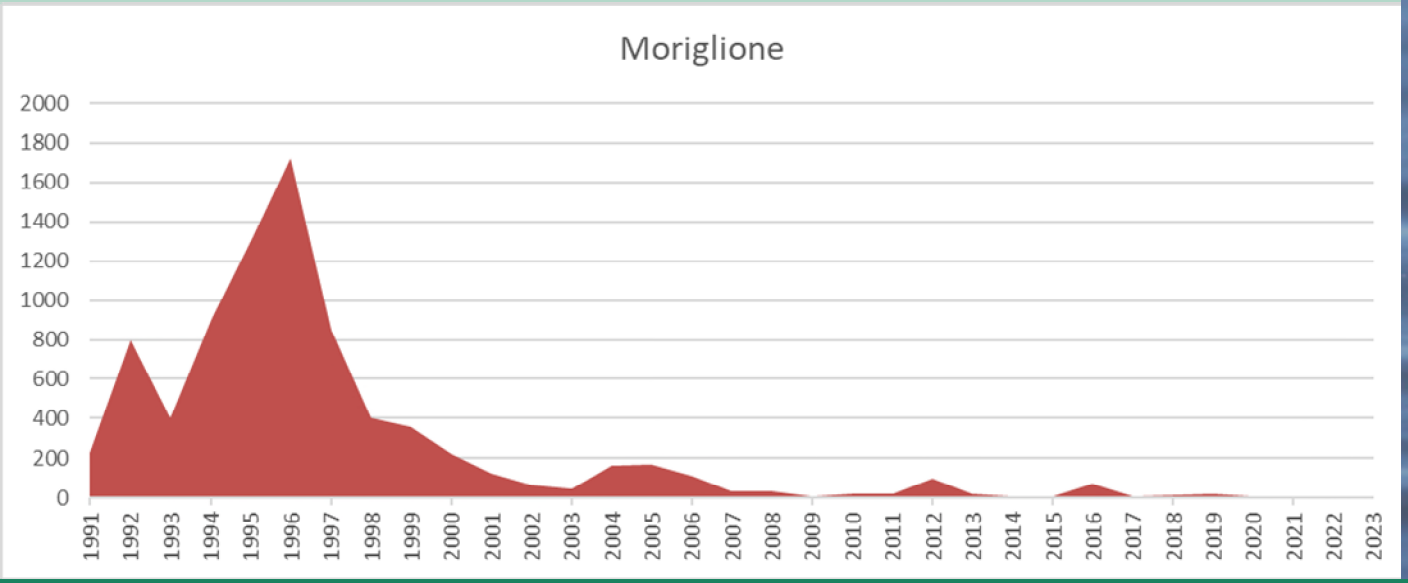

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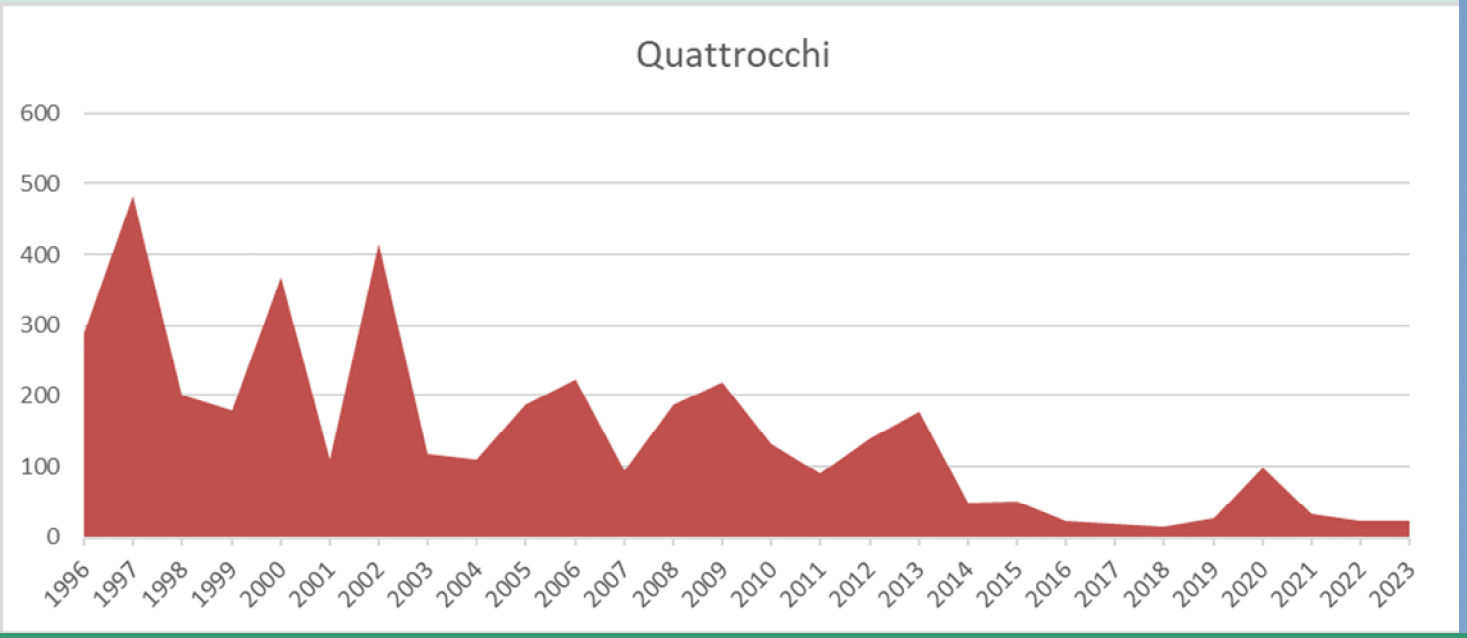

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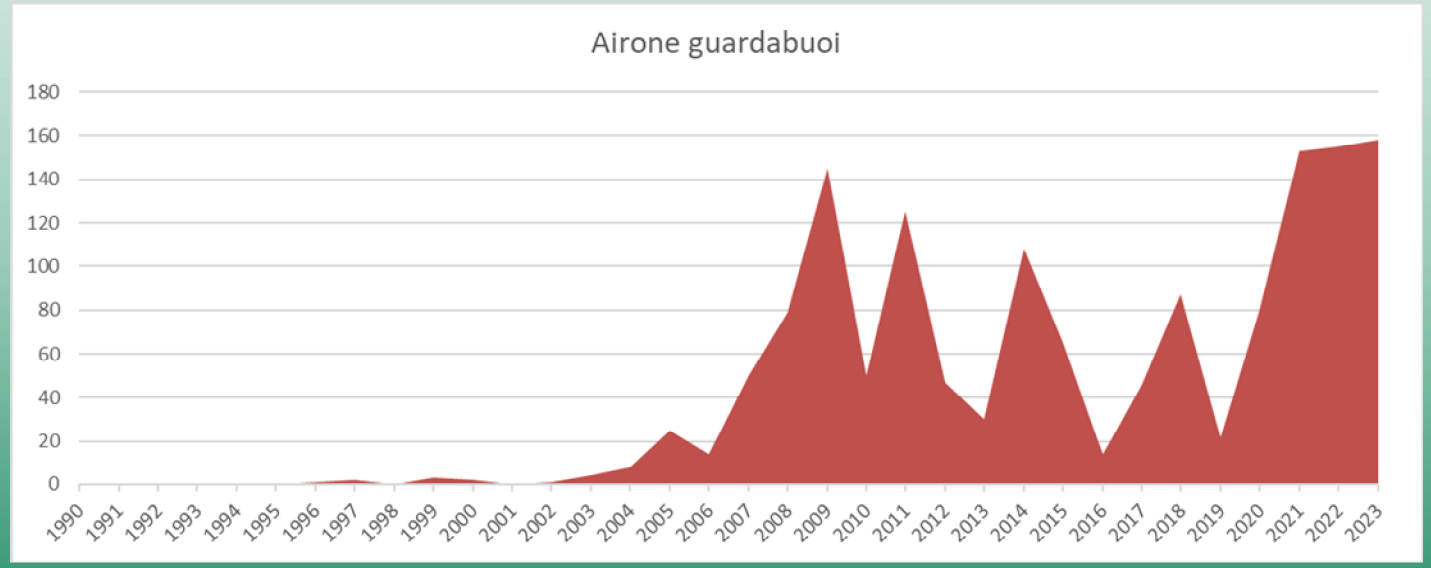

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Effetti dei cambiamenti climatici sugli uccelli migratori

Distribuzione a nord del gruccione: osservazioni sempre più frequenti a nord delle Alpi

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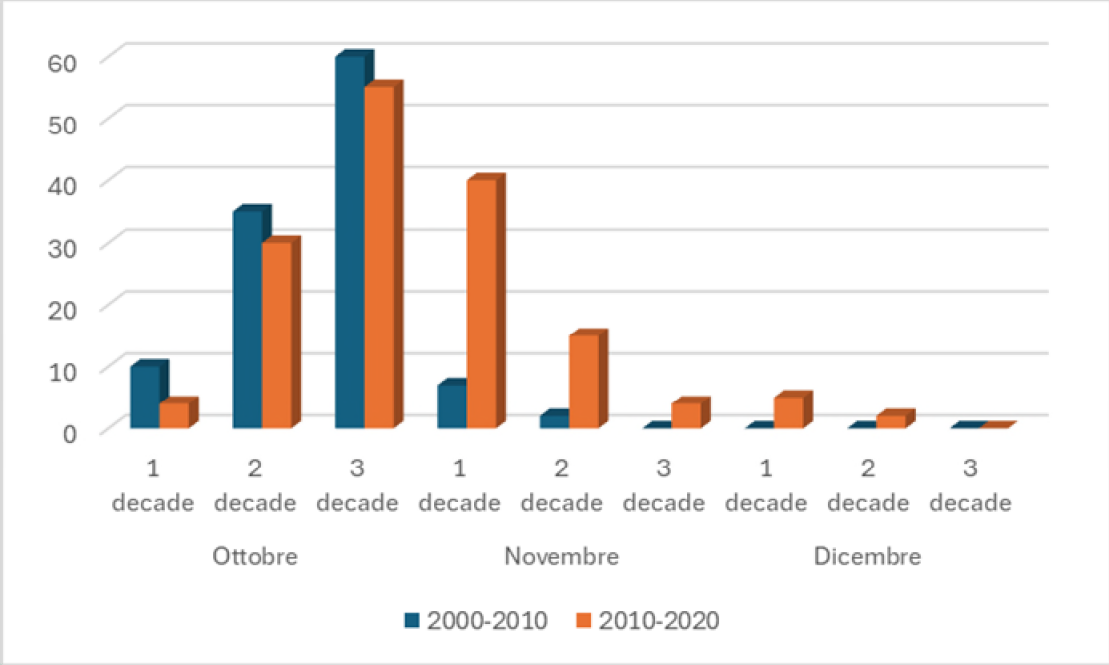
Effetti dei cambiamenti climatici sugli uccelli migratori

Abbattimenti di beccaccia riserva Prato Carnico



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Effetti dei cambiamenti climatici sugli uccelli migratori

Successo riproduttivo minore in gabbiano tridattilo e fulmaro per minore presenza di fito e zooplancton e conseguente modifica delle catene alimentari

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Effetti dei cambiamenti climatici sugli uccelli migratori

Aumento frequenza eventi estremi improvvisi (balestrucci)

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Effetti dei cambiamenti climatici sugli uccelli migratori

Considerazioni:

Lack of phenotypic/genotypic adaptability: species that are unable to respond to climate change maybe most vulnerable to climate change.

Dispersal ability: species with poor dispersal ability may be unable to move with changes in their climate space, especially when compounded by habitatfragmentation.

Ecological specialization: rapid changes in the environment are likely to favour generalist/adaptable species and be detrimental to highly specialized species adapted to a fine ecological niche.

Small population size: will make species more vulnerable to rapid stochastic changes, if the climate becomes more variable, as predicted.

Increases in the frequency of extreme events: populations can be severely reduced by extreme climatic events, and an increase in their frequency may affect the viability of populations in the long term.

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Effetti dei cambiamenti climatici sugli uccelli migratori

Considerazioni:

Loss of habitat or decline in habitat quality: climate change may affect the viability of the habitats that birds use, changing the timing and abundance of heir food supplies and other resources.

Large-scale changes in agriculture, including crop types and pesticide usage (in response to changing pest populations), will be a particularly important factor for many bird species that live in human-modified habitats.

Changes in the range of other species: where species range expansion or contraction occurs in response to climate change, changes in the level of competition and predation may occur The potential for invasive and alien species to have detrimental impacts is another important factor that needs to be considered: some species that are currently benign or inhibited from colonizing certain areas may change their attribute sunder changed environmental conditions

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Quali soluzioni?

- **Pianificazione territoriale**
- **Pianificazione degli investimenti per l'ambiente**
- **Ripristini ambientali**
- **Gestione faunistica**

FOR NATURE
analizzare, valutare, gestire

Grazie per l’attenzione