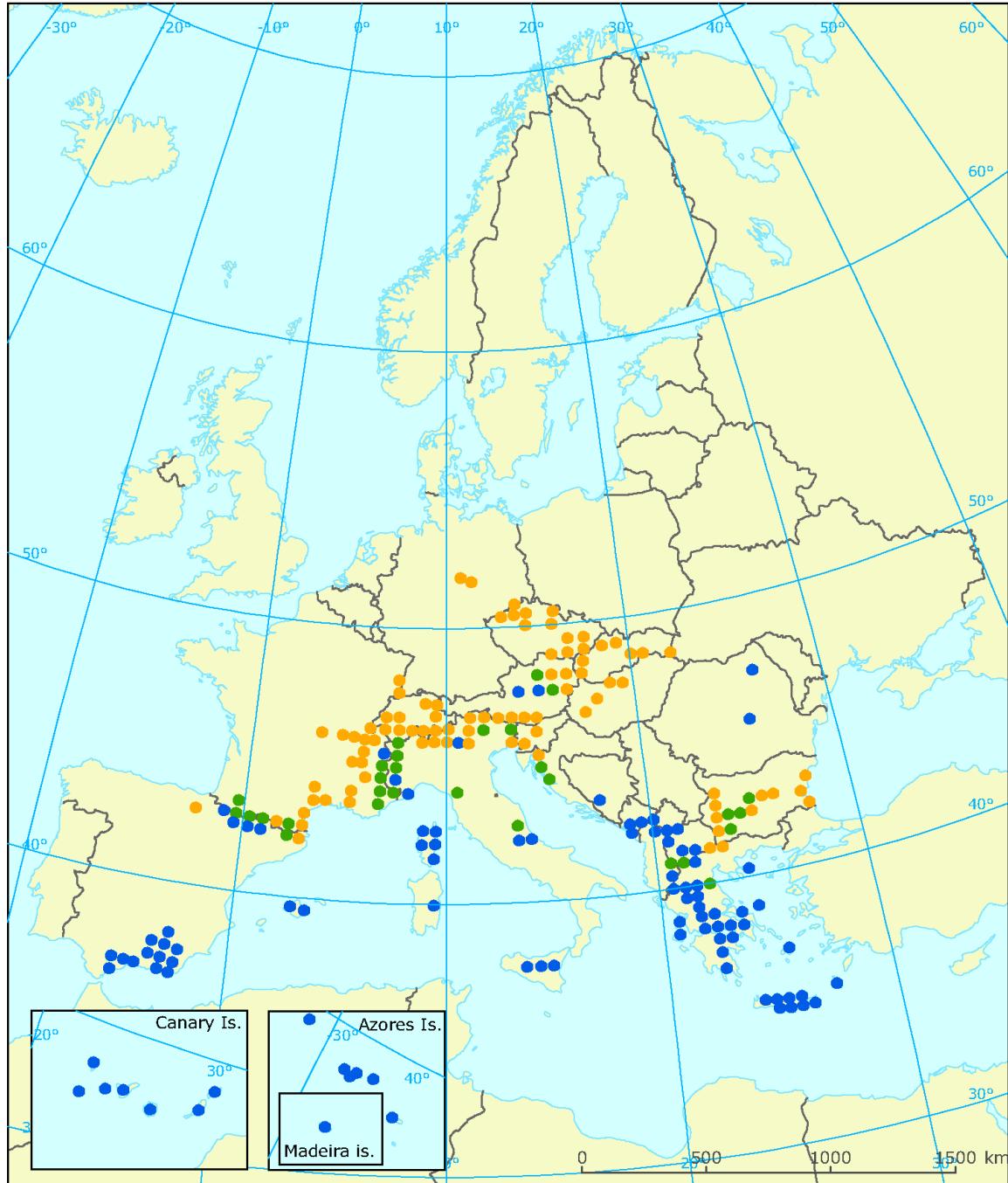


# **La ricerca ornitologica sulle Alpi: attuali conoscenze e prospettive future**



**Dan Chamberlain  
&  
Giulia Masoero**

**Università di Torino**

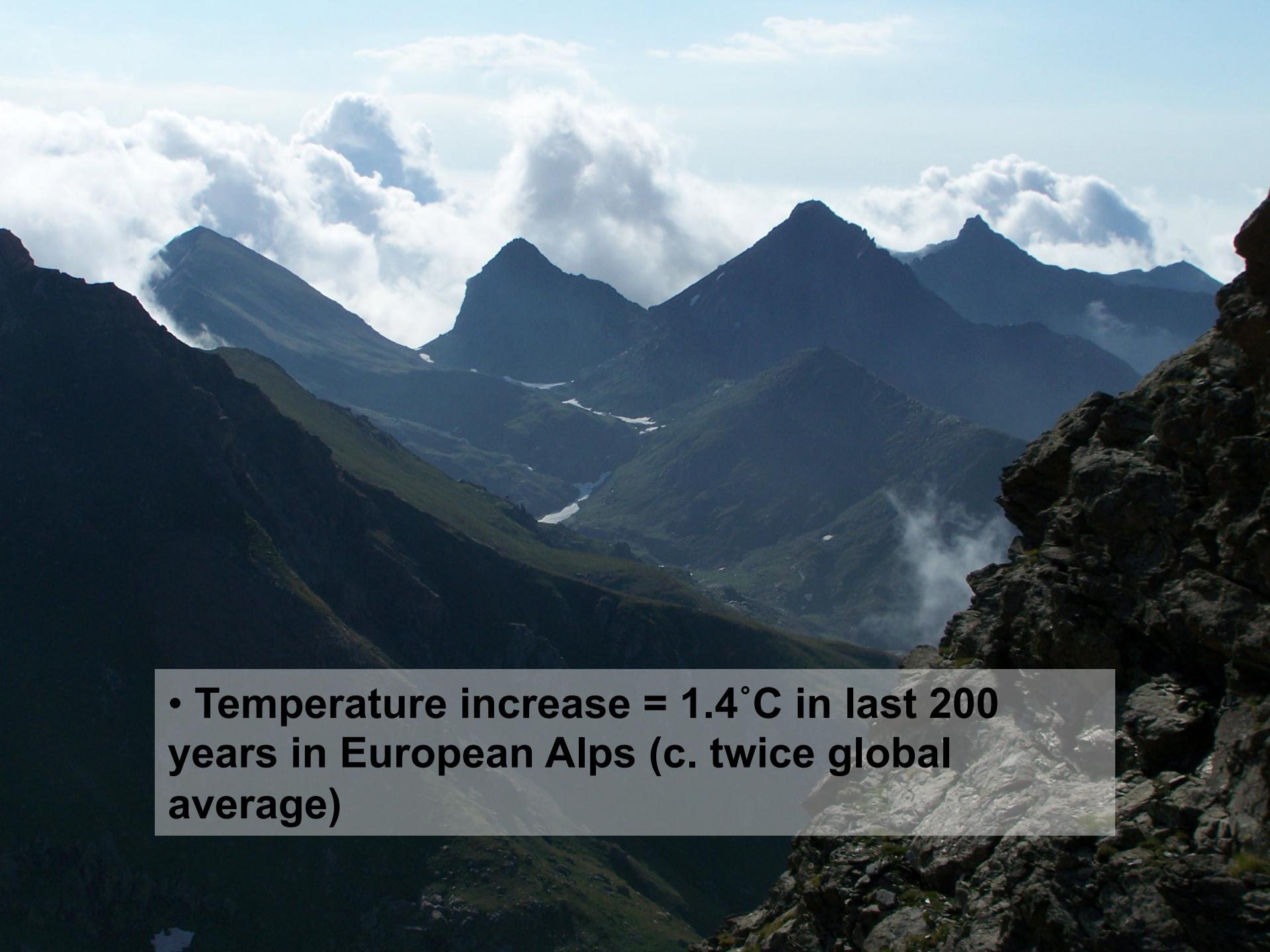


**Hotspots of plant, bird  
and mammal diversity  
based on species richness  
and narrow endemism**

- Richness
- Richness and narrow endemism
- Narrow endemism

**Most European  
diversity hotspots are  
in mountain areas**

(Source: European  
Environment Agency  
[www.eea.europa.eu](http://www.eea.europa.eu))

- 
- Temperature increase =  $1.4^{\circ}\text{C}$  in last 200 years in European Alps (c. twice global average)

# Talk Outline

- 1. Evidence of changes in bird communities**
- 2. Modelling future shifts**
- 3. Research needs – population structure**
- 4. – phenology**
- 5. – productivity**
- 6. – resources & management**

# Evidence for altitudinal shifts



Archaux 2004. *Ibis* 146: 138-144.

Popy et al. 2010. *J Biogeogr* 37: 57-67.

Maggini et al. 2011. *Ecol Model* 222: 21-32.

Ptarmigan have moved to higher altitudes in 29 years in the Swiss Alps

maximum 9.4m/year (E&S Alps), no change W Alps

13% population decline (Saettler pers. com.)



Pernollet et al. 2015. *Ibis* 157: 823-836.

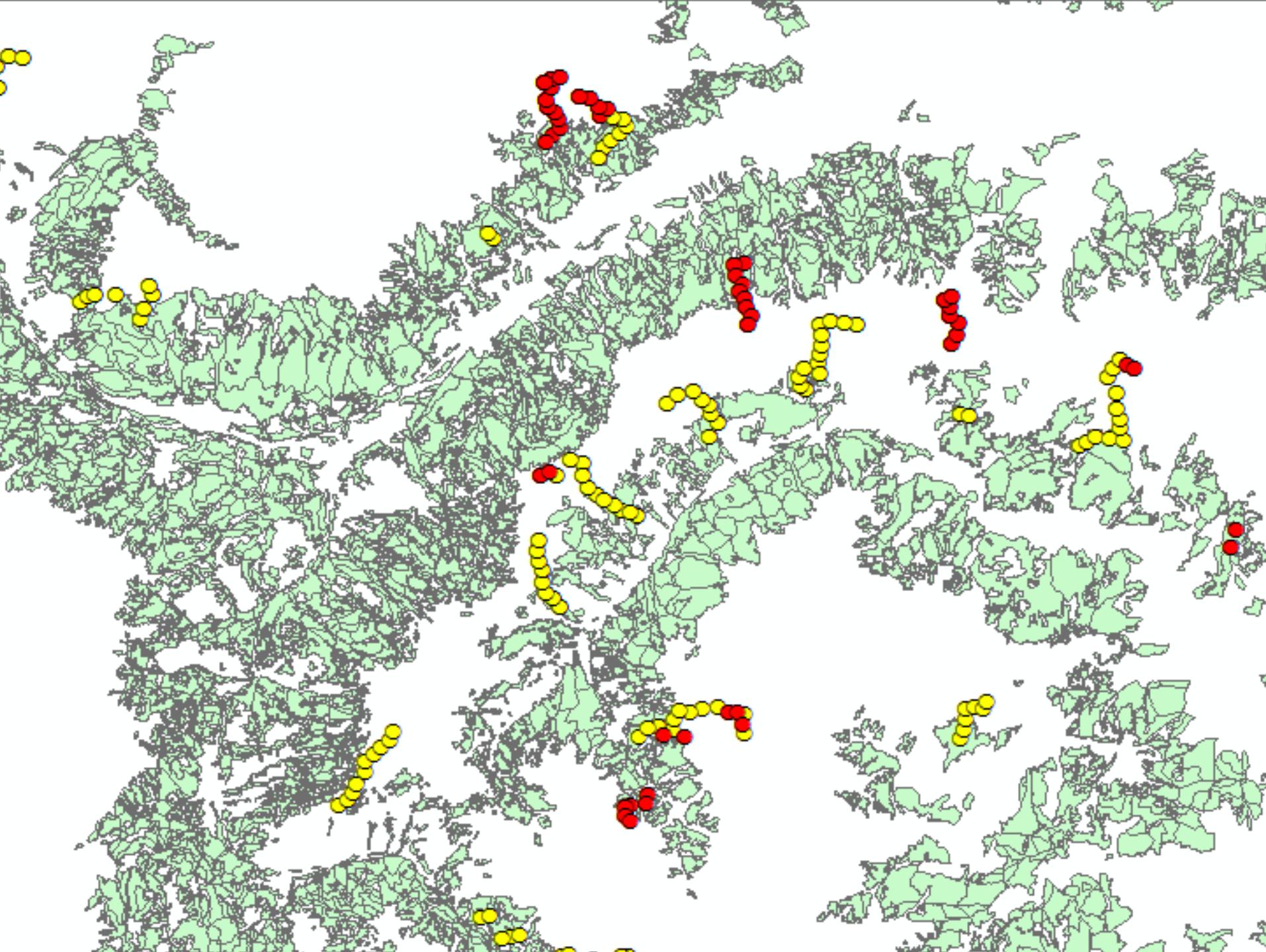
# Change in distribution and population size

Flousek et al. 2015 . PLoS ONE 19: e0139465

- In general, species shifted distributions upwards
- Population declines in higher altitude species

# Modelling future distributions

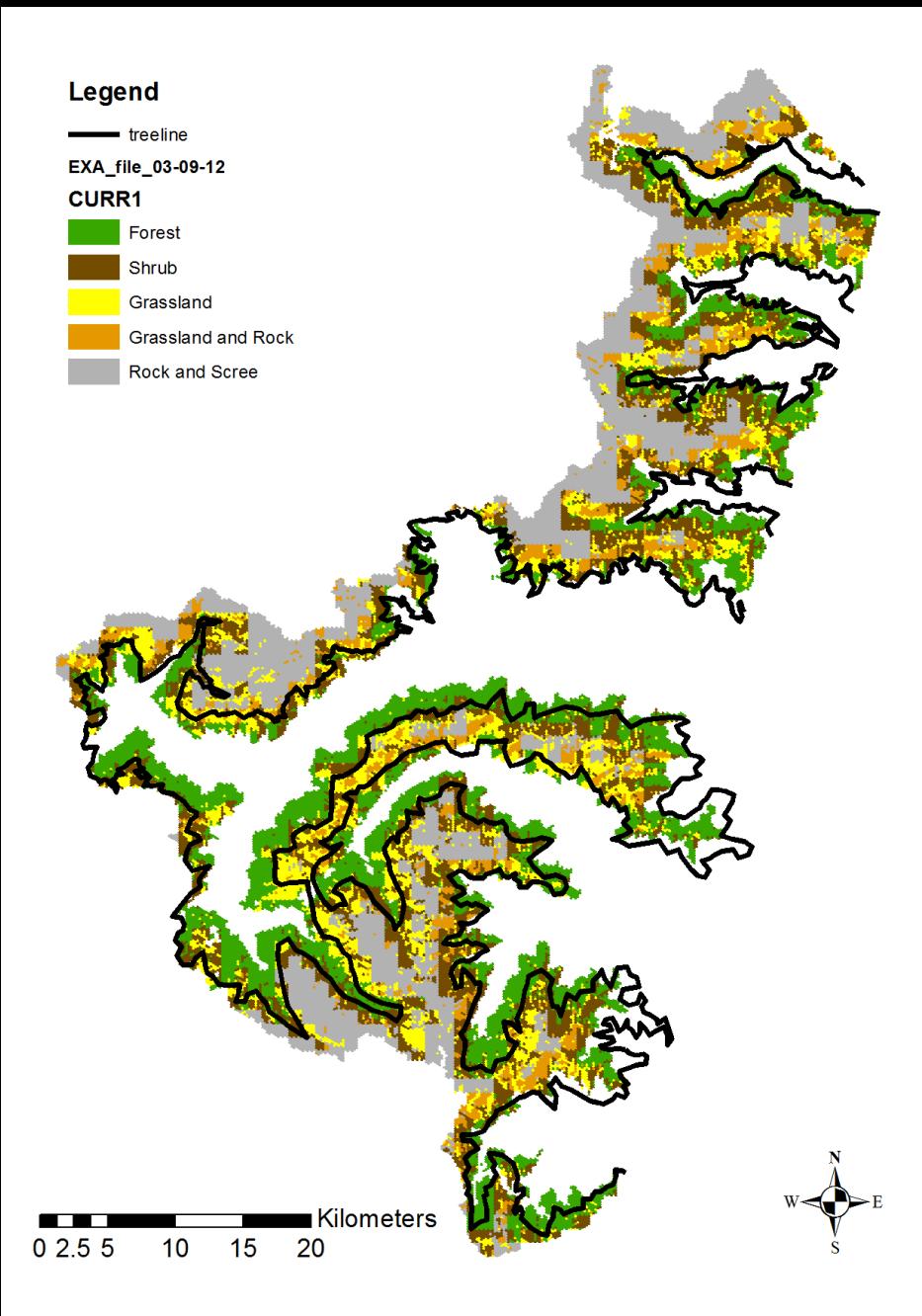




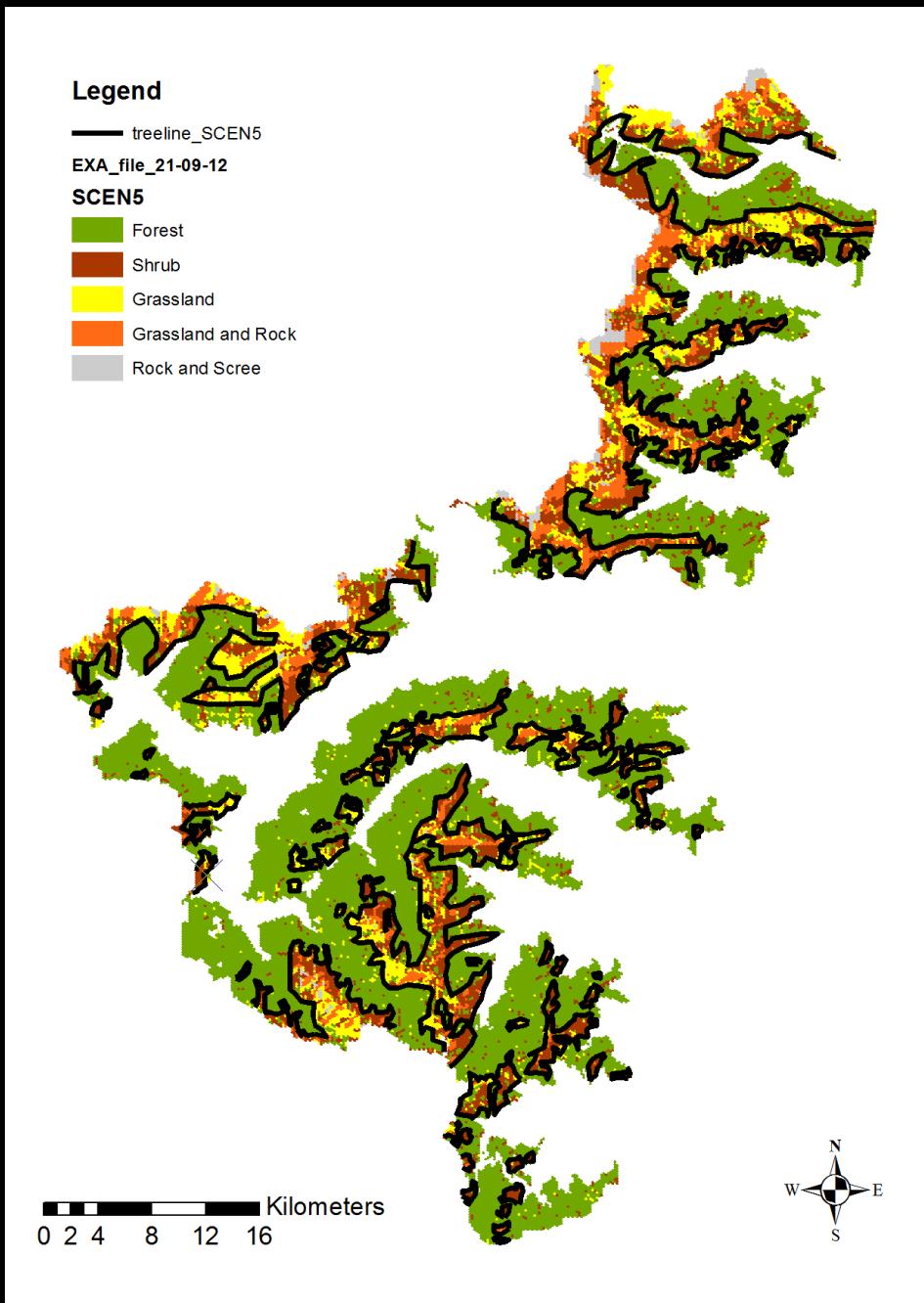


© Enrico Caprio

**(a) Current predicted land cover and observed treeline**

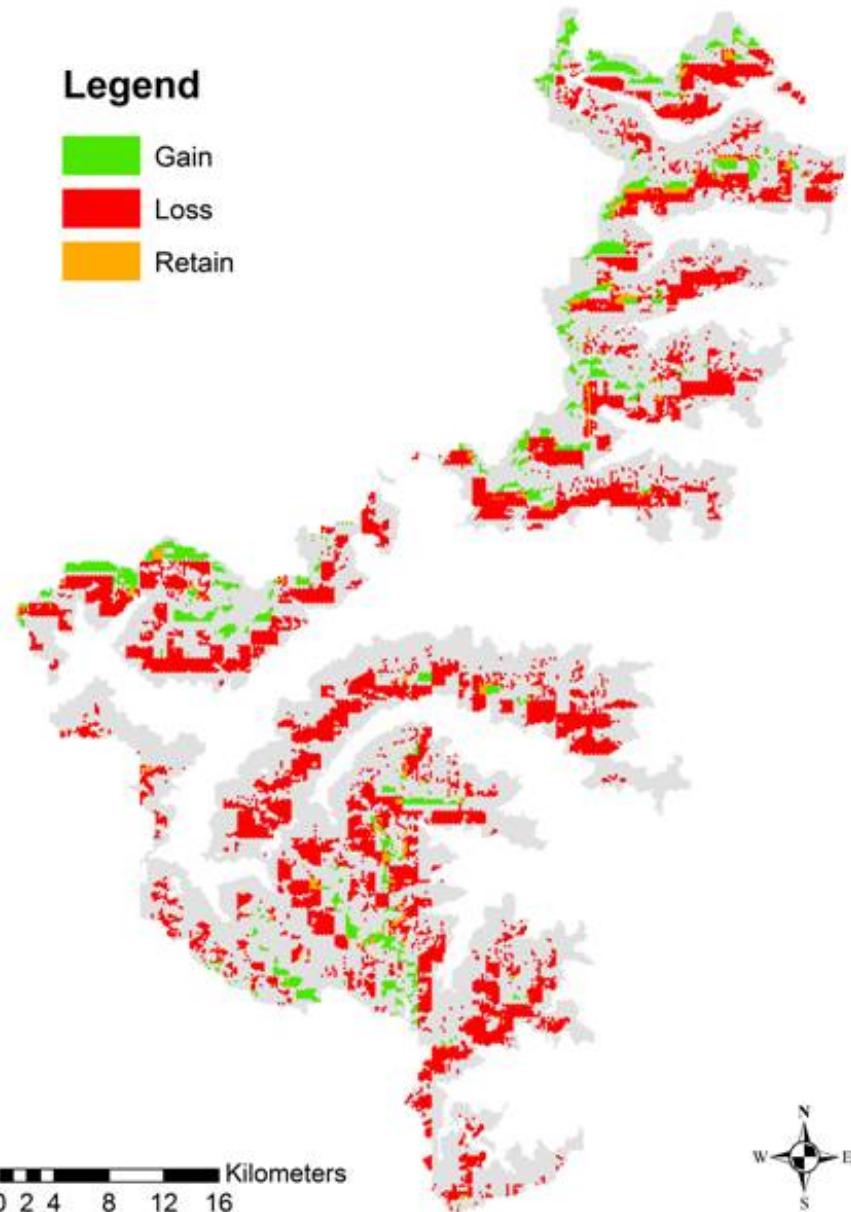


**(b) Predicted land cover according to SCENARIO1 (by 2080)**



**Legend**

- █ Gain
- █ Loss
- █ Retain



**(c) Change in the projected  
distribution of Spioncello by  
2080**

**Chamberlain et al. 2013  
Biological Conservation 167:  
127-135.**



# **Changes in distribution (-24% to -92%)**

**Changes in overlap of distribution with areas suitable for skiing:**

**Spioncello +11%**

**Sordone +6%**

**Codirosso spazzacamino -21%**

**Fringuello alpino +5%**

**But for hot-spots where most species occur, overlap will increase by up to 20%**

(NB worst case scenarios)



# **There may be less room than we think!**

**Maintain open habitats or let nature take its course?**



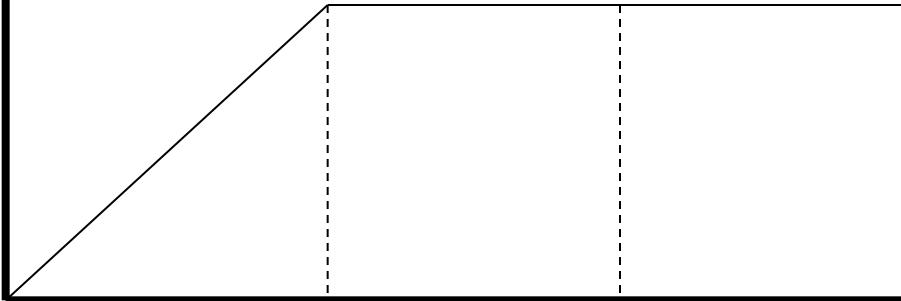
© George H Higginbotham

# Source-sink effects

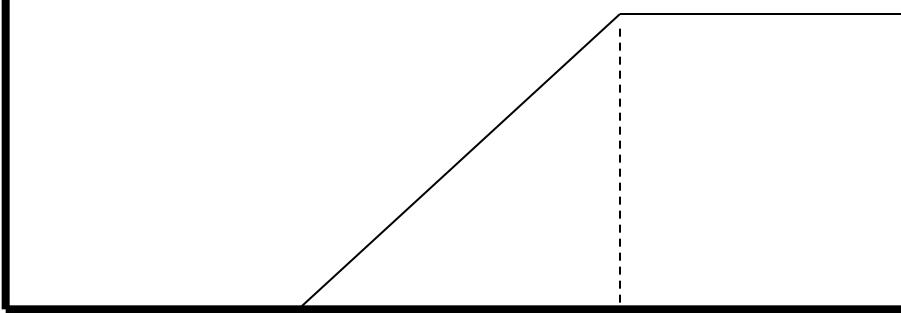


**Population density**

**A. High productivity**



**B. Low productivity**



**C. No productivity**



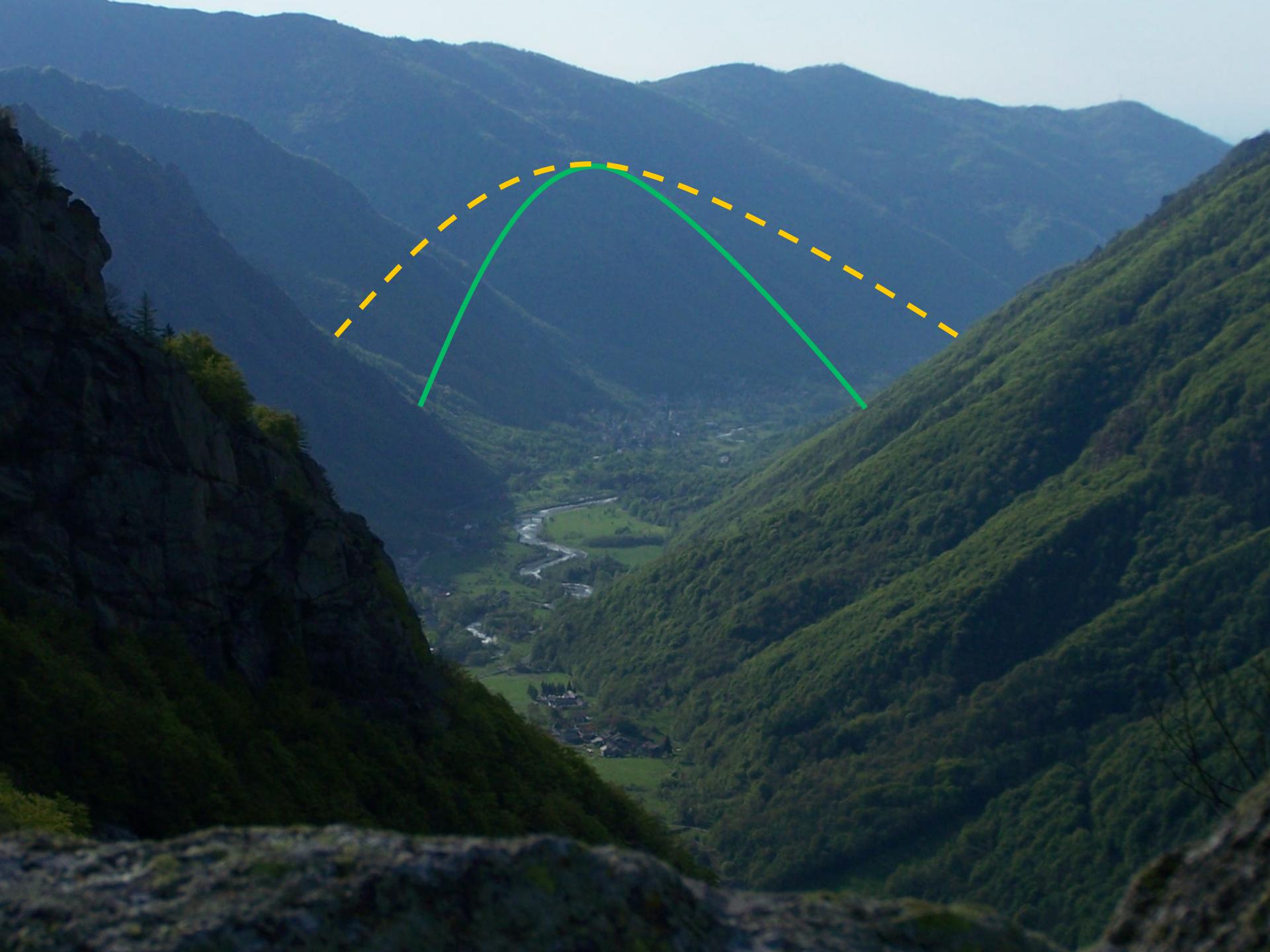
**Population size**

Newton 1998,  
Brown 1969



**Preferred habitat  
in valley bottom**

**Improvements in  
valley bottom lead  
to greater  
occupancy of less  
preferred habitats**





**A true climate response leads  
to a change in the mean of  
the altitudinal distribution**

# Research needs

- Monitoring across a wide altitudinal range over time to assess shift patterns (as per Maggini et al. 2011)
- Assess population age structure along an altitudinal gradient

# Phenology and the altitudinal green wave



**18th June 2010, c. 2800m**



**12th June 2011, c. 2800m**





A photograph of a small brown bird, possibly a sparrow or finch, perched on a patch of ground covered in white snow. Sparse, dry grass and twigs are visible through the snow. The background is a soft-focus view of more snow and vegetation.

# Research needs

- Productivity in relation to snowmelt for residents and migrants
- Date of arrival on breeding grounds in relation to snowmelt
- ...in other words, intensive demographic studies over several years, again

# Factors limiting reproductive performance



A small bird, likely a sparrow or similar songbird, is perched on a light-colored rock in a field of green grass and low-lying plants. The background is a soft-focus green landscape.

## Spioncello

- Never found within 50m of mature trees
- Never found where canopy cover was  $\geq 10\%$

## Nidi artificiali

- 3 uova di quaglia
- 2 uova di plastilina (PlastiDip®) + 1 di quaglia.



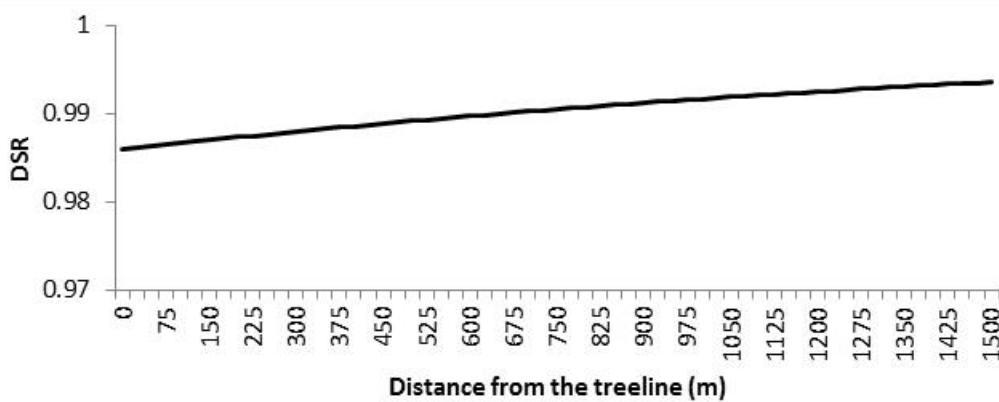
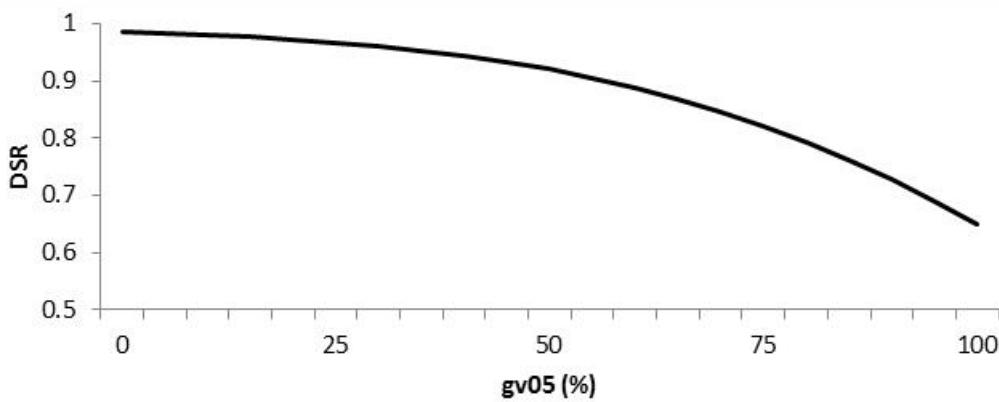
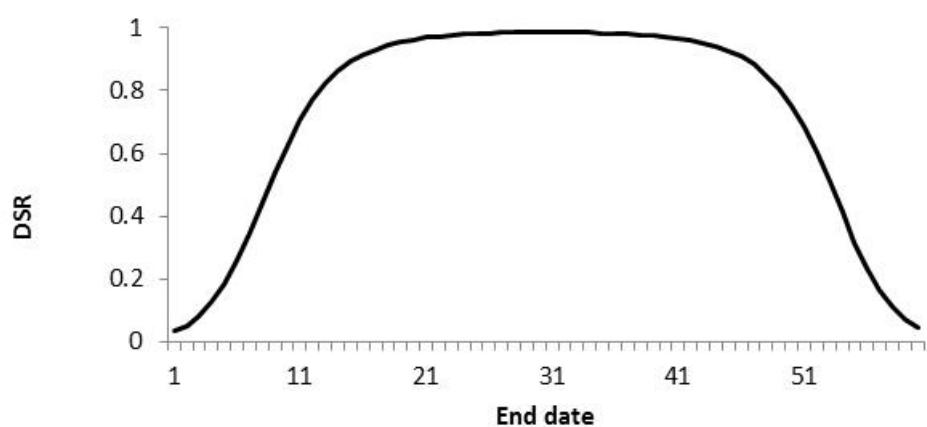
# Design dello studio

60 punti

2793 m

2184 m

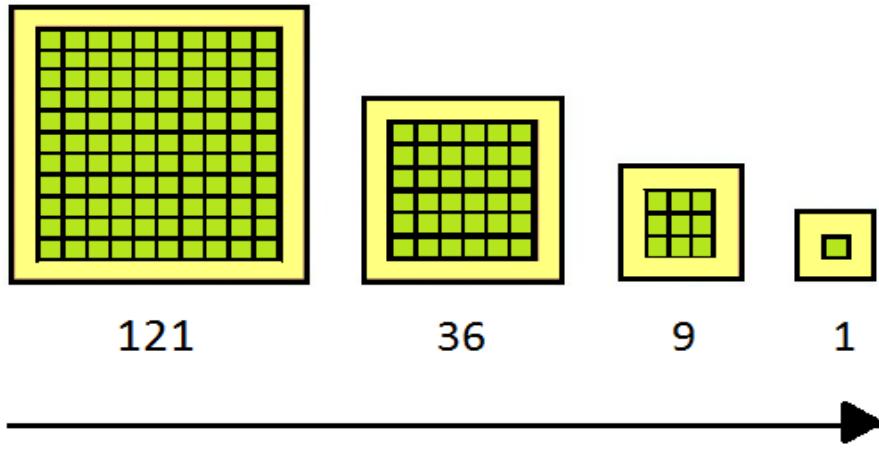
## Sopravvivenza dei nidi: MARK



**DSR media = 98.7%**

**Sopravvivenza 16gg = 80.7**

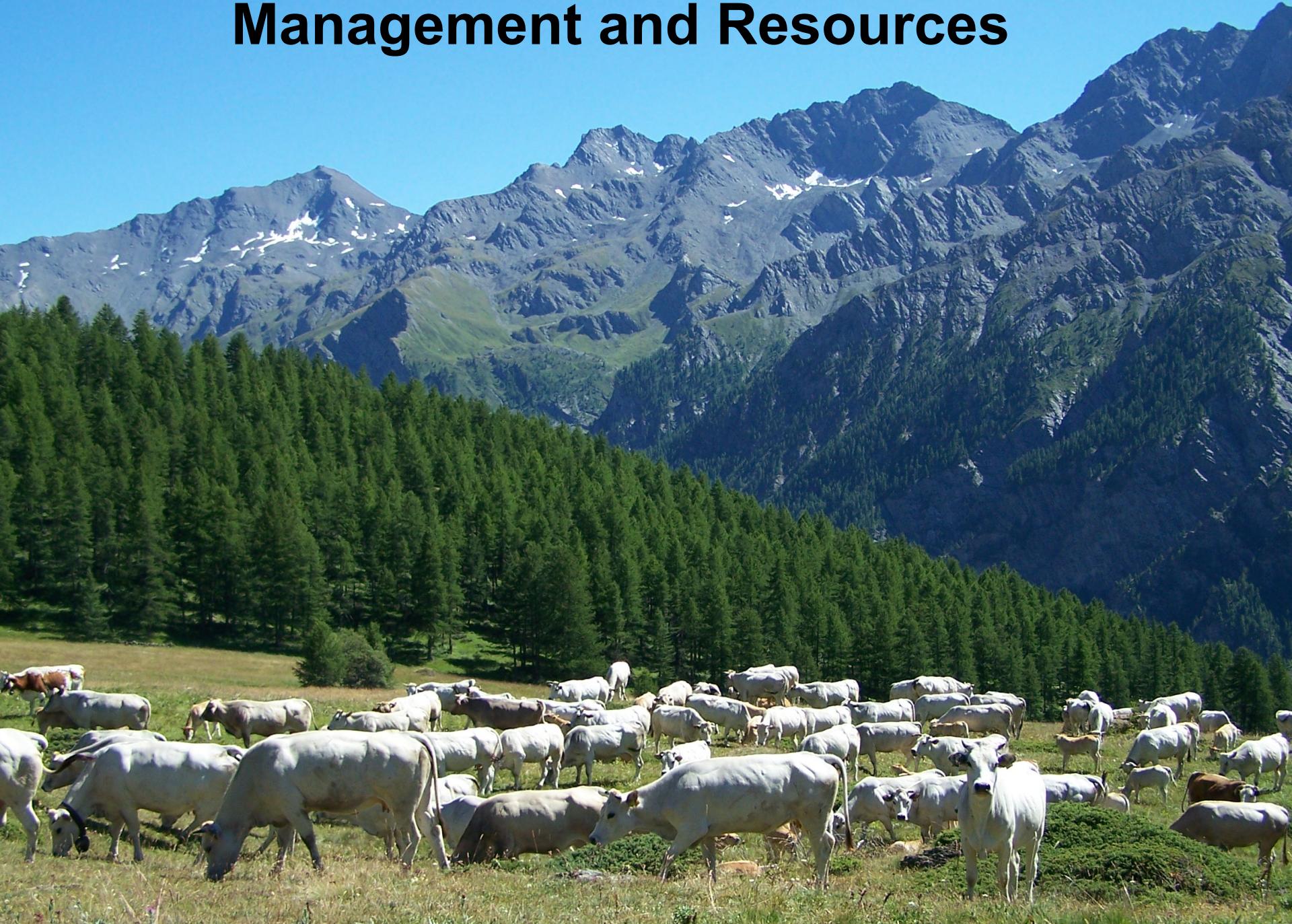
## Conseguenze per la conservazione



# Research needs

- Intensive demographic studies (productivity, survival) through territory mapping, nest monitoring and ringing
- Consideration of other costs (parasites, pathogens, immune response)

# Management and Resources







*Pterostichus externepunctatus*



*Anonconotus alpinus*

# Research needs

- Understand the link between grazing, vegetation structure and bird nesting success
- Effects of management on key resources
- Obviously, these ‘resources’ are interesting in their own right!

*Pardosa sp.*

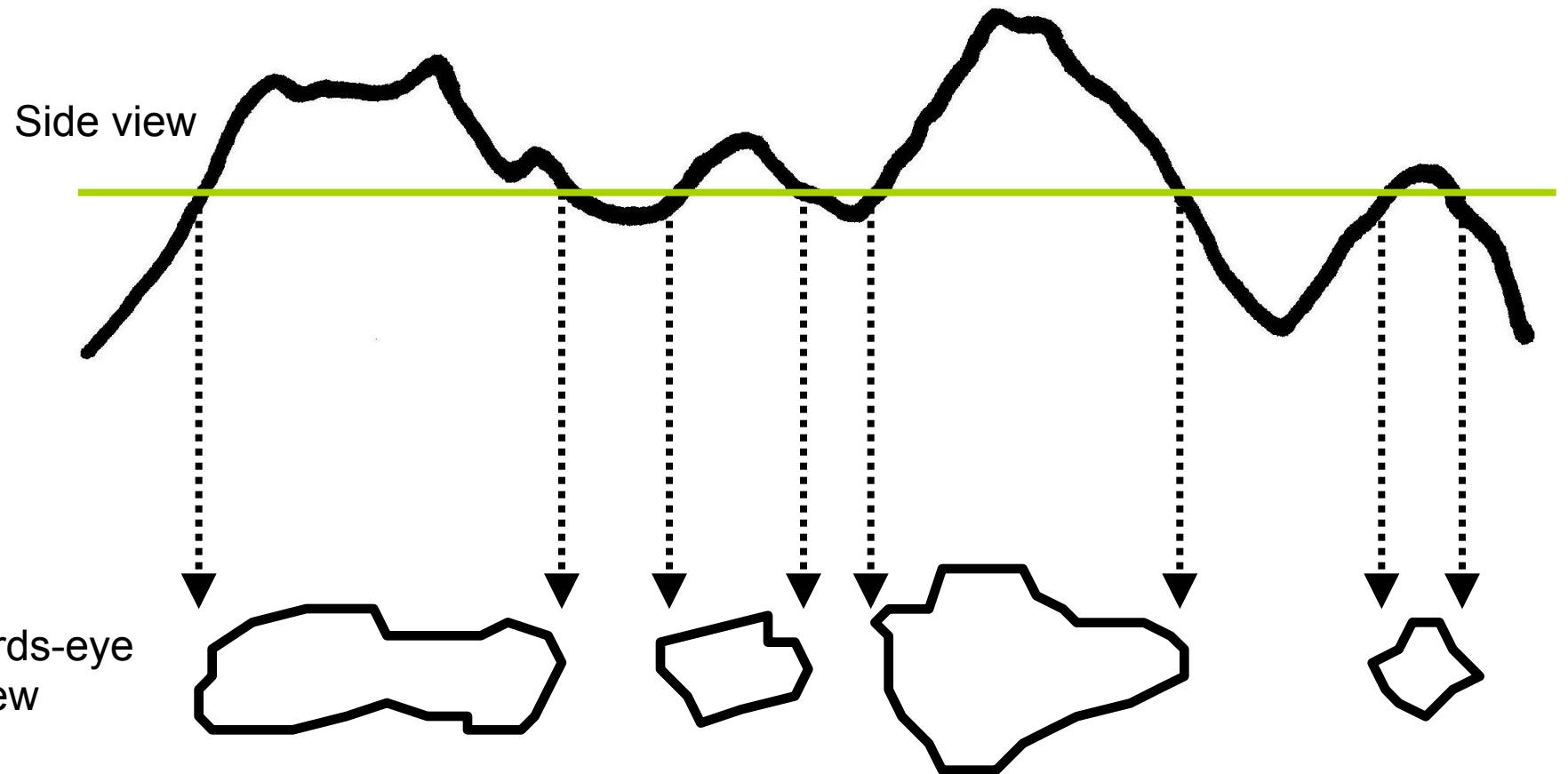
# Summary

- Intensive demographic monitoring programmes
- A gradient approach
- Nest monitoring
- Alpine CES
- Trans-alpine monitoring transects ('GLORIA for birds')



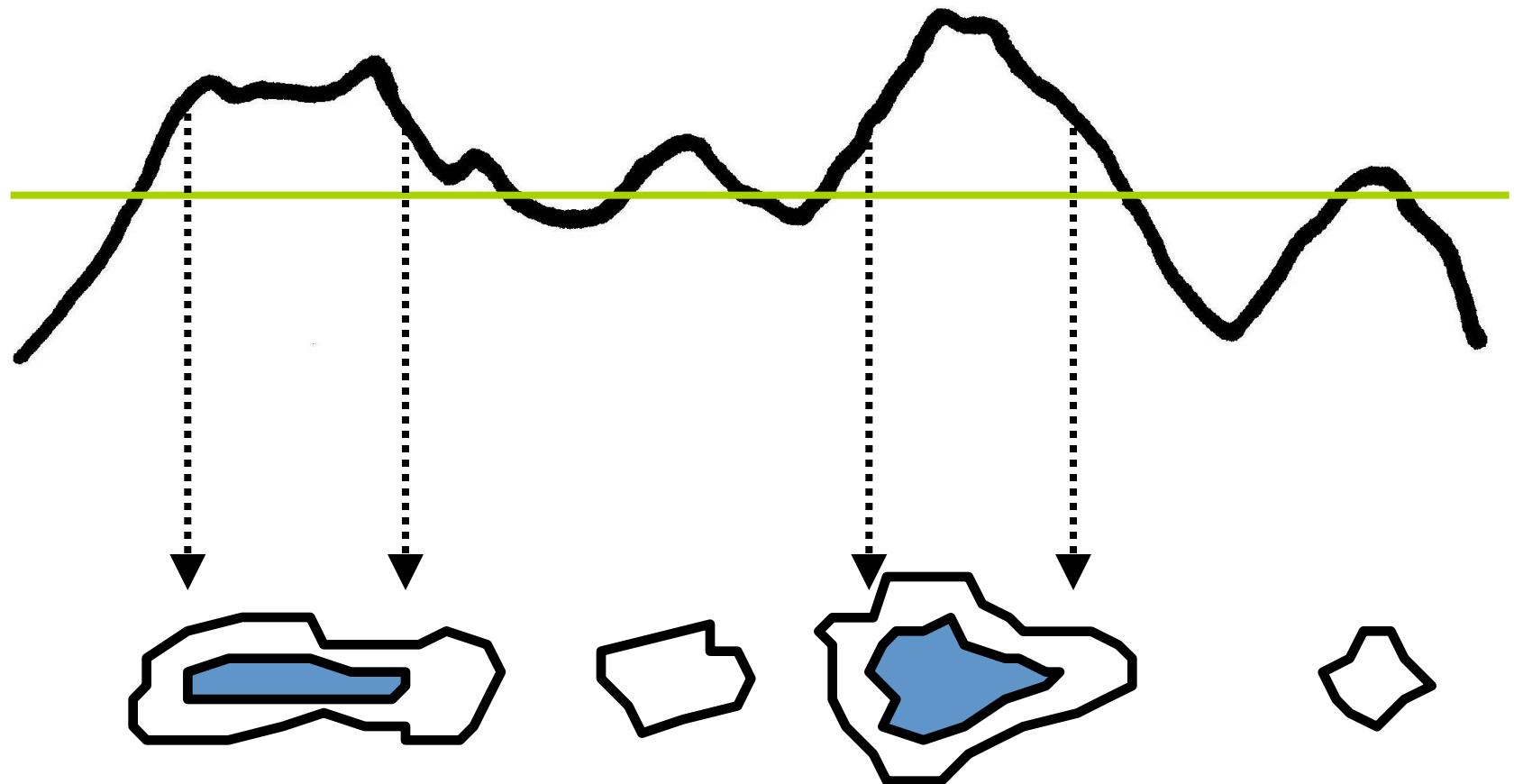
**Ringraziamenti: Mattia Brambilla, Enrico Caprio, Ilenia Marocco, Luca Maurino,  
Beatrice Nervo, Antonio Rolando, Domenico Rosselli, Cristina Vallino**

# Mountain ridge with treeline



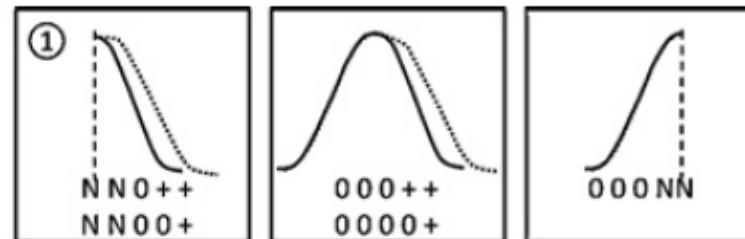
**Open areas above the treeline = 'islands'**

# Warming climate causes the treeline to advance

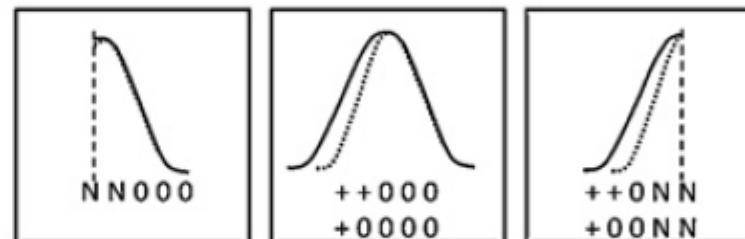


**As a consequence, the islands get smaller  
– and some disappear altogether**

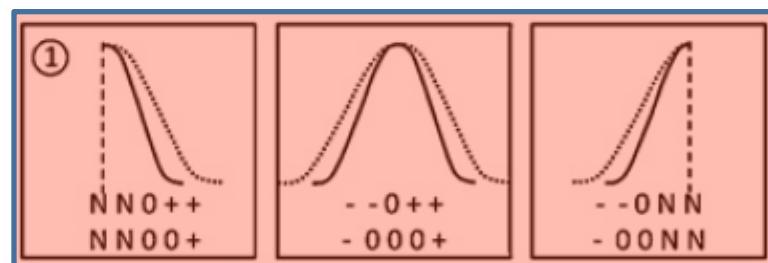
**A** Leading edge expansion



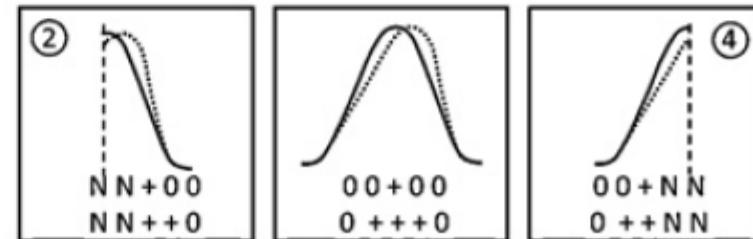
**B** Trailing edge retraction



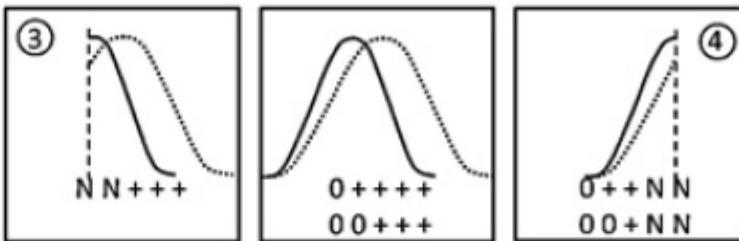
**C** Range expansion



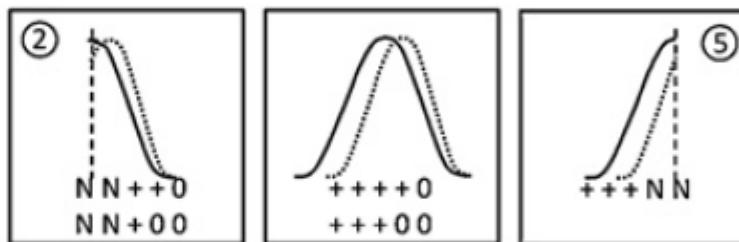
**D** Optimum shift



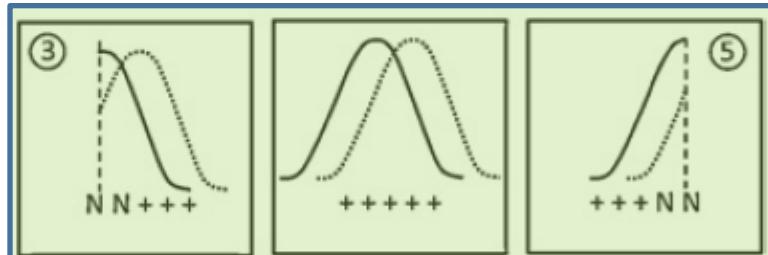
**E** Expansion



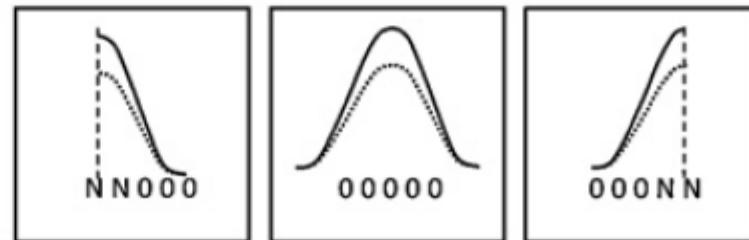
**F** Retraction



**G** Shift



**H** Change in abundance





© Tommy Holden

## Geographic transferability

WI and D – shape is the same, so relative change OK

CT – same in both

WT – only markedly different species

...so in general OK, but caution needed

