



26th September 2016

Padova Sydney Conference



THE UNIVERSITY OF
SYDNEY

DAFNAE

Habitats Directive and management of forest operations: which implications and risk under the current trend of climate change?



UNIVERSITÀ
DEGLI STUDI
DI PADOVA

TESAF

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The golden Alpine salamander (*Salamandra atra aurorae*) in conservation peril



« new forestry paths and roads were built by using heavy machines and a large number of trees, particularly Silver Firs (*Abies alba*), have been marked for removal in the near future ...

... intended logging will have dramatic negative consequences for the habitat of the salamanders ...

... it is very likely that this population will go extinct as a consequence of already undertaken and planned logging measures ...

Similar activities and heavy forestry exploitation are also currently ongoing ...

... spontaneous protest of herpetologists and some politicians have temporarily stopped the forestry activities »

Some logging data for the region

- Mean growing stock = 204 m³/ha
- Mean yield = 1.2 m³/ha/year
- Mean annual increment = 5.5 m³/ha
- Annual yield / growing stock = 0.56 %
- Clearcut forbidden by the Italian law
- Forest operation techniques



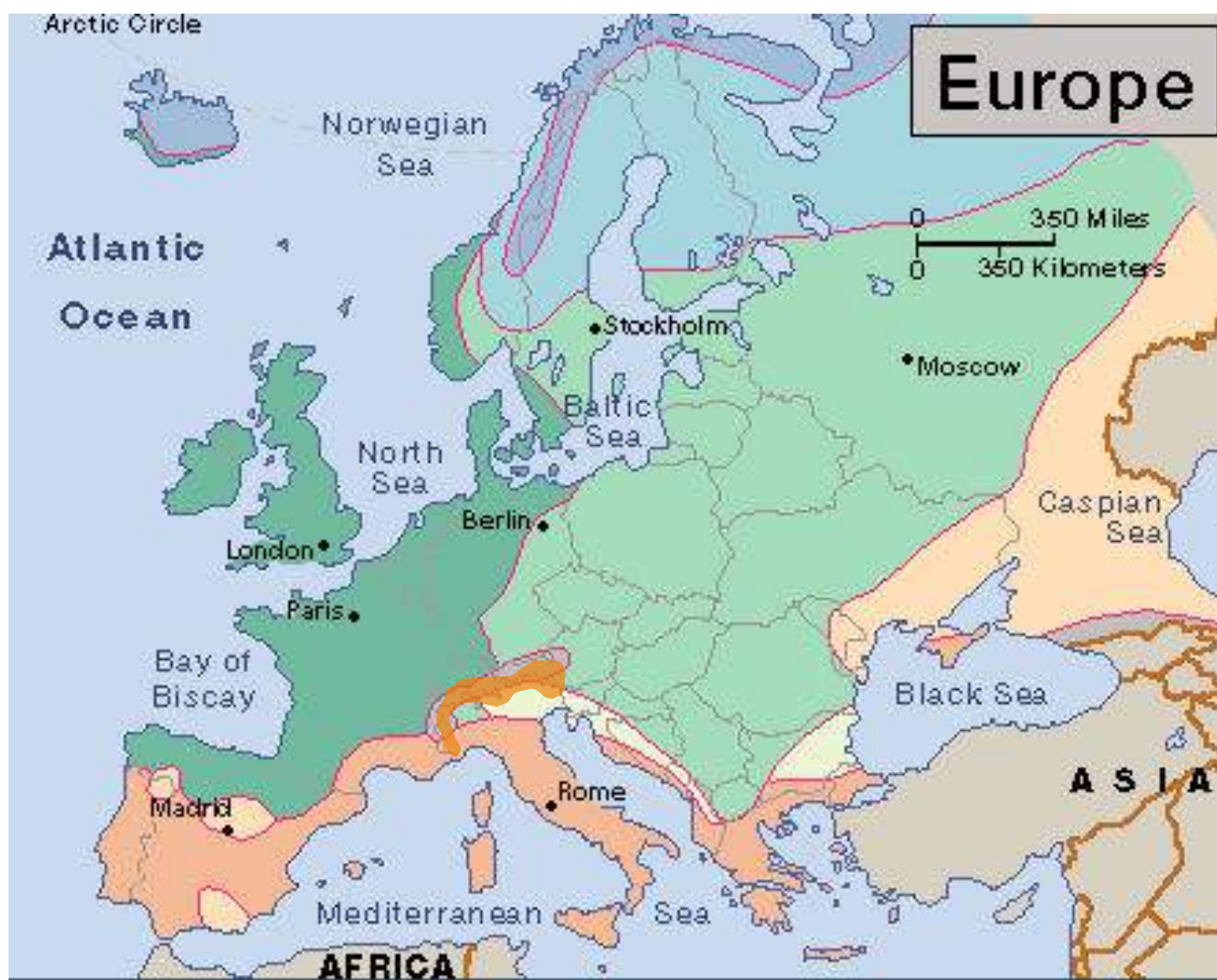
Summary

- The golden Alpine Salamander
- Obligation to protect: Habitats Directive
- Application of experimental evidence to conservation measures pursuant to Directive
- Implications in view of climate variability and forest operations

Salamandra atra aurorae Trevisan

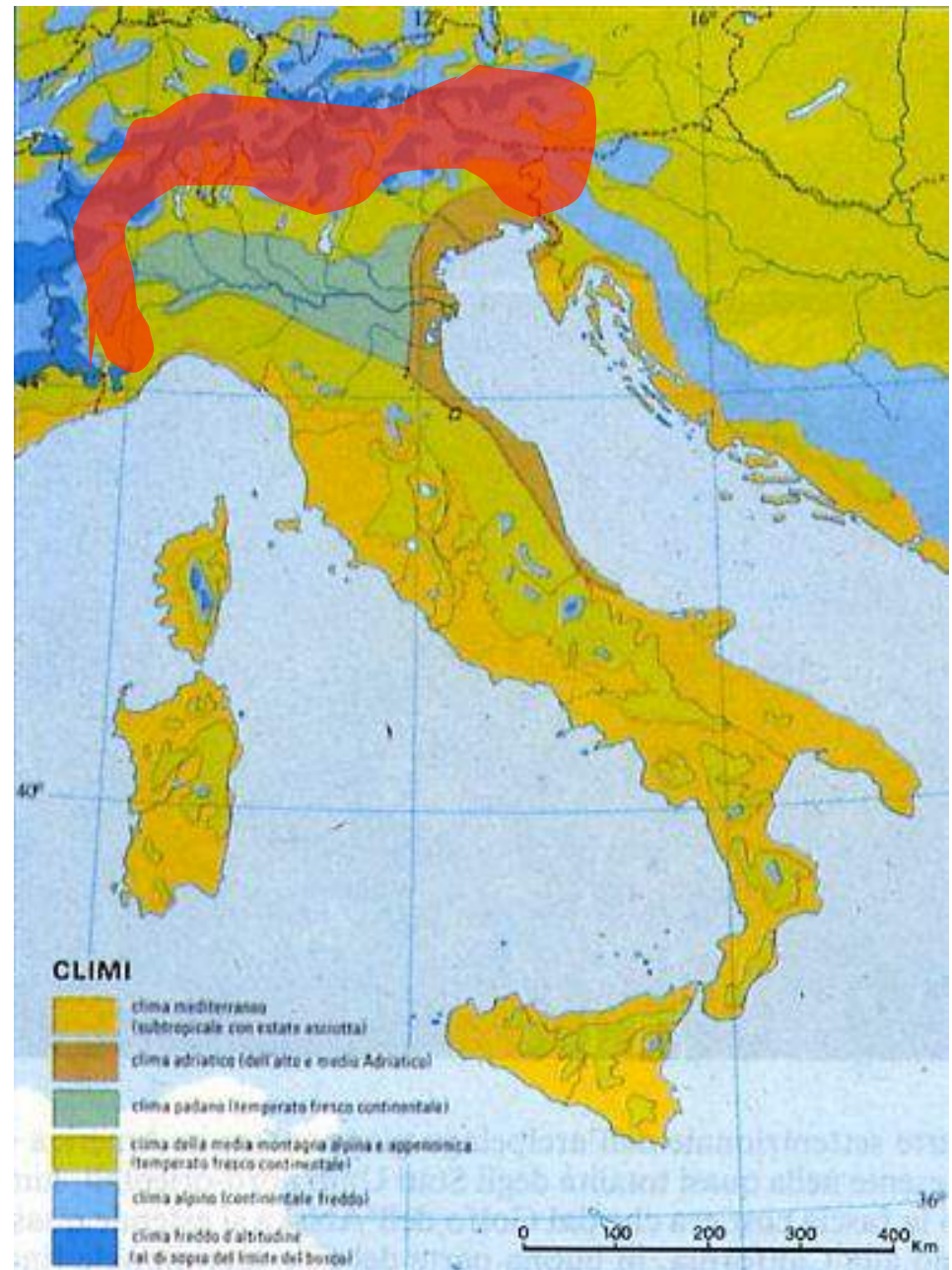
- Endemic of a little Central Alpine district
- Elusive and little active amphibian
- Quiescent in winter
- Viviparous, not linked to water
- Italian Red List: vulnerable
- 477 (\pm 184) individuals / ha mature stand
- 97 (\pm 23) individuals / ha young stand
- Mean width home range: 7.8 m
- Maximum recapture distance: 30 m
- see Bonato & Fracasso (2003)

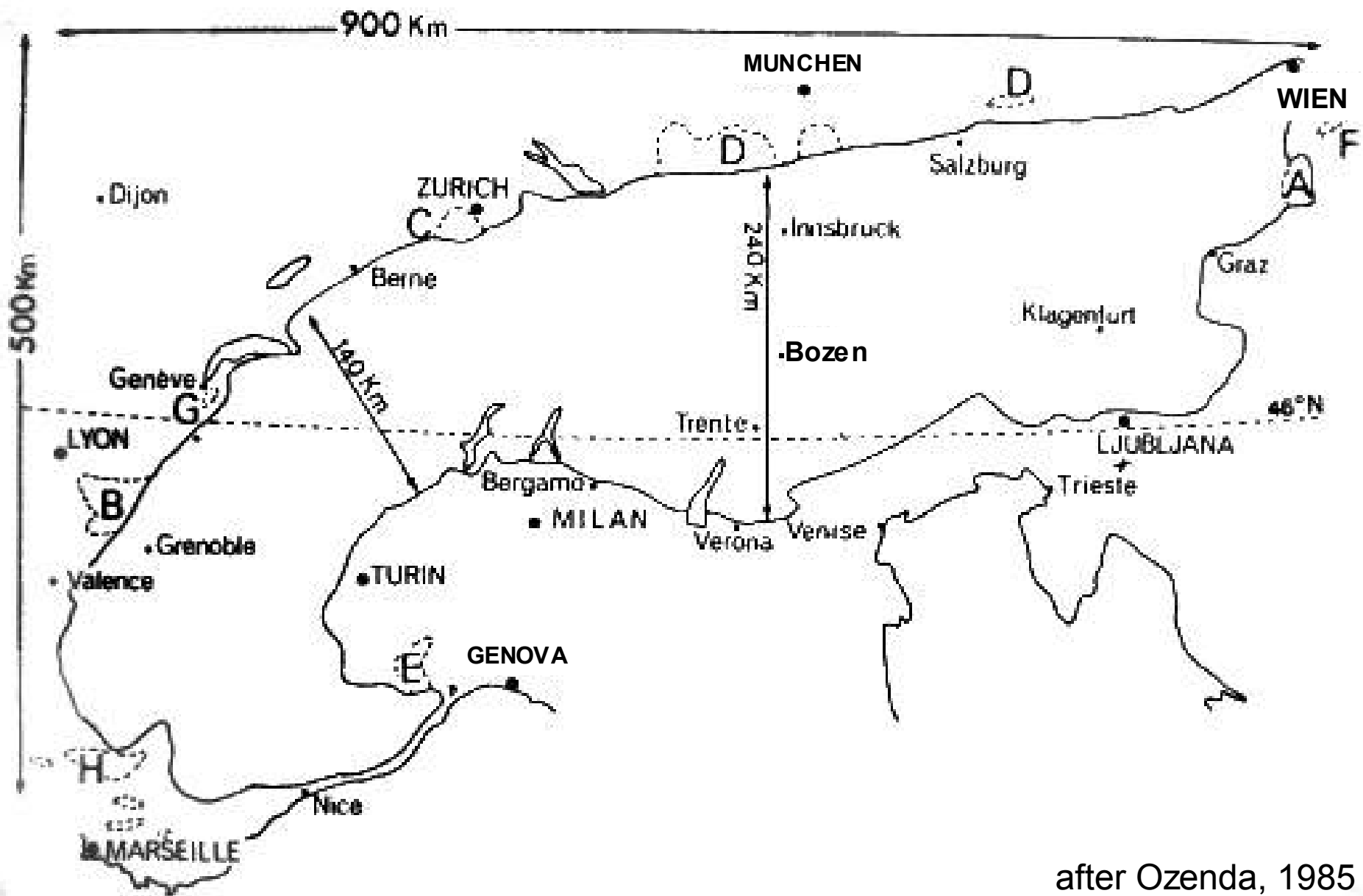




Climate

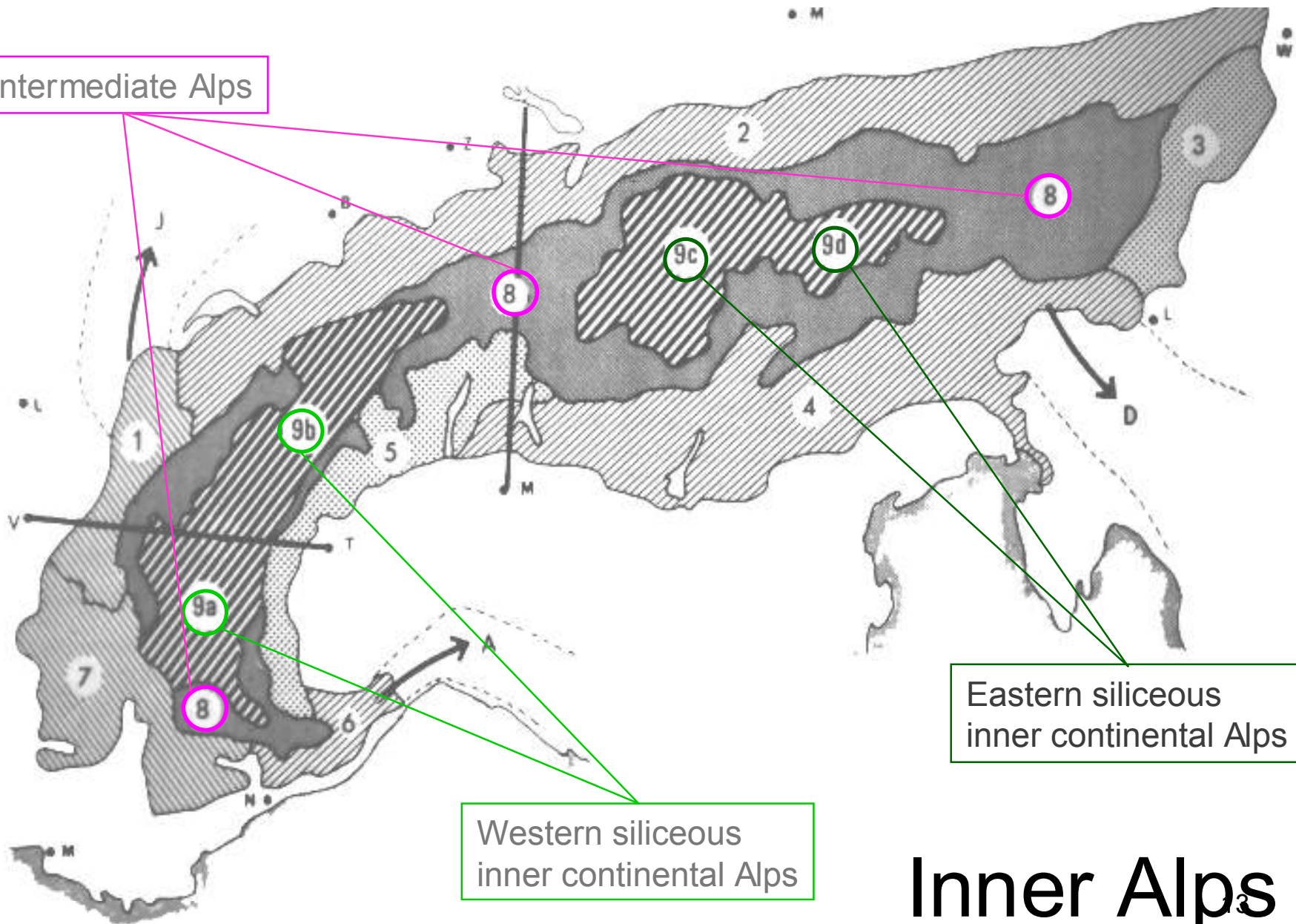
- Temperate continental
- Alpine continental





after Ozenda, 1985

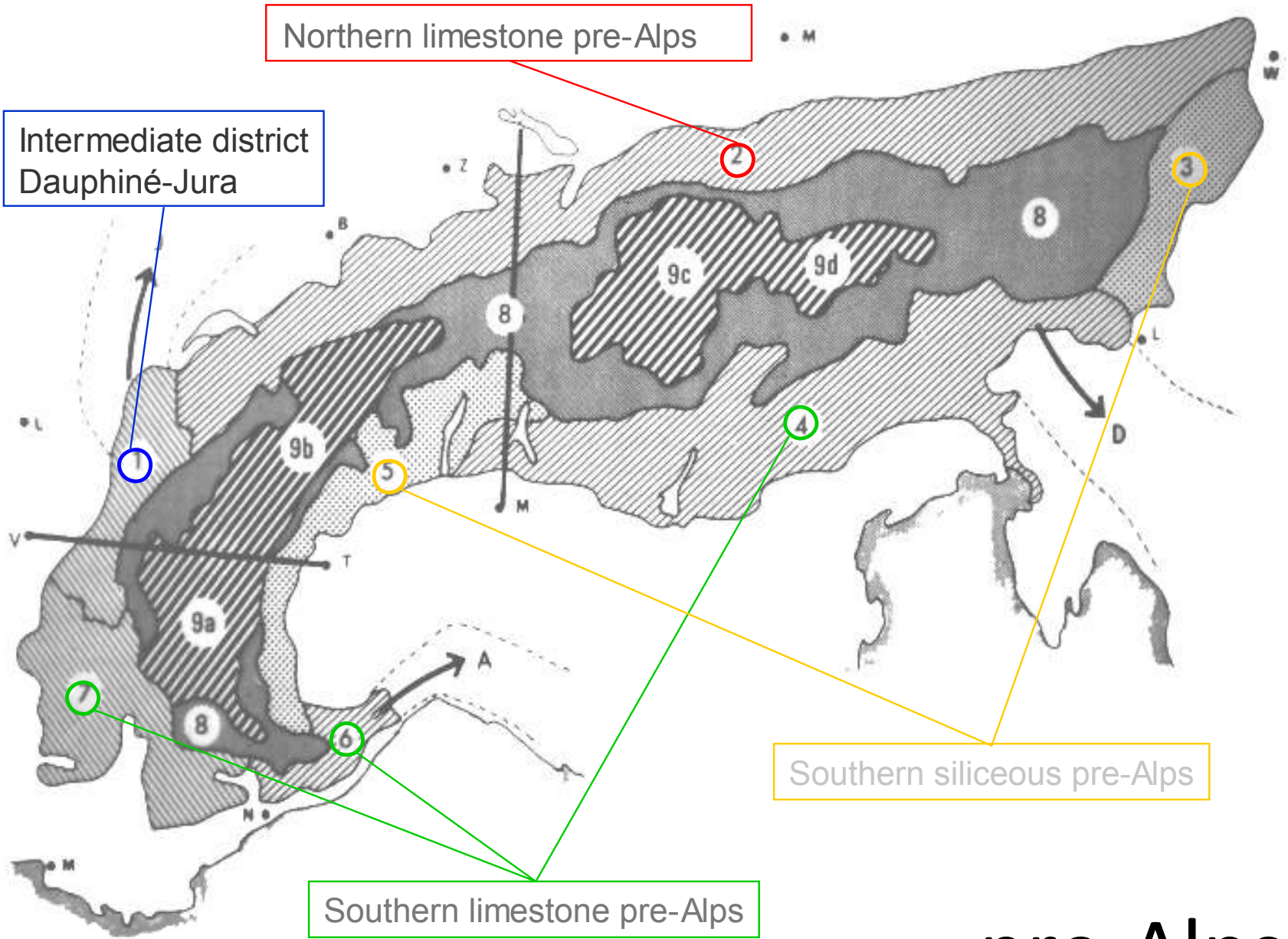
Intermediate Alps



Eastern siliceous inner continental Alps

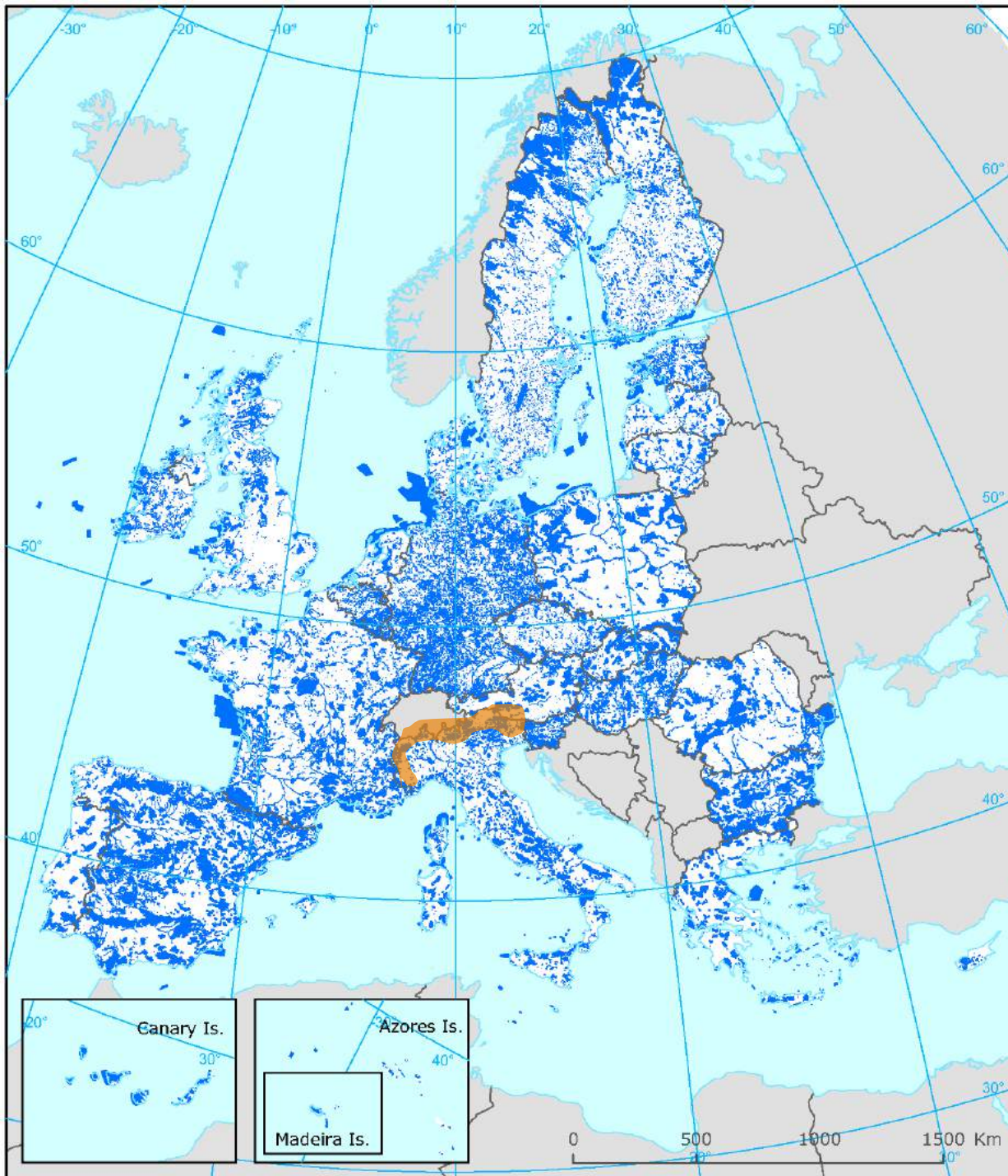
Western siliceous inner continental Alps

Inner Alps



pre-Alps



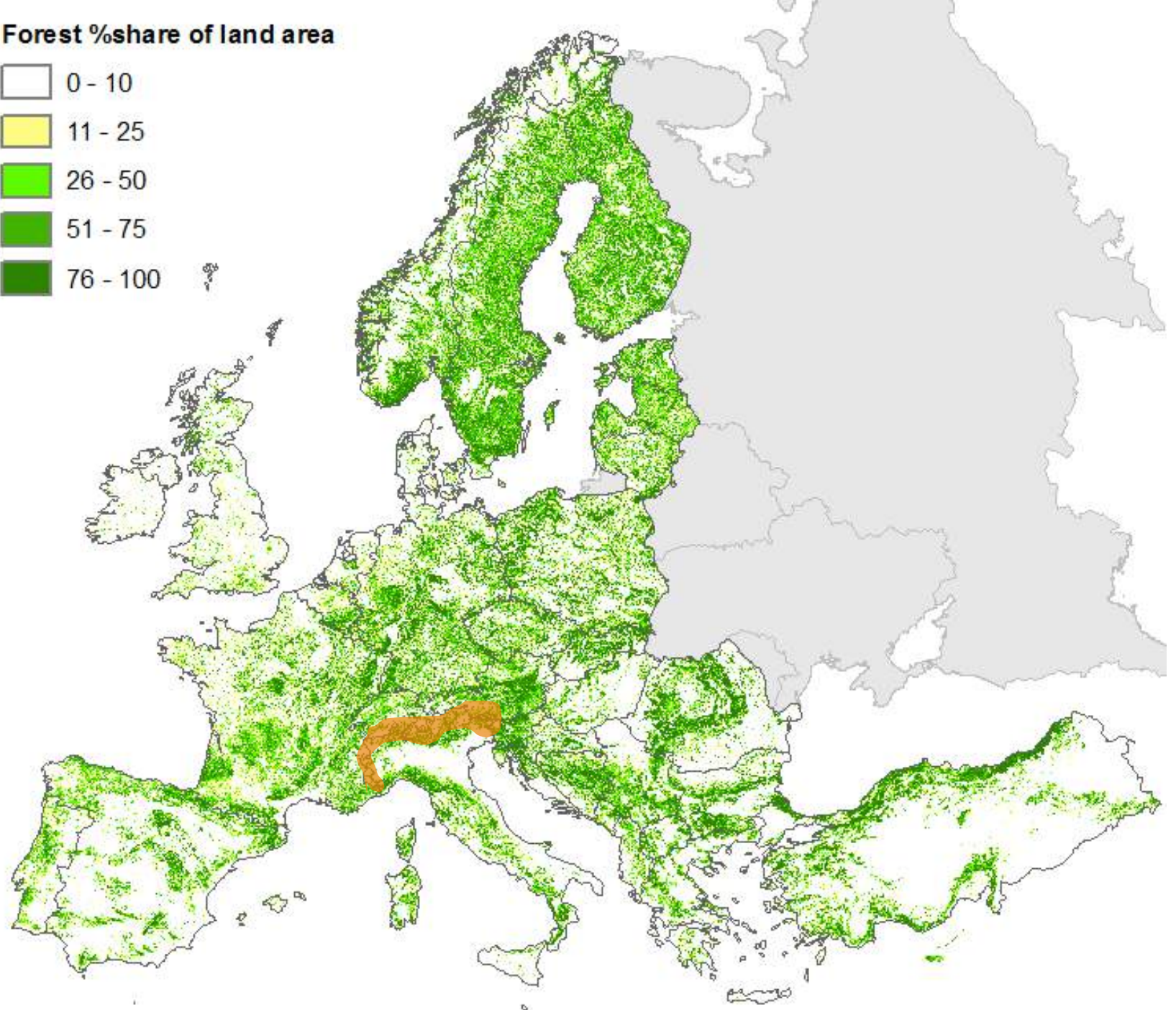
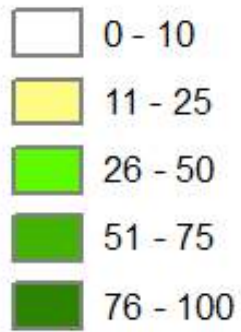


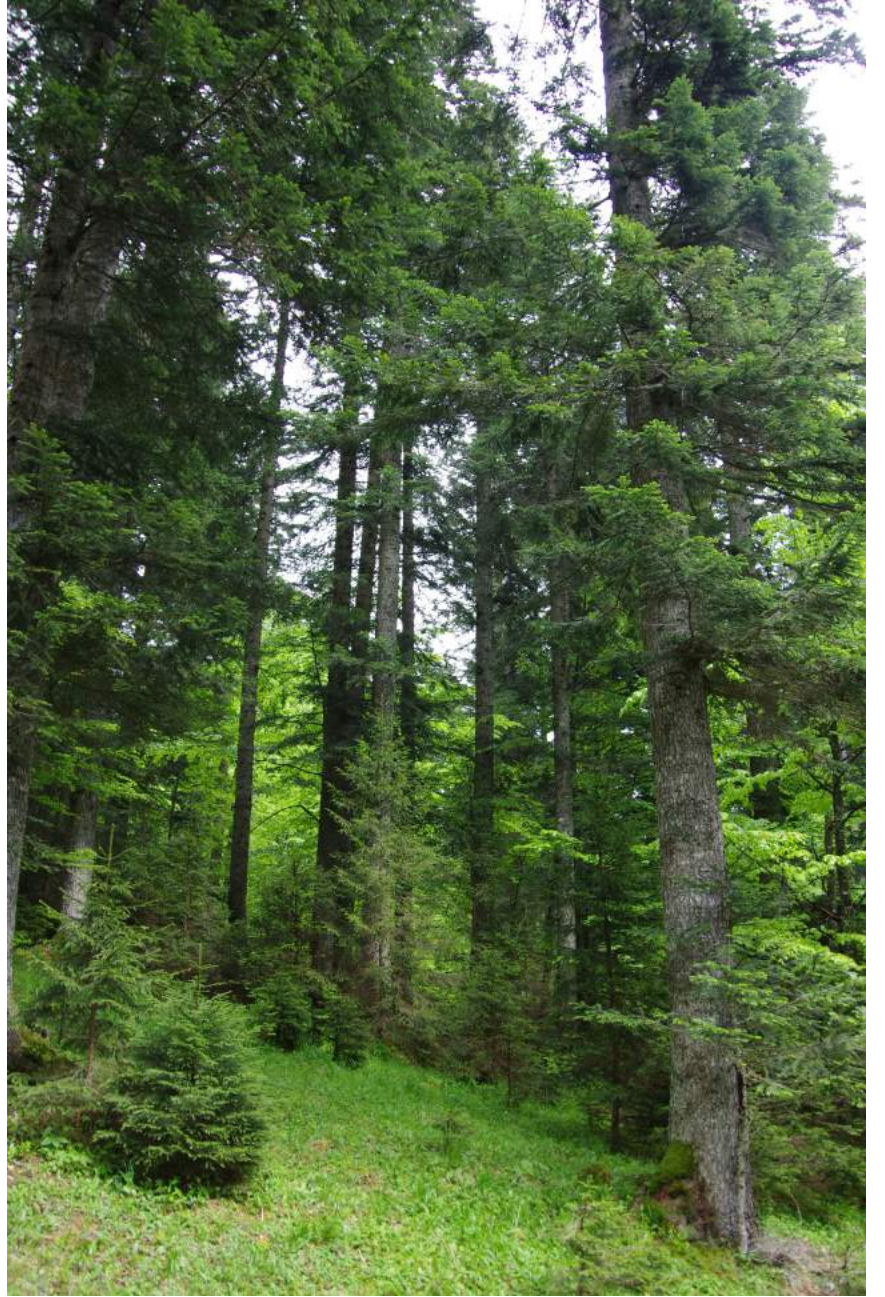
Distribution of Natura 2000 sites across EU Member States

■ Natura 2000 sites

- Habitats Directive (92/43/EEC)
- 18 % of the EU's land area
- world largest network of protected sites
- more than 1,000 species protected
- conservation measures must be established by Member States

Forest %share of land area





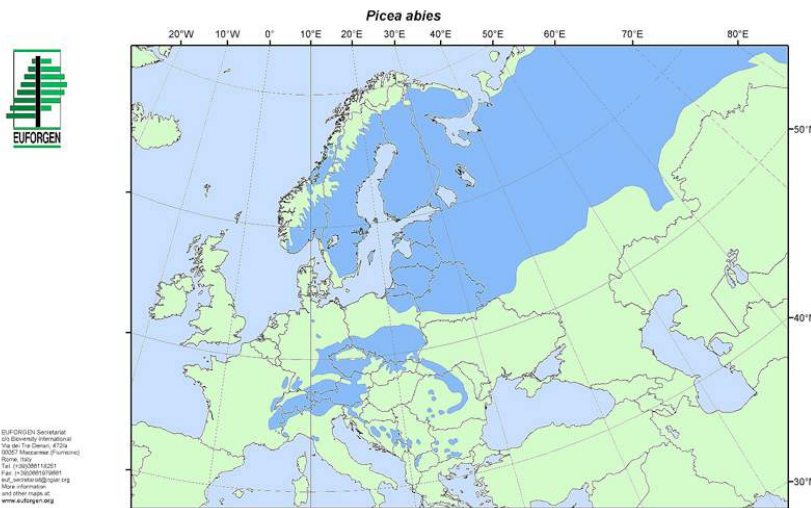
European Silver-fir (*Abies alba*)

- Shade tolerant
- High-moisture
- Deep soils



Norway Spruce (*Picea abies*)

- Large ecological amplitude
- Cold resistant
- Medium light demanding



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This distribution map, showing the natural distribution area of *Picea abies* was compiled by members of the EUFORGEN Networks based on an earlier map published by H. Schmidt-Vogt in 1977 (Die Fichte, Verlag Paul Parey, Hamburg and Berlin, p.647).

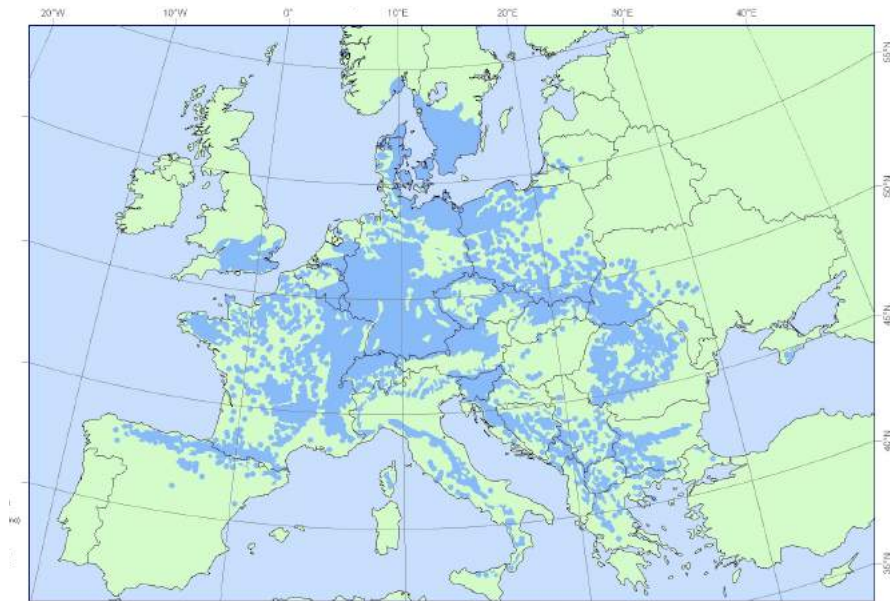
Citation: Distribution map of Norway spruce (*Picea abies*) EUFORGEN 2009, www.euforgen.org.

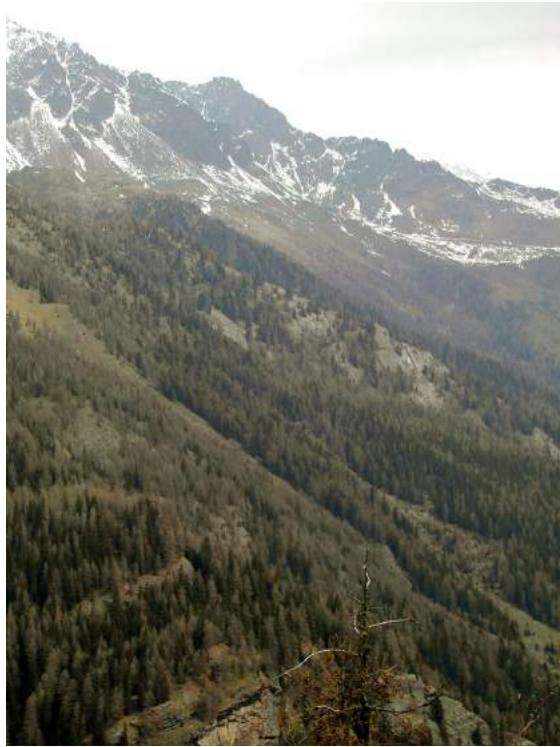
First published online in 2003 - Updated on 24 July 2008

0 375 750 1,500 Km

European Beech (*Fagus sylvatica*)

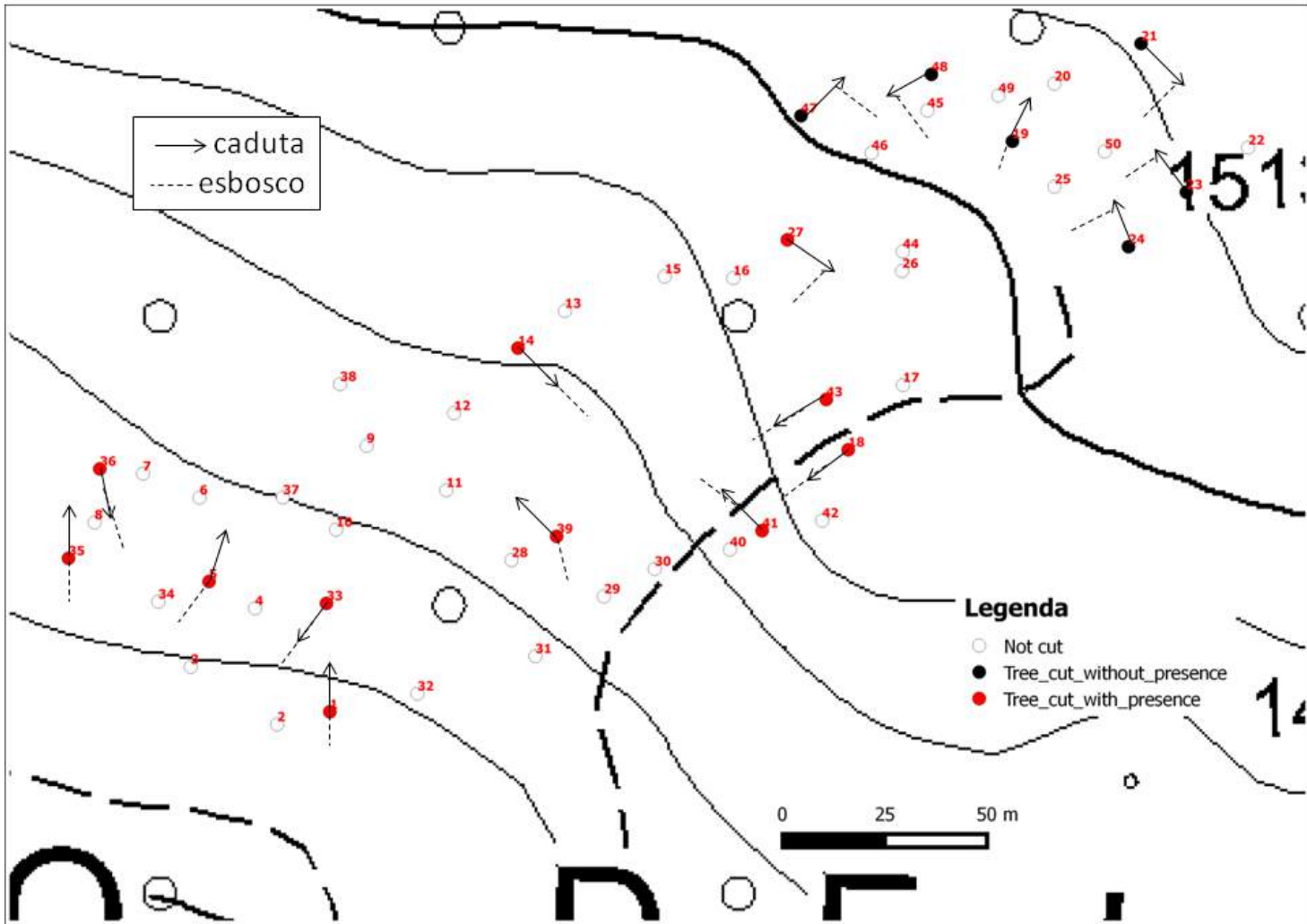
- Humid atmosphere
- Well-drained soils
- Shade tolerant



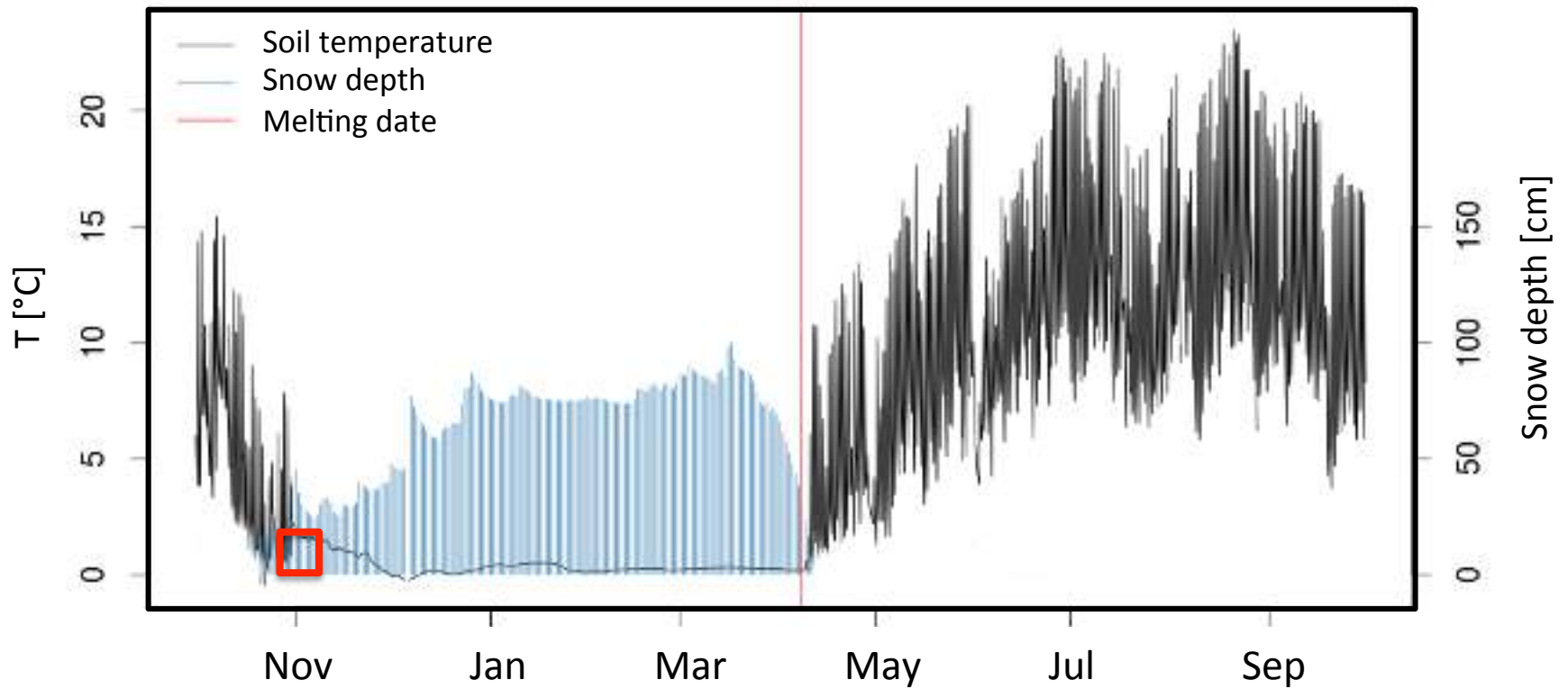




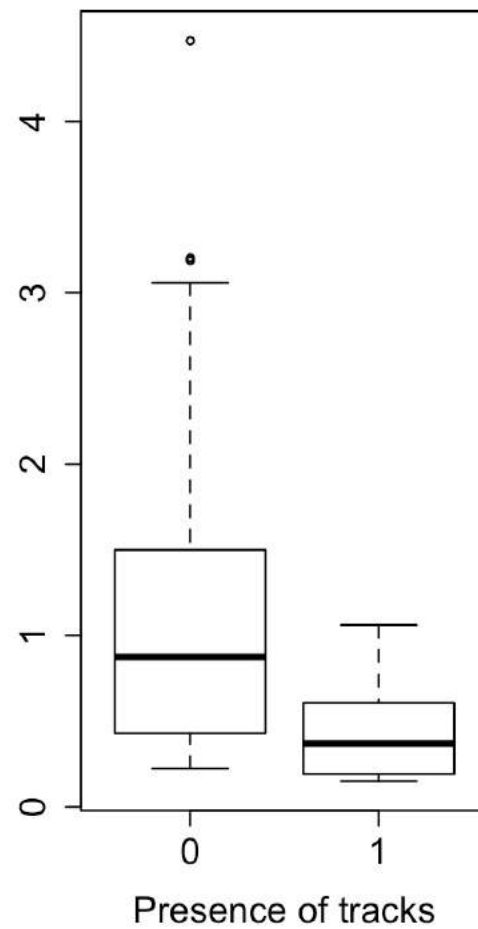
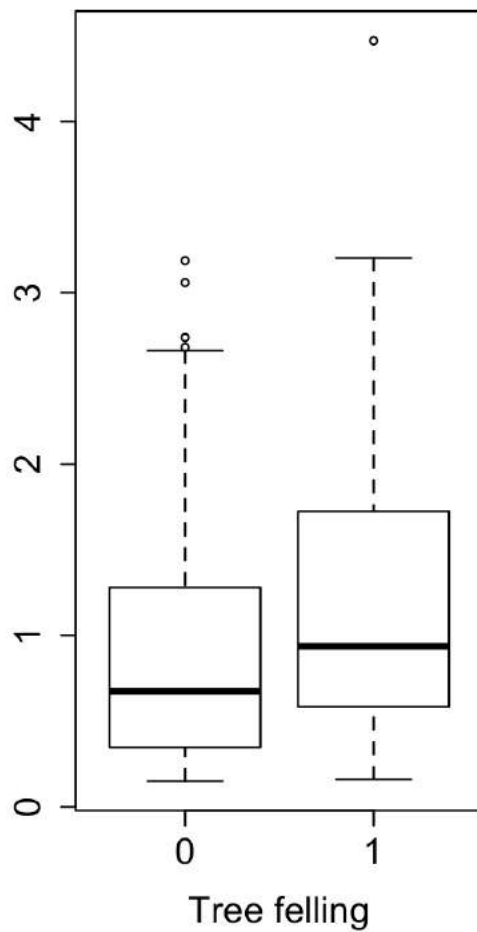
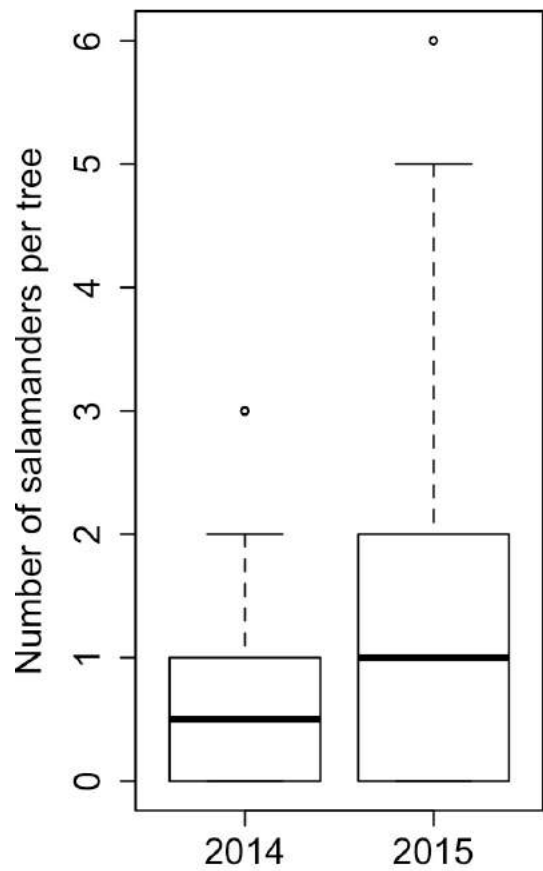
11 cut and 11 control (presence) 6 cut and 6 control (absence)



Forest operability window





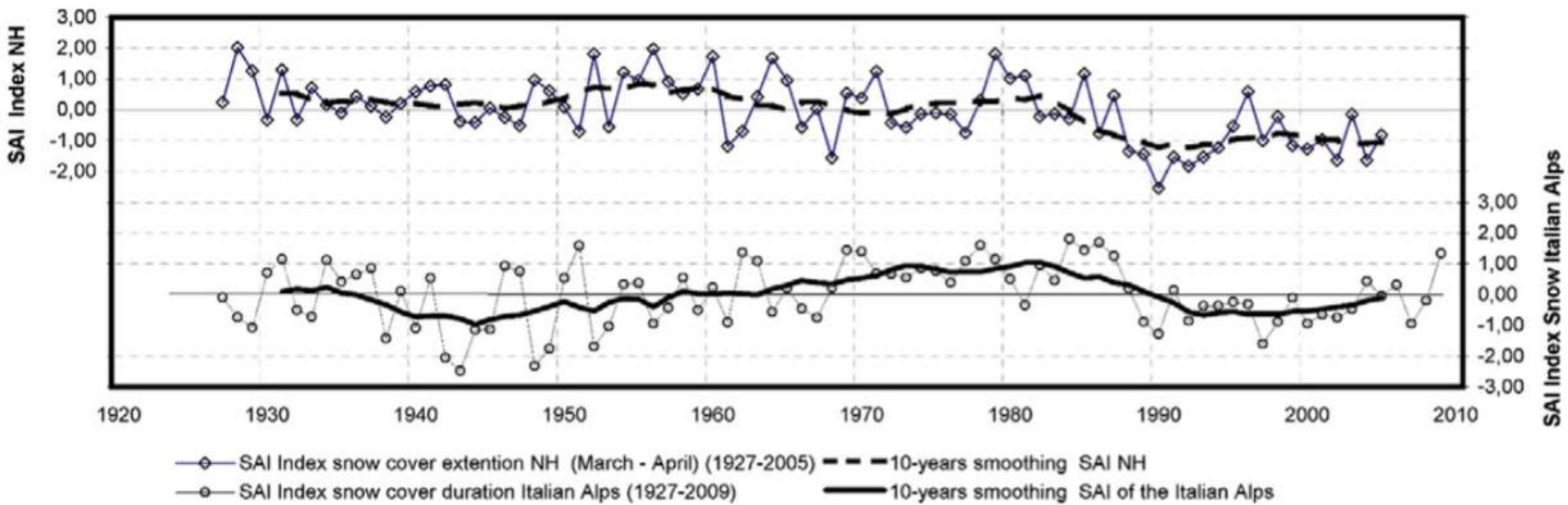


Natura 2000 conservation measures
Veneto Region Council Decree 786/2016
Art. 232

- Inside the core habitat of salamanders:
«logging may only be carried out from
October 15 to April 20, preferably with soil
frozen or covered with snow, selecting the
extraction methods that cause the lowest
pressure and soil compaction, and scheduling
to reduce at minimum necessary the transit
outside roads and permanent tracks »
- Precautionary principle

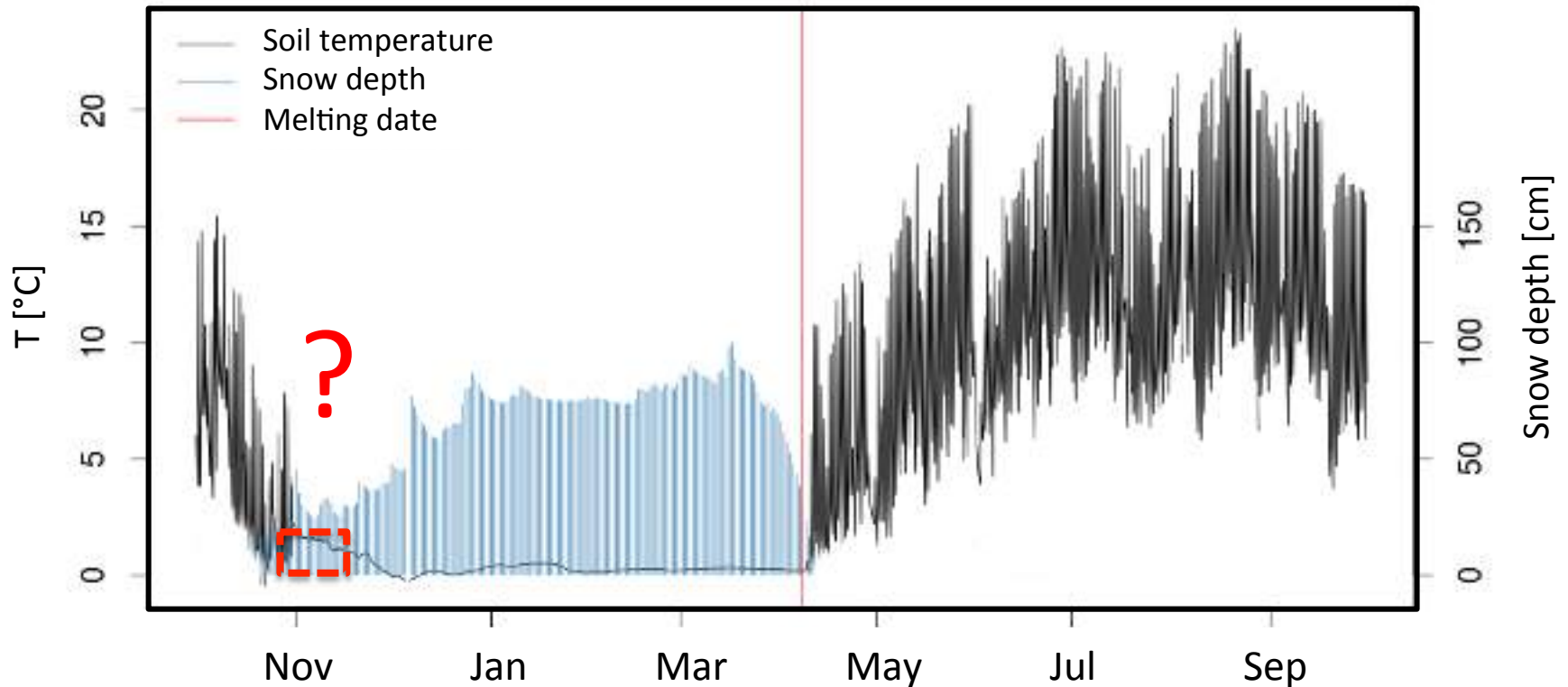
Recent snow cover variability

- Study area (1950-2009, source: Valt & Cianfarra, 2010)
 - 1.54 days / decade snow cover duration
 - 2.10 cm / decade cumulated snowfall
- Alps: the last decade is characterised by a recovery from the documented decreasing trend mainly evident between 800 m and 1500 m a.s.l.



From: Valt, M., & Cianfarra, P. (2010). Recent snow cover variability in the Italian Alps. *Cold Regions Science and Technology*, 64(2), 146-157.

Vagueness of the forest operability window



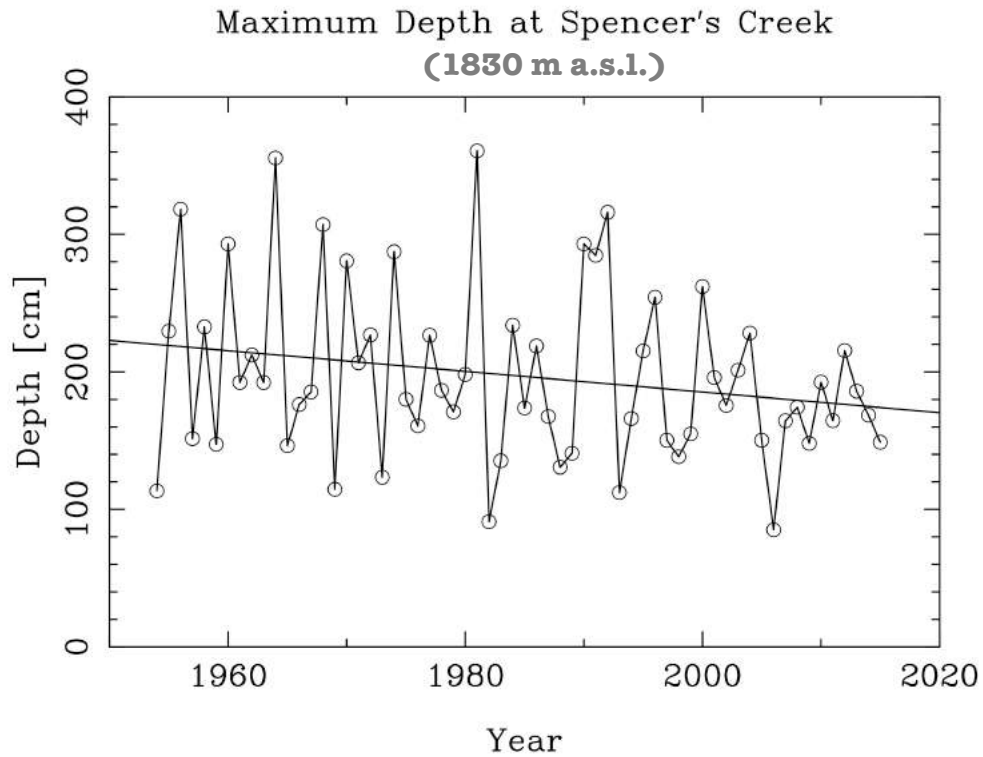
... comparisons are important







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Nicholls, N. (2005). Climate variability, climate change and the Australian snow season. *Australian Meteorological Magazine*, 54(3), 177-185.



The only species of salamander in Australia is axolotl, and only as a pet!



Conclusions

- **Significance** of the relationships between timing of forest operations and habitat suitability
- Feasibility of forest operations is limited by yearly climatic variability
- **Variability** of climate parameters and species ecology hinders any generalisation of conservation measures
- As a consequence the **precautionary** principle is applied which contrast with possible wood mobilisation policies (like in EU) and forest planning
- Further **multi-disciplinary research** is needed
- **Inter-continental** perspectives from the Australian Alps?



Along the trail to Mt. Sterling (Australian Alps)