

# Effects of future climate change on biodiversity in the Barents Region

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we owe it to the world  
prevent global warming



**FROM THE WORLD** ...  
 No matter what the rest of the world does, we should do our bit to stem global warming. And even a small island like Guernsey can set an example, as former Elizabeth College pupil and sustainable development researcher **Simon Bradshaw** explains

**Telegraph.co.uk**  
 Home » Earth » **Earth Picture Galleries**

**Polar bears will not survive without action to tackle climate change**

Polar bears will not survive without action to tackle climate change and save their rapidly disappearing Arctic habitat, conservationists have warned

 This block contains a screenshot of a news article from the Telegraph website. At the top, the site's name "Telegraph.co.uk" and a navigation menu "Home » Earth » Earth Picture Galleries" are visible. The main headline reads "Polar bears will not survive without action to tackle climate change". Below the headline is a large photograph of a polar bear standing on a small, isolated ice floe in the middle of a vast, blue Arctic sea. The bear is looking towards the right. At the bottom of the page, a caption states: "Polar bears will not survive without action to tackle climate change and save their rapidly disappearing Arctic habitat, conservationists have warned".

# Consequences

Expected species turnover and establishment of new species communities

- Current efforts to conserve biodiversity may be in vain
- Conservation strategies targeted at specific species may be rendered obsolete
- Reliable predictions of future species distributions are needed to design appropriate conservation measures



# Objectives

To assess the current capacity of existing protected areas in the Barents Region to conserve biodiversity in a future, more warm and wet climate.

- Can the network of protected areas conserve biodiversity in future?
- Which species are contracting/ expanding their range?
- Where are major gaps in migration routes?

# Methodology:

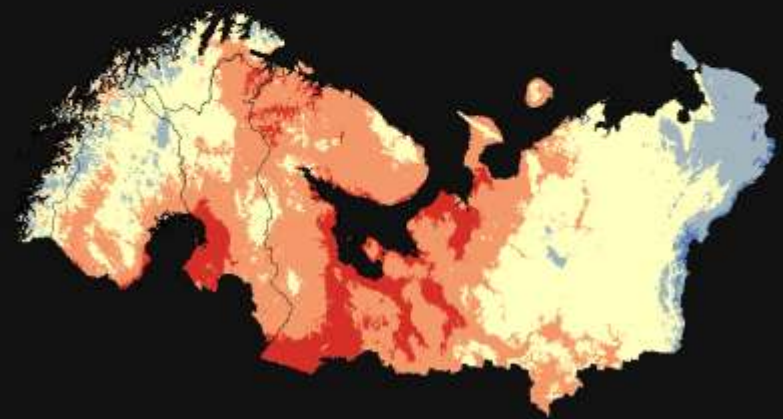
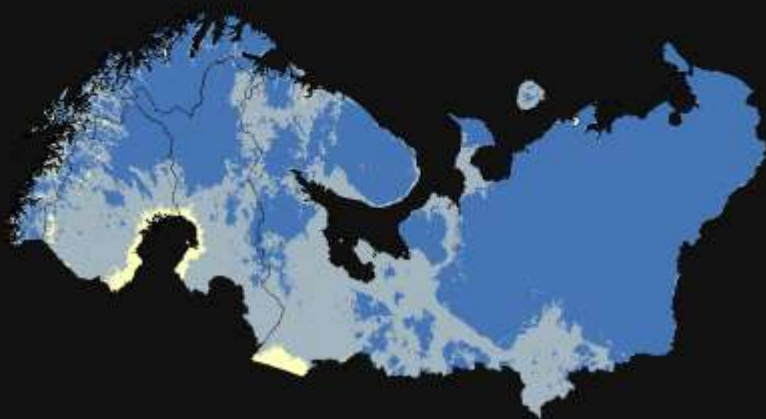
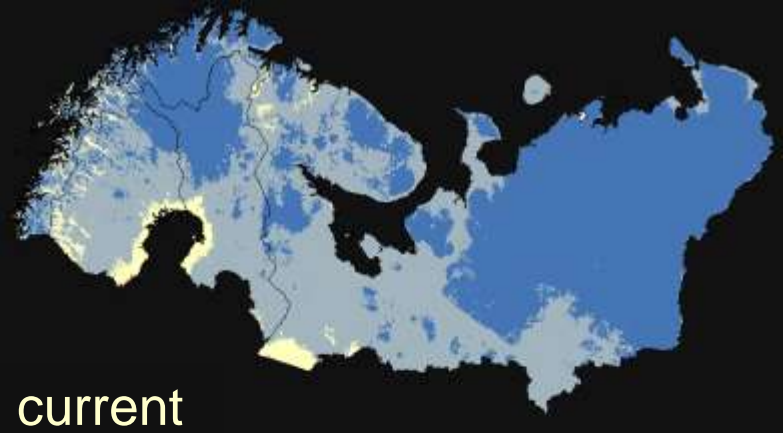
## Species distribution modelling

- Species occurrences
- Current and future projections of environmental variables
  - Climate → CGCM2 and HADCM3, A2 & B2 scenario for 2080
  - Habitat data → Wolf et al. Max Planck

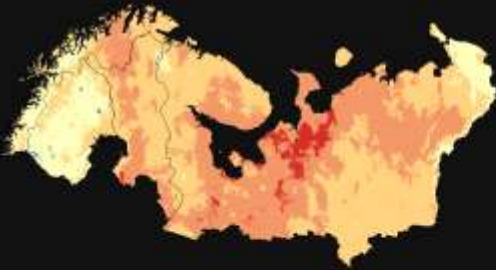
# Results

- ~ 600 species assessed
  - Birds
  - Butterflies
  - Gastropods
  - Mammals
  - Plants
  - Reptiles & Amphibians

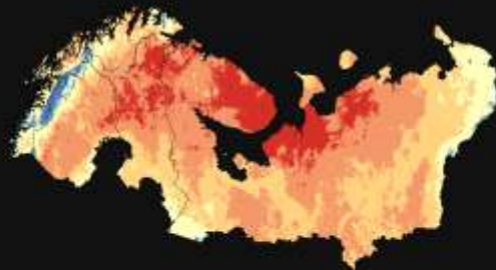




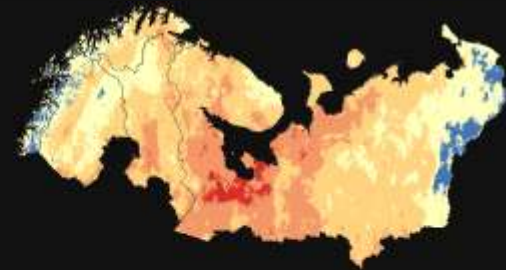
# Similar patterns (BCS)



Birds



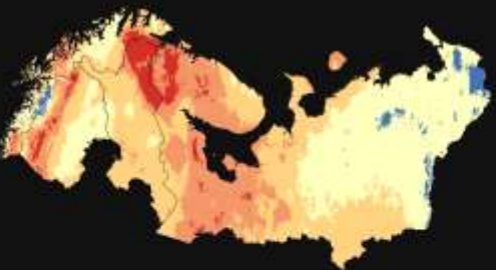
Butterflies



Gastropods



Mammals



Plants



Reptiles and  
amphibians

# Birds

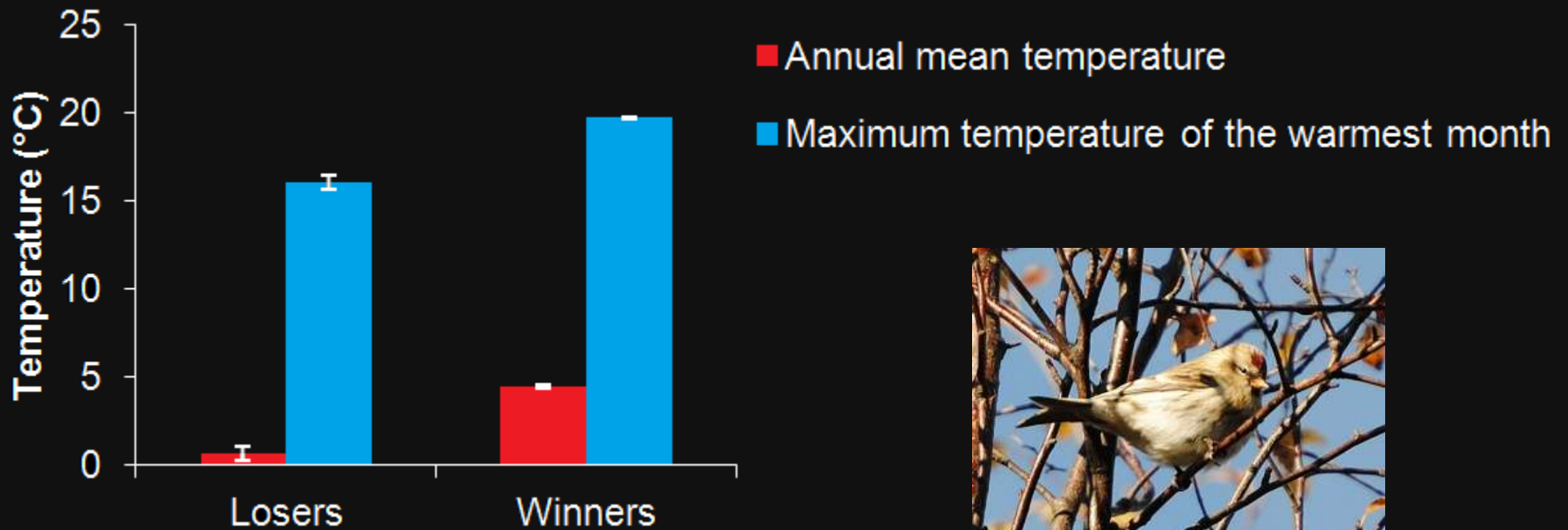
What does it take to be a loser?

- 240 species assessed (breeding season)
- ~ 13% losers
  - Passeriformes
  - Charadriiformes



Arctic skua

# Temperature



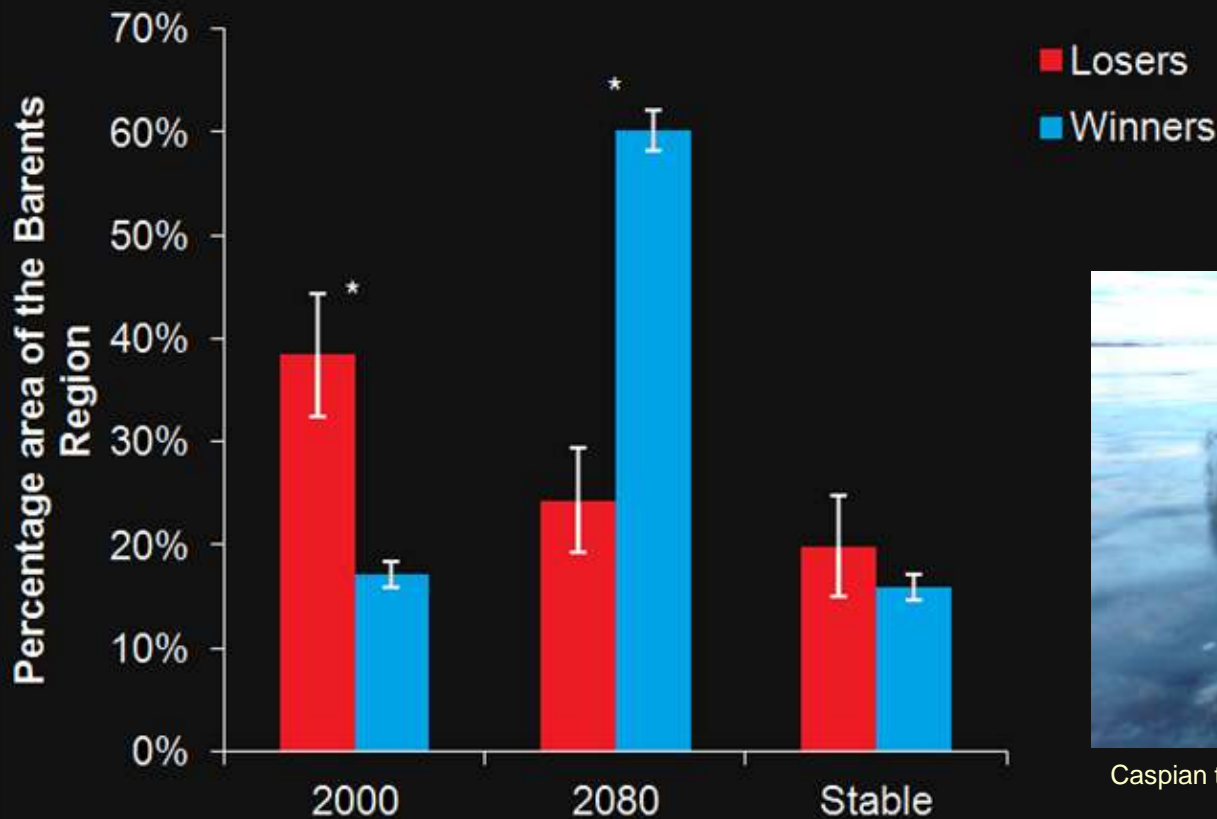
Arctic redpoll

# Elevation



Bohemian waxwing

# Loss/ gain of breeding range



# Conclusions birds

- Currently well established species will be the major losers → mostly 'cold adapted' species
- Adding to this:
  - Increased pressure of newcomers
  - Anthropogenic changes, prey availability, problems during the rest of the year

Adapt or die scenario?



Avocet

# Mammals

(In review in Nature Climate Change)

- 64 species assessed
    - Future climatic conditions favour most mammals: 9 potential establishers, 44 winners
    - Habitat specialists and cold related species are losers e.g. Arctic fox, Norway lemming, tundra vole, wolverine
- Large species turnover to be expected



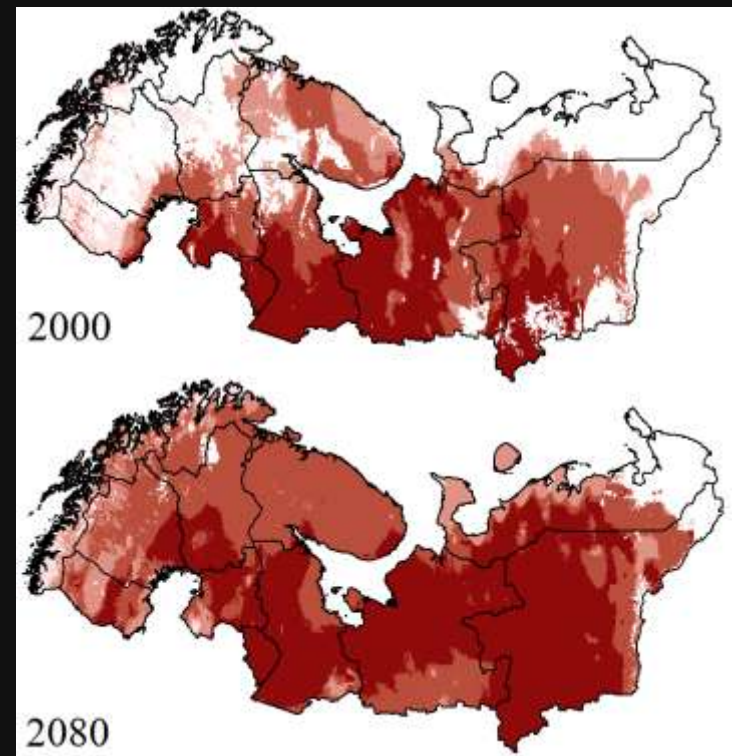
Norway lemming

# Effect of turnover on species communities

## Moose versus large predators



Moose

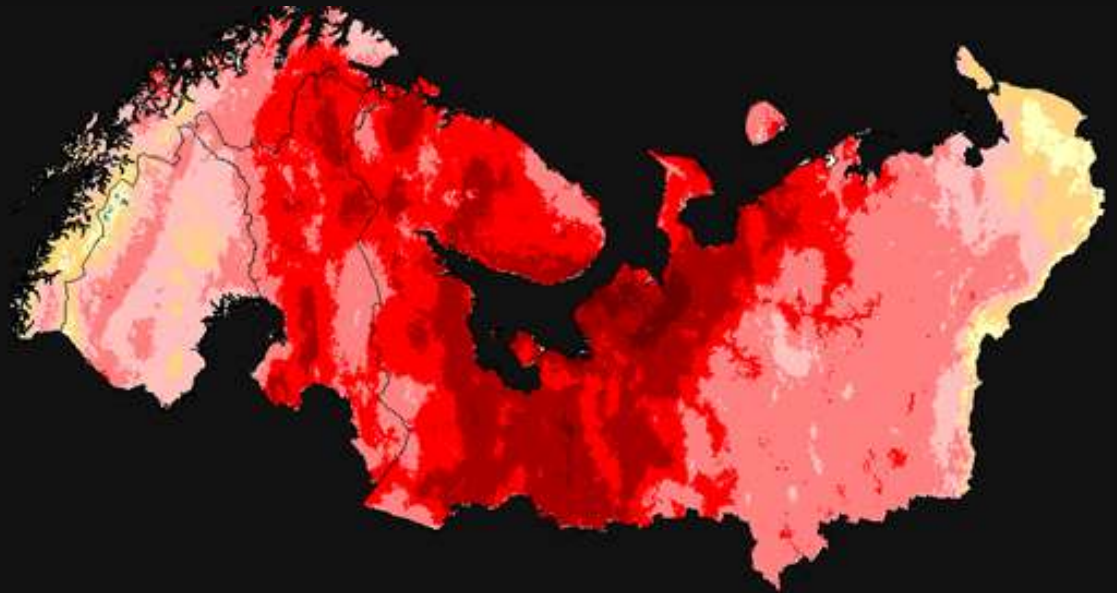


# Species turnover (BCS)

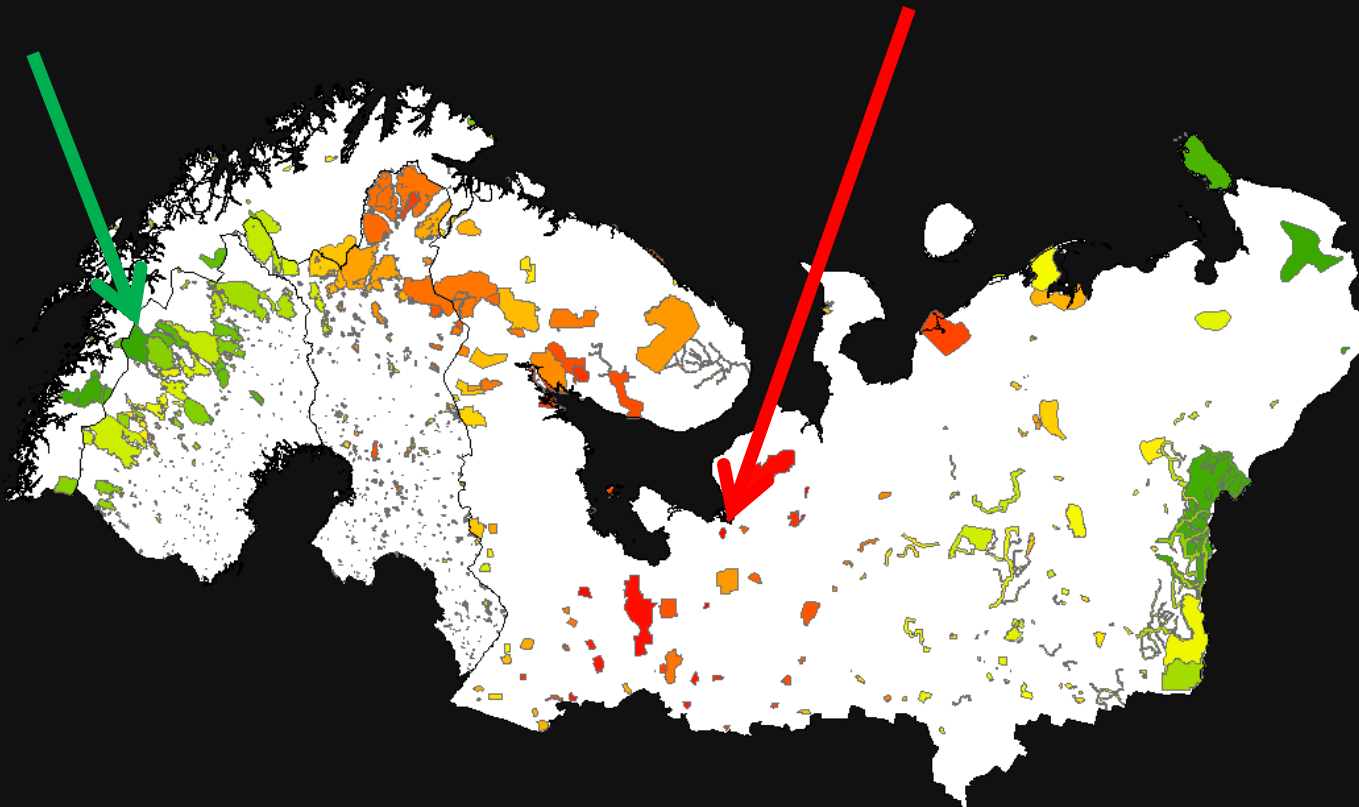
Changes in species richness from present till 2080,  
assuming full dispersal ability



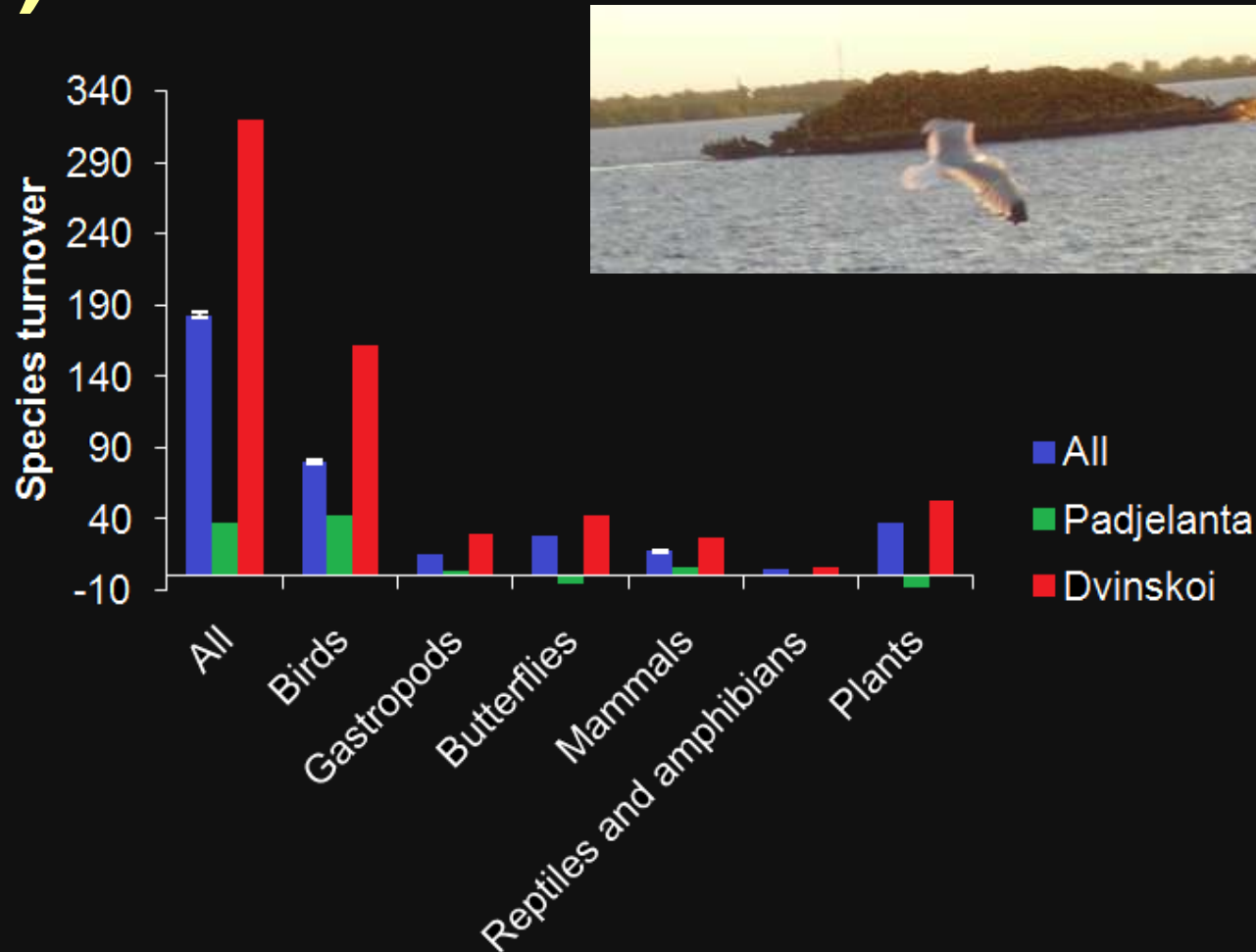
0 500 1 000 Km.



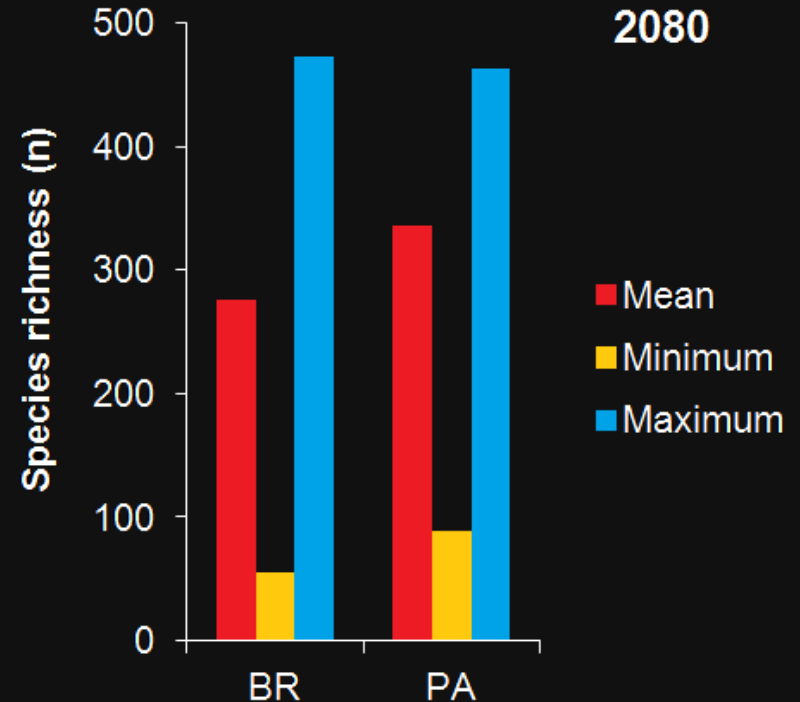
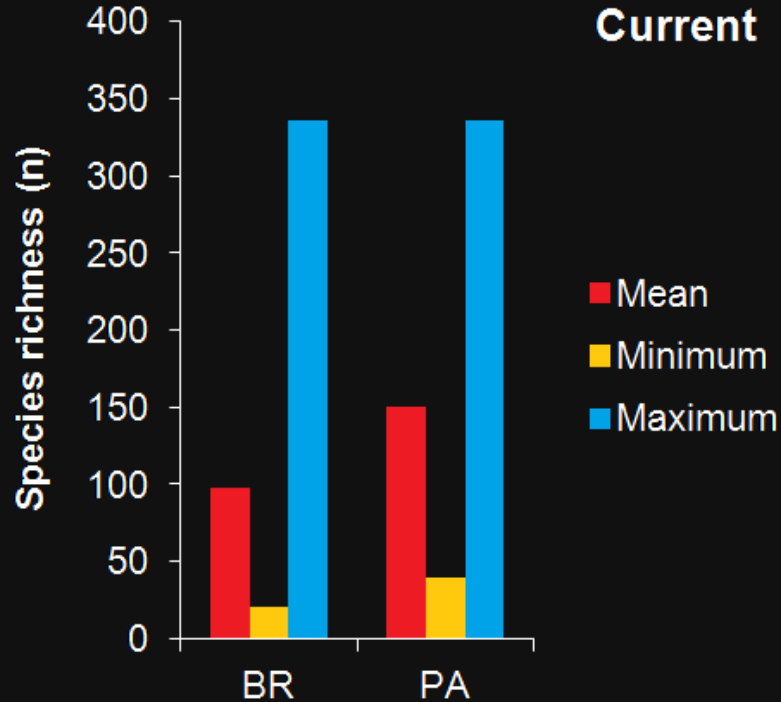
# Species turnover protected areas (BCS)



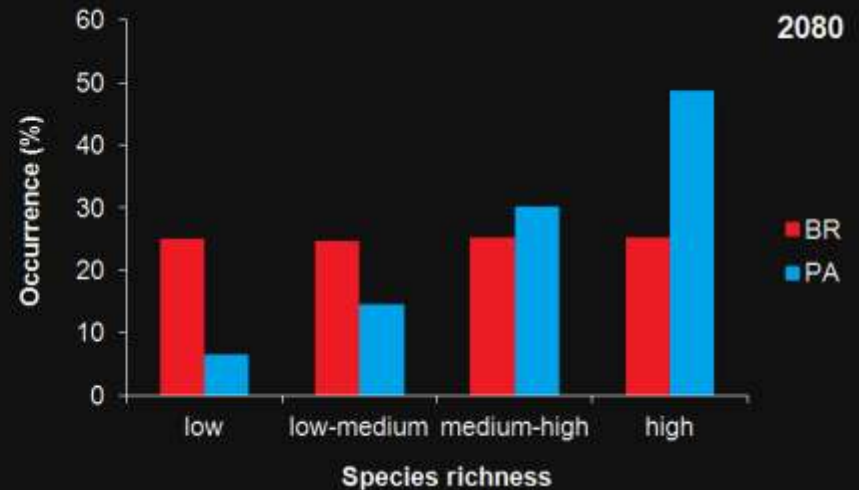
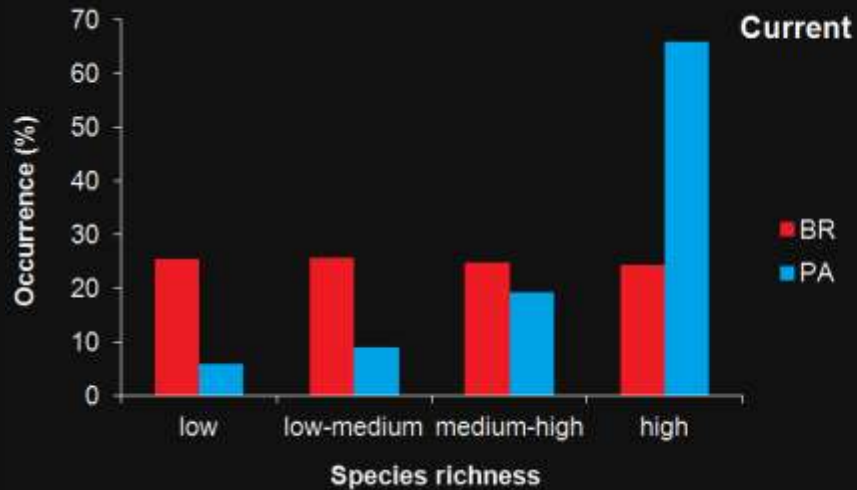
# Species turnover protected areas (BCS)



# Do protected areas do their job?

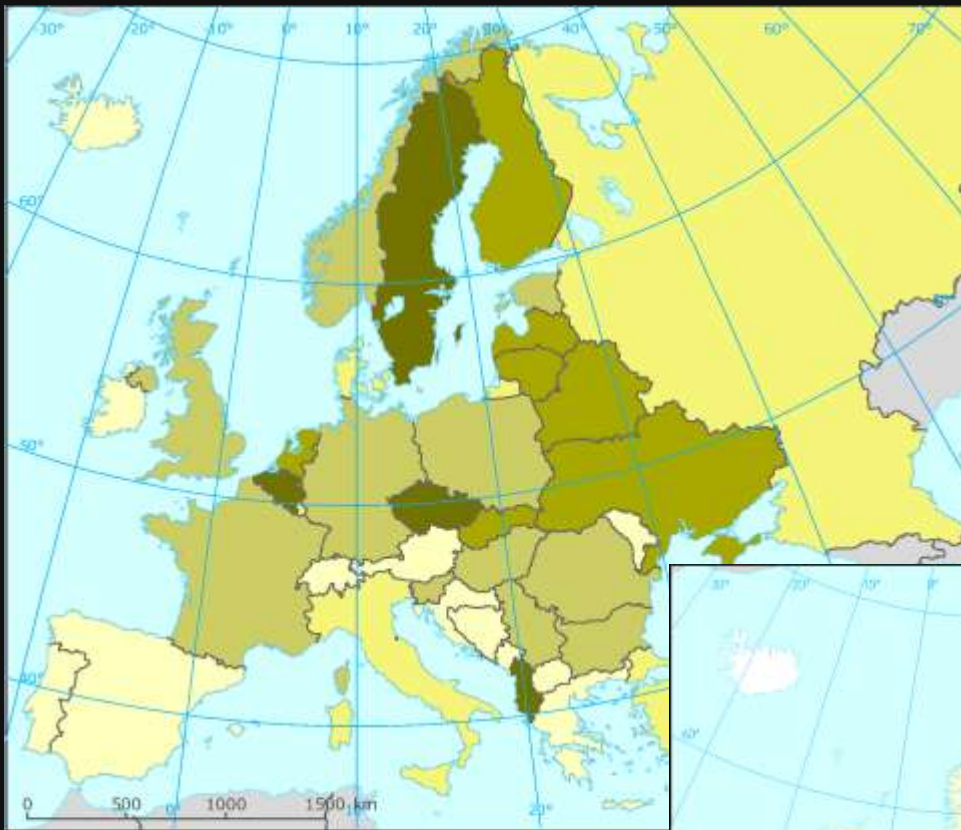


# Do protected areas do their job?

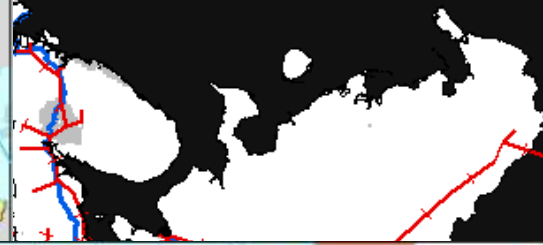


# Dispersal ability





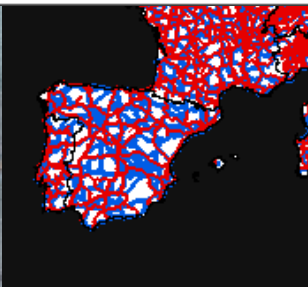
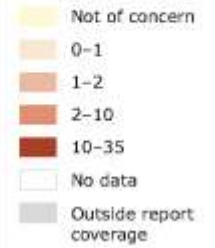
**Utilisation rate (annual fellings expressed as a percentage increment) in 2005**

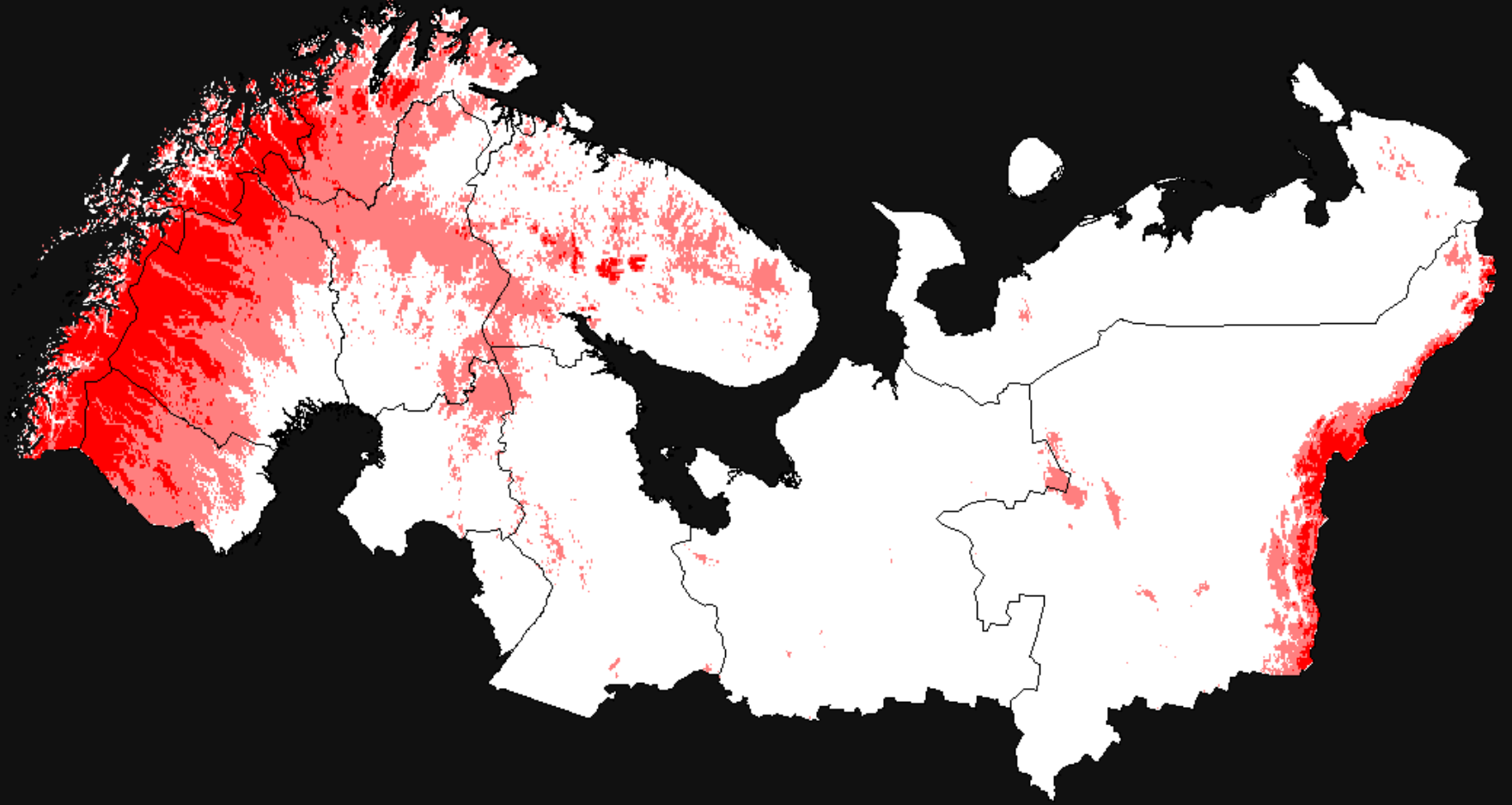


**Extent of illegal logging**

Official estimates

Total harvested volume %





# Overall conclusions

- A future more warm and wet Barents Region can sustain a higher number of species, provided that dispersal is not hampered
- A large species turnover is expected, altering existing species interactions with unknown consequences



# Overall conclusions

- Specialist and cold-adapted species will be vulnerable
- The region surrounding the White Sea will be a hotspot for species diversity → More protected areas may be required in Russia

# Next step

Anthropogenic  
factors



# Thanks!

