Designing a climate corridor for wetlands as an adaptation strategy to climate change

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GREEN WORLD RESEARCH

Content

A climate corridor for wetlands

1. Effects of climate change
2. Adaptation measures
3. Diagnosis and design

Responses to climate change

1. Species ranges shift as a response to temperature rise.
   - Observed for many species
   - Further shifts predicted by climate envelope models

However species affected by habitat fragmentation are not able to follow shifting temperature zones

Short-distance disperser

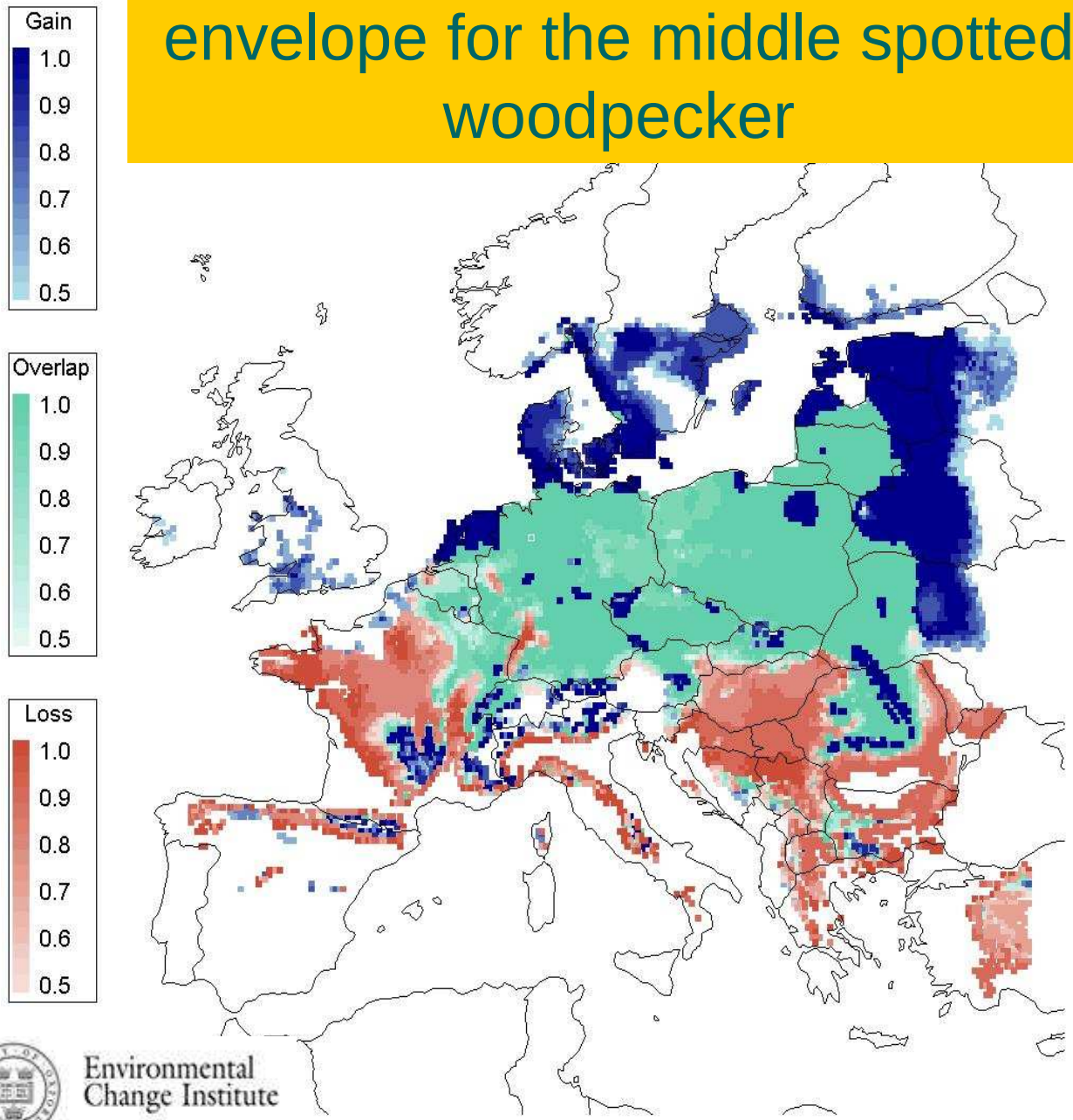
No range expansion

Long-distance disperser

Range expansion

Warren et al. 2001

Projected suitable climate envelope for the middle spotted woodpecker



Environmental Change Institute
UNIVERSITY OF OXFORD

But will species be able to follow?

Potential loss of biodiversity

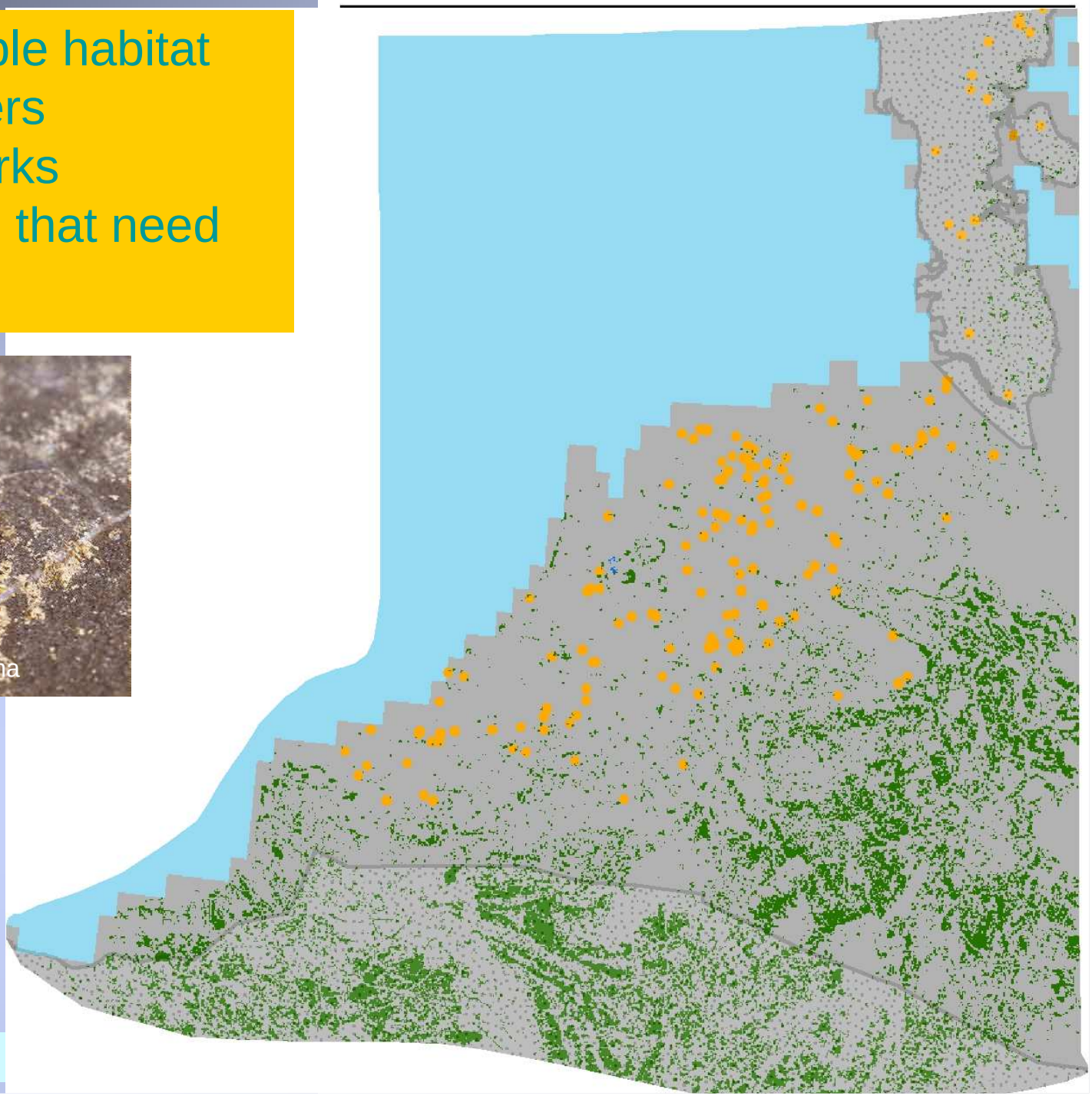
Dendrocopos medius

Branch

www.branchproject.org

1. Include suitable habitat
2. Include barriers
3. Define networks
4. Identify areas that need adaptation

Agile frog Rana dalmatina



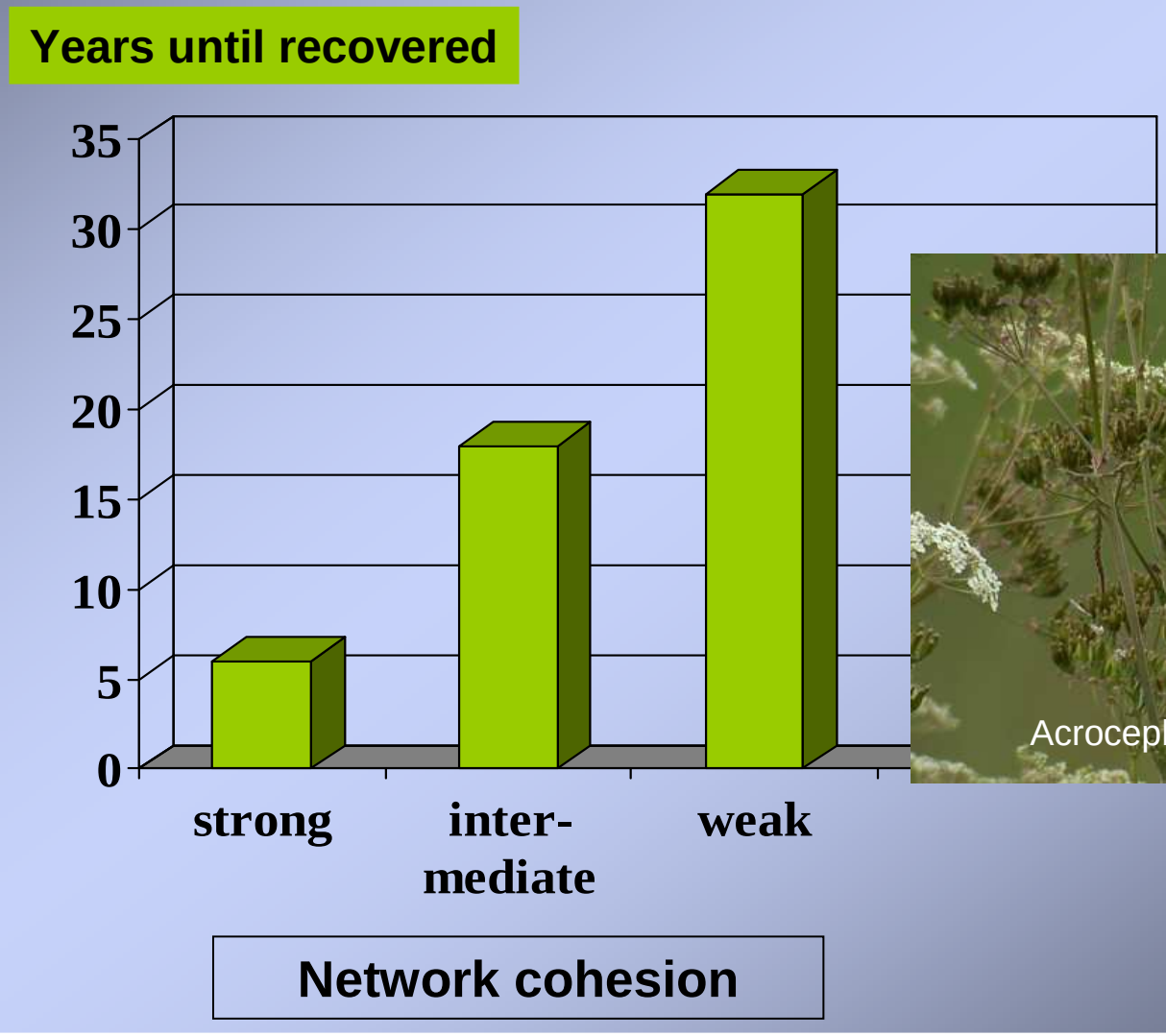
Vos et al J. App. Ecol. 2008

Responses to climate change

2. Weather extremes more frequent and stronger
   - More warm and dry periods
   - More extreme precipitation
   - More storms

Results in larger fluctuations of populations: increase of extinction risk

Predicted sedge warbler recovery: faster in stronger habitat networks



Foppen et al. 1999

What happens if we do nothing?

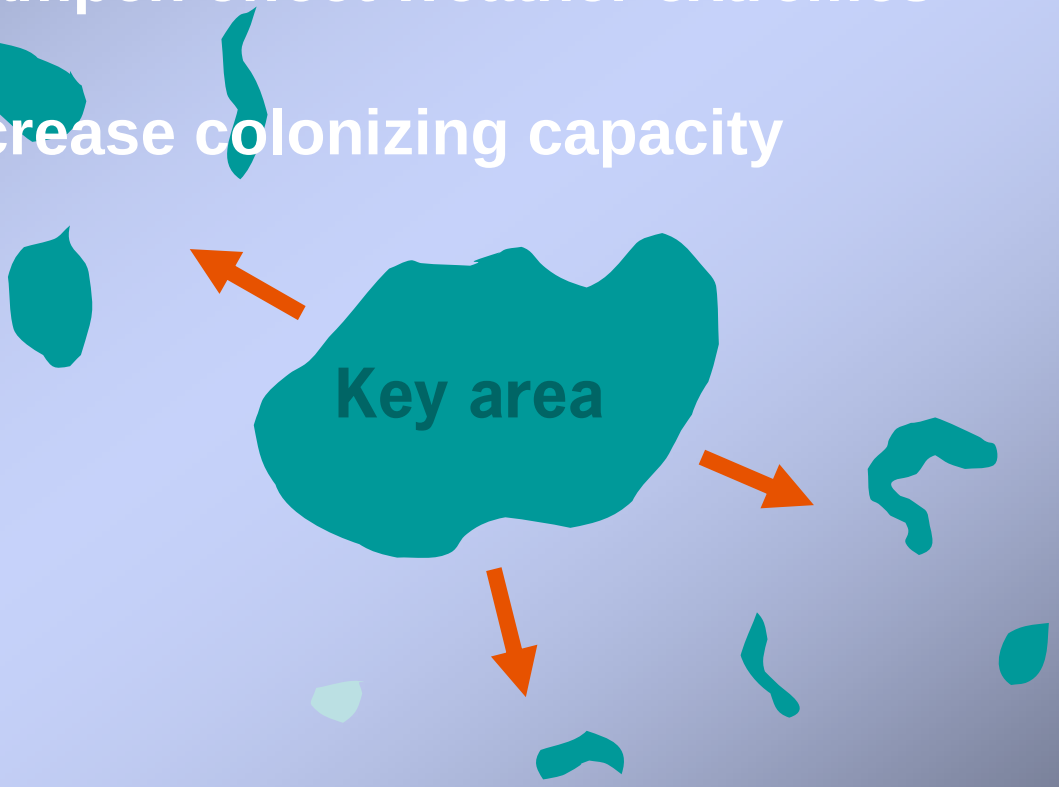
- Increasing risk of biodiversity loss
- Decreasing resilience of ecosystems
- loss of adaptive capacity

Adaptation strategy 1: Enlarge Areas

1. To compensate for population fluctuations

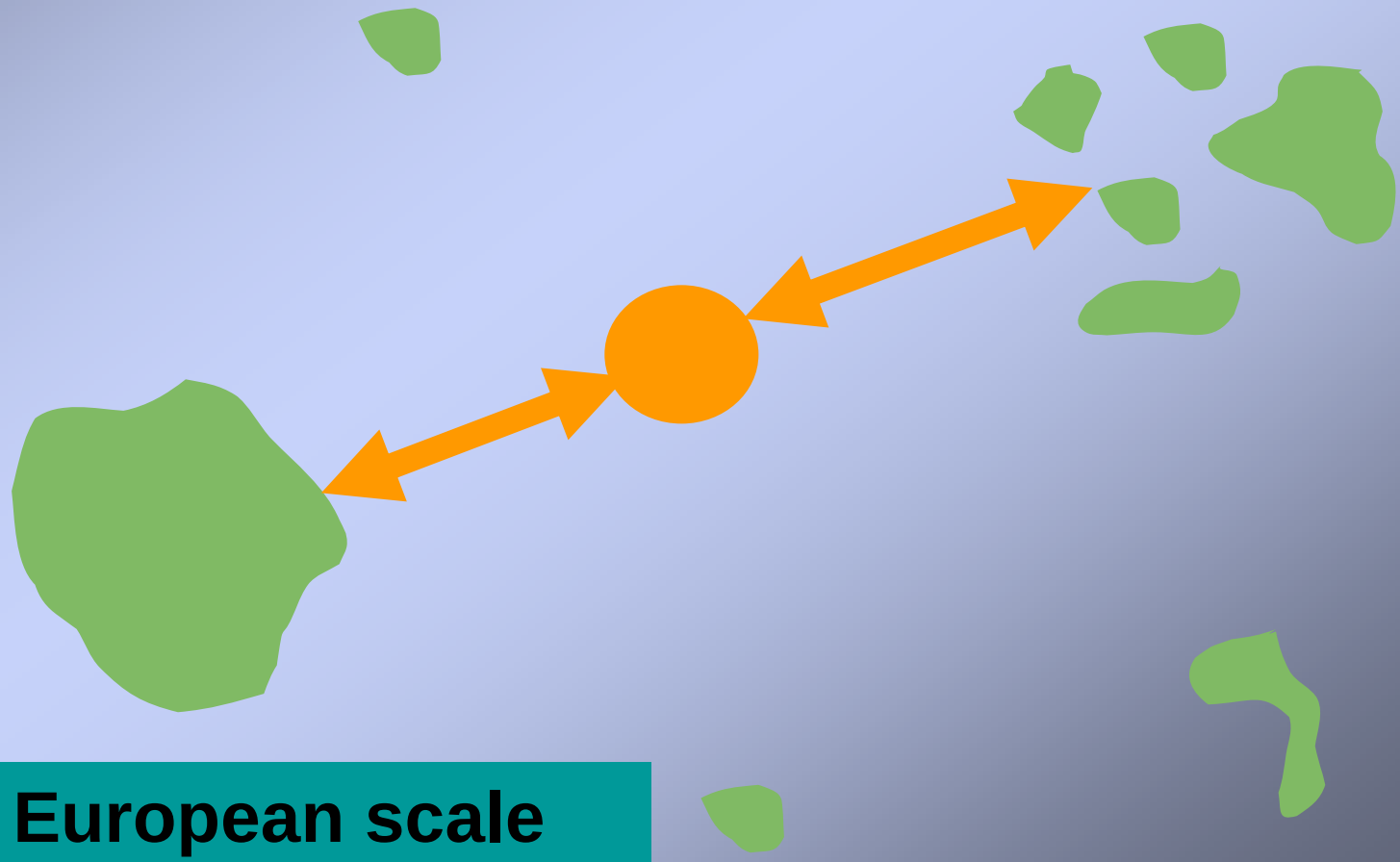
2. More room for habitat heterogeneity to dampen effect weather extremes

3. Increase colonizing capacity



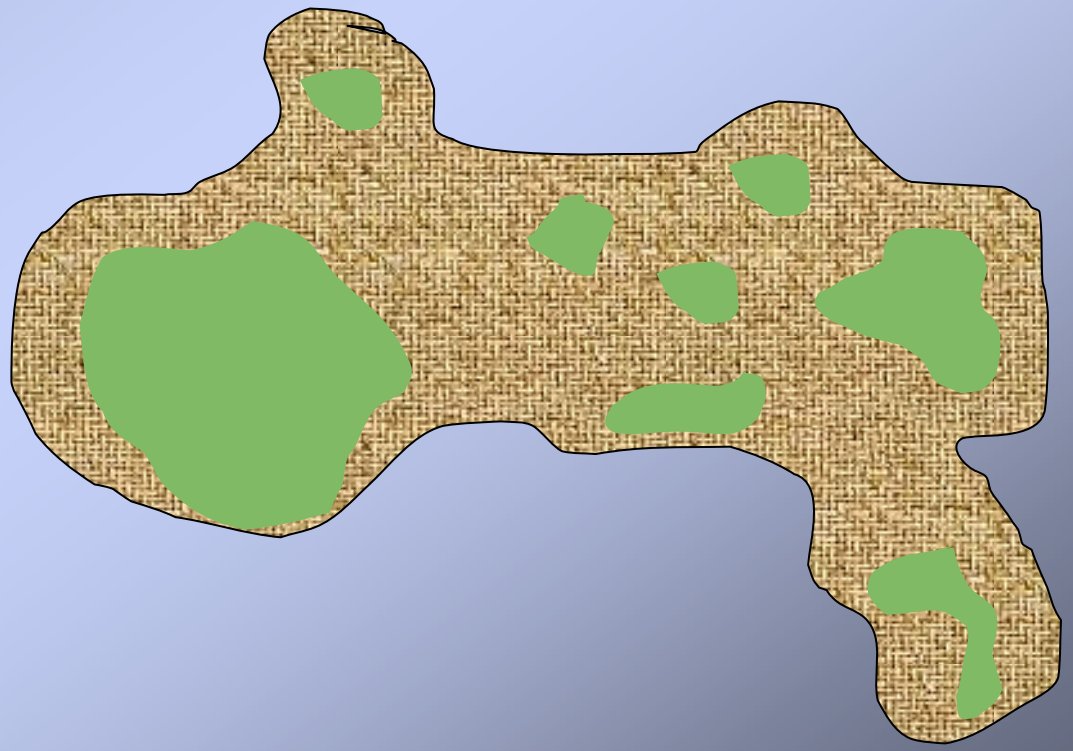
Adaptation Strategy 2: Link habitat networks

To facilitate range shifts of species



On a European scale

Strategy 3: Develop Multifunctional bufferzones surrounding nature areas



Green veining (Green Infrastructure) - natural elements in the agricultural landscape

Improving matrix permeability:

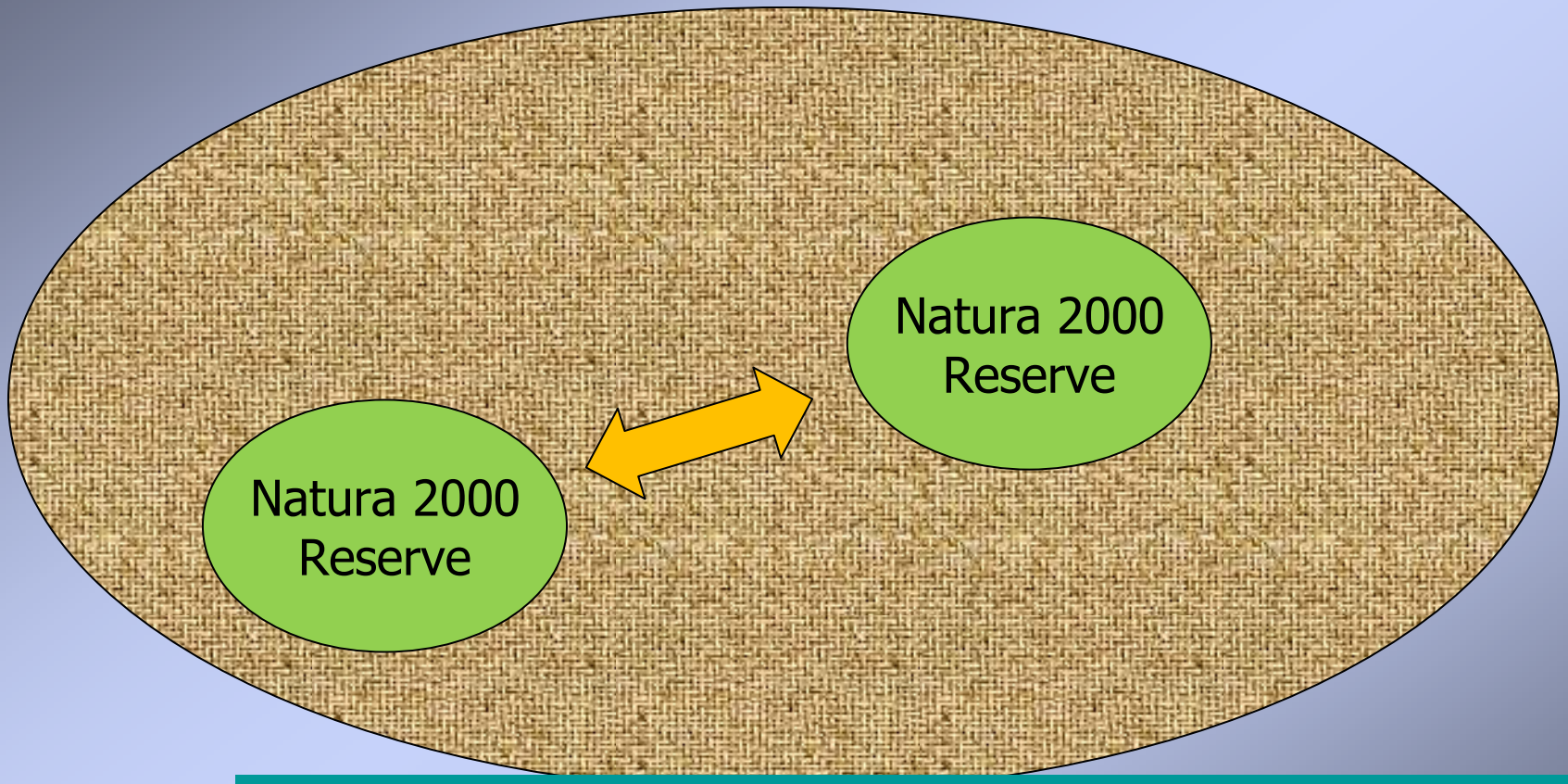
Link networks

Improve colonizing capacity

Multifunctional benefits

- Recreation quality
- Economic value pest control, pollination

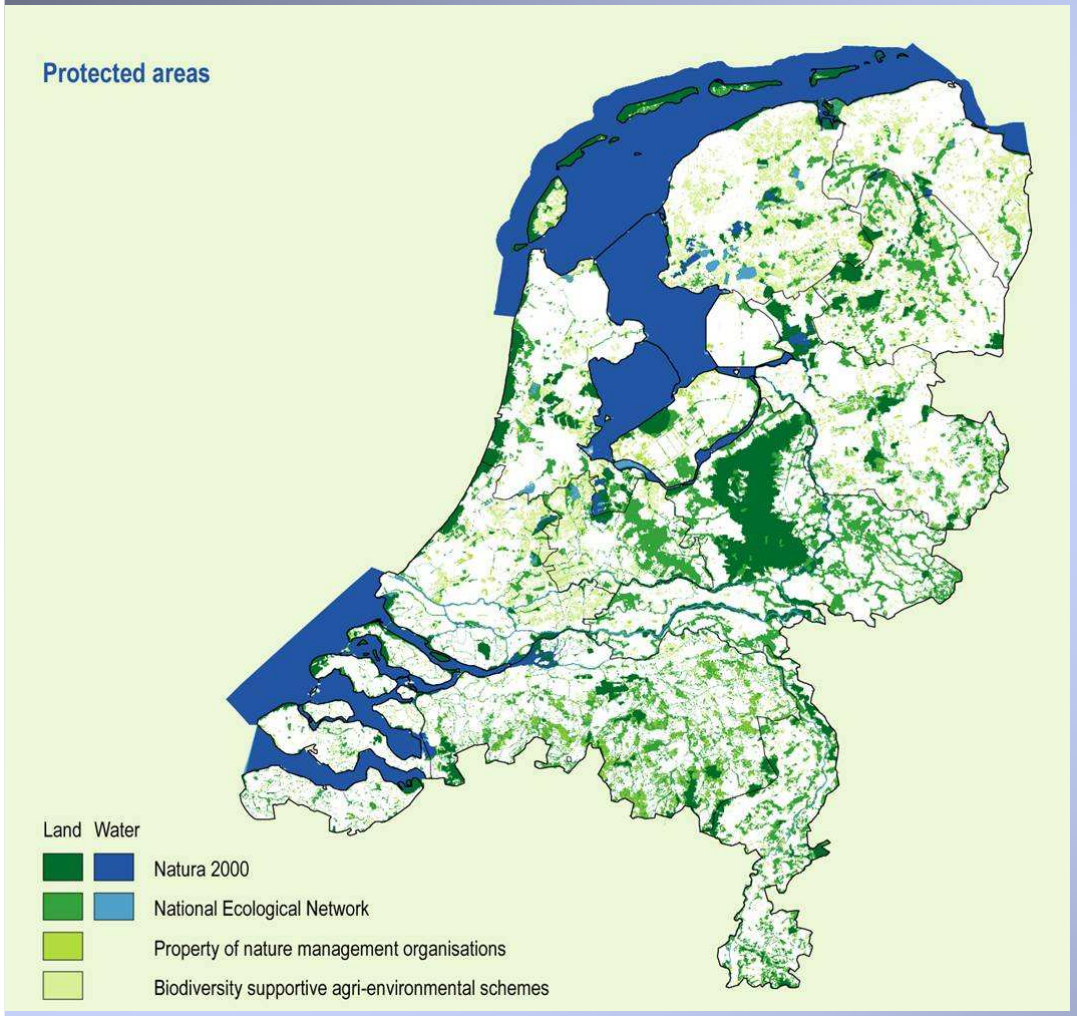
Network of reserves embedded in multifunctional landscape



Species benefit from the combination of large scaled and small scaled networks (greenveining):

Grashof-Bokdam et al. 2009

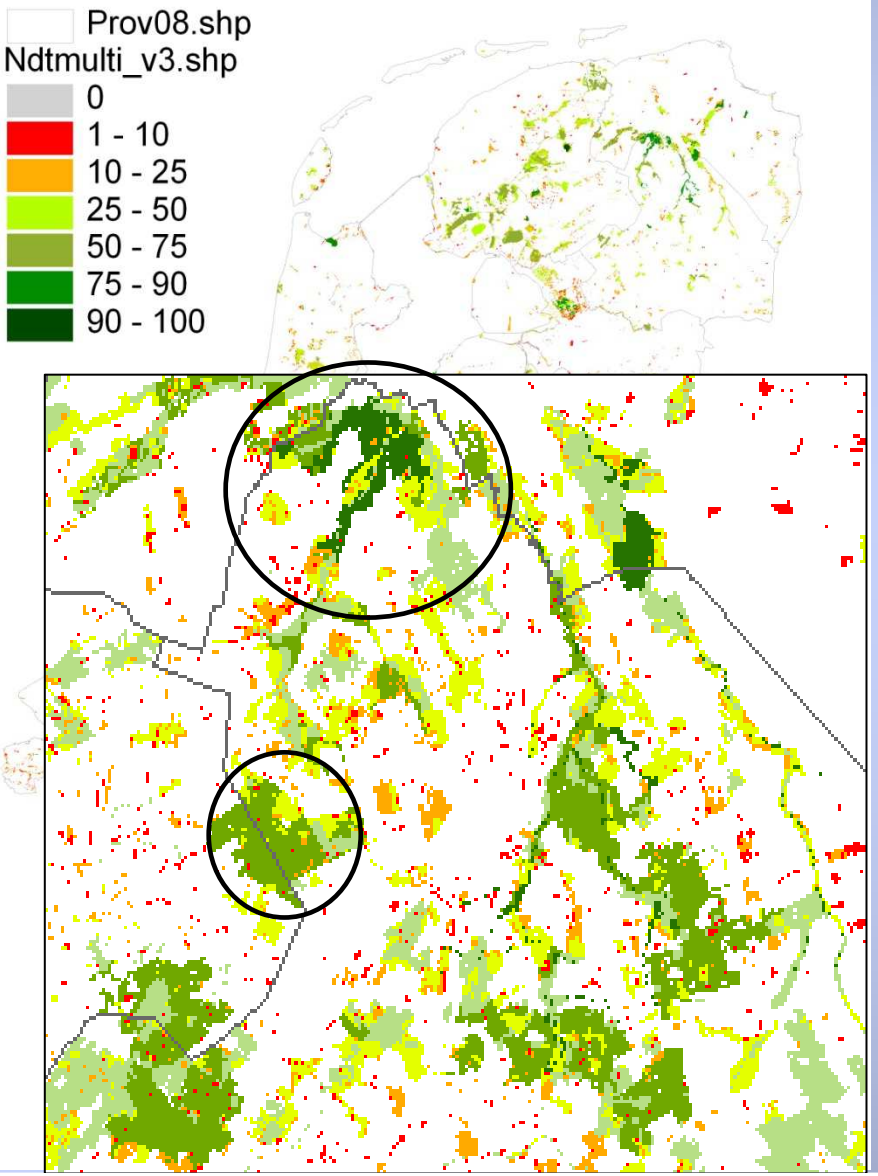
Applying the addaptation strategy



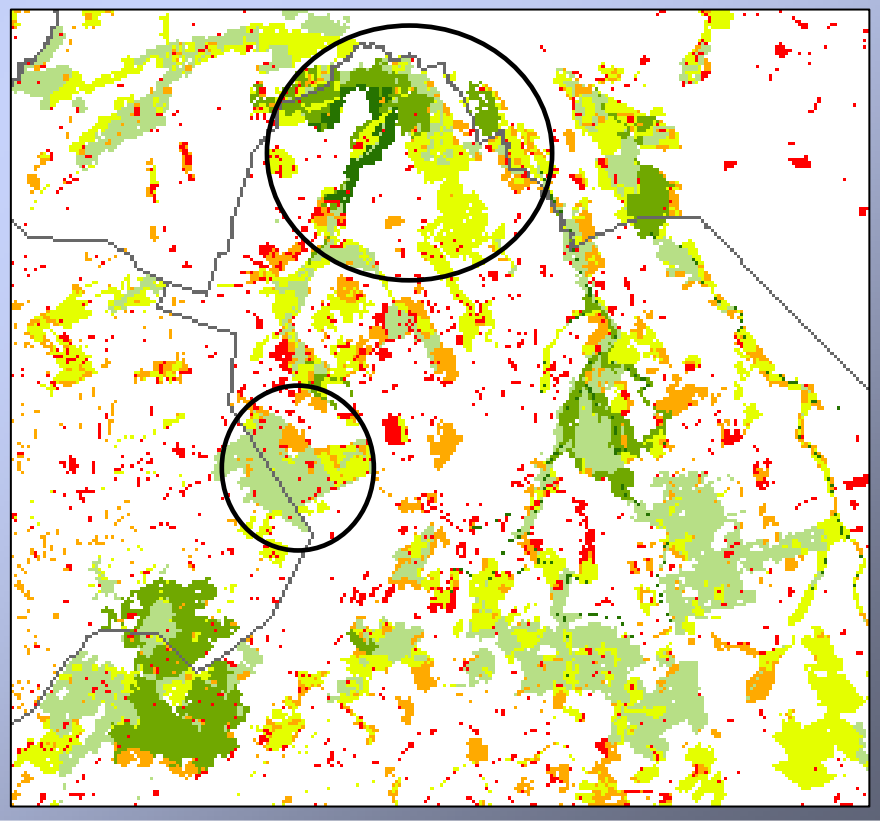
Where is adaptation of the National Ecological Network needed?

Example Wetland Ecosystem

Diagnosis 1: Identify nature areas that will become too small

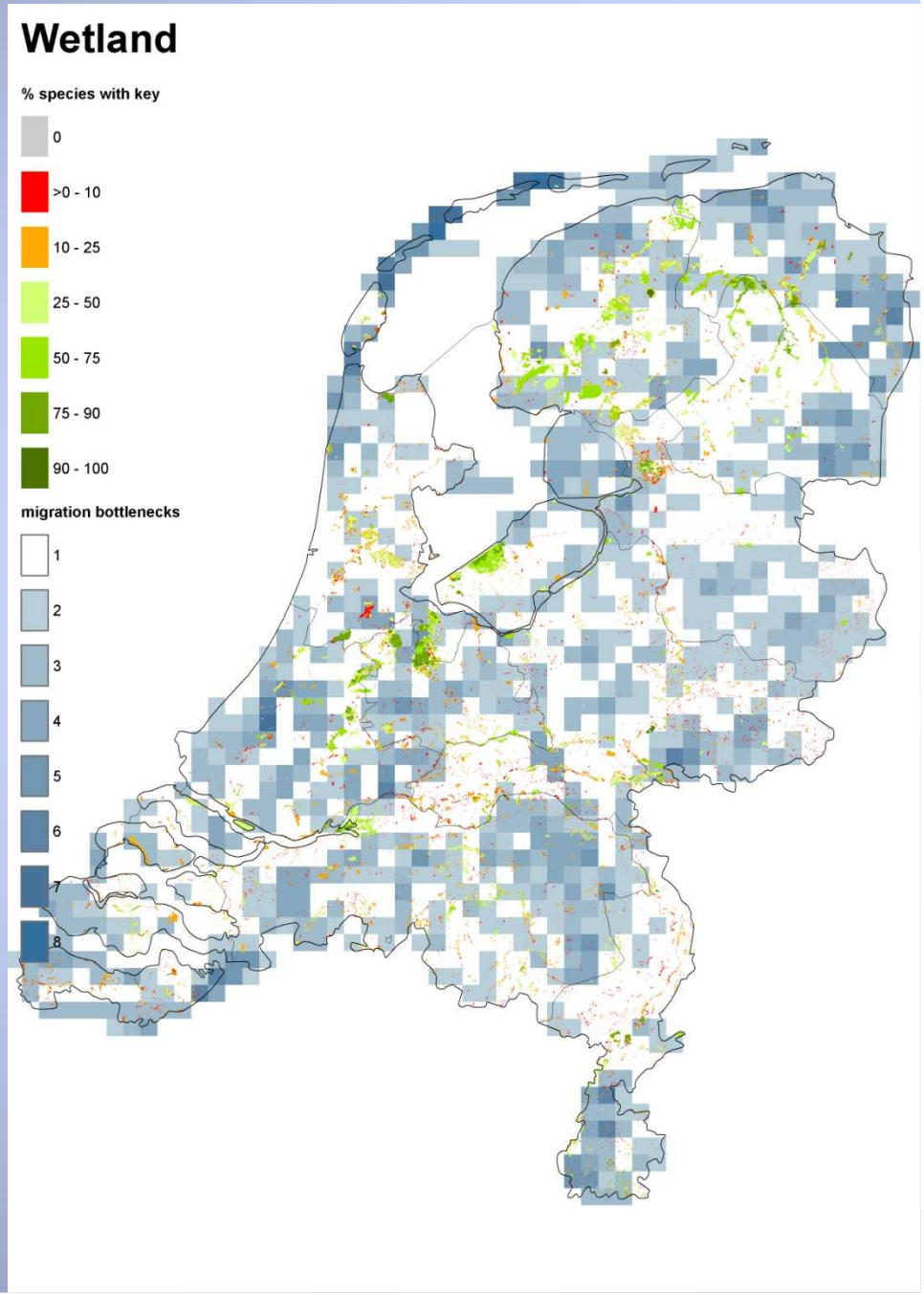


double area standards for key populations for all target species



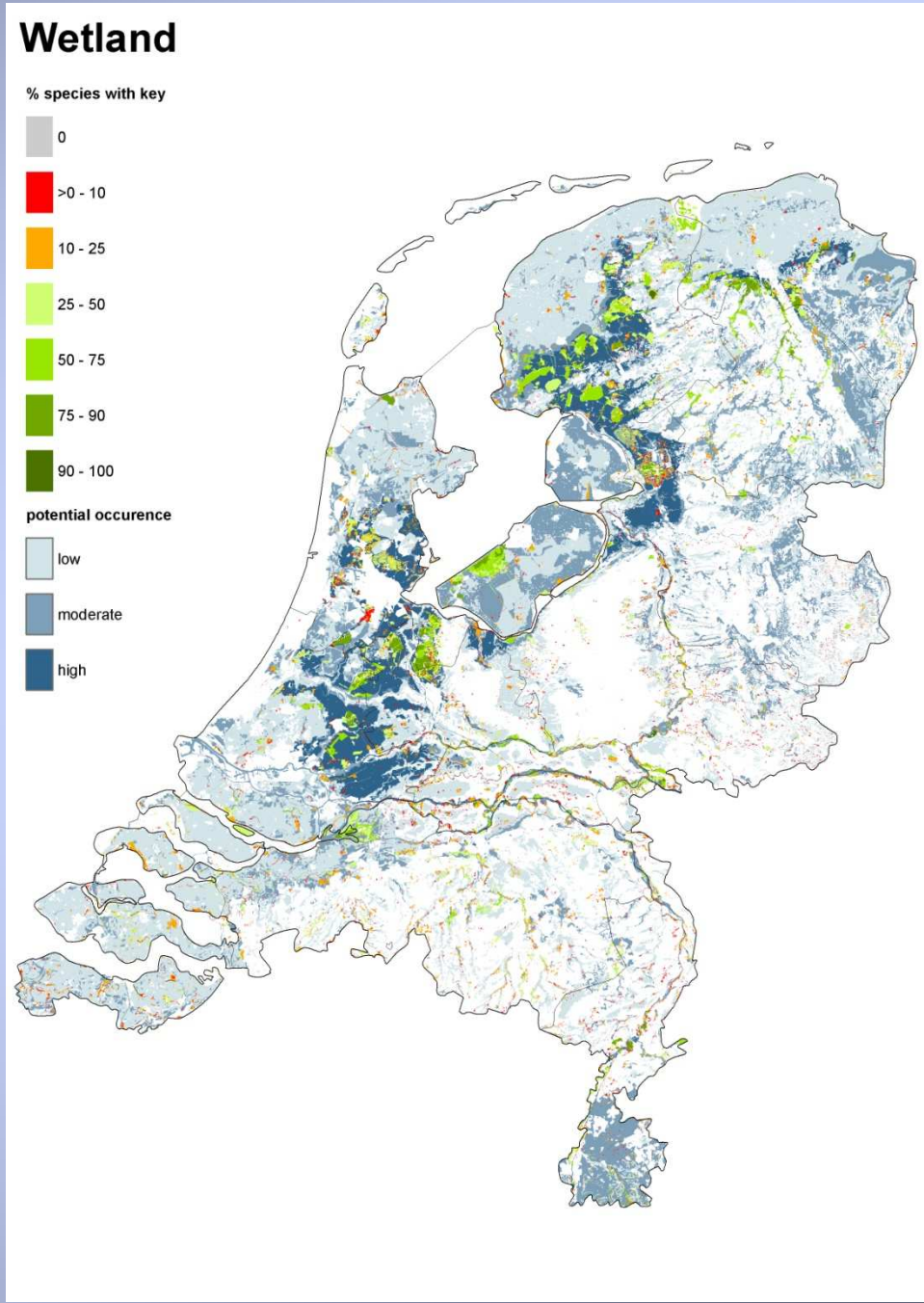
Diagnosis 2: Identify bottlenecks for species with different dispersal capacity

Locations where species will not be able to shift their range



Diagnosis 3: Identify suitable conditions

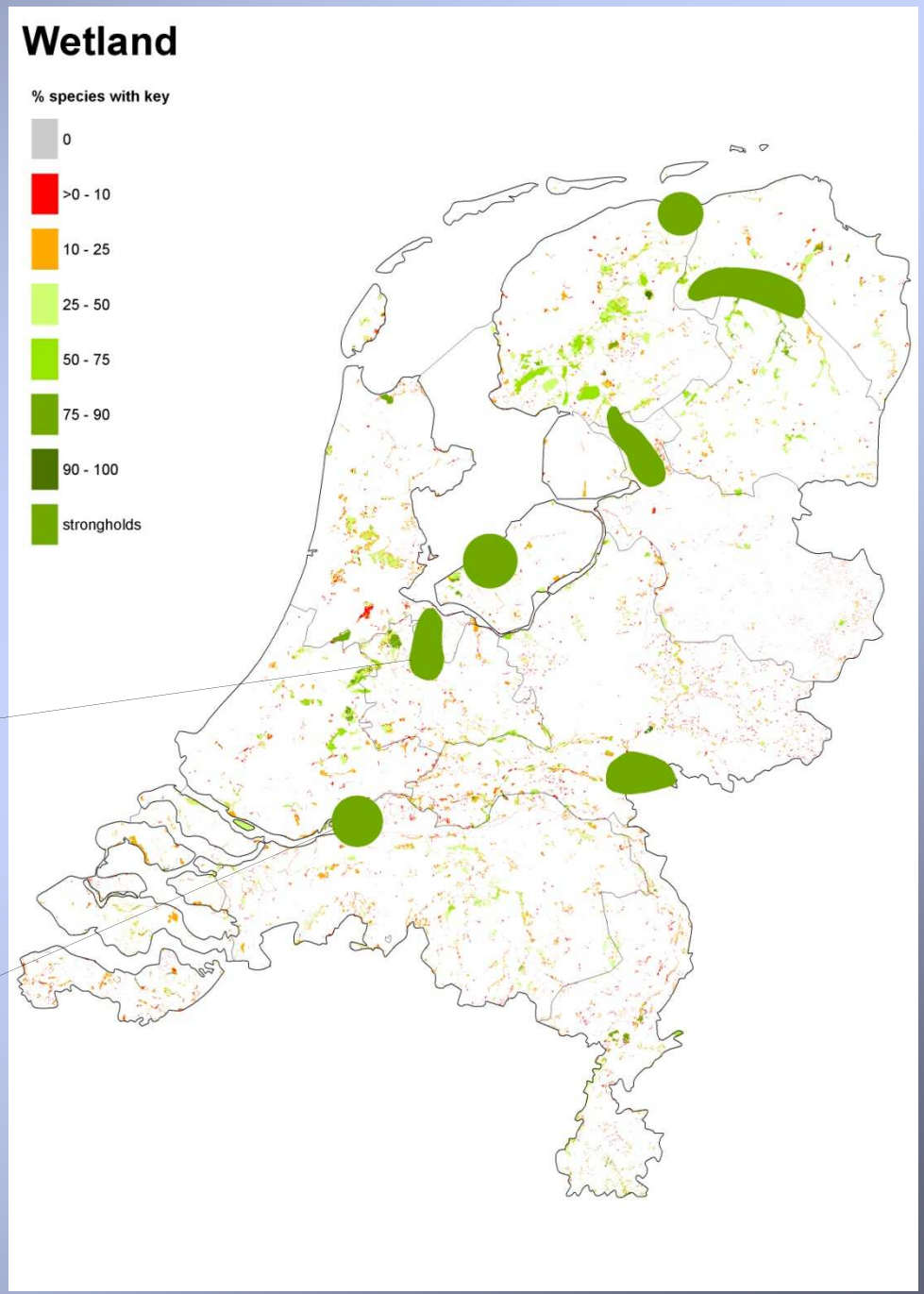
Locations where wetland restoration is possible



Design of a climate corridor for wetlands

Step 1 Identify strongholds

Nature areas where most target species get a key population



Design of a climate corridor

Step 2

Connect the strongholds with a climate corridor

Step 3

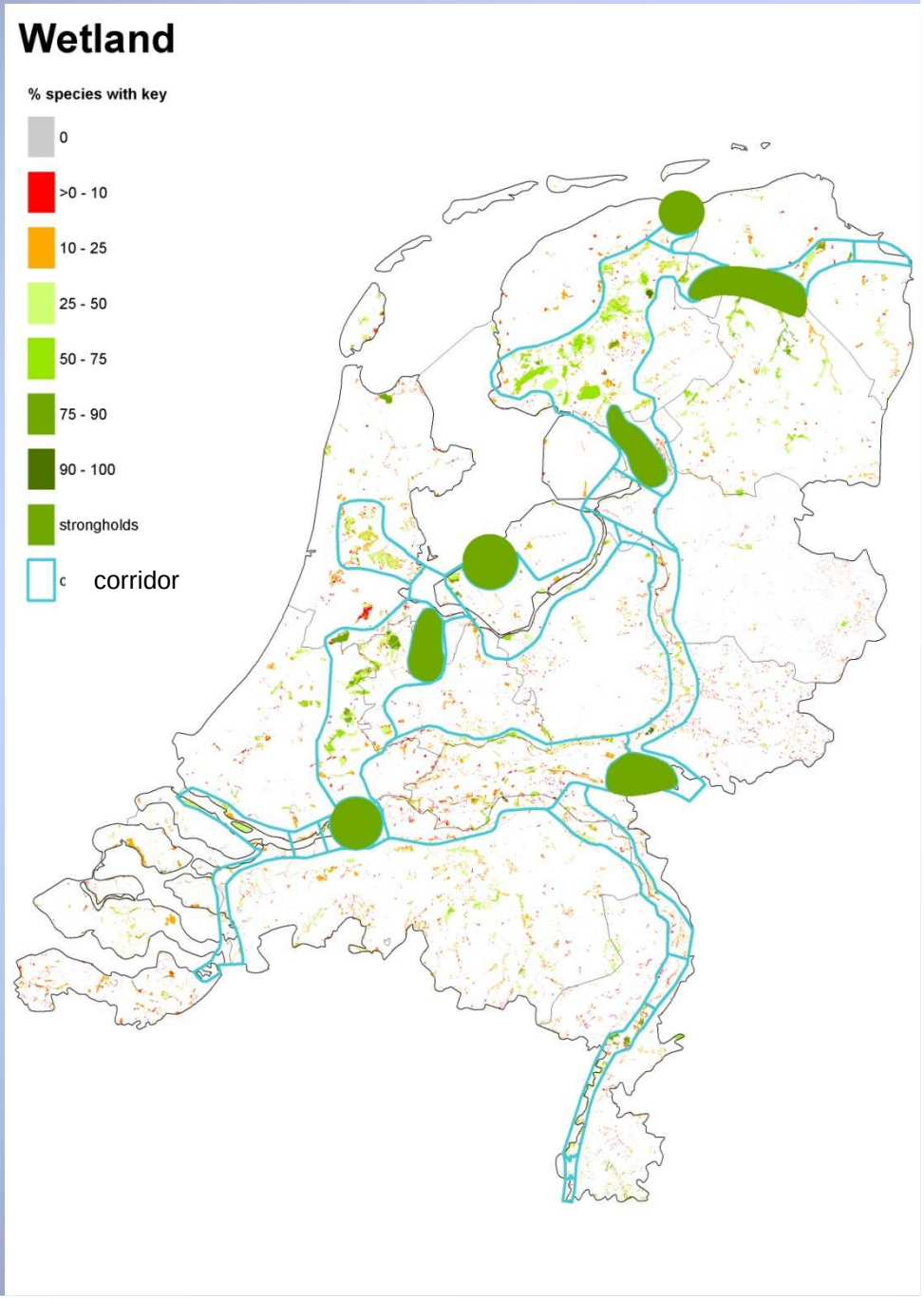
Enlarge wetlands within the climate corridor

- Increase carrying capacity
- Increase heterogeneity

Step 4

Link networks within the climate corridor

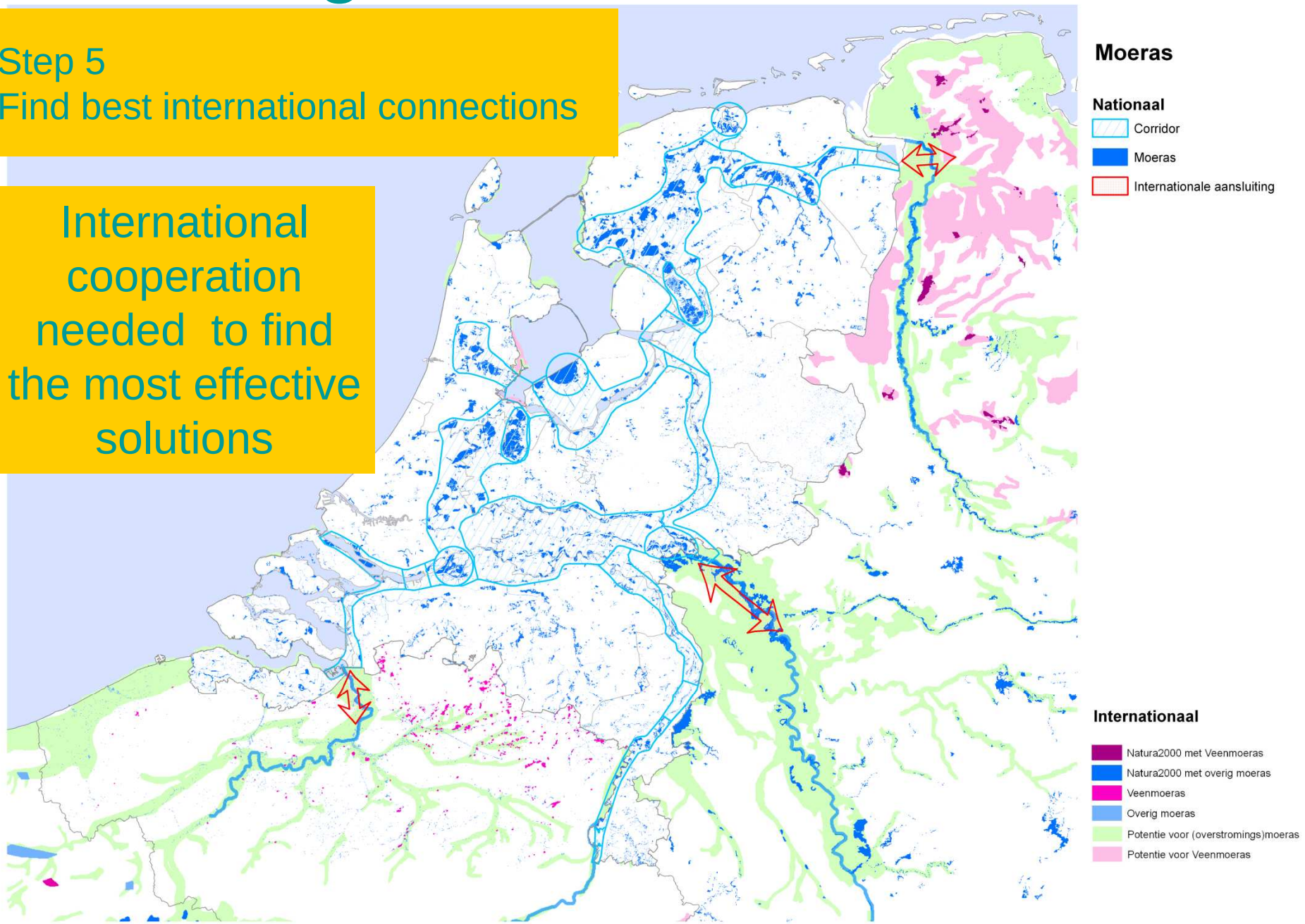
- Increase connectivity
- Create new wetland areas
- Solve barriers



Design of a climate corridor

Step 5
Find best international connections

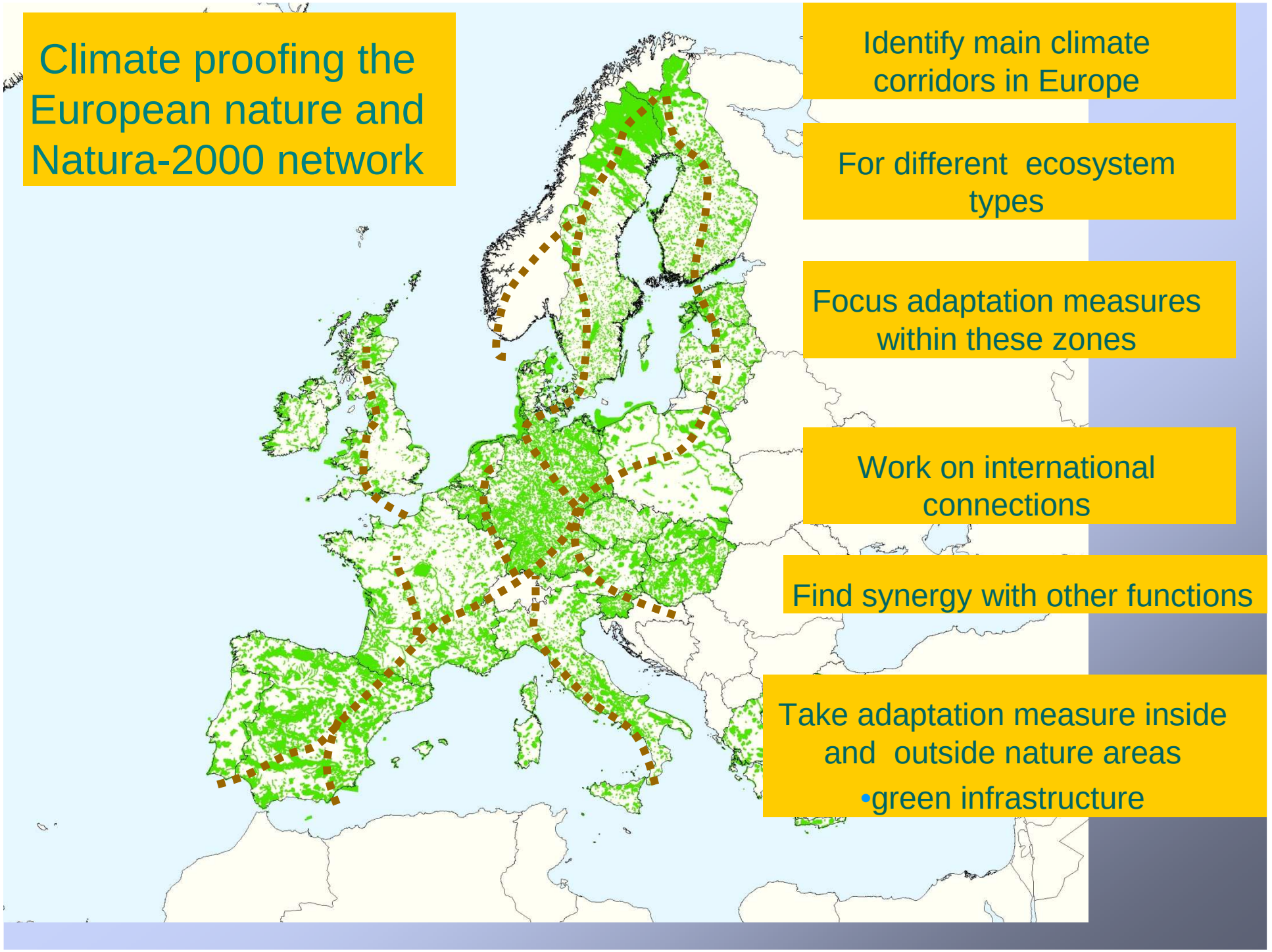
International cooperation needed to find the most effective solutions



Implementation: find possibilities for synergy between nature and other landuse functions

- recreation
- regulated flooding areas
- water retention areas

Climate proofing the European nature and Natura-2000 network



Identify main climate corridors in Europe

For different ecosystem types

Focus adaptation measures within these zones

Work on international connections

Find synergy with other functions

Take adaptation measure inside and outside nature areas

- green infrastructure

Thank You