



# Spatial and functional aspects of coherence for insect species of the Habitats Directive – case study on *Maculinea* species

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3. Study area
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Coherence – metapopulation context

# Metapopulation theory

## Basic processes

- local extinction
- colonization (dispersal)

## Basic problem


- define the metapopulation



Maculinea nausithous and M. teleius

## Basic Biological Facts

- reproductive period July to mid August
- life span adults approx. 10 days (3 – 5 days)
- egg pool 130 – 180 eggs/female
- host plant (egg – L4) *Sanguisorba officinalis*
- host ant (L4) *Myrmica* sp.
- habitat straw meadows and moist grassland with tall herbs

 **The *Maculinea* life-cycle is highly complex, specialized and risky!**

# Habitat types



Tall herb communities

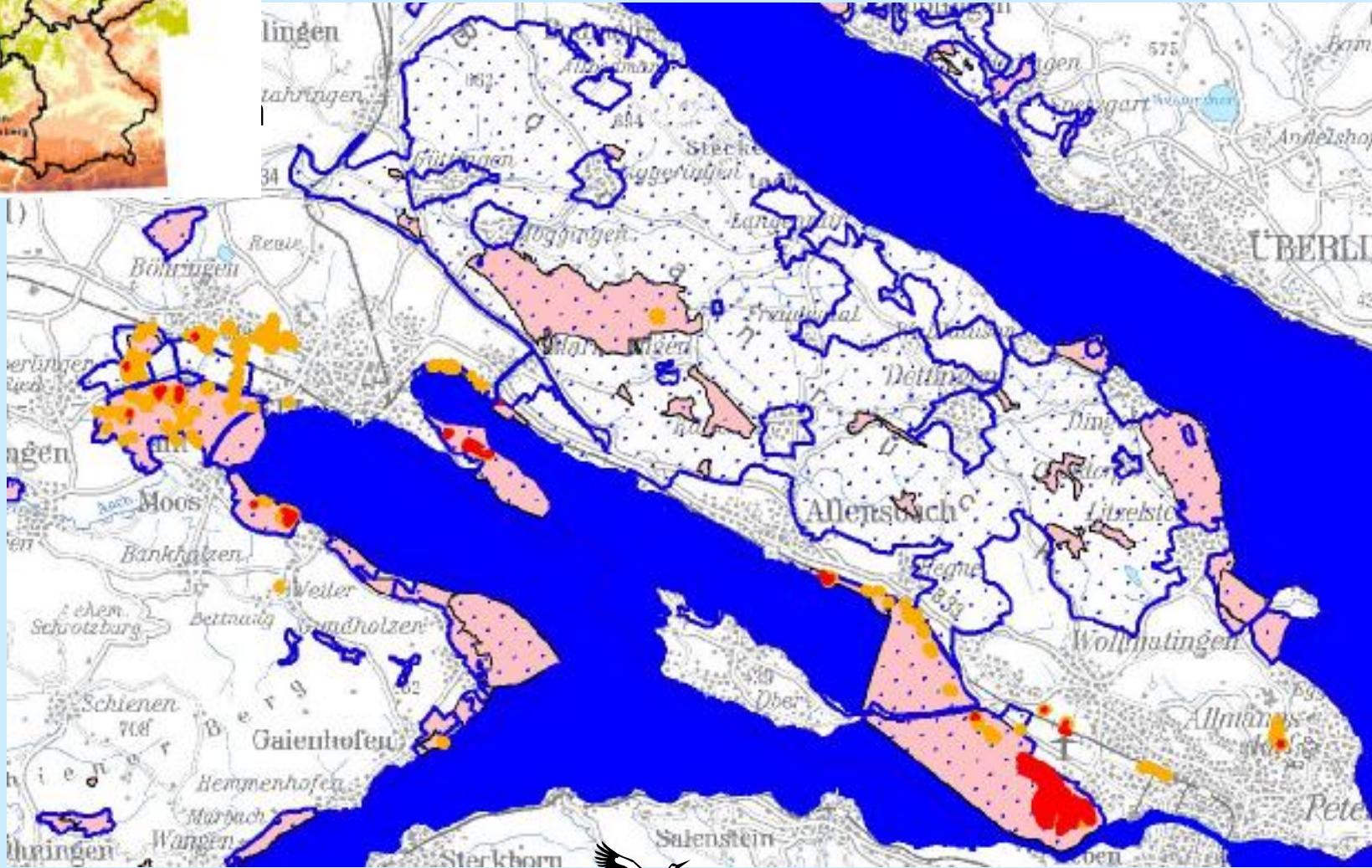


Straw meadows



Ditch edges

***Maculinea nausithous* (orange) and *M. teleius* (red) in the western Lake Constance area**

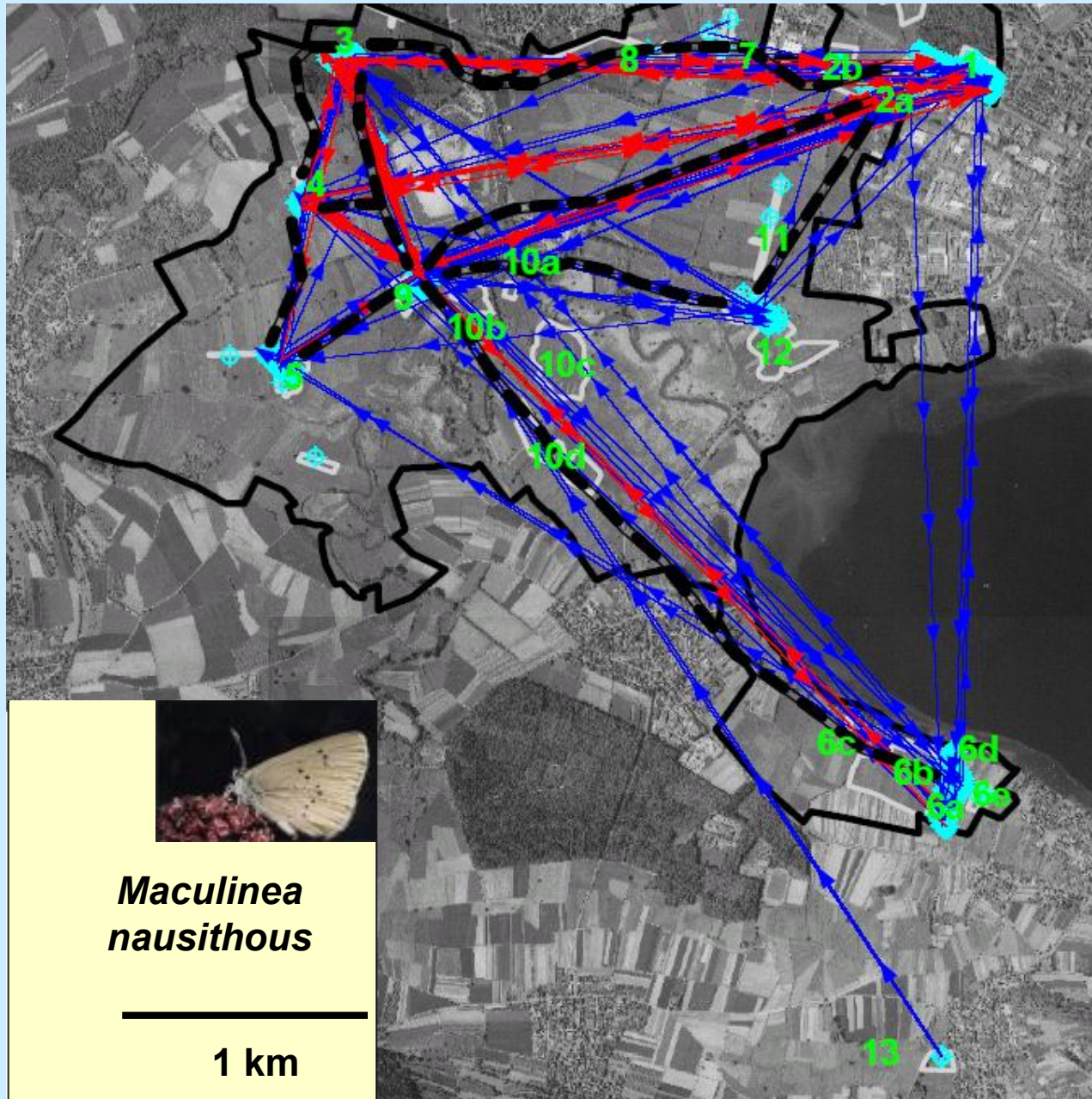


## Mortality

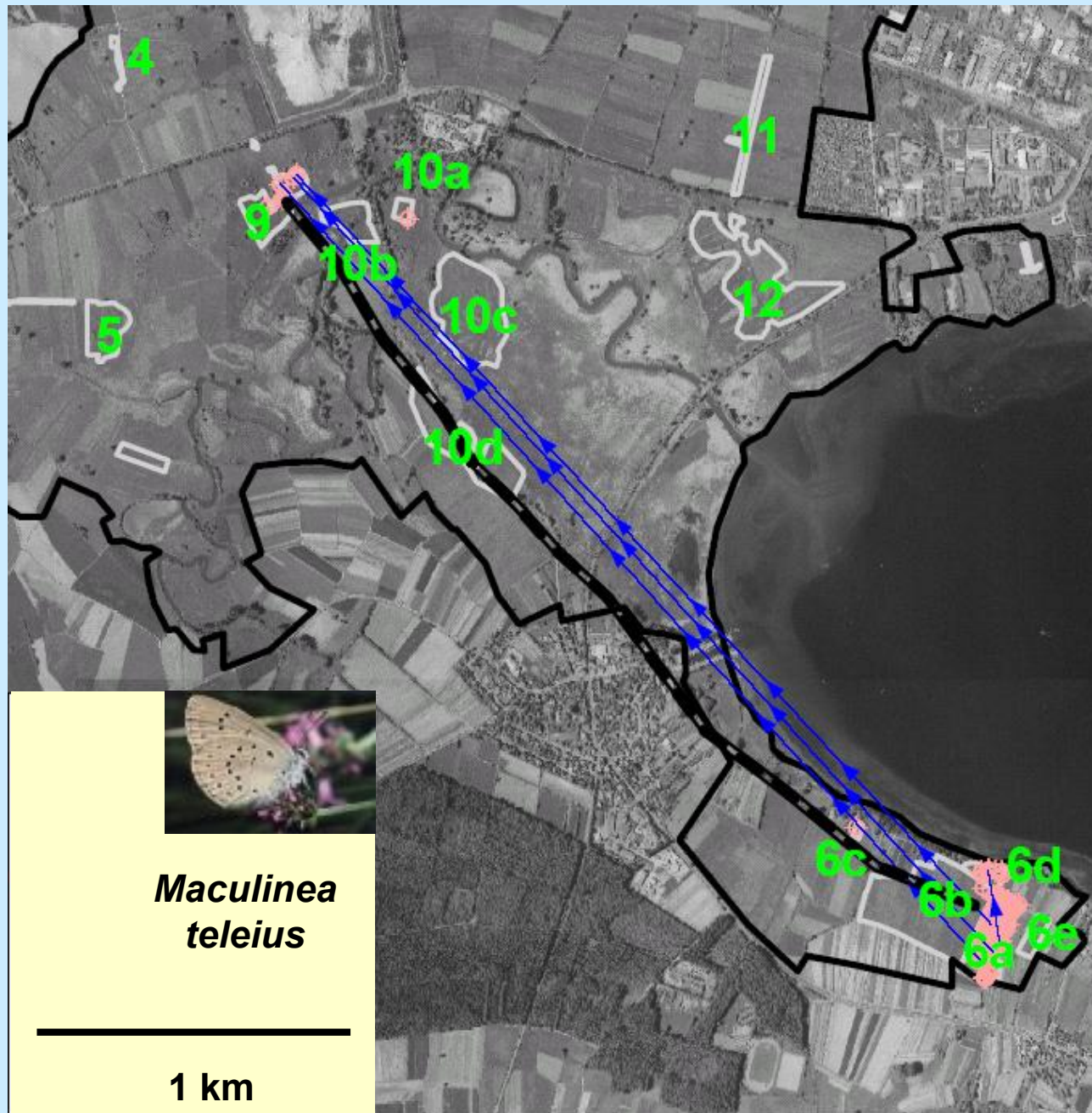
# Causes for local extinction

- natural disturbance (flooding)
- succession
- changes in land use pattern (intensification)
- development

# Mobility pattern (favourable year)



# Mobility pattern (favourable year)



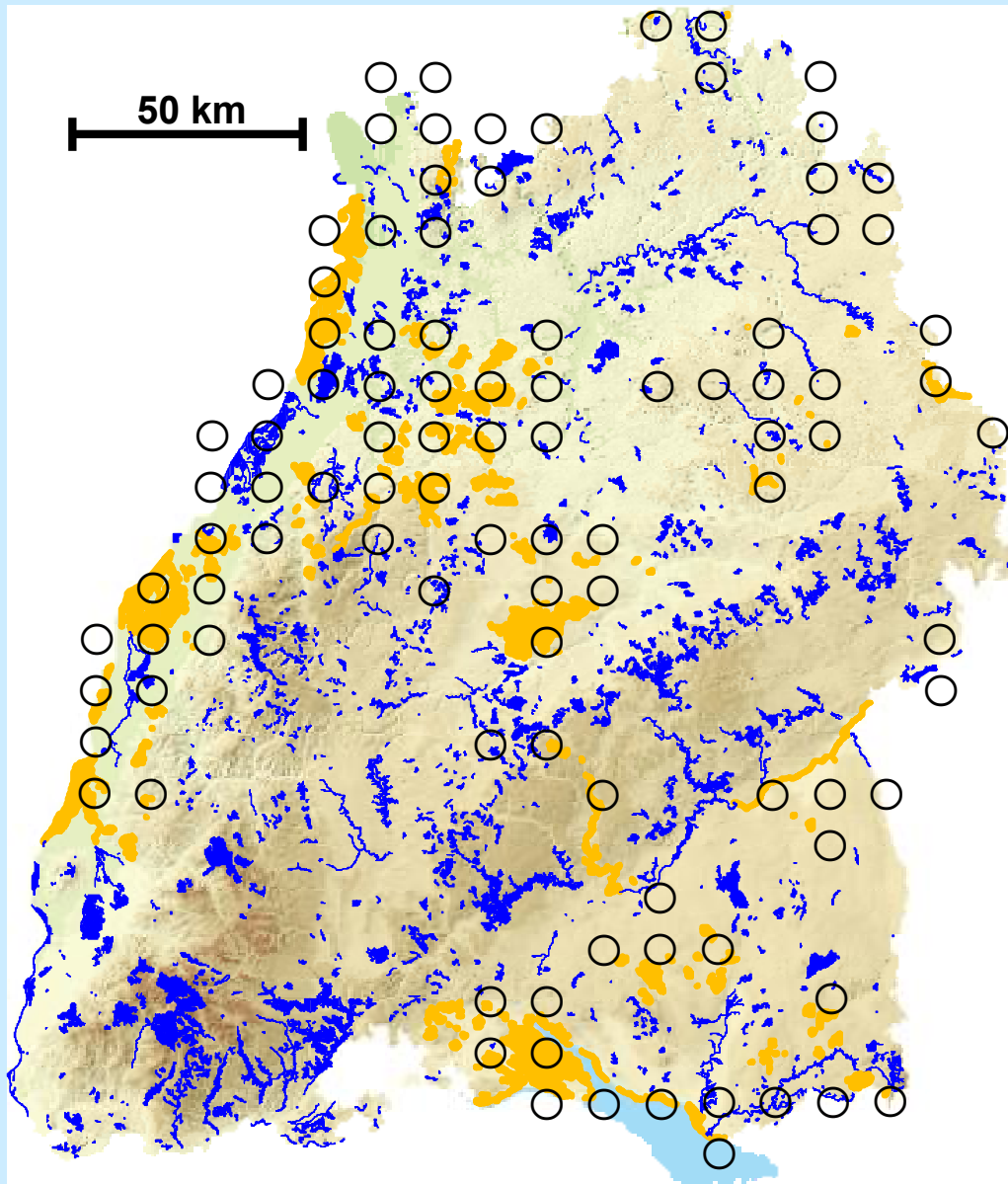
## Dispersal

# Summary

- dispersal (movement between sites) is common
  - 15-20% in *M. nausithous*
  - 5 - 10% in *M. teleius*
- dispersal covers distances between 3.5 (average) and 7 km (maximum)
- dispersal is target oriented
- importance of source populations (core areas)

# Coherence

## of the Bad.-Württ. NATURA 2000 Network for *M. nausithous*



**Circles: overall distribution**

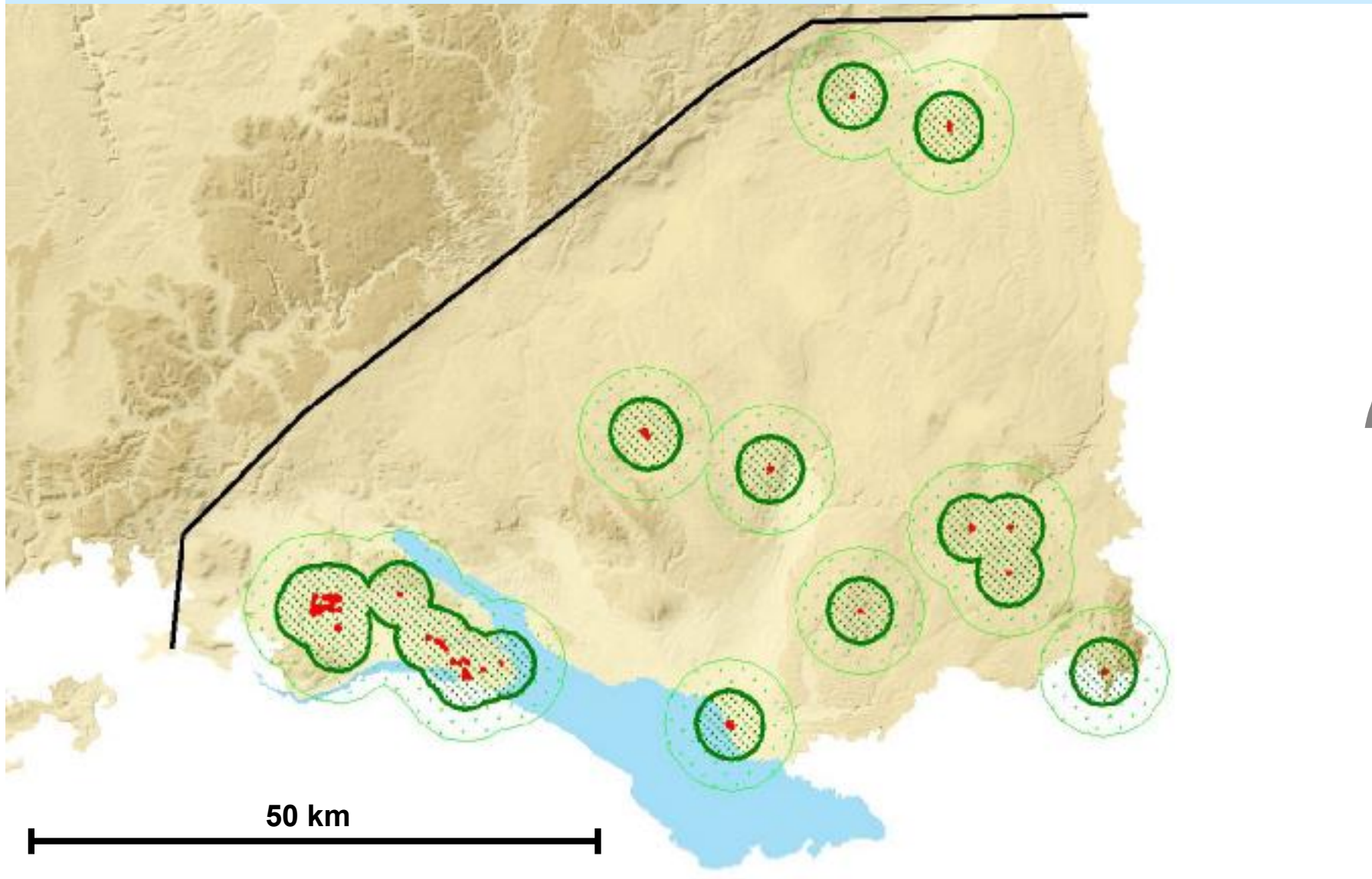
**NATURA 2000 sites**

- orange: *M. nausithous* present

- blue: *M. nausithous* absent

# Coherence:

network for *M. nausithous*, Lake Constance Area



Coherence

# Basic considerations

- measures
- monitoring
- finances
- societal aspects
- administration
- planning

## Coherence

# Basic considerations

## - measures

- patches (wet pastures with mowing and fertilisation regime adapted to the flowering of *S. officinalis*)
- corridors to link the patches
  - alternating corridors along grassland (1-5% of grassland area)
  - alternating corridors along ditches (20% of the channel length)
- monitoring
- finances
- societal aspects
- administration
- planning



## Coherence

# Basic considerations

- measures
- **monitoring (adaptive management)**
  - on site qualities (local scale)
  - coherence efficiency (quantification of coherence aspects)
- finances
- societal aspects
- administration
- planning

## Coherence

# Basic considerations

- measures
- monitoring
- **finances**
  - cross compliance (indirect)
  - traditional agri-environment schemes (measure oriented)
  - advanced agri-environment schemes (target oriented)
  - conservation contracts
- societal aspects
- administration
- planning



## Coherence

# Basic considerations

- measures
- monitoring
- finances
- **societal aspects**
  - tradition (the clean landscape)
  - definition of success
  - recognition of qualities relating to nature conservation by the general public
- administration
- planning

## Coherence

# Basic considerations

- measures
- monitoring
- finances
- societal aspects
- **administration**
  - staffing of conservation administrations
  - new foci in the agriculture administration
  - integrative approaches (different administrative levels, different sectors at a given level)
- planning

## Coherence

# Basic considerations

- measures
- monitoring
- finances
- societal aspects
- administration
- **planning**
  - multi-faceted (sectoral integration)
  - spatial integration
  - importance of site quality aspects (data base)
  - quality control



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