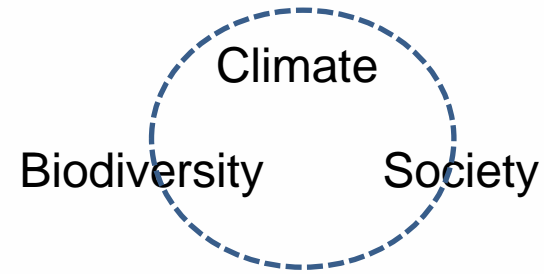




# Biodiversity in Changing Climate, some illustrations

**Kaja Peterson**  
**SEI Tallinn**  
23 October 2013  
Tallinn

# Key questions

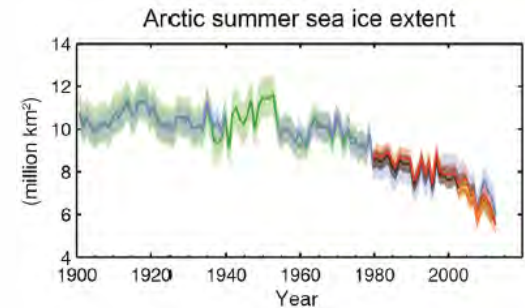
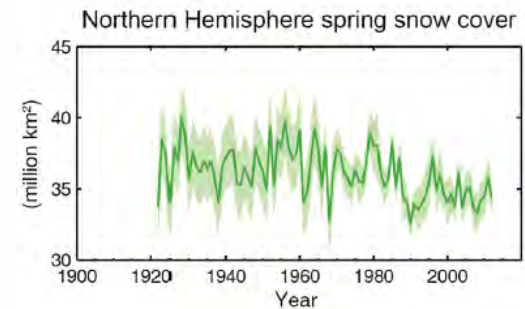
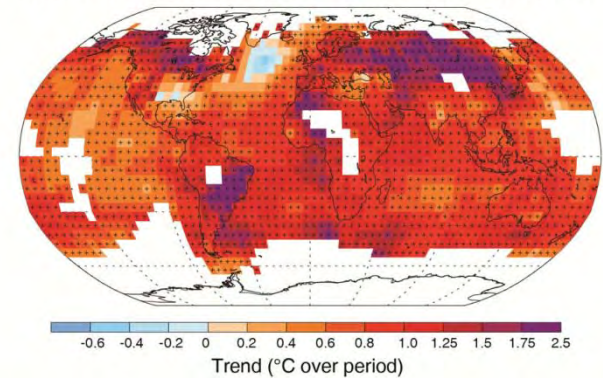


- What is changing?
- How would those changes affect ecosystems and humans?
- How to react?
- How urgent is that?

# What is changing?

## Climate:

- Precipitations, water cycle
- average temperature (annual, seasonal, monthly)
- storm days
- marine/inland ice days
- floods
- heat waves
- UV radiation level,
- air quality, etc



IPCC, 5th

# What is changing?

## Biodiversity/ecosystems:

- date of arrival of migratory birds to breeding sites
- date of spring blooming of plants
- start and duration of hibernation
- influx of non-indigenous/alien species
- location of roosting and wintering sites
- migration routes
- food chain relationships
- distribution range
- etc

# What is changing?

## Socio-economics:

- costs/benefits
- values
- perceptions
- equality/inequality
- awareness



EEA, 2012

# Which socio-economic sectors become affected?

- **Natural resource use based sectors**

**Agriculture** (due to changes in crop types, sowing time, harvest time, pest control, damage compensation, energy crops, water consumption, etc)

**Forestry** (pest control, timber harvest, etc)

**Fishing** (bag size, parasites, etc)

**Hunting** (bag size, supplementary feeding, etc )

**Water management** (area size, alien species, mgmt costs, etc)

**Coastal management** (flood management, coastal habitat management, etc)

**(Renewable) Energy production**

# Agricultural land use under European climate scenarios 2050

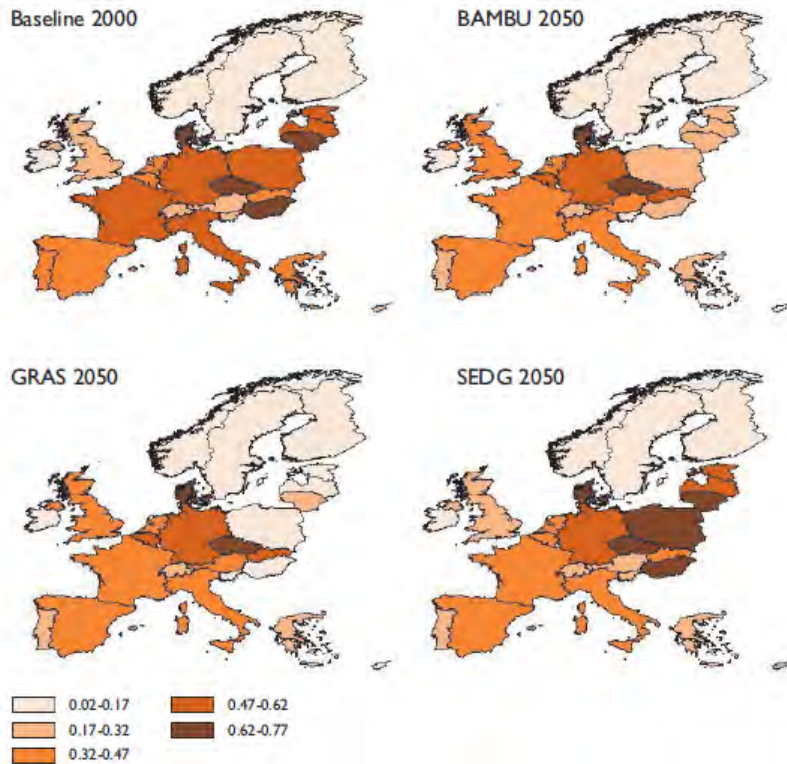


Fig. 6. Share of cropland in Europe up to 2050 in ALARM land use scenarios

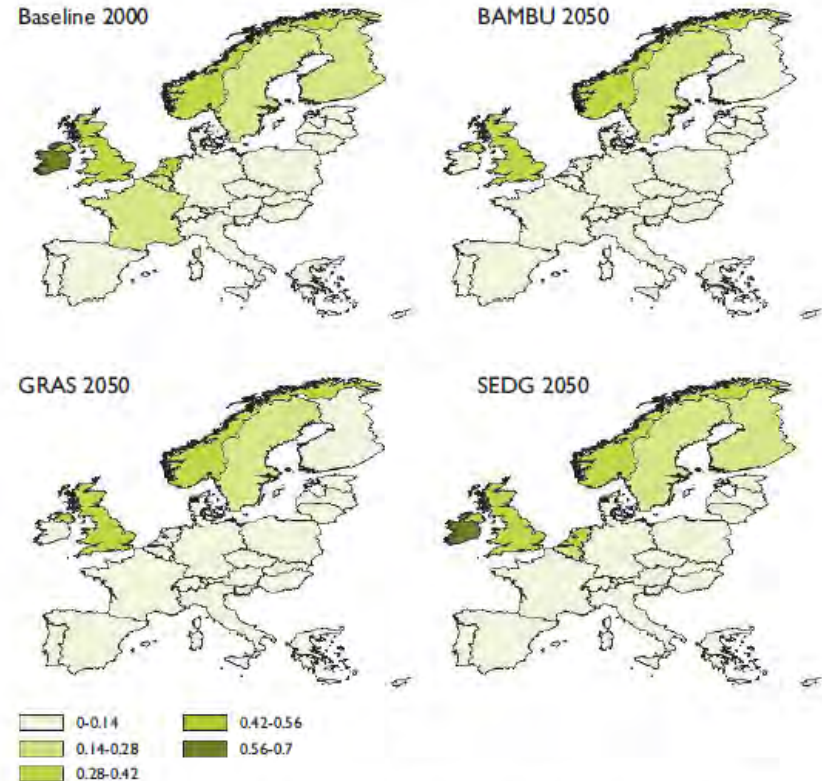
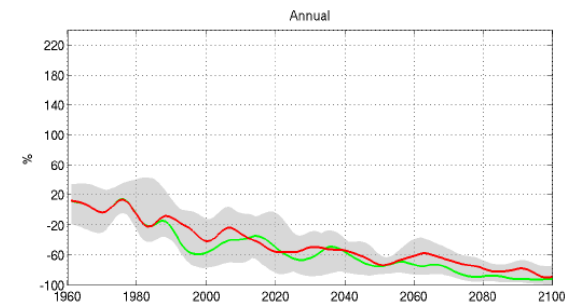
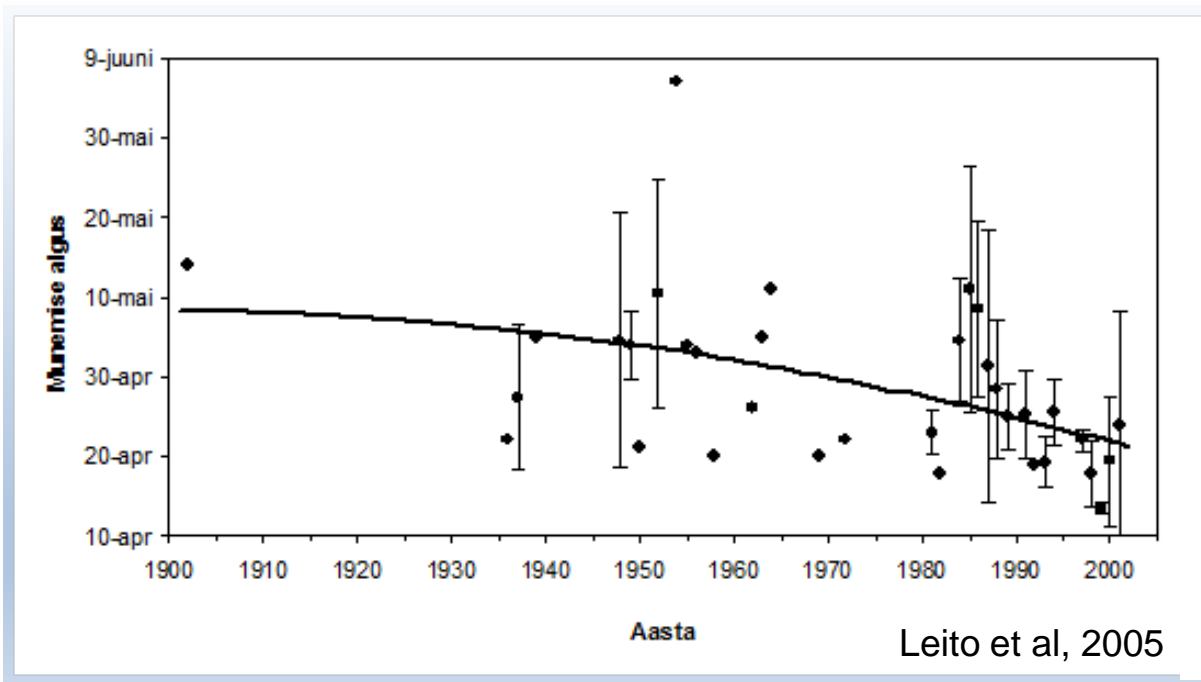


Fig. 7. Share of grassland in Europe up to 2050 in ALARM land use scenarios

# Ecological changes observed

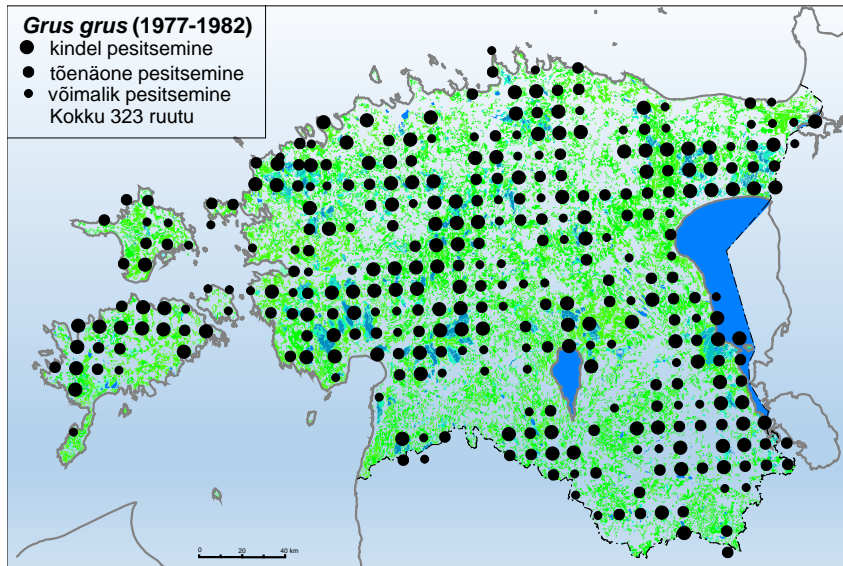
Date of the first egg has become earlier

e.g. Common Crane *Grus grus* 2 days earlier in 10 years, thus 6 days earlier in the past 30 years

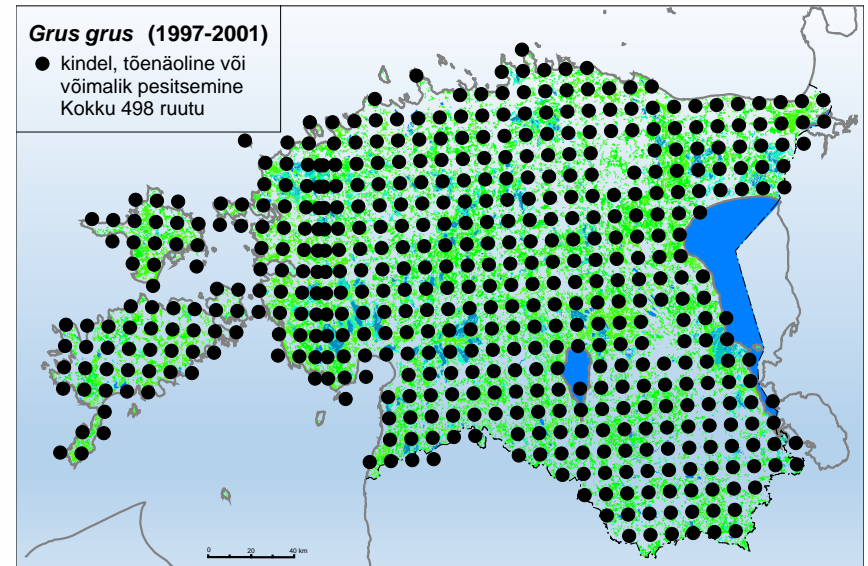




# Change in distribution of the breeding population of the Common Crane



Estonian Breeding Bird Atlas, 1993



Estonian Breeding Bird Atlas, 2001

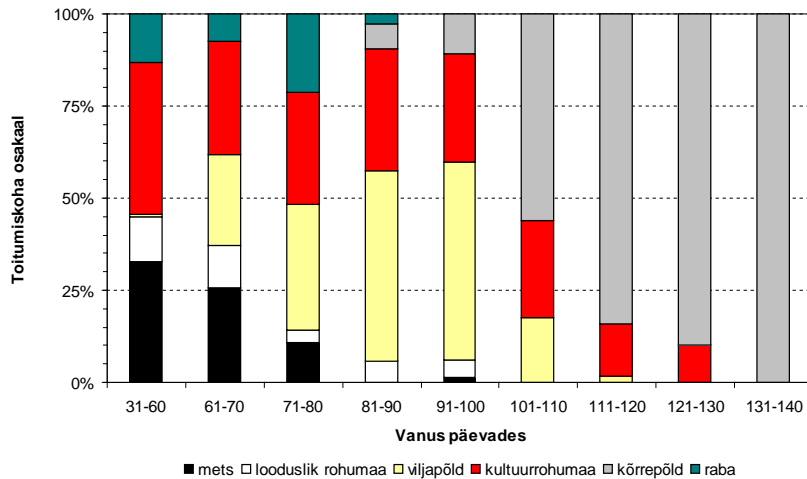
Leito et al., 2005

# Different habitats needed at different phases of life cycle



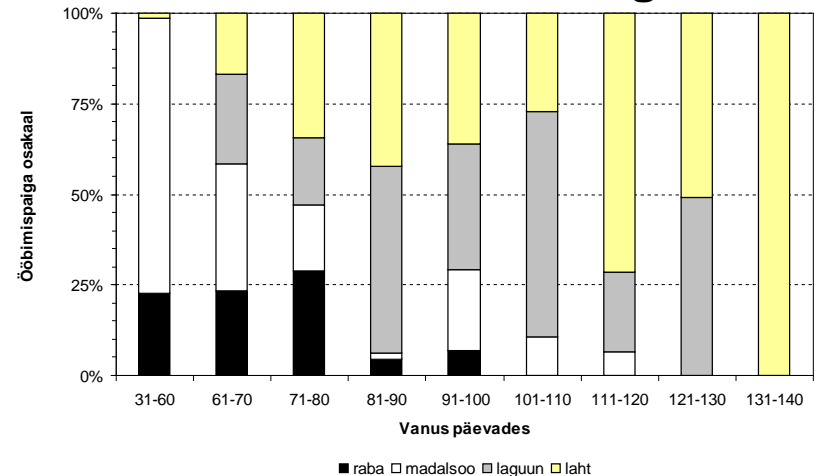
From chicks to juveniles

## Feeding habitat



From grasslands to stubble fields

## Roosting habitat



From bogs to the sea

# Changing diates

- **Before 2000**

Cereals



- **After 2000**

Cereals

Rape seed

*Cabbage*

*Carrots*

*Potatoes*

*Strawberries*



Leito *et al.*, 2005

# Food supply under attack of southern pests

## Damage by *Plutella xylostella*, diamondback moth (DBM)



### Kapsakoi ründab rapsi

25.06.2013

*Lii Sammler*  
*Maaleht, 22.06.2013*

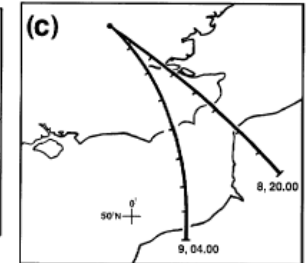
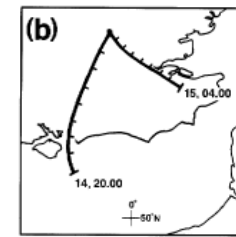
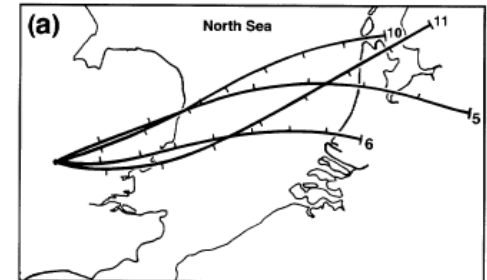
Tänavu on kõikjal Eesti põldudel väga palju auklikke rapsitaimi. Süüdi on kapsakoi, kes hektarite viisi kahjustab rapsipõlde.

"Hiljuti olin mõne päevad Rootsis ja kui koju tulin, siis olid rapsil lehed auklikuks näritud," sõnab Saaremaa teraviljakasvataja Kaido Kirst. "Vaatasin taimed üle, leidsin neid lehtedel - j mitte vähe!" Sama juttu räägib Voore Farmi taimekasvatusejuht Margus Lepp. "Neid on igal pool," ütleb ta põllule maha kükitades ja leiabki juba kolmanda taime lehe alt väikese lehega sama värvi rohelise ussikesi.

Põhara Agro OÜ juhi Jaanus Põldmaa sõnul pole kapsakoi rünnak suvirapsile Eestis esmakordne. Neid oli ka üle-eelmisel aastal, kuid tänavune on eriti jõuline.

Kapsakoi rünnak algas Eestis kahe nädala eest, kui olid kuumad ilmad. Arvatakse, et röövik, kes tavaliselt möllab Lõuna-Euroopas ja Poolas, saabus siia soojade õhuvooludega. Meie karmis kliima ta teadaolevalt ei talvitu.

"Selline massiline kapsakoi rünnak nagu tänavu, on tavaliselt üle 15-20 aasta," ütleb Baltic Agro tootejuht Elo Tuubel. "Ta sööb mitte ainult suuri lehti, vaid ka südamikku, kust peaks tulema rapsi õisik ja sealt seeme."

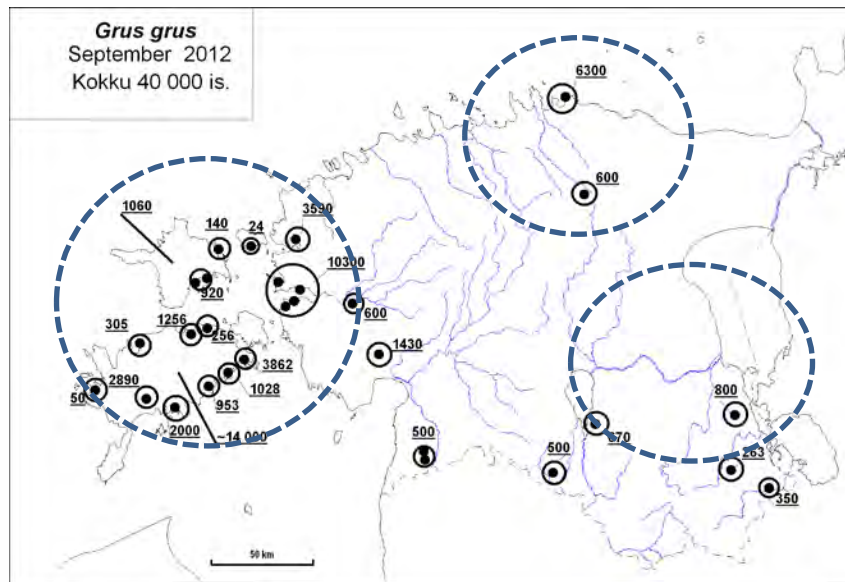


Chapman et al., 2002:

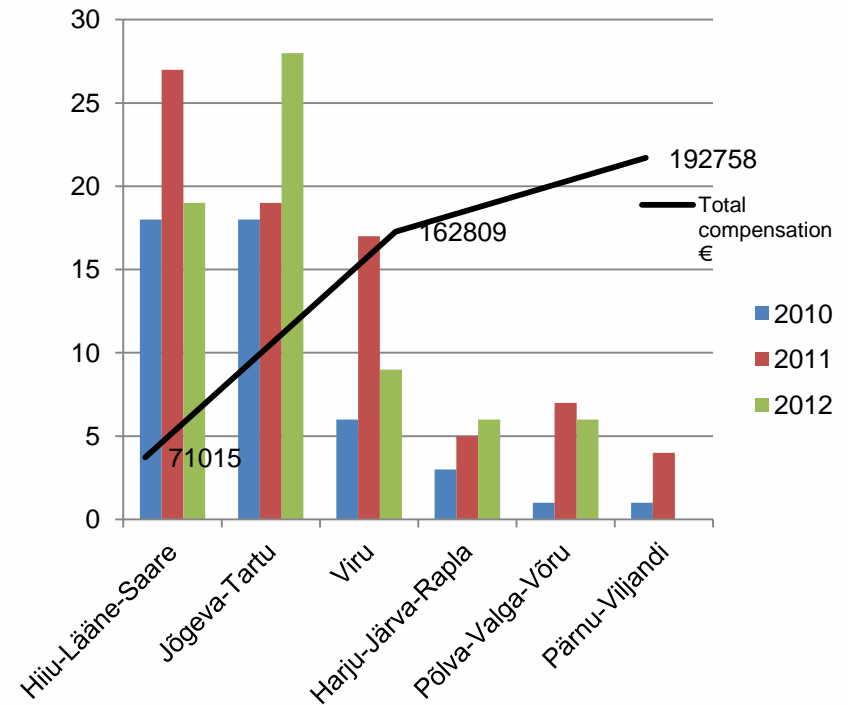
Early season immigration of moths has become more common in UK. Global DBM pest management requires at least USD1bln annually

Sarfraz et al., 2005

# Ecological changes have socio-economic effects: Roosting populations of Common Crane in Sept 2012 and crop damages by cranes and geese 2010-2012

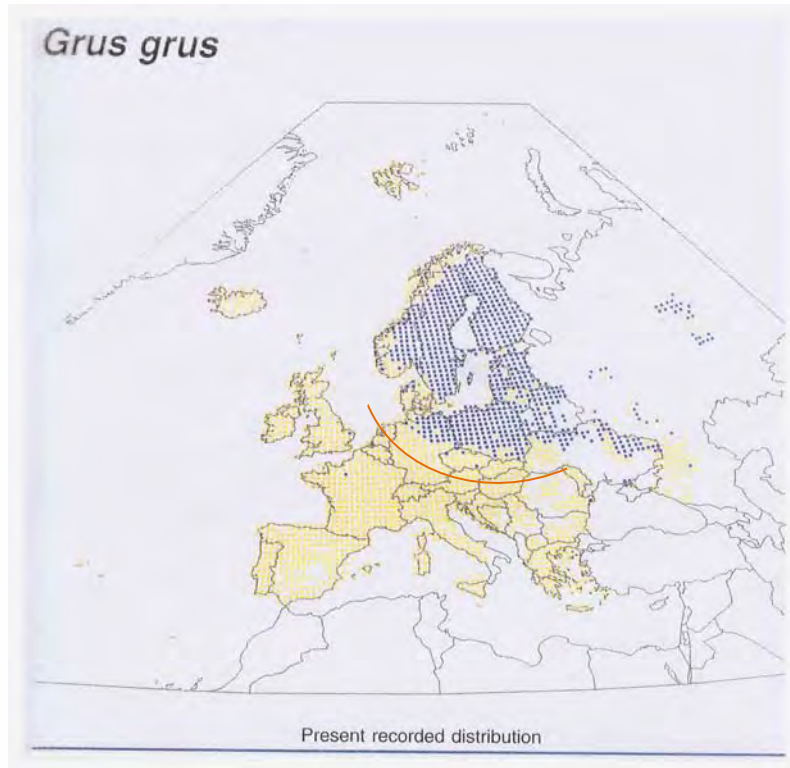


A. Leito, 2013

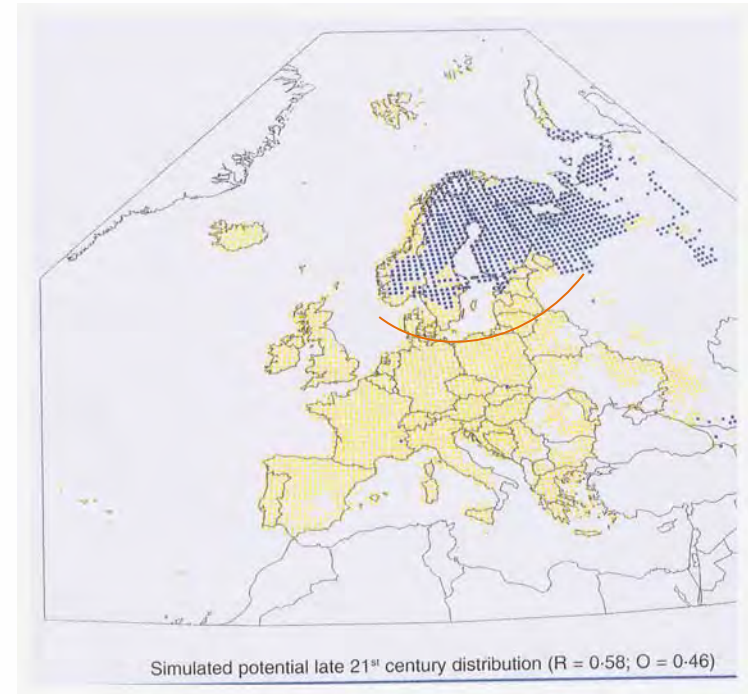


Environmental Board, 2013

# Changing home range – what implications may follow?

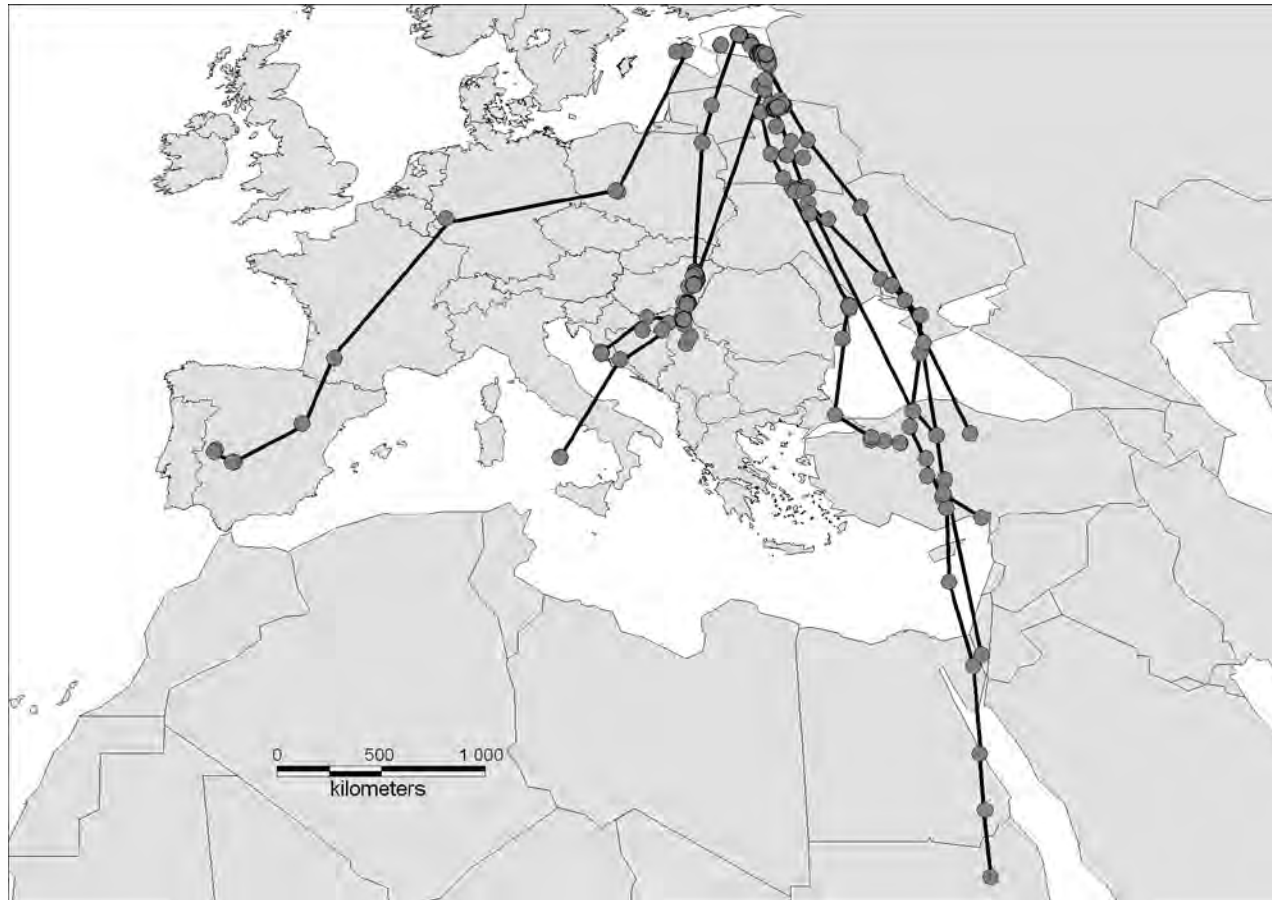


Present recorded distribution



Simulated potential late 21<sup>st</sup> century distribution

# Changing migration routes - what implications may follow?



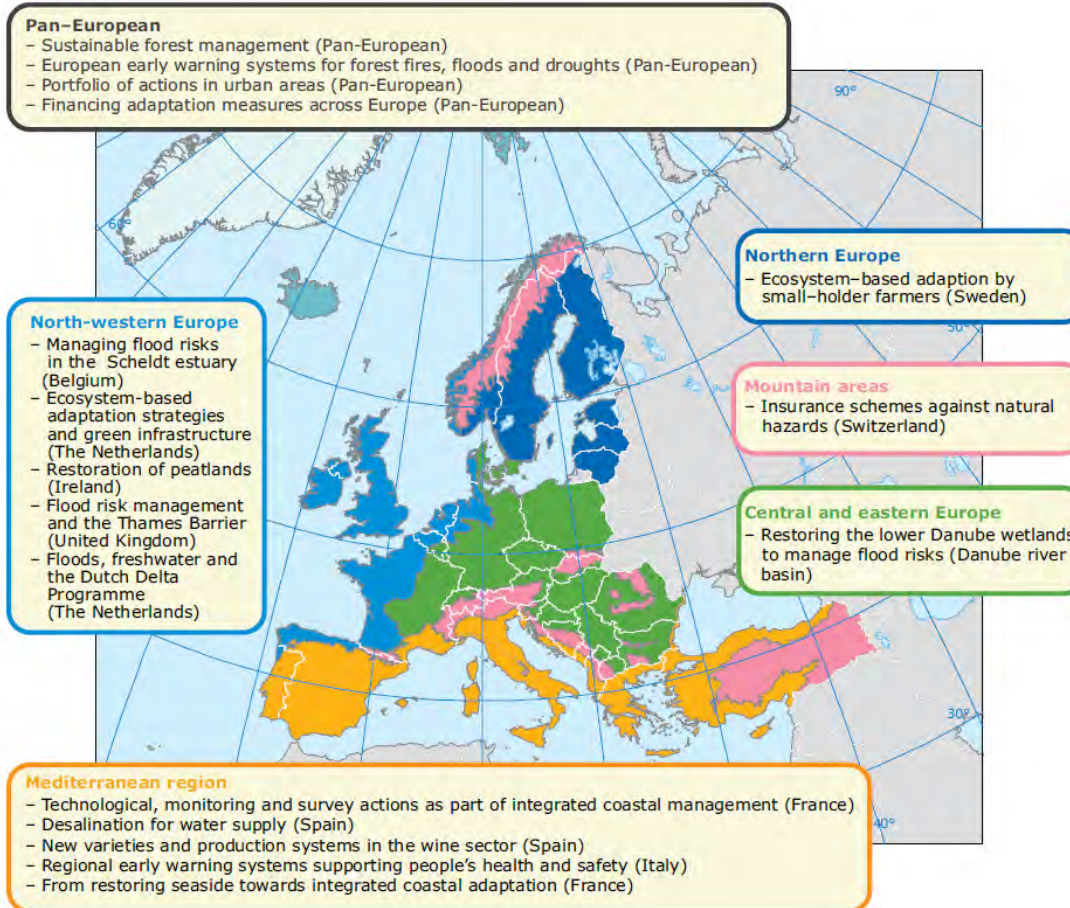
23 cranes equipped with satellite monitoring devices in Estonia in 2001-2013

# Conclusions

- Monitoring schemes need to be in operation
- Cross-use of data for decision-making at different levels, sectors - evidence base
- Considering climate change in:
  - ✓ impact assessments (RIA, SEA, EIA, AA)
  - ✓ investment plans
  - ✓ support schemes (nature management, RDP agri-environmental measures)
  - ✓ damage costs
  - ✓ insurance costs, etc



# Examples of adaptation in Europe



EEA, 2013

# How urgent?

- It is not so much about urgency but rather “taking climate issues into account should become usual practice”

- Thank you for your attention!