

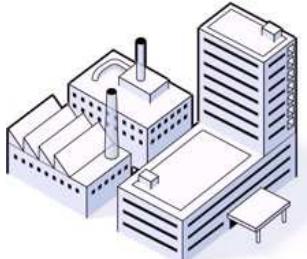
Really long term radiological assessment of ecosystems and humans



SKB's system

Swedish Nuclear Fuel and Waste Mangmt. Co

Medical care, industry and research



SFR

Final repository for short-lived radioactive waste

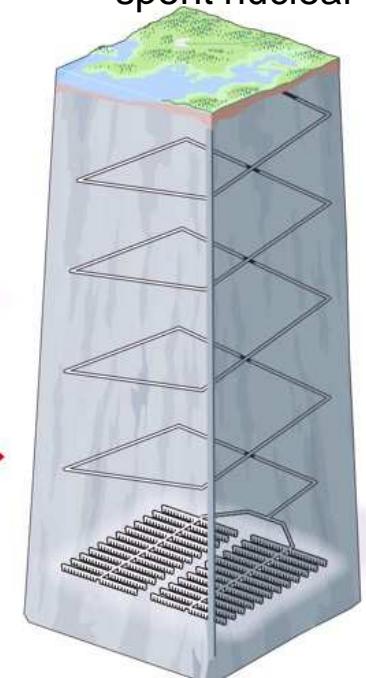


SFL

Final repository for intermediate level radioactive waste

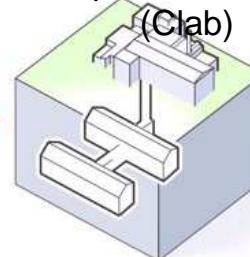


Final repository for spent nuclear fuel

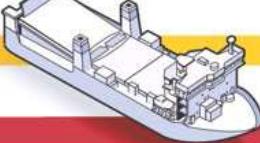


CLAB

Central interim storage for spent nuclear fuel (Clab)

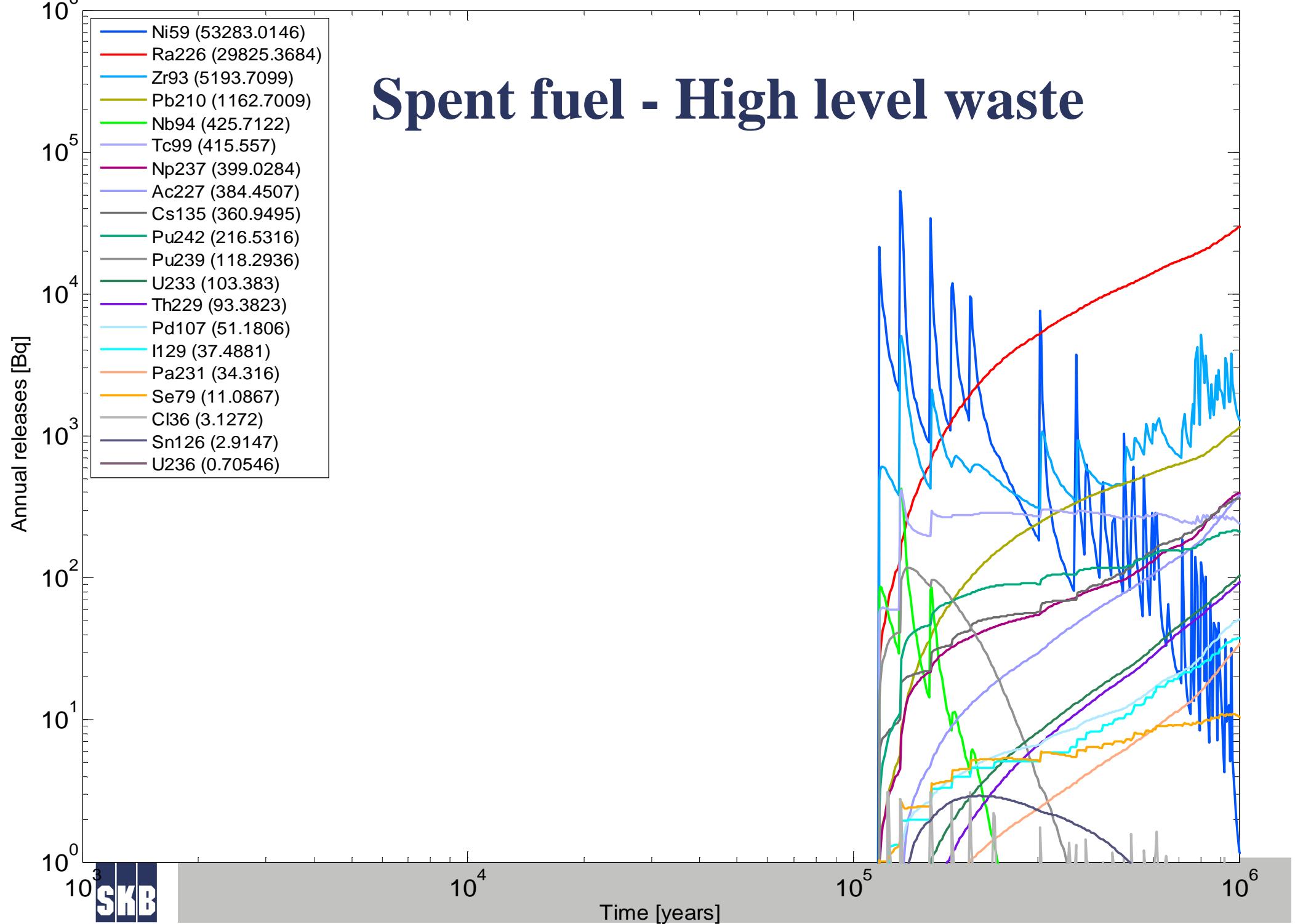


m/s Sigyn →
Sigrid

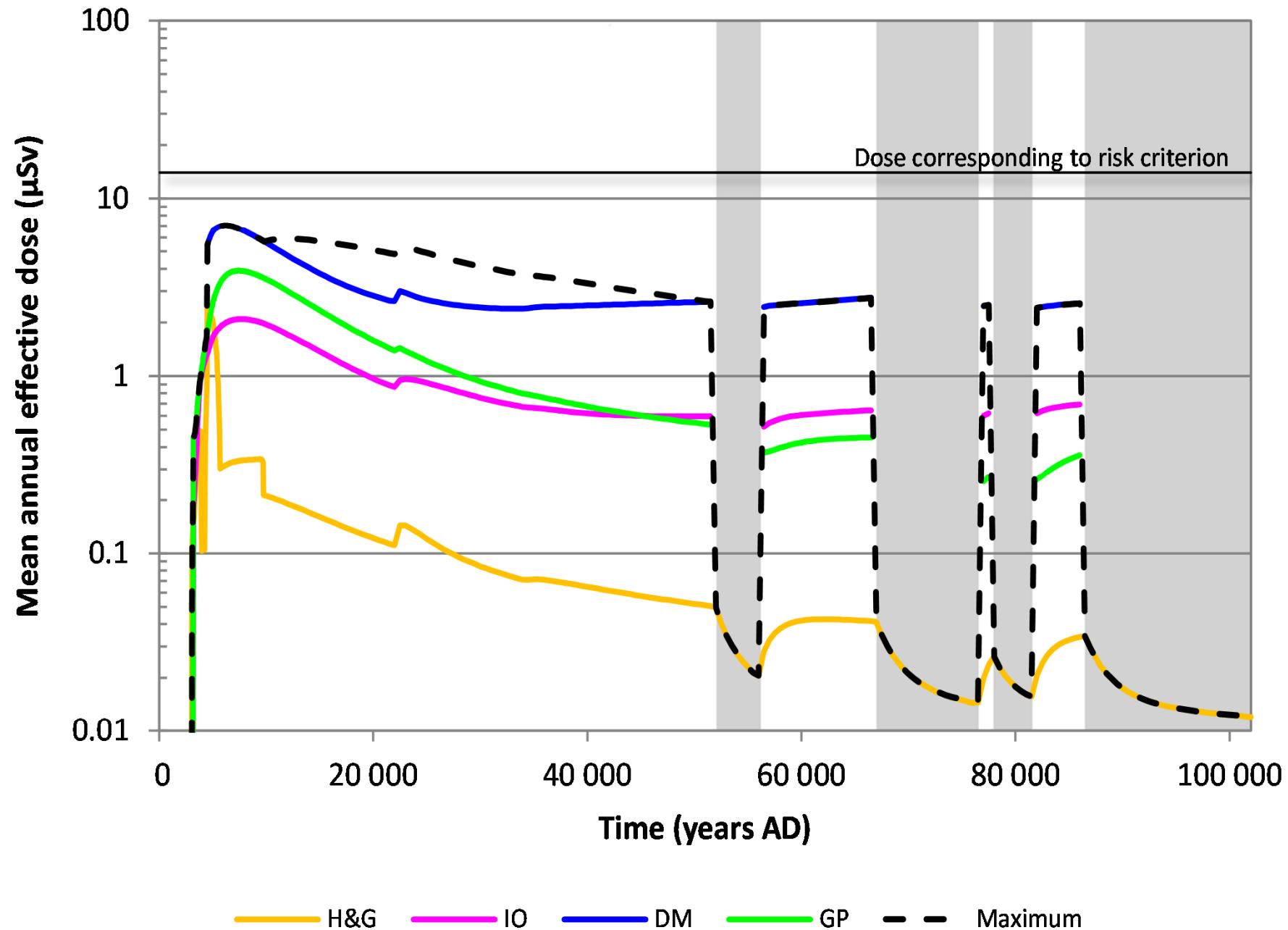


Nuclear power plant

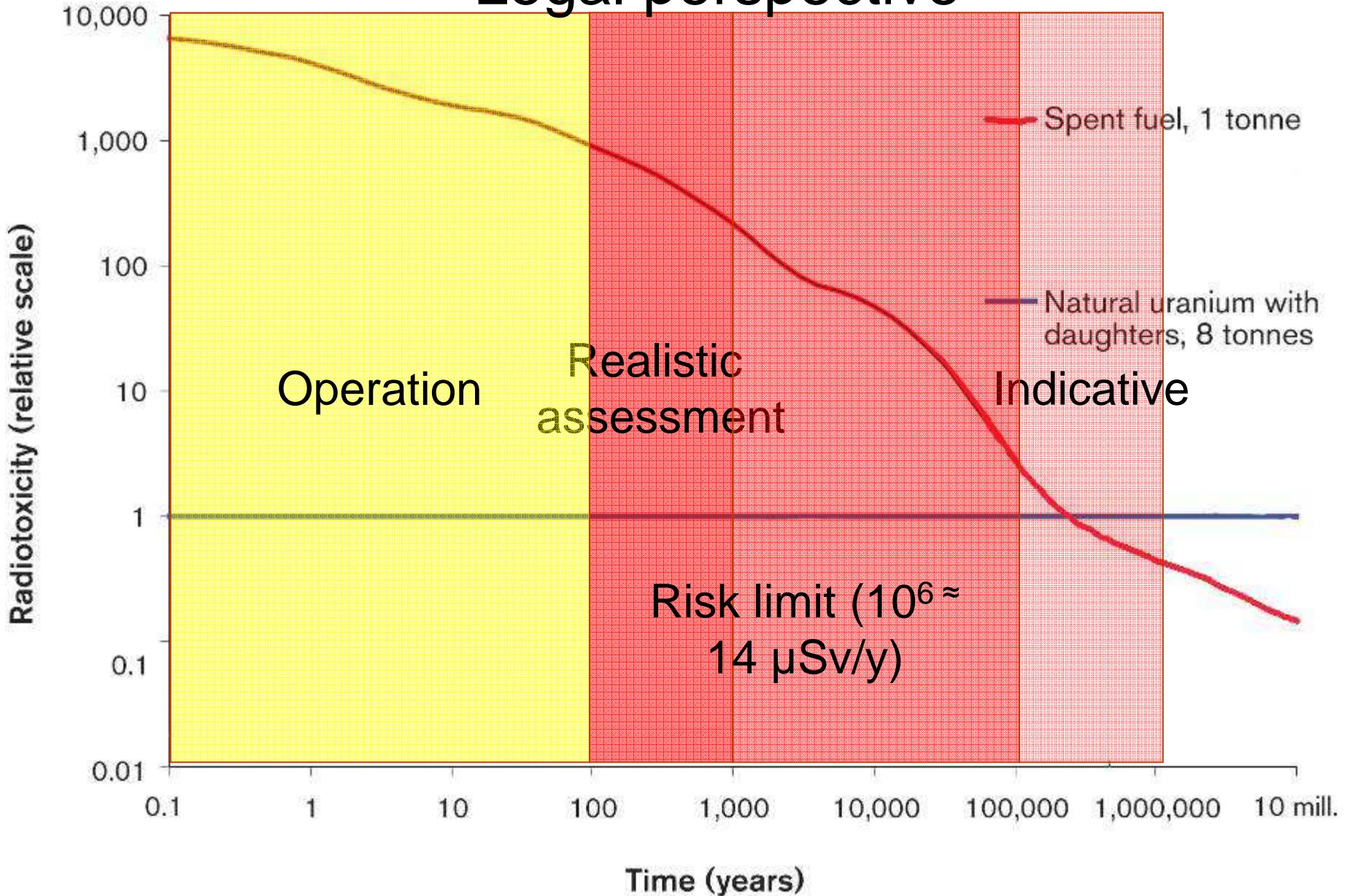
Spent fuel - High level waste



SFR - low level waste



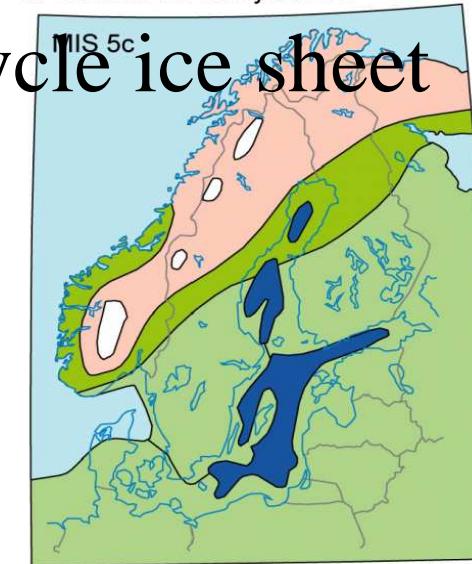
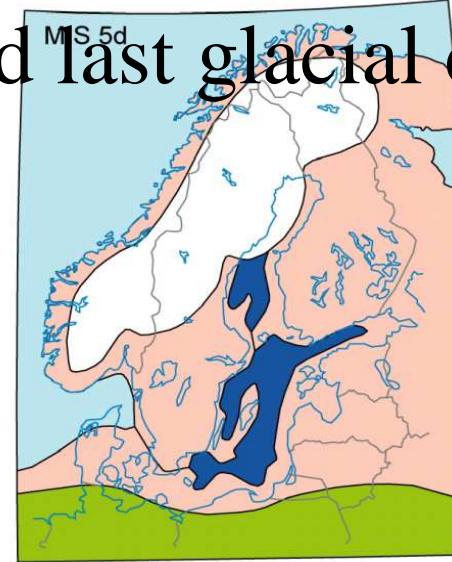
Legal perspective



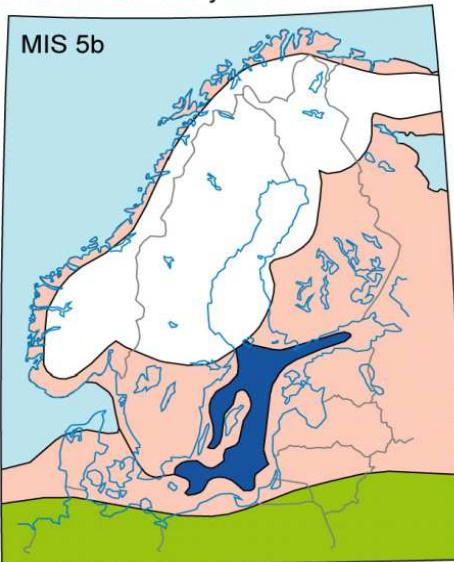
The Eemian Interglacial
c. 130 000–115 000 years BP

The first Weichselian Stadial
c. 115 000–100 000 years BP

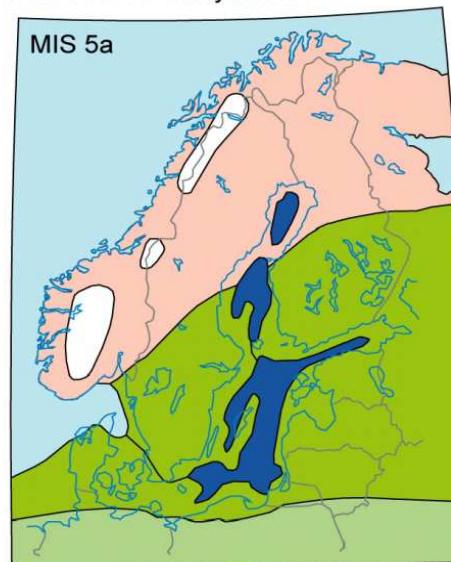
The Jämtland/Brörup Interstadial
c. 100 000–90 000 years BP



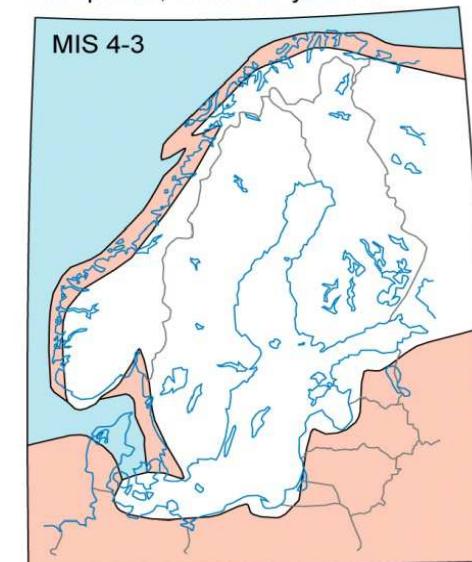
The second Weichselian Stadial
c. 90 000–80 000 years BP



The Tärendö/Odderade Interstadial
c. 80 000–70 000 years BP



The start of the Weichselian Glaciation's
main phase, c. 50 000 years BP



Borders

- Shore line
- National border

Vegetation

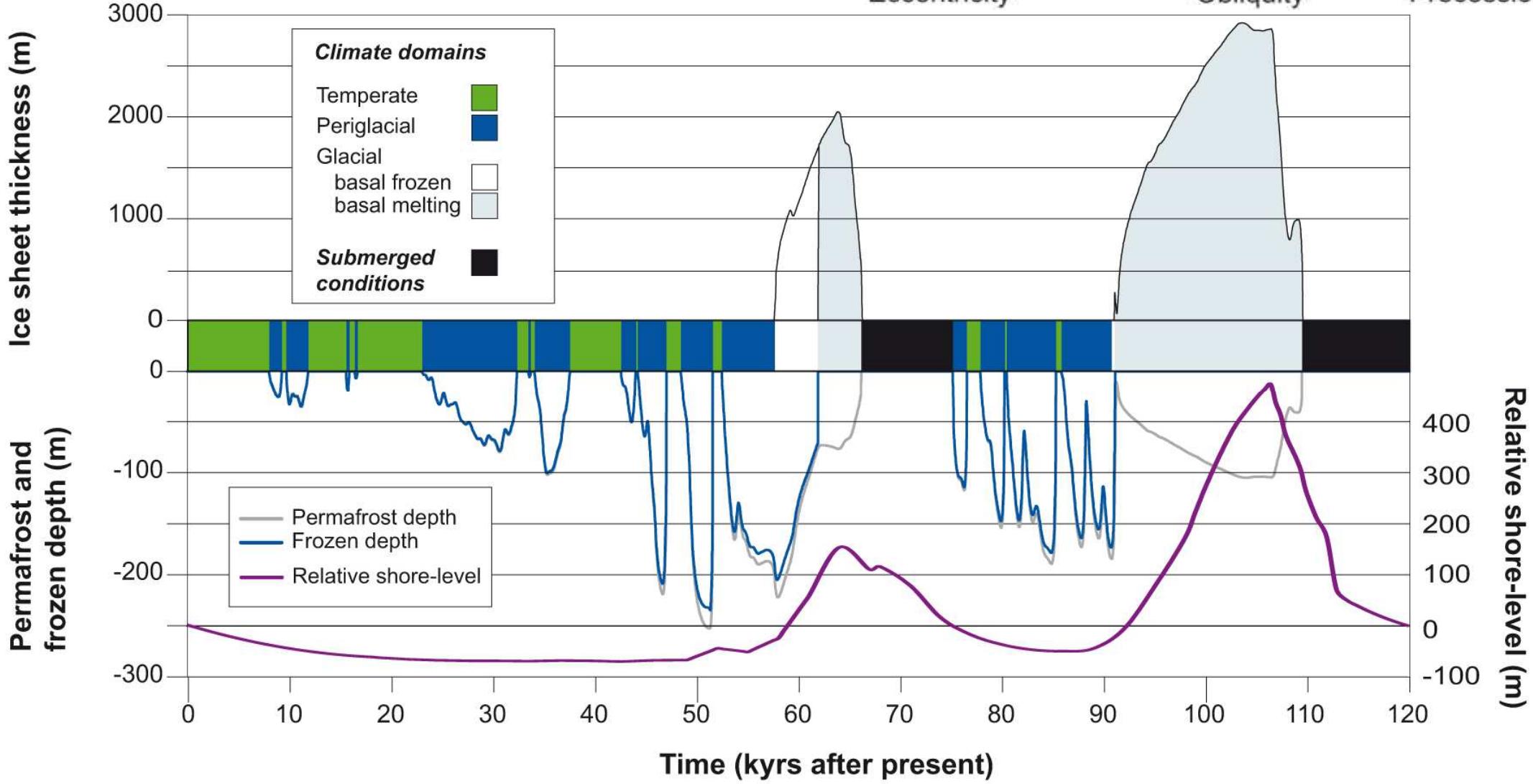
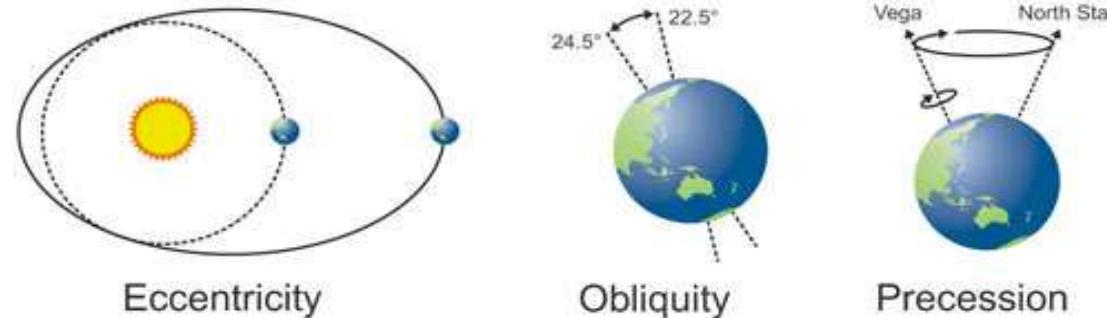
- Glacier
- Lake
- Ocean
- Tundra
- Birch forest
- Coniferous forest
- Temperate forest of broad-leaf trees

0 200 400 800 1200 km

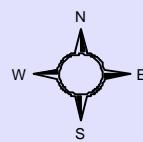


Milankovitch Cycles

Future climate without green-house



8500 BC



0 100 200 300 400 500 km

Icesheet

~ 2000 AD Shoreline

Altitude (m)
-3000 - -300
-300 - -100
-100 - -50
-50 - -25
-25 - 0
0 - 25
25 - 100
100 - 300
300 - 3000

We learn
from the
past

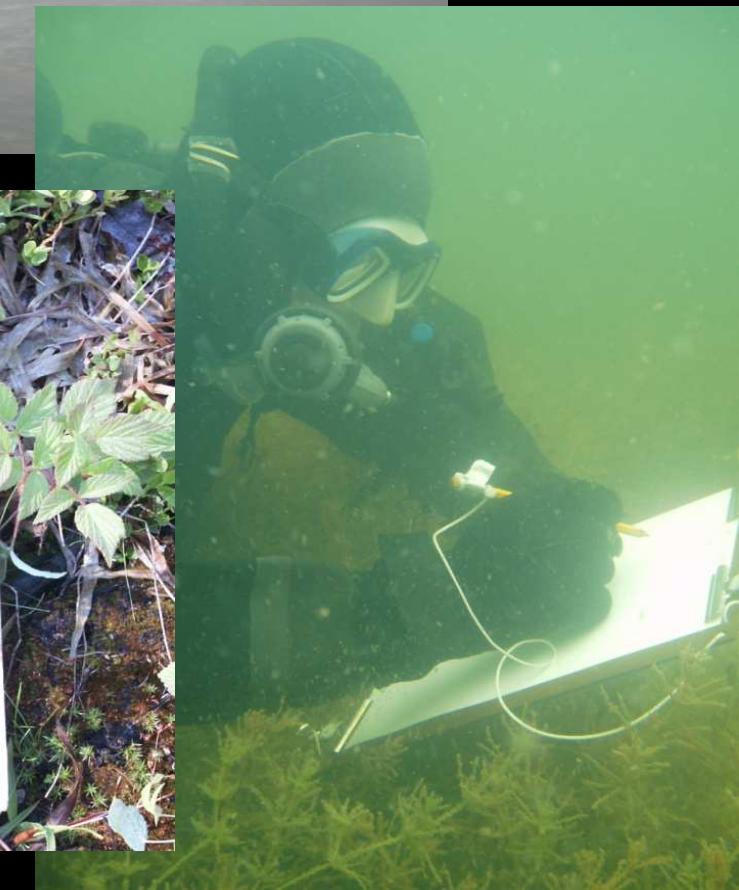


SFR facility, SR-PSU safety assessment

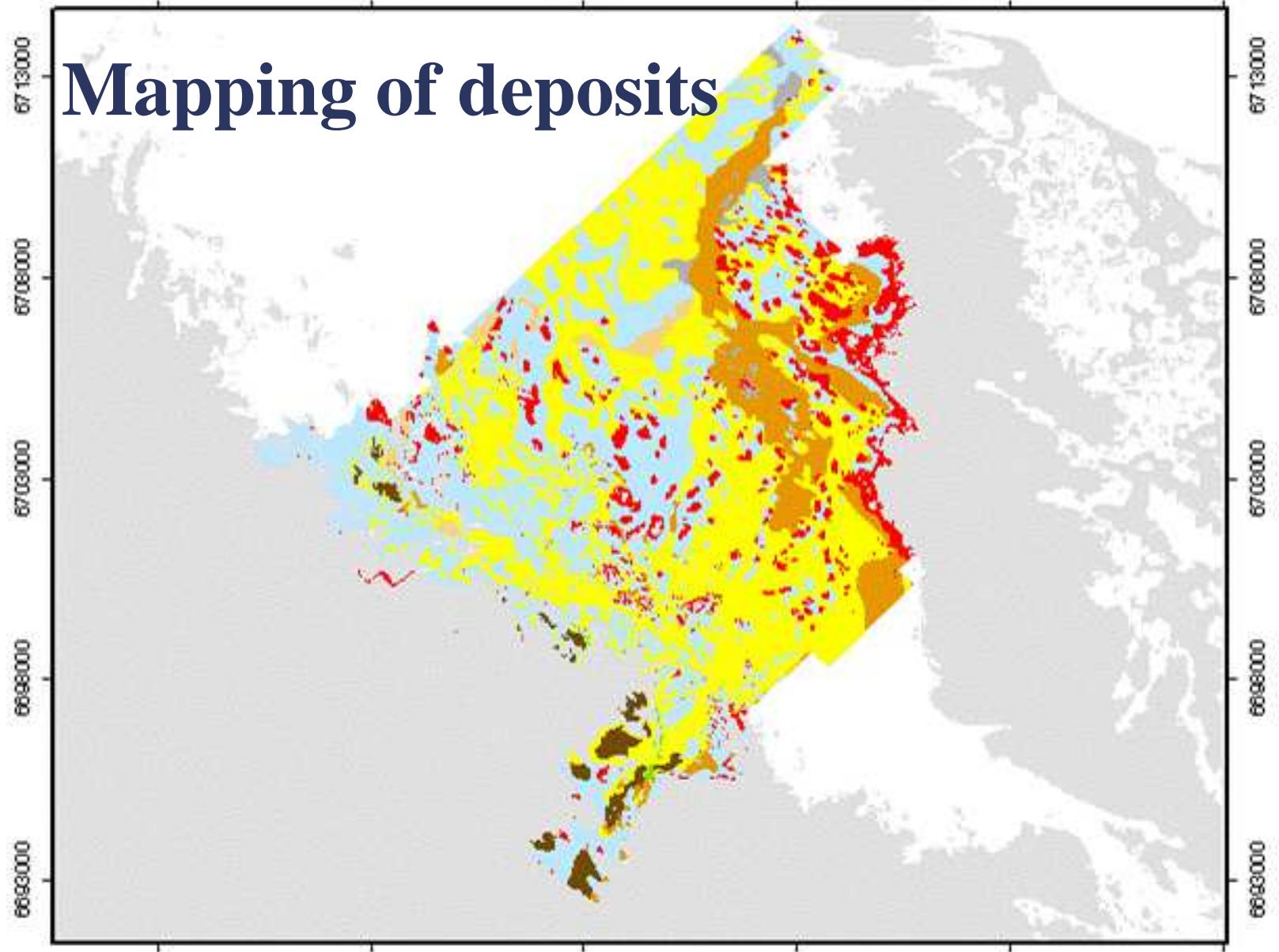


Site investigations 2001-2011 for high level repository

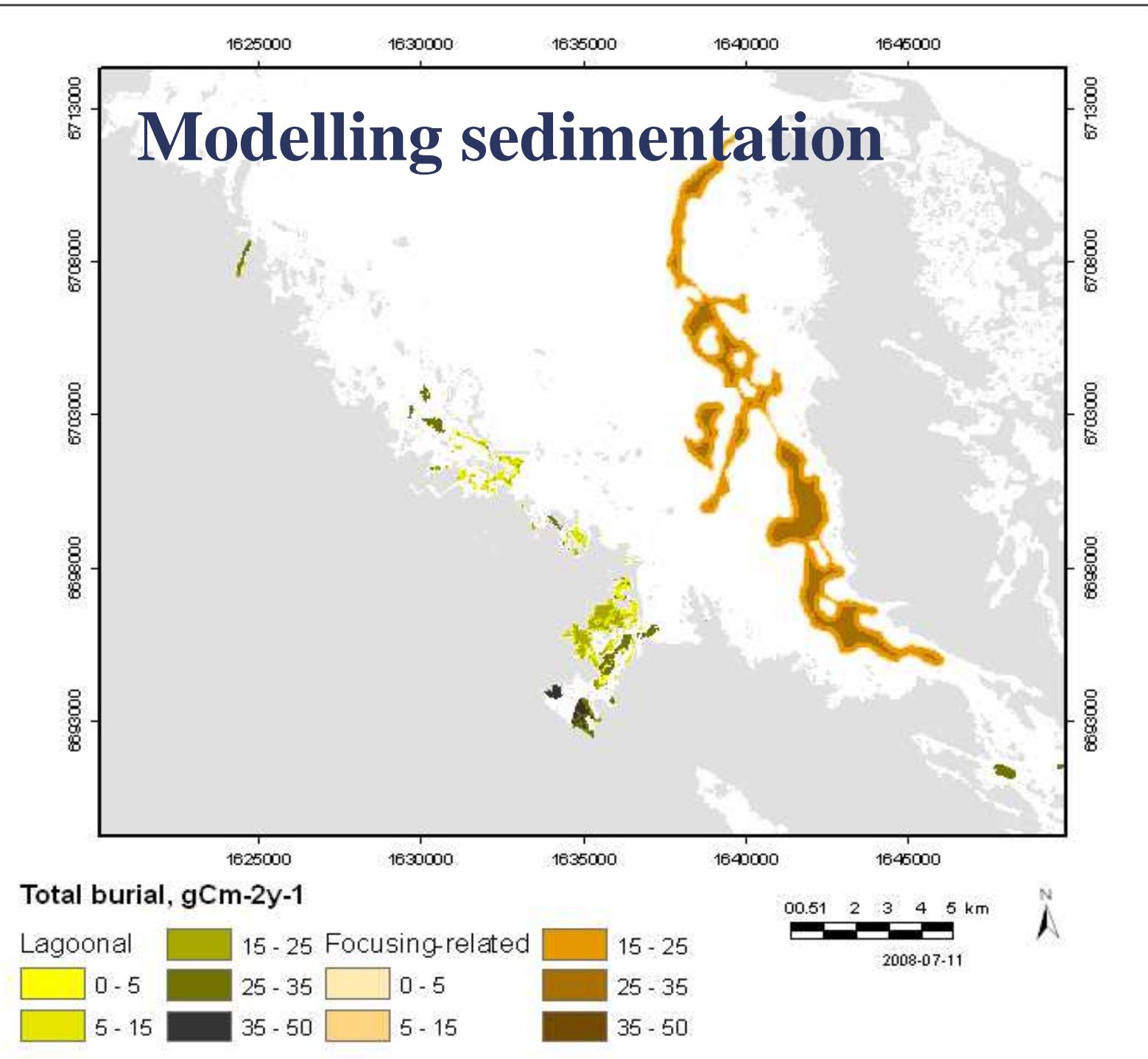
Mapping of life



Mapping of deposits

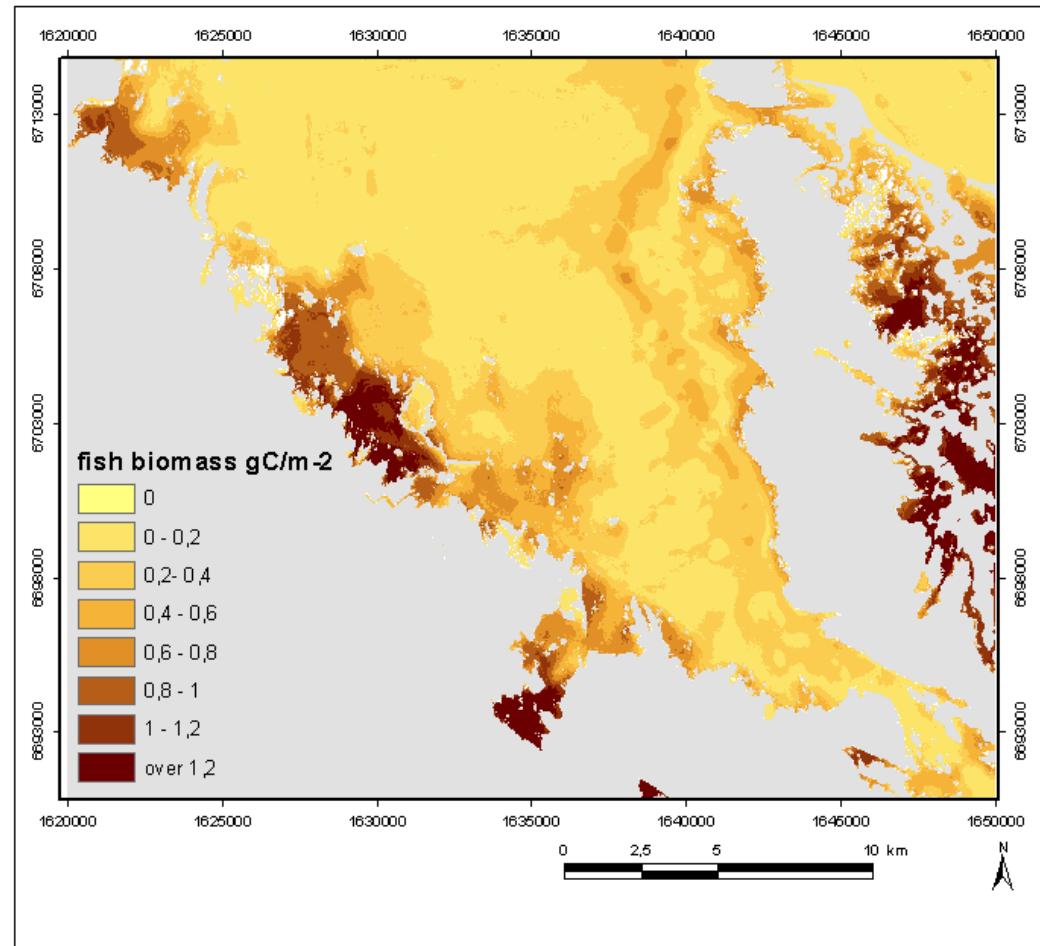


Modelling sedimentation

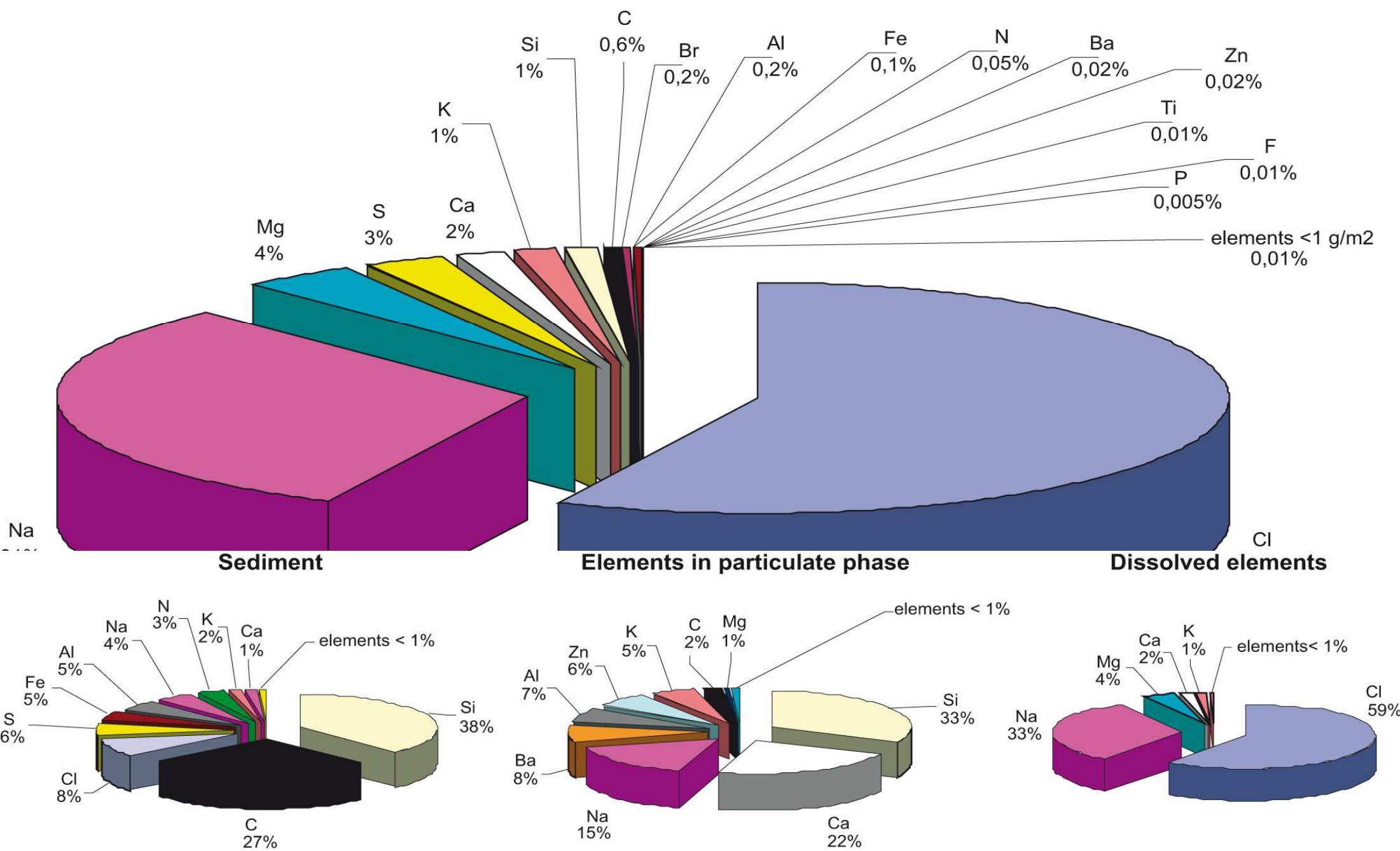


General description - fish

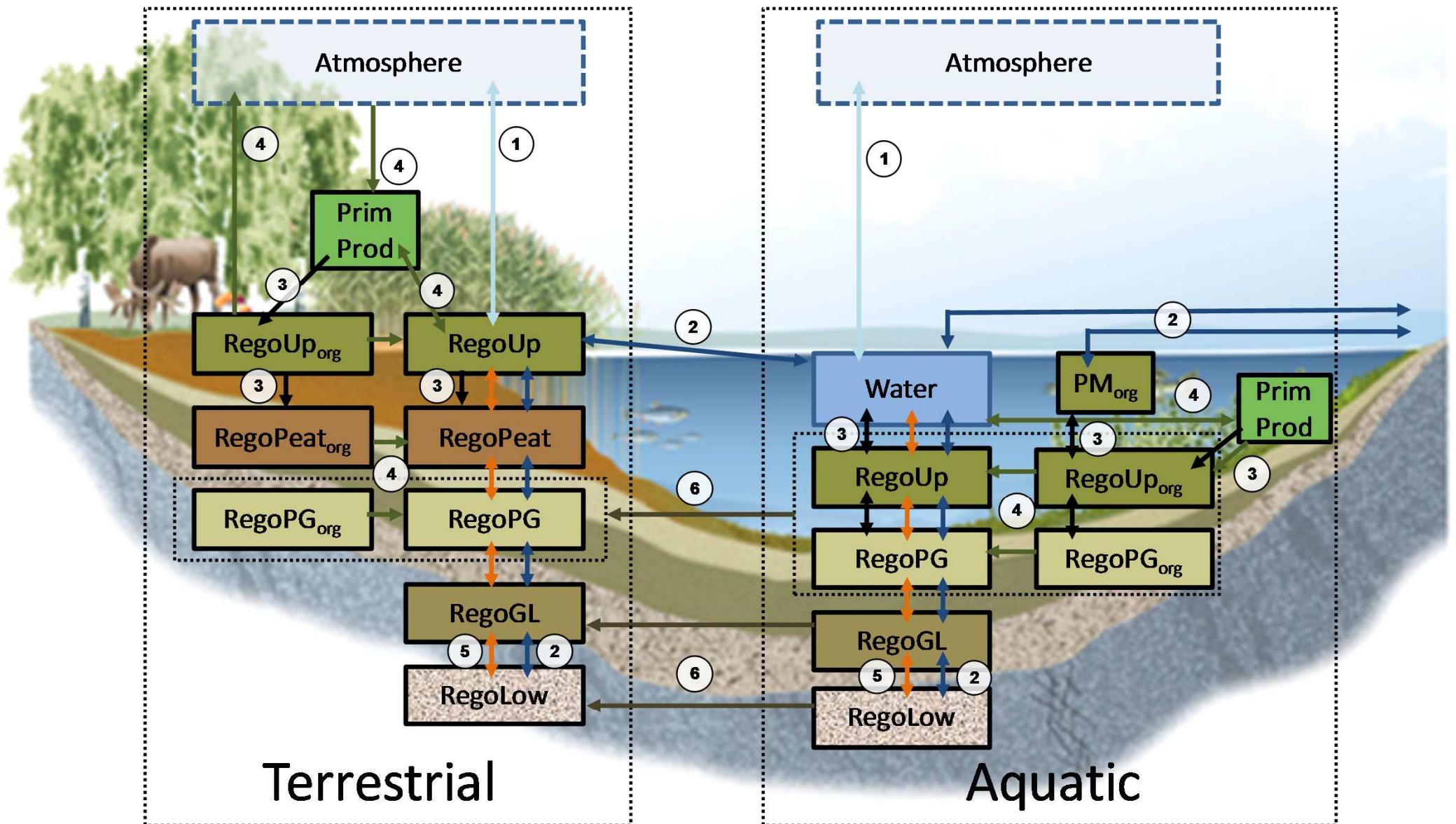
- Coastal fish community, Herring and sprat dominates (60-70 kg/ha)
- Inner bays, perch, roach and white bream dominates



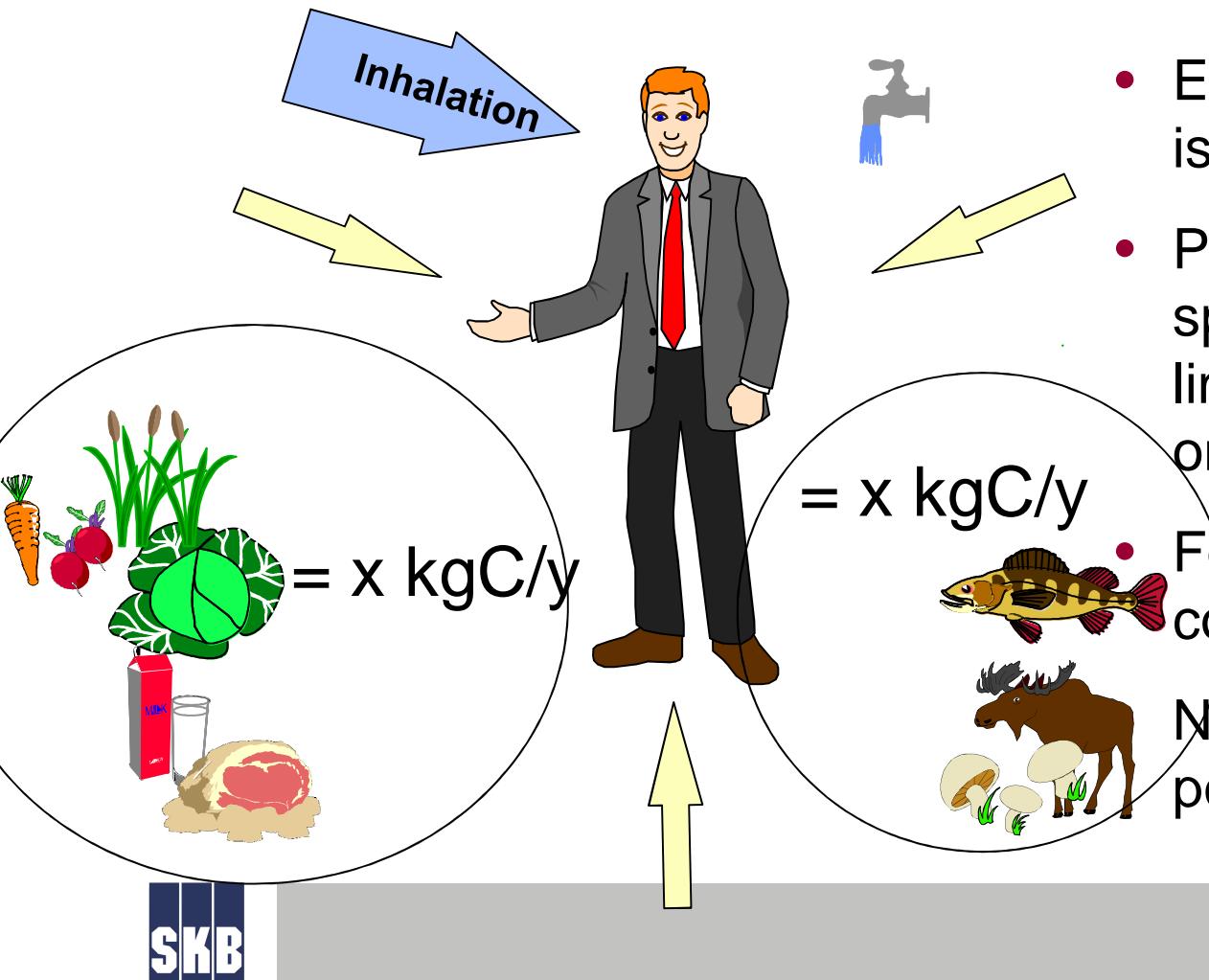
Chemical composition (e.g. ICP-MS, AS)



Biosphere model extended for C-14

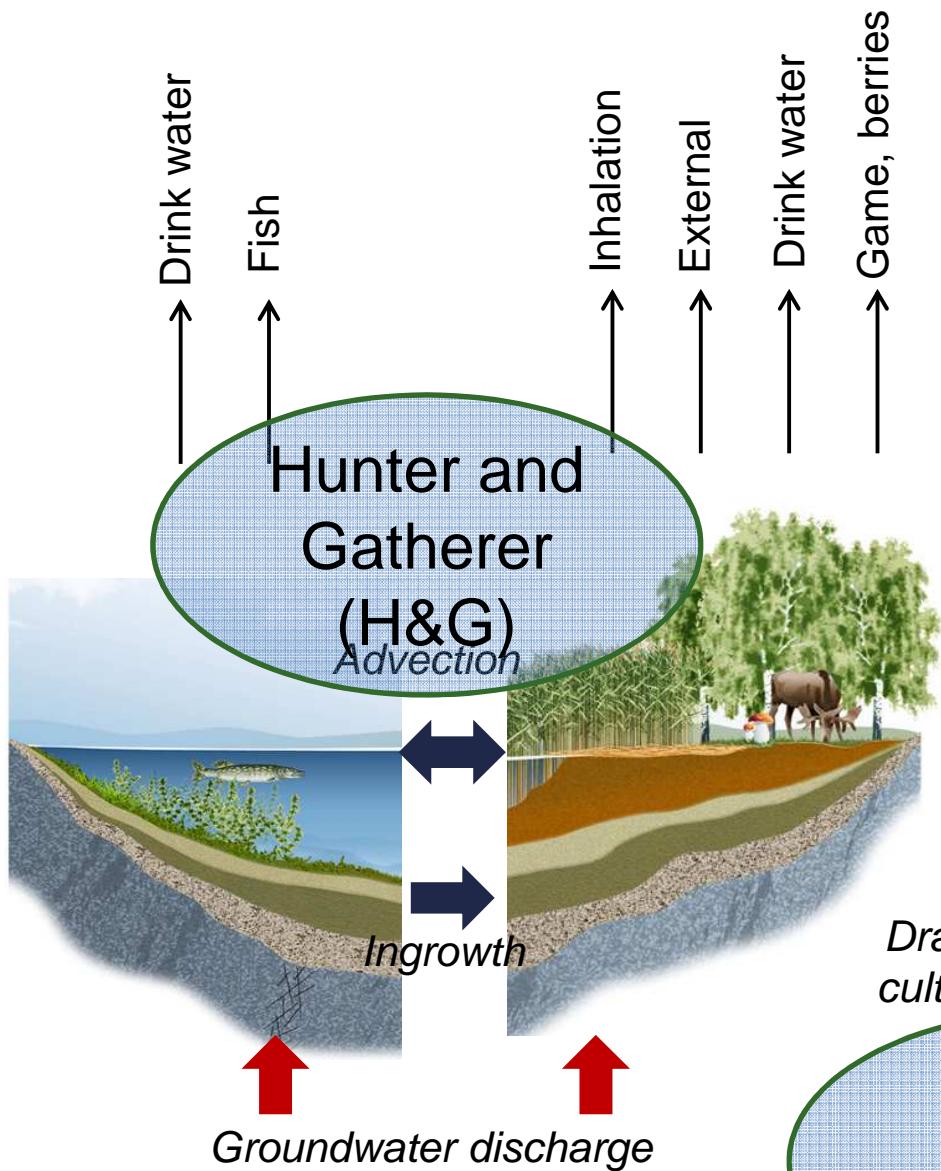


Human exposure in Sr-Site

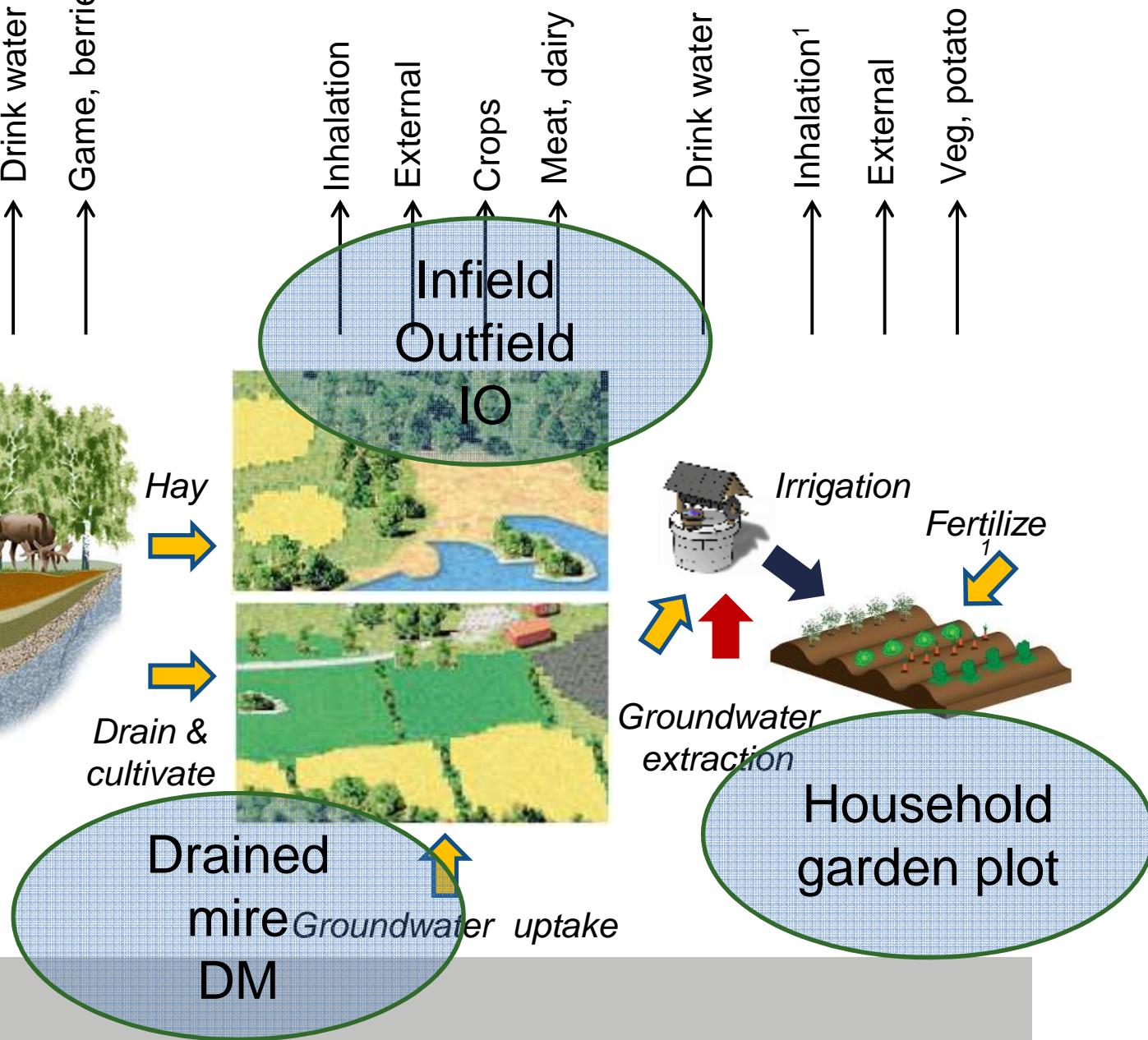


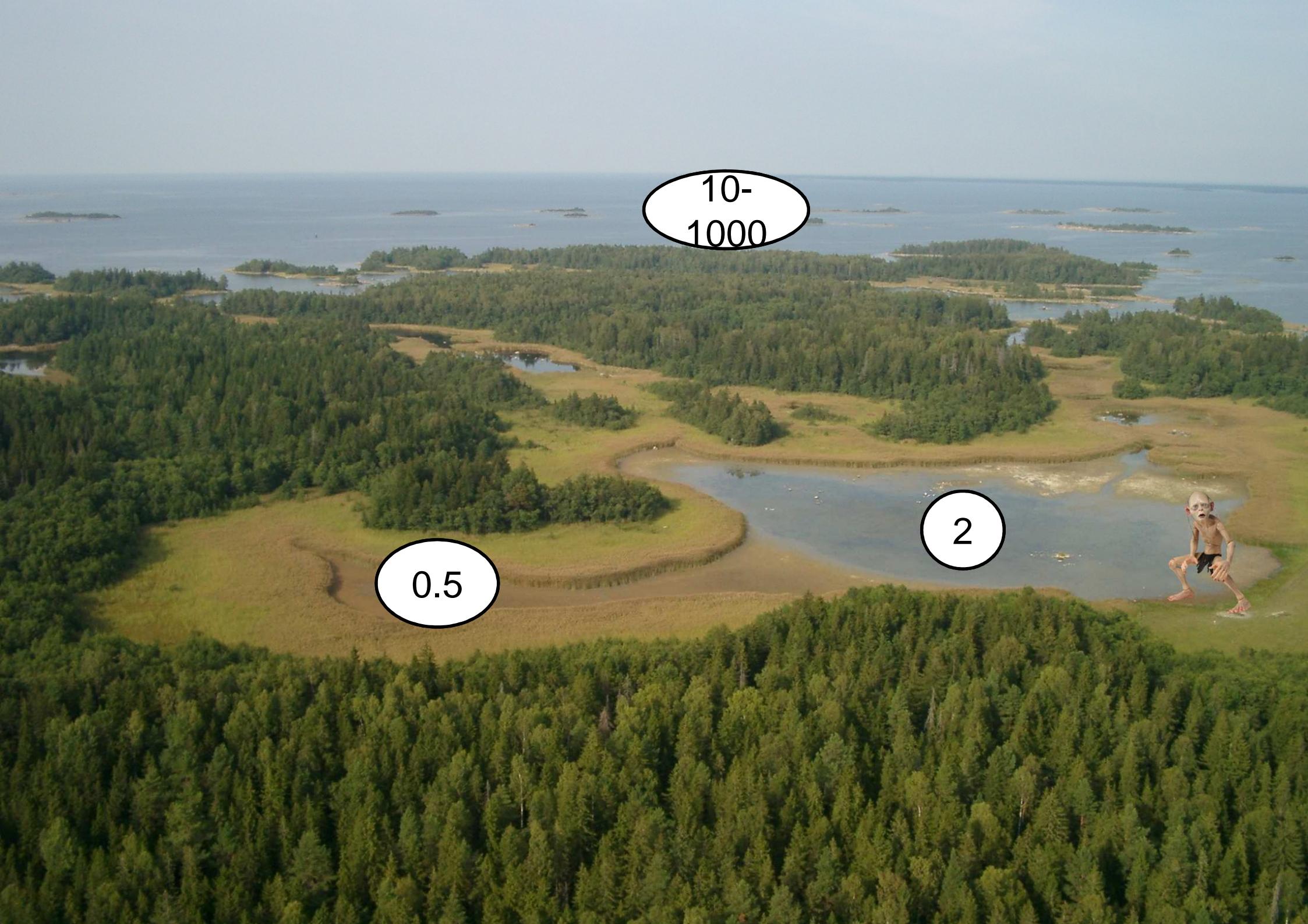
- Intake totally 110kgC/y
- Everything edible in the object is used
- Production of food (kgC) is spatially constrained → a limited population can be feed on the space
- Food intake and population is connected and thus exposure
- Not necessary to count potatoes and carrots

Natural ecosystems



Agricultural ecosystems





0.5

10-
1000

2

Forsmark variant with farmlands 5000 AD

10-
1000

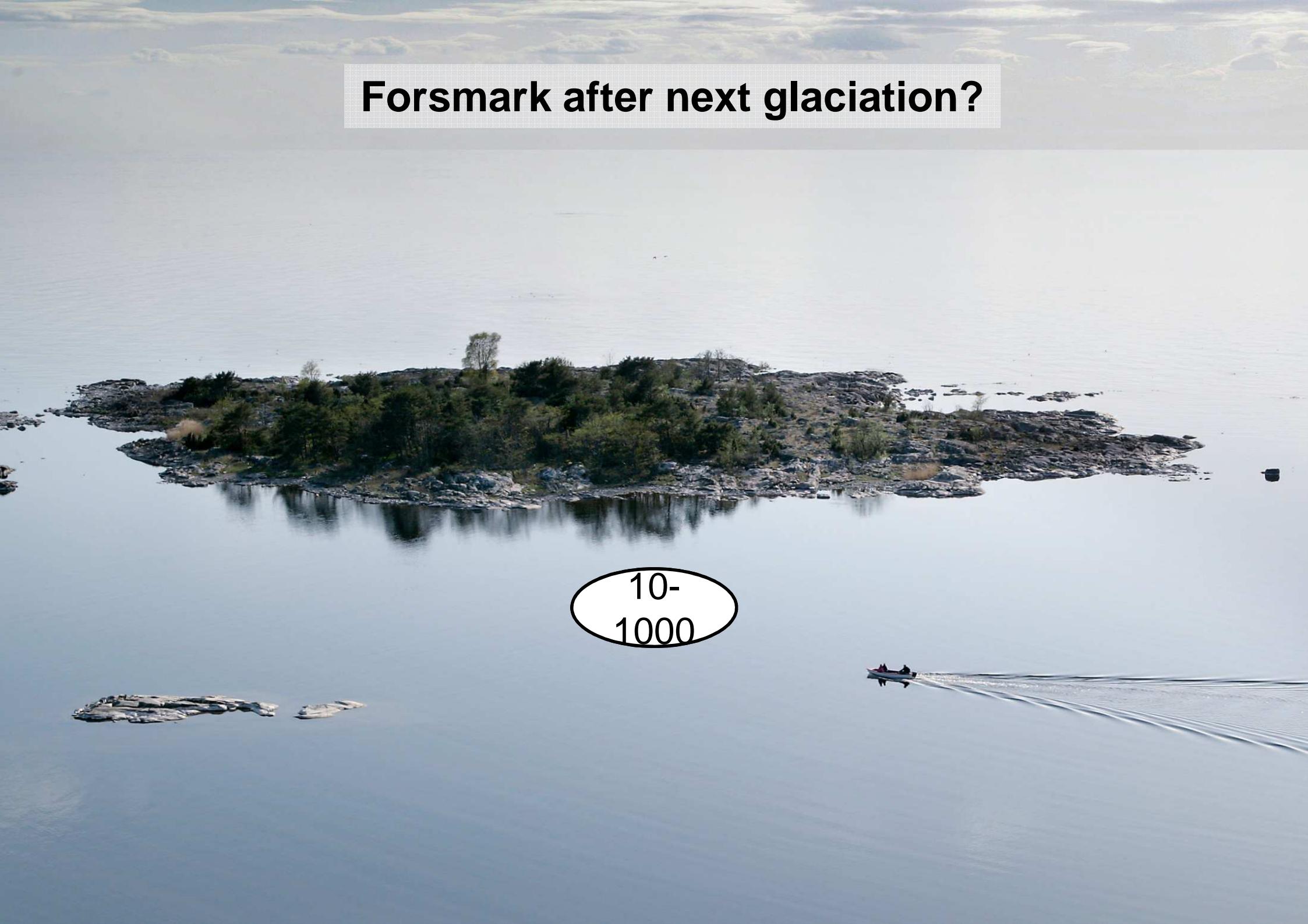
80

5

Forsmark variant with no farmlands 20,000 AD



Forsmark after next glaciation?



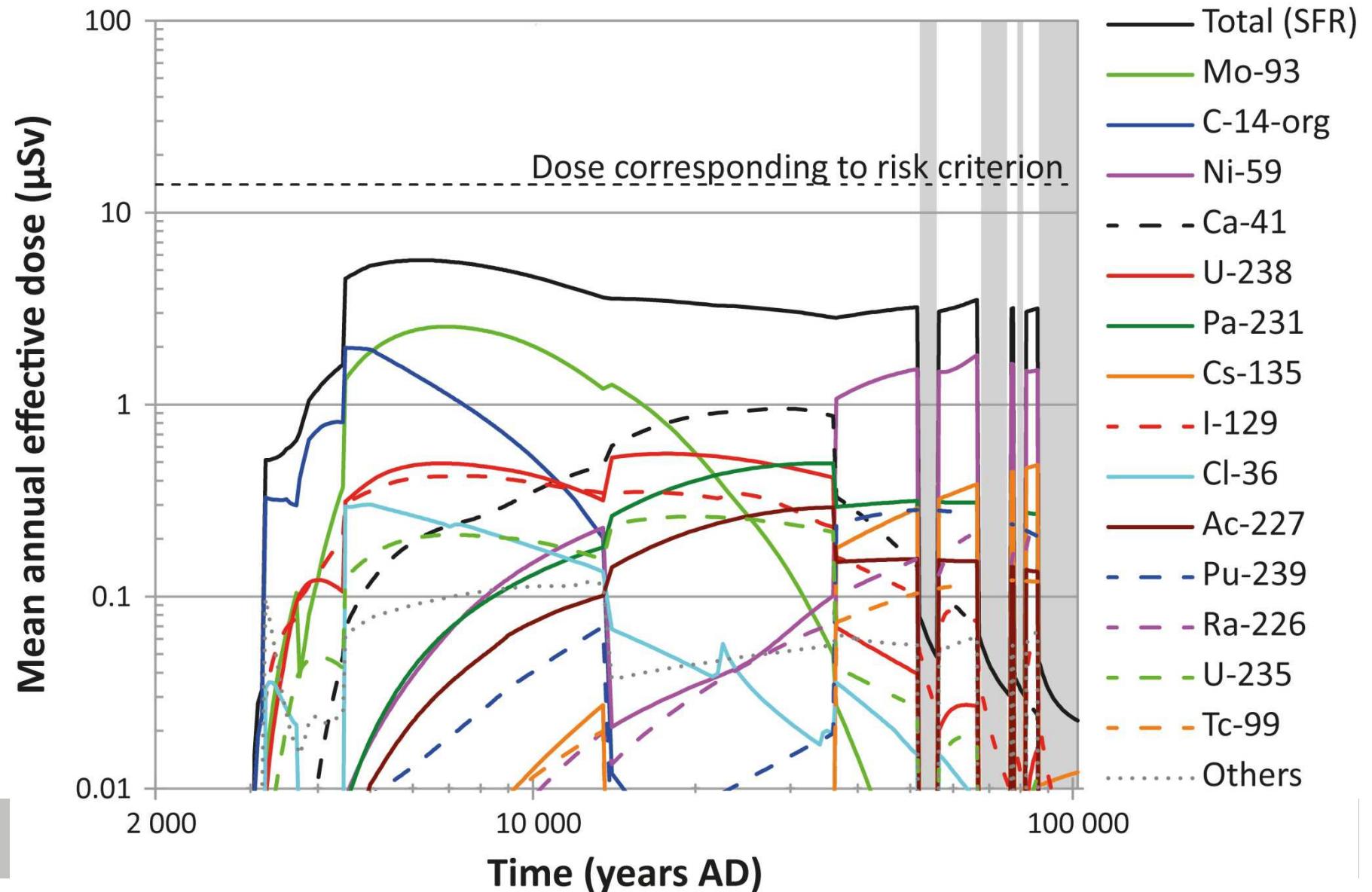
10-
1000

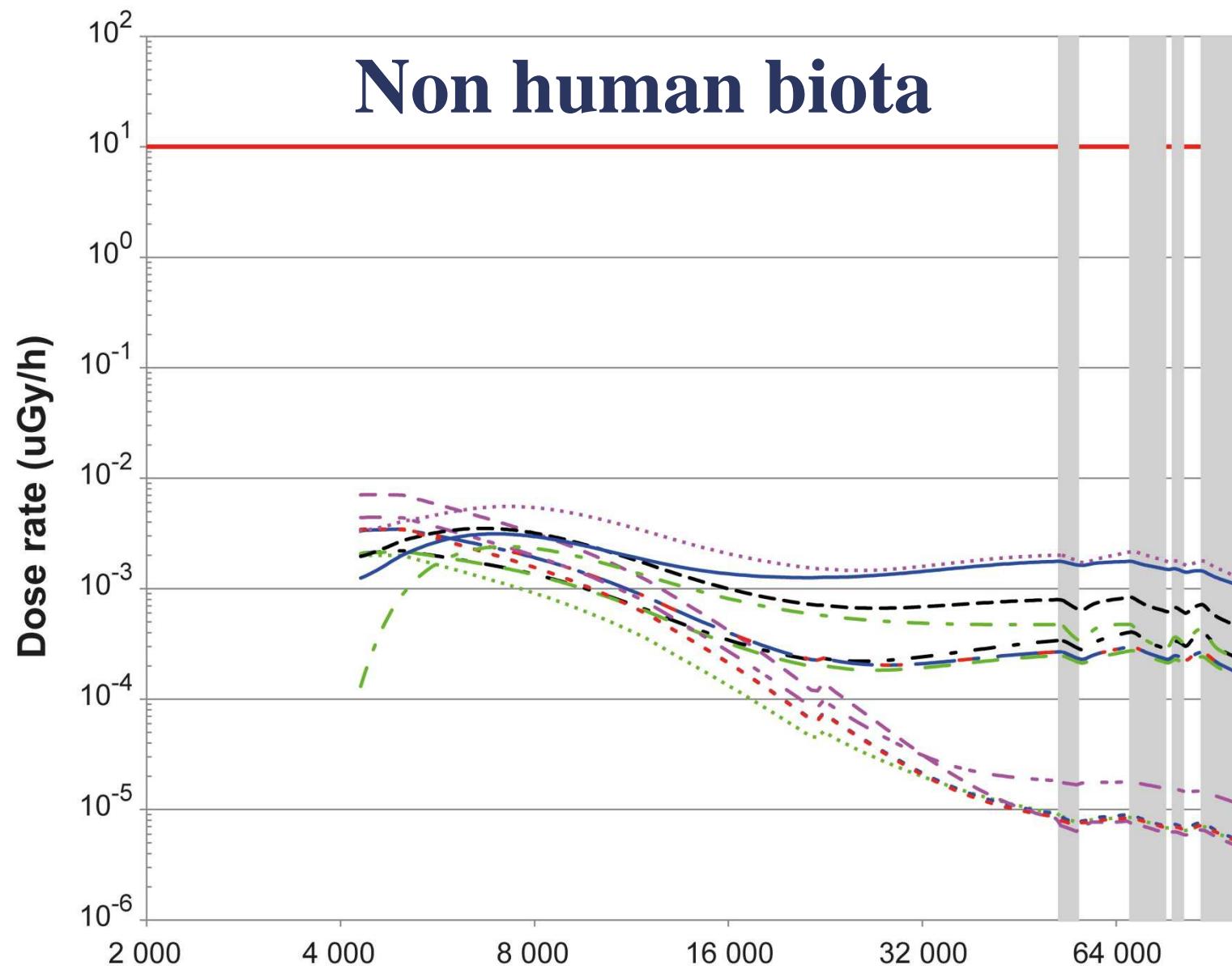


...or during next glaciation?



Results from LLW (SFR)





Summary

- A ecosystem focused assessment
 - Natural productivity
 - Constrained in space
 - Nutritional demand
 - Population constraint
 - Habitat constraints
 - Non human biota
 - Other environmental hazards
- Site specific data
 - Reduced variability
 - Realistic combination of data
- Shore line displacement driver
 - Geometry the major factor
- Next step to use element concentration modelling for radionuclide uptake
- Report at www.skb.se

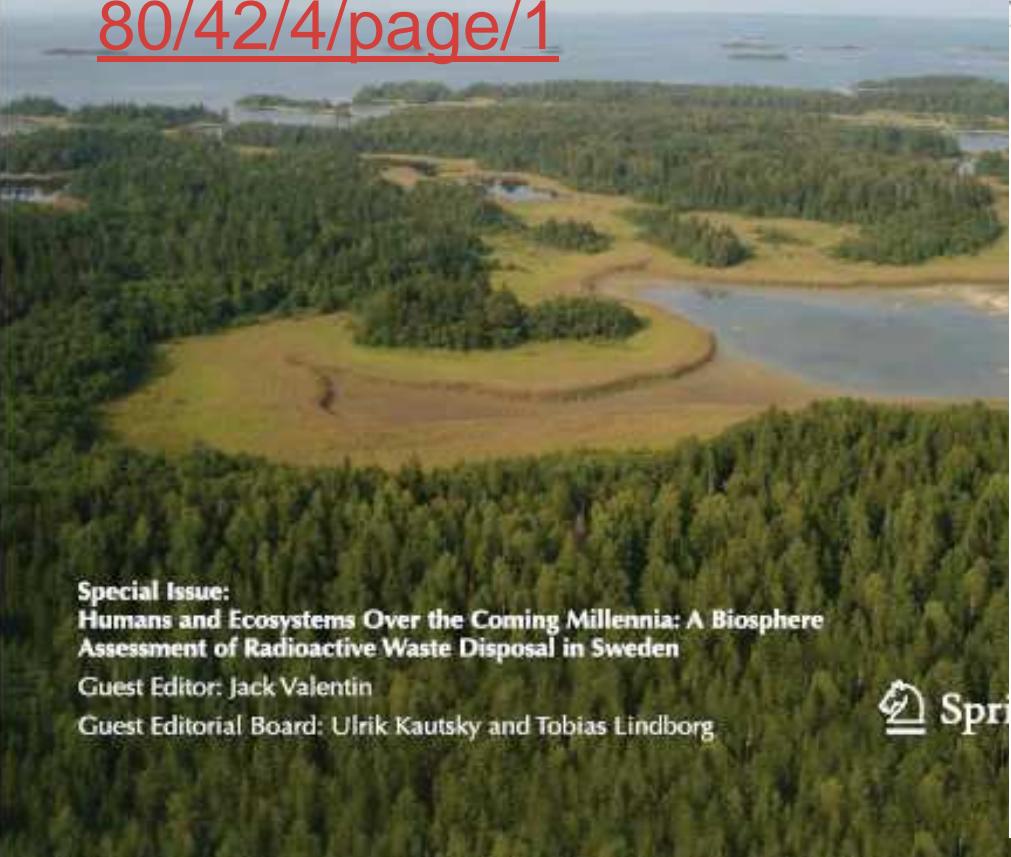
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The impact of low and intermediate-level radioactive waste on humans and the environment over the next one hundred thousand years

Ulrik Kautsky   , Peter Saetre, Sten Berglund¹, Ben Jaeschke, Sara Nordén, Jenny Brandefelt, Sven Keesmann, Jens-Ove Näslund, Eva Andersson

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