

Multi-element analyses for estimation of concentration ratios with site specific chemistry data from two sites in southern Sweden



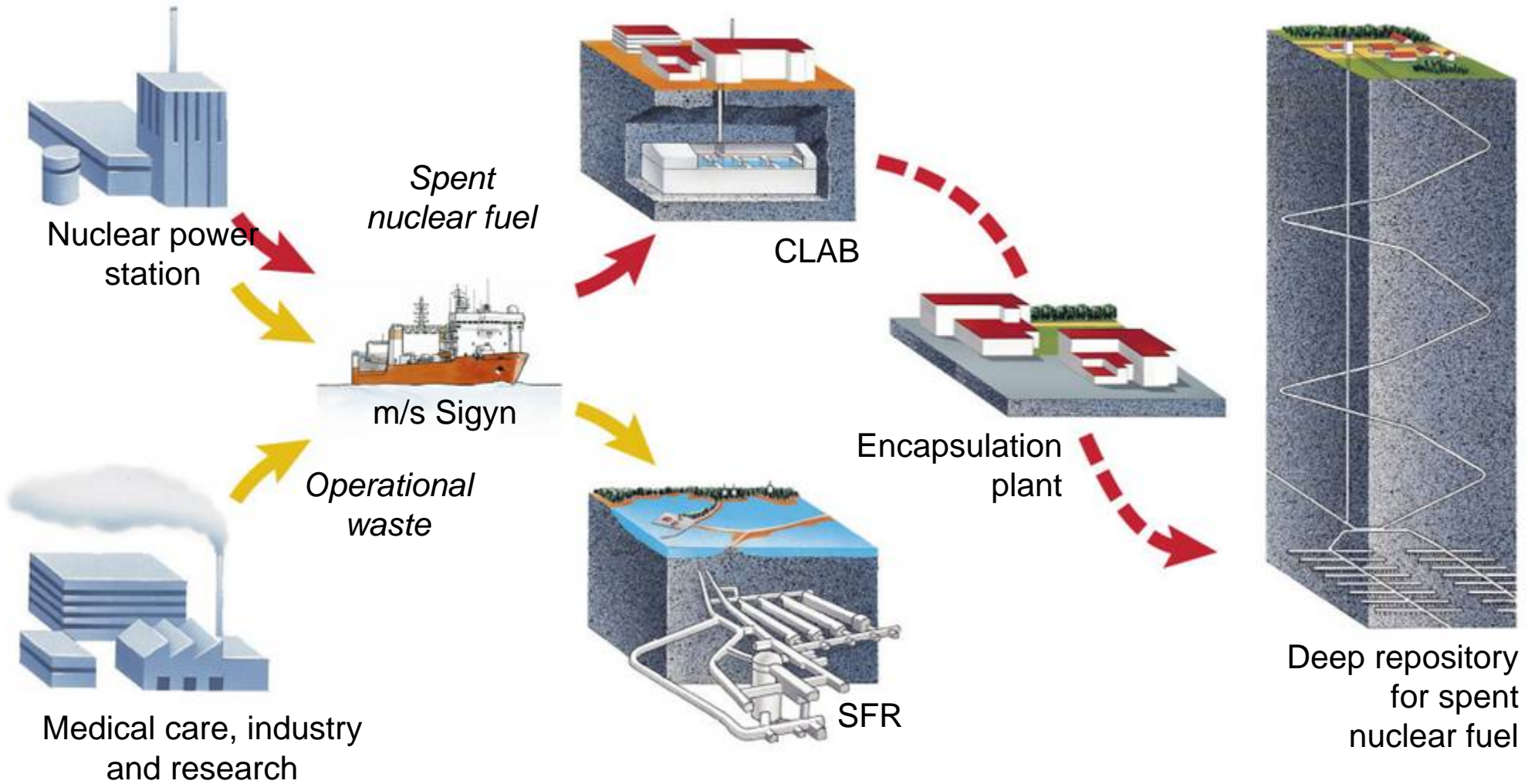
Svensk Kärnbränslehantering AB

Sara Nordén

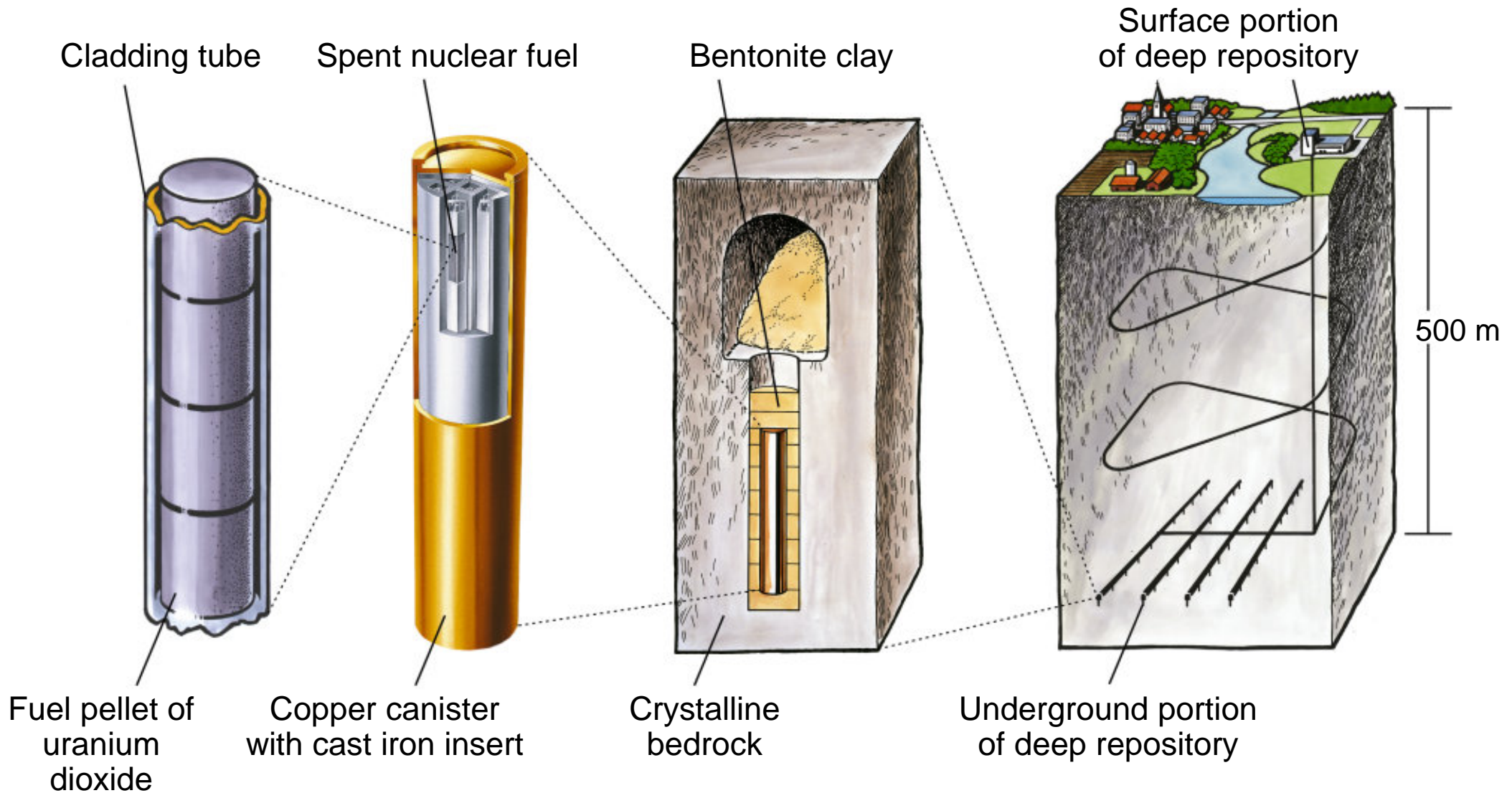
SKB

- Company owned by Swedish Nuclear power producers
- Plan for and take care of the Swedish radioactive waste

The Swedish system

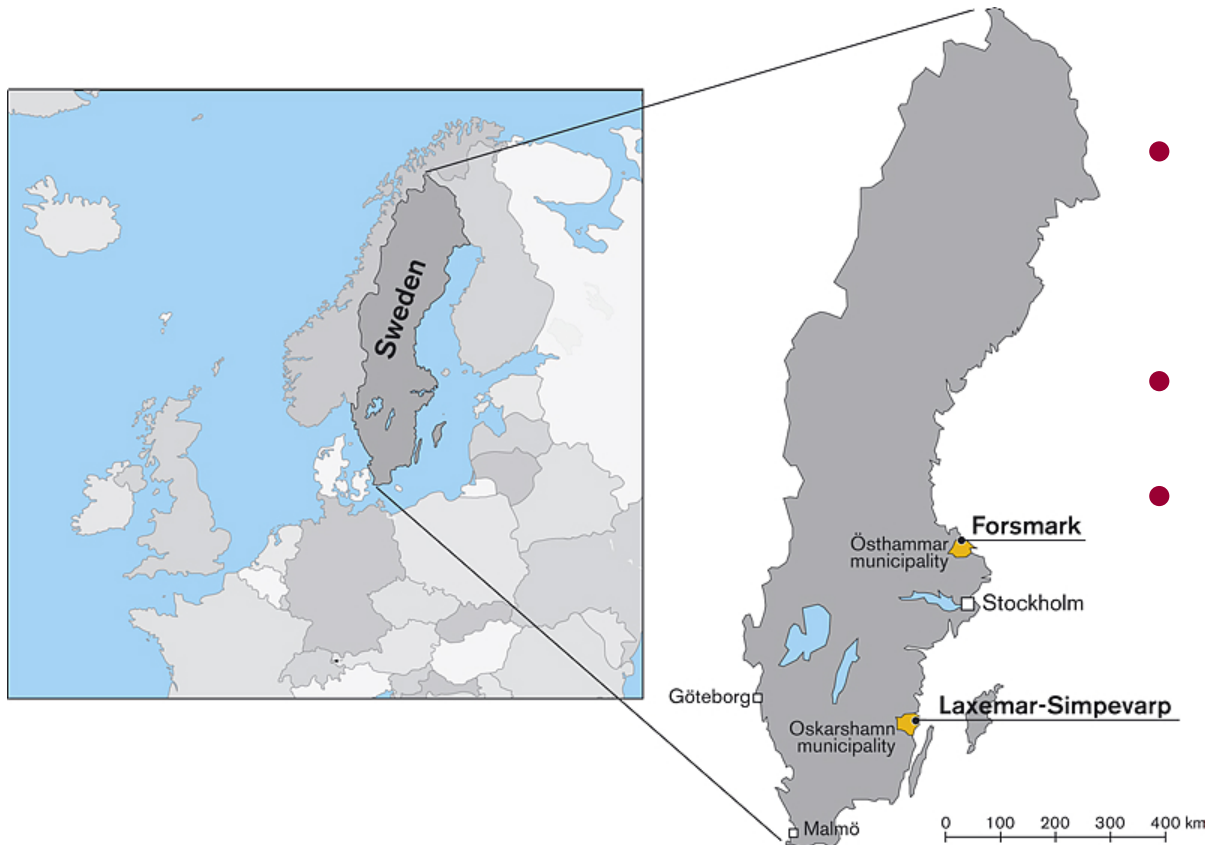


Safety barriers



SKB application for a spent nuclear fuel repository

- Site investigations at two sites:
Forsmark and Laxemar-Simpevarp

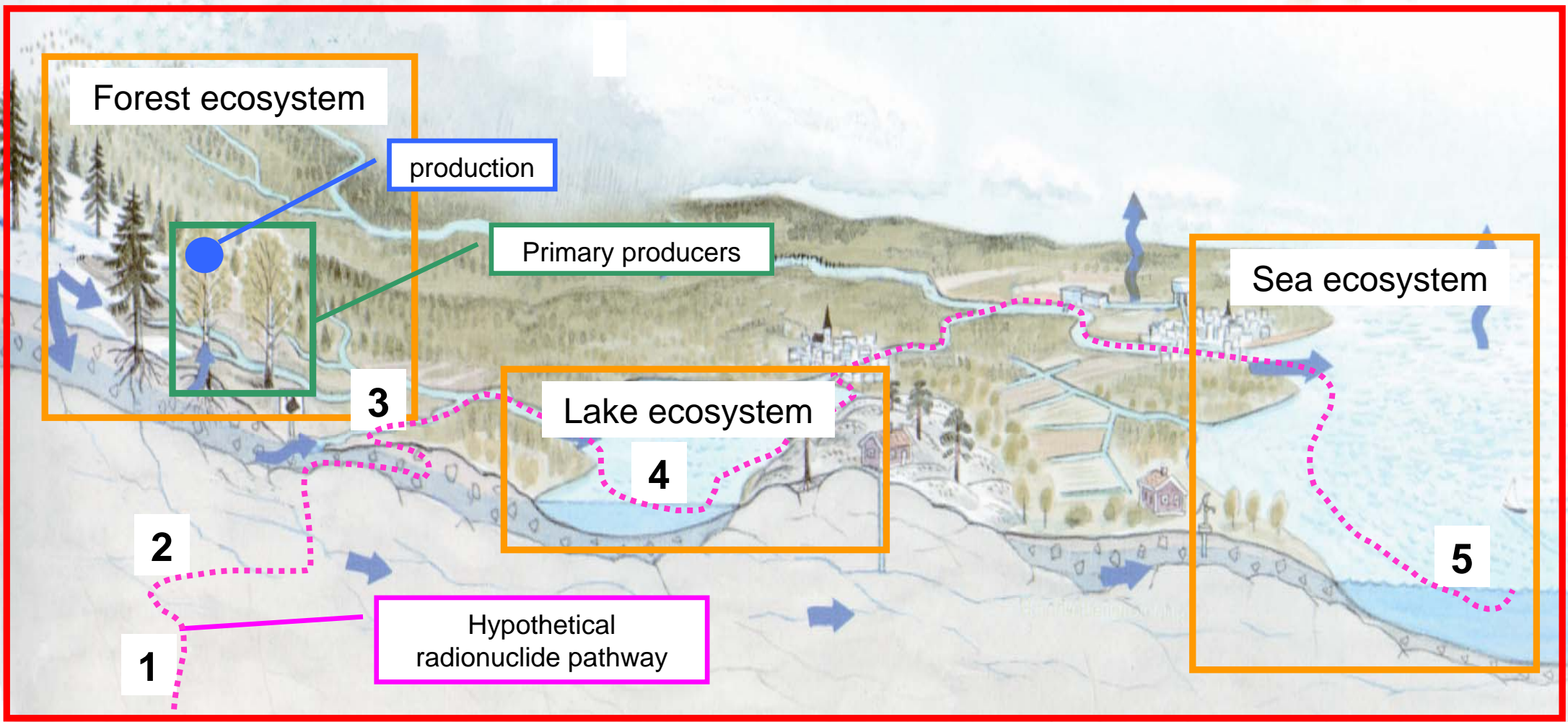


- Site investigations 2002-2008
bedrock and environment
- Modelling and description
- Site selection: June 2009
- Safety assessment (SR-Site):
Late 2010

- Linked ecosystems
- Ecosystems
- Ecosystem entities
- Property



Conceptual model of linked ecosystems



Risk assessment

1. Dispersion part of model

- Transport with ground/surface water
- Sorption and uptake processes: often modelled with Concentration Ratios (CR)

2. Dose calculations

- Concentrations in different media from the dispersion part
- Assumptions of consumption rates and exposure times

Element specific concentration ratios

Aquatic environments

- Conc. in biota versus conc. in water

Terrestrial environments

- Conc. in biota versus conc. in soil or food

Sorption within deposits

- Conc. in solid phase versus conc. in porewater

Sorption in water

- Conc. in suspended matter versus conc. in filtered water

Element specific concentration ratios

Model parameters widely used in radioecology

”Summary of a number of different processes”

Huge ranges in literature; advisable to use site specific data if available

Site specific data

Mainly total concentrations (ICP-MS) for c. 70 elements

Aquatic environments

- Water
- Suspended matter
- Sediment
- Primary producers:
phytoplankton, macroalgae,
macrophytes, microalgae
- Fish: planktivores, benthivores,
piscivores
- Mussels
- Crustaceans



Site specific data

Terrestrial environments

- Soil
- Porewater
- Vegetation:
trees, shrubs, herbs, mosses
- Animals:
rodents, large herbivores,
carnivores
- Mushrooms

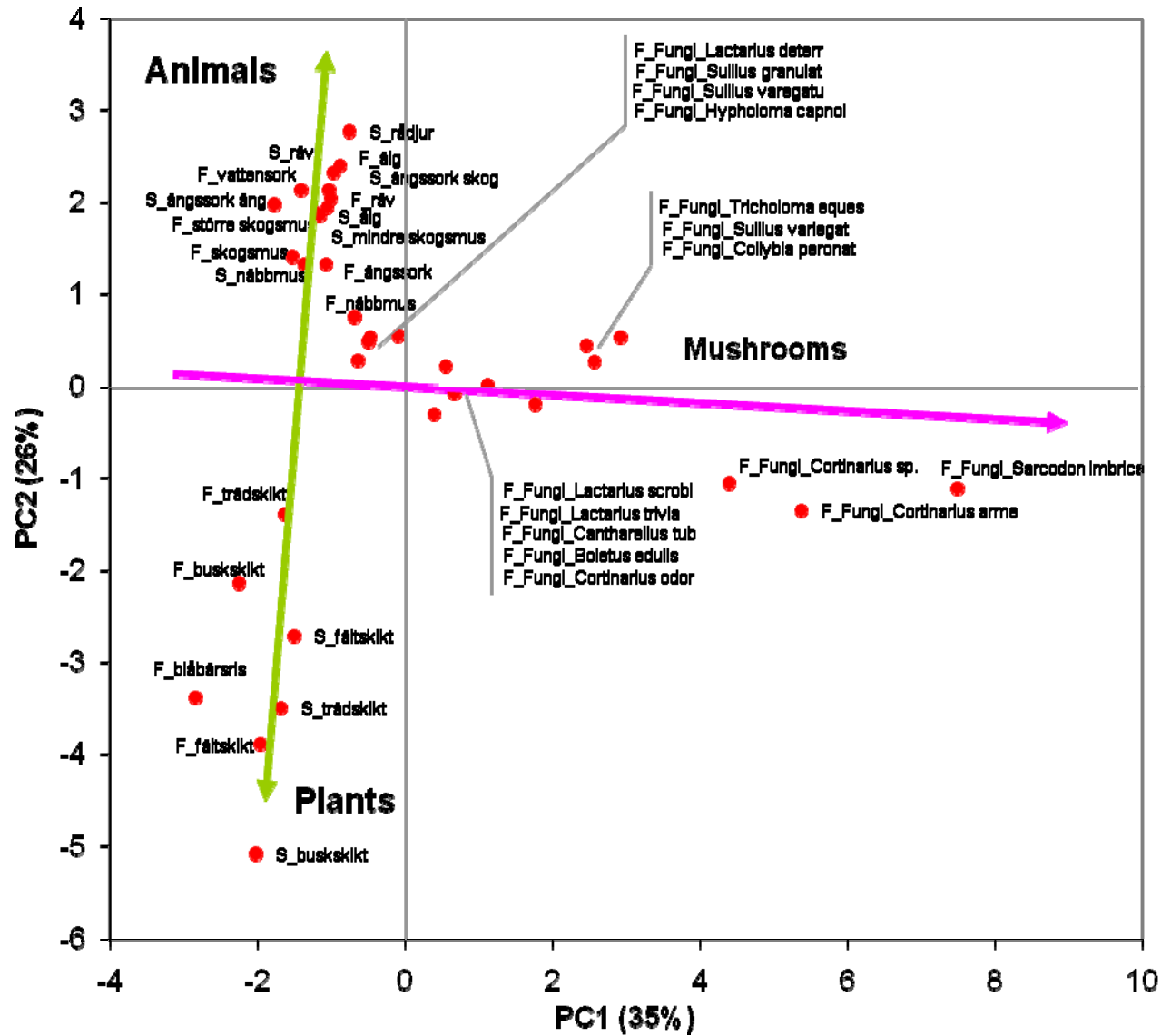


PCA analyses

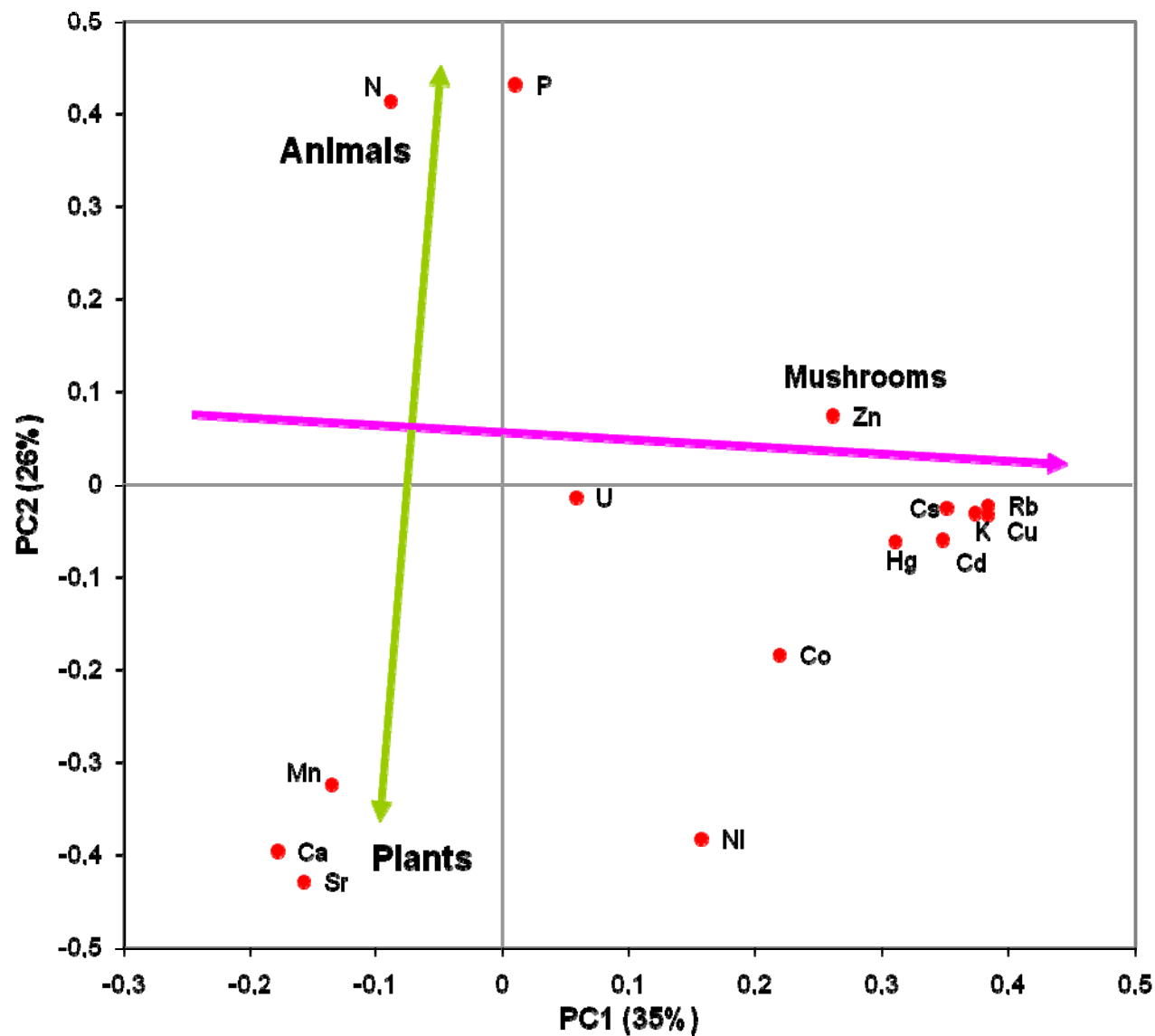
Screening of data as a basis for the selection of data when estimating CR:

- Location
- Biota types
- Ecosystems
- Elements

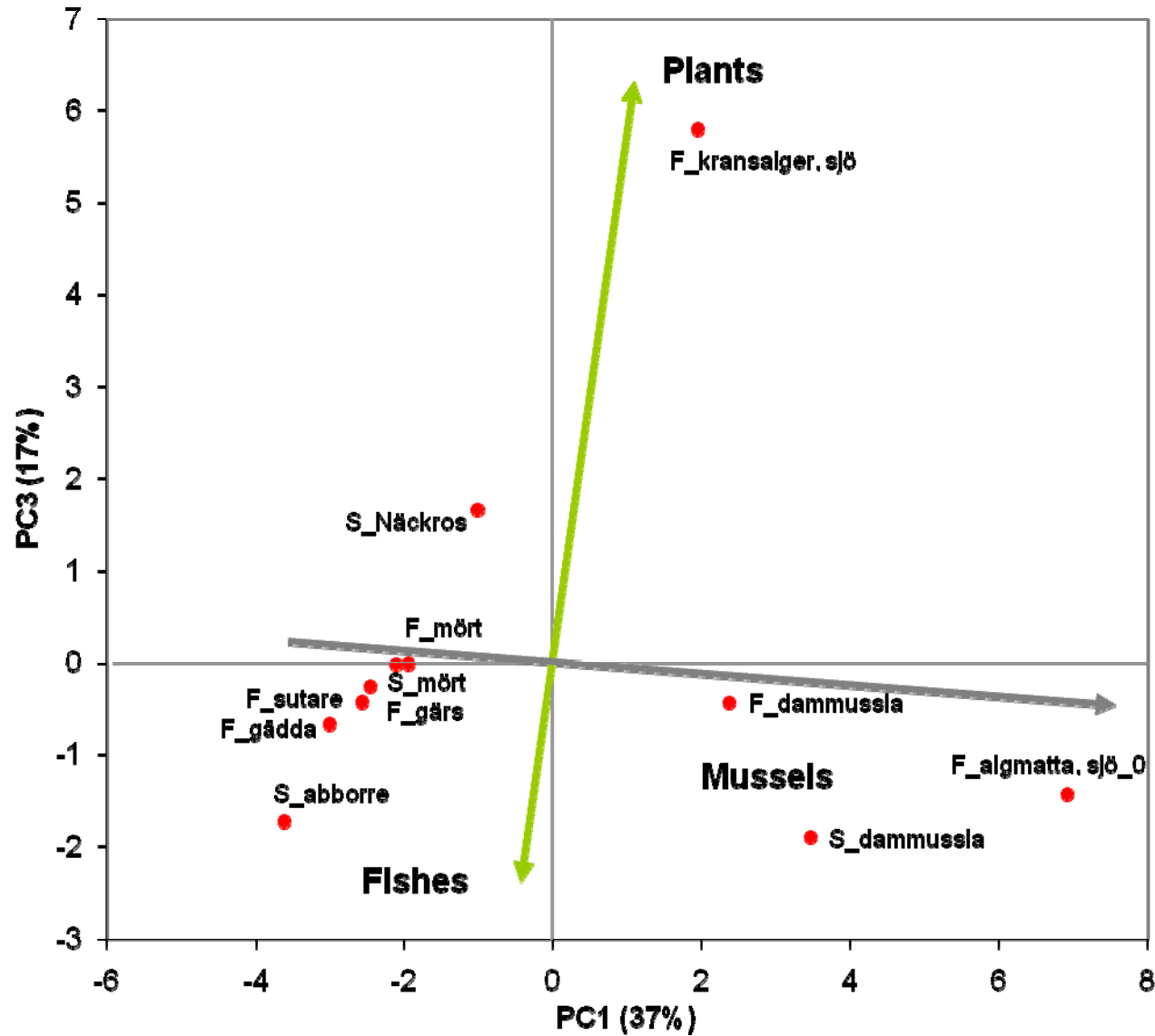
Terrestrial biota



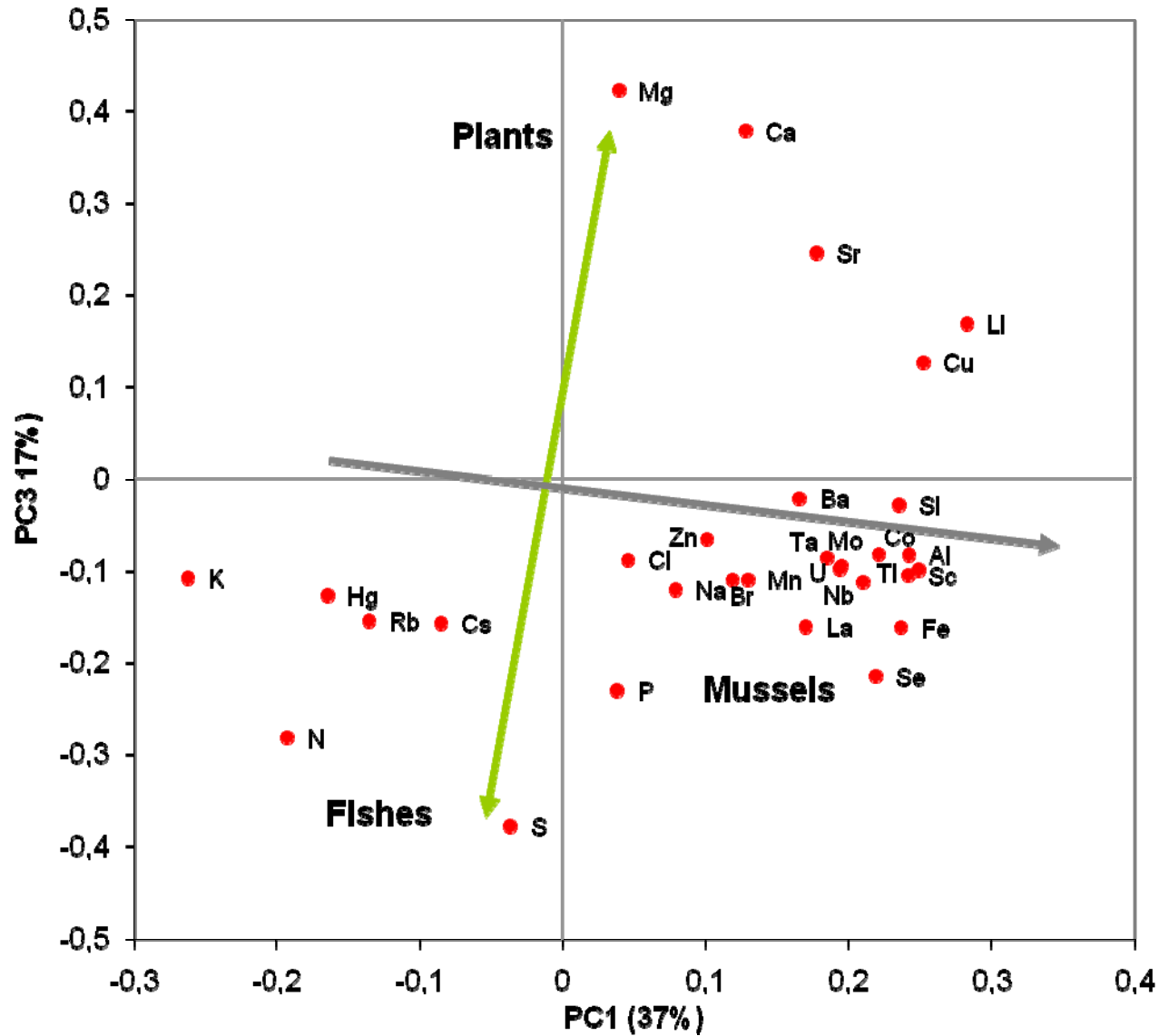
Terrestrial biota



Limnic biota



Limnic biota



Thank you for your attention!