Environmental Monitoring

Swedish Environmental Protection Agency

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Environmental Monitoring

WHAT is it and WHY is it important?

- A systematic approach of collecting, measuring and analysing environmental data in order to:
  - describe the state of the environment;
  - follow up changes and trends in the physical, chemical and biological environment;
  - identify threats to the environment;
  - provide data to be used as a basis for action;
  - monitor implementation and effects of action;
  - analyse environmental impact of various emission sources.

Environmental Monitoring

Monitoring data is produced and used at different levels:

- International level
  - EU directives requires data
  - Conventions requires data
    -Stockholm Convention
    -Convention on Long-range Trans boundary Air Pollution (CLRTAP)
- National level
  Swedish EPA and Sectorial Authorities are responsible
- Regional level
  County Administration Boards are responsible

The Swedish Coordinated Environmental Monitoring Programme

- No laboratory at the agency
- Consultants (commercial labs)
- Collaborations with researchers at universities
- Design and coordinate the monitoring programmes
- Collect and publish data
- Inform about results
- Environmental statistics (e.g. time trends)
- Evaluation
- Quality assurance, guidelines, investigation methods
- Working methods used in monitoring is carefully decided and documented

The Swedish Coordinated Environmental Monitoring Programme

- Air
- Landscape
- Mountains
- Forests
- Wetlands
- Agriculture
- Freshwater (National Water Authority & EPA)
- Sea & Coastal areas (National Water Authority & EPA)
- Health related environmental monitoring
- Toxic substances coordination:

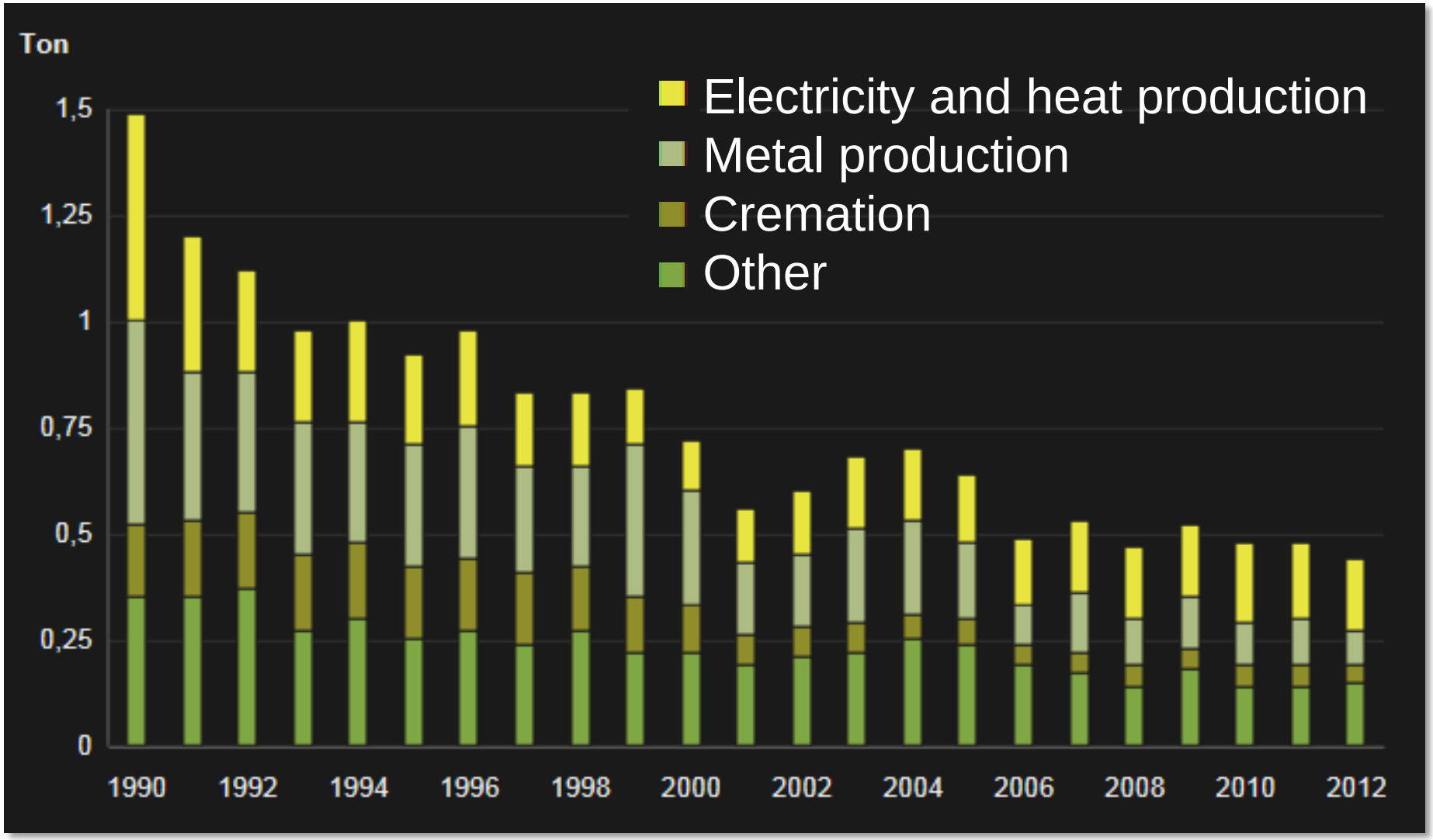
  - screening
  - environmental specimen bank
  - hazardous substances in urban environment

Environmental Specimen Bank

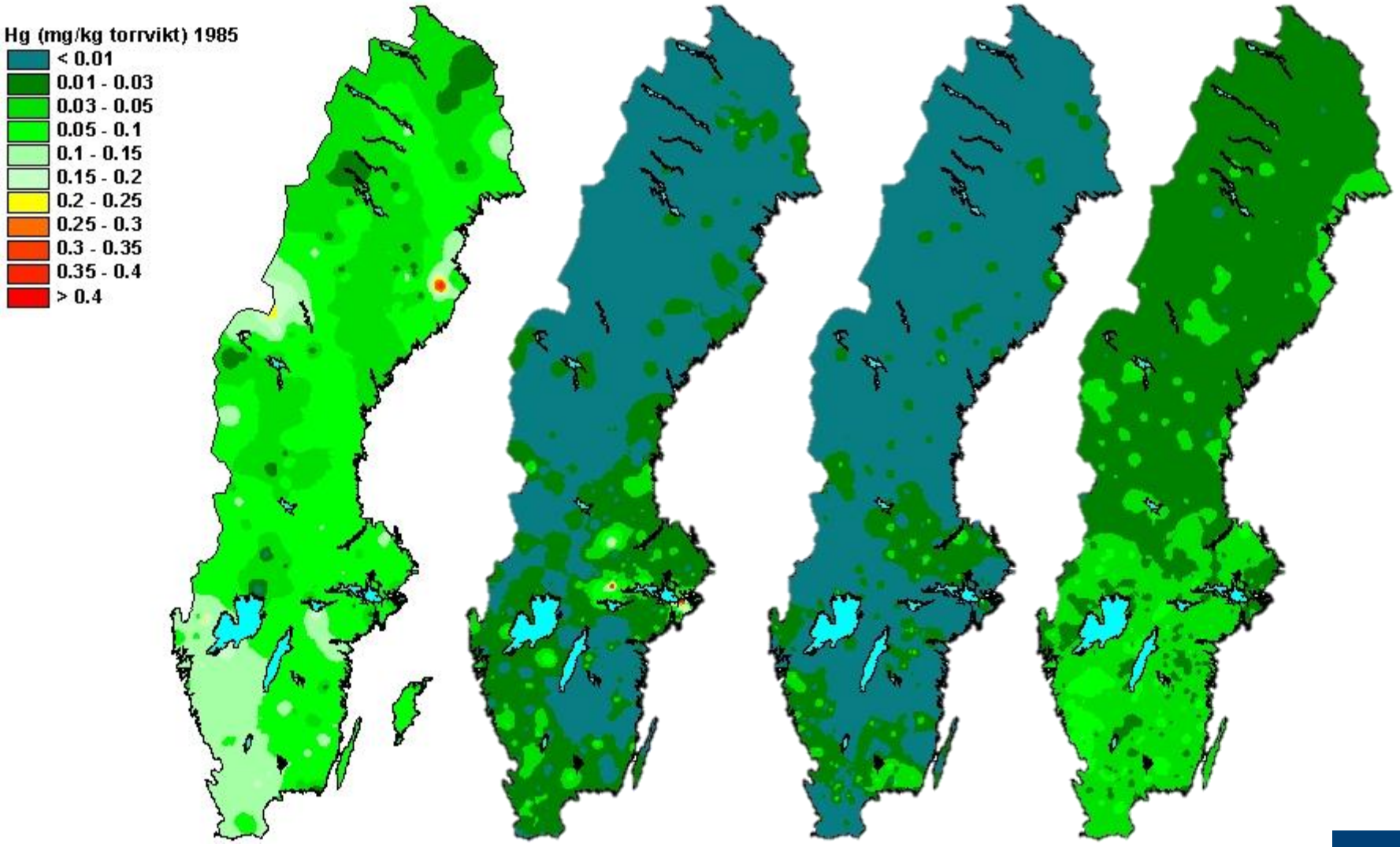
- Samples from more than 290 000 organisms.
- Mostly animal samples but also plants.
- Most of the samples are kept in freezers (-30°C and -80°C).
- The oldest material dates back to the 1960's.

NATUR VÅRDS VERKET

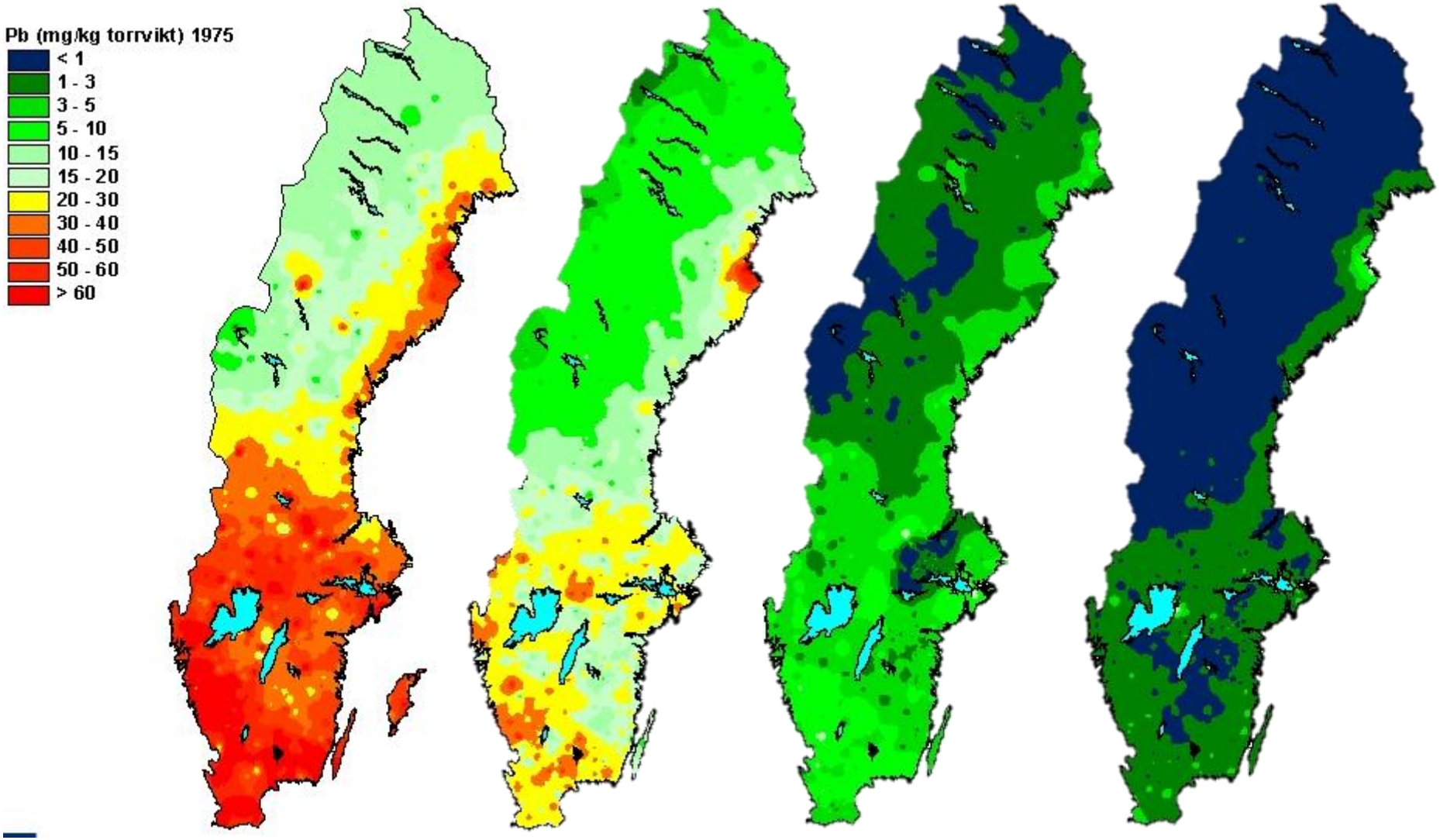
Mercury release to air in Sweden



Mercury in moss

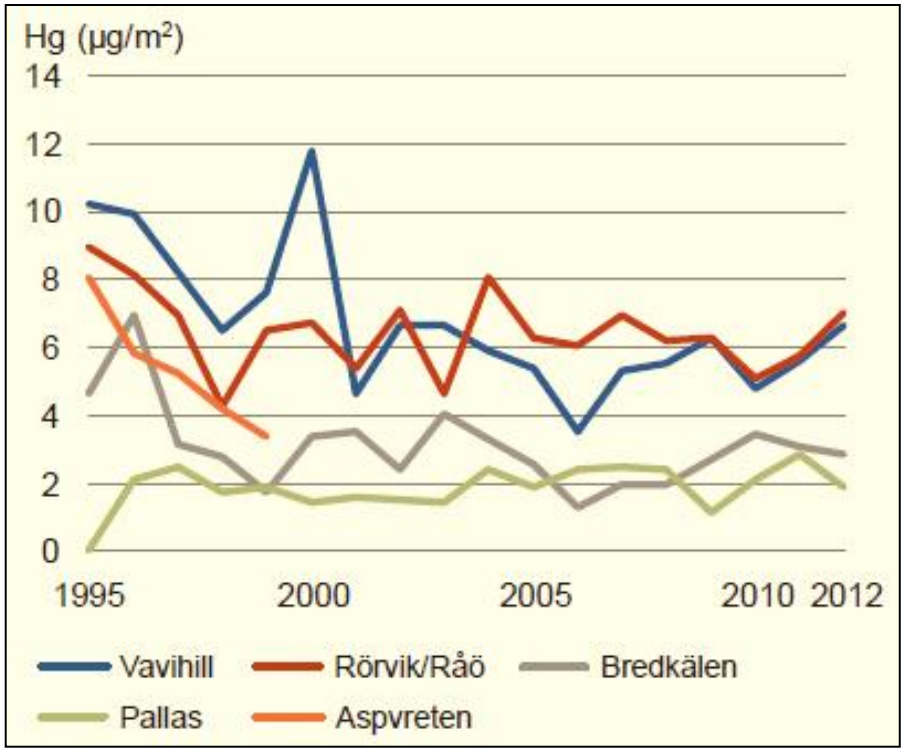


Lead in moss

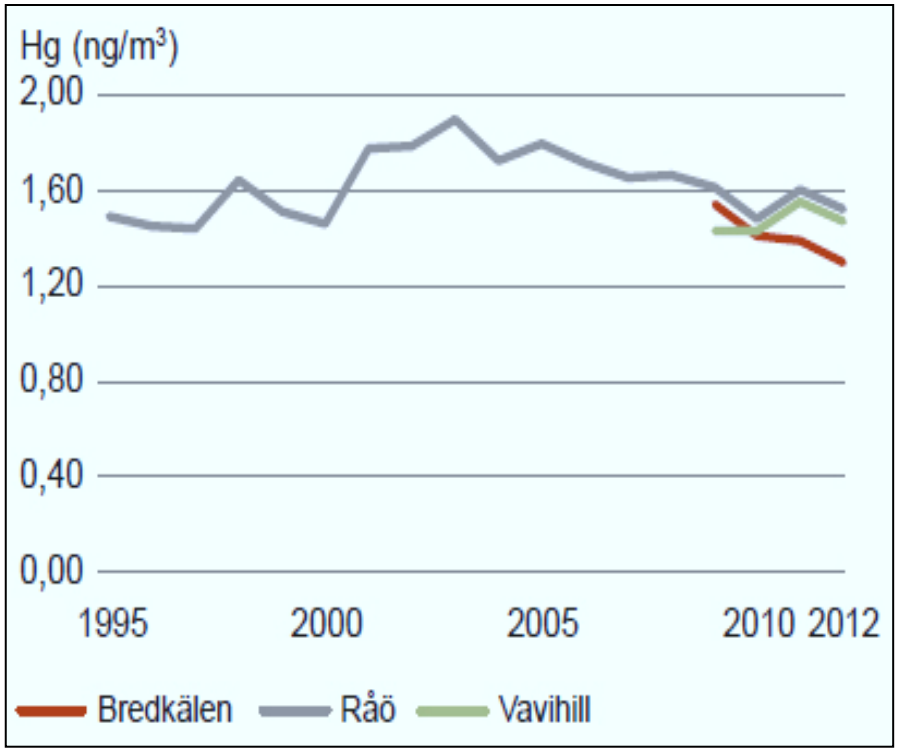

Pb (mg/kg torrvikt) 1975
< 1
1 - 3
3 - 5
5 - 10
10 - 15
15 - 20
20 - 30
30 - 40
40 - 50
50 - 60
> 60
1975
1985
2000
2010

Mercury deposition and concentration in air

Annual deposition of Hg

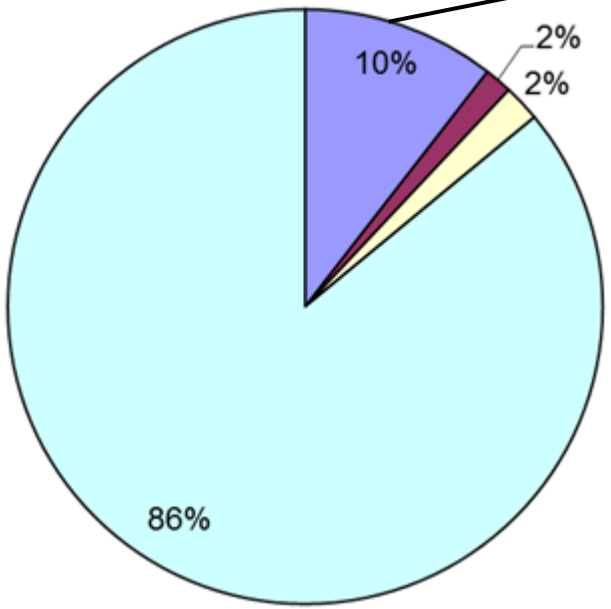


Total gaseous Hg in air

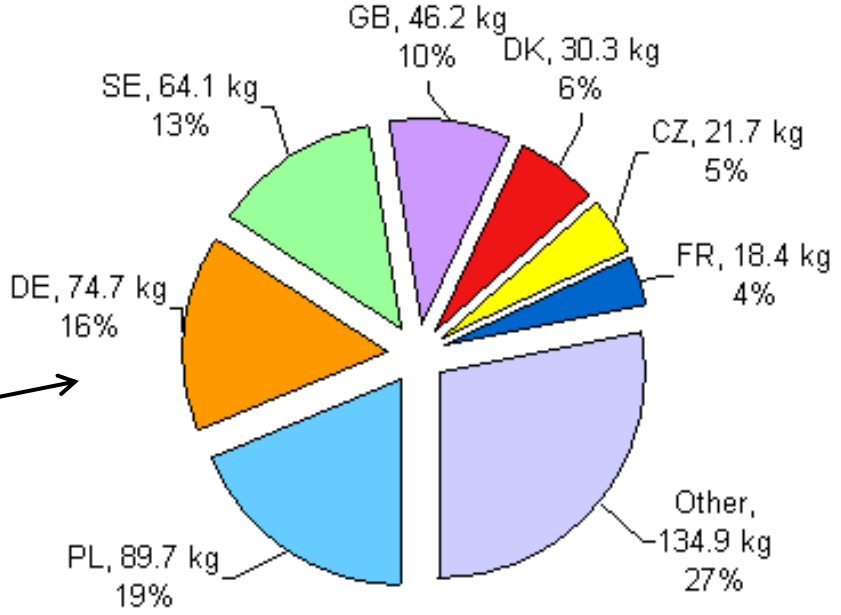


Mercury deposition to Sweden from other countries

4 tonnes

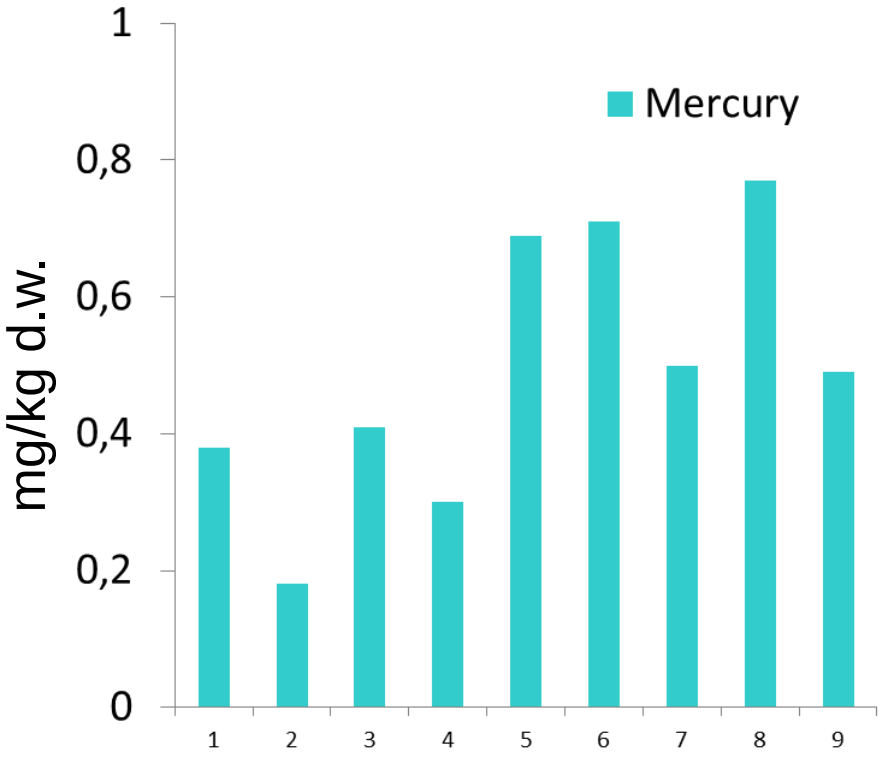


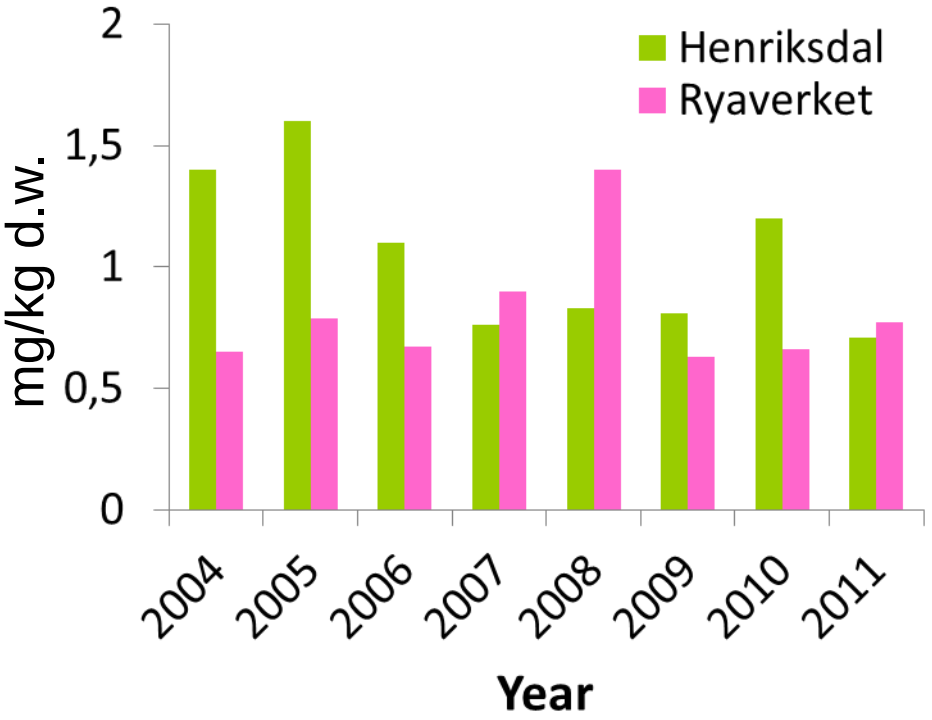
Europe



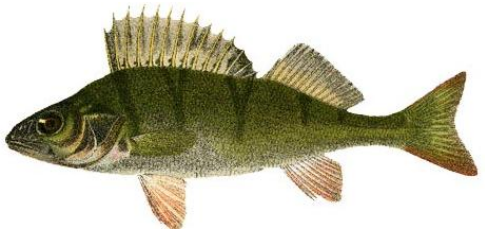
- European sources
- Sweden
- Natural sources and re-suspended
- Global sources

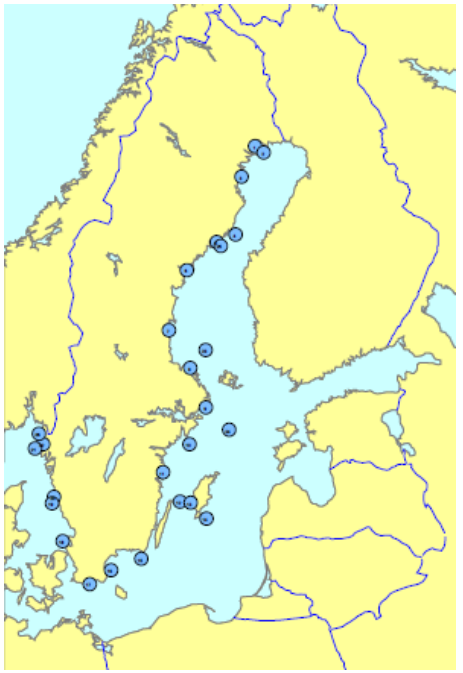
Mercury in sludge from waste water treatment plants

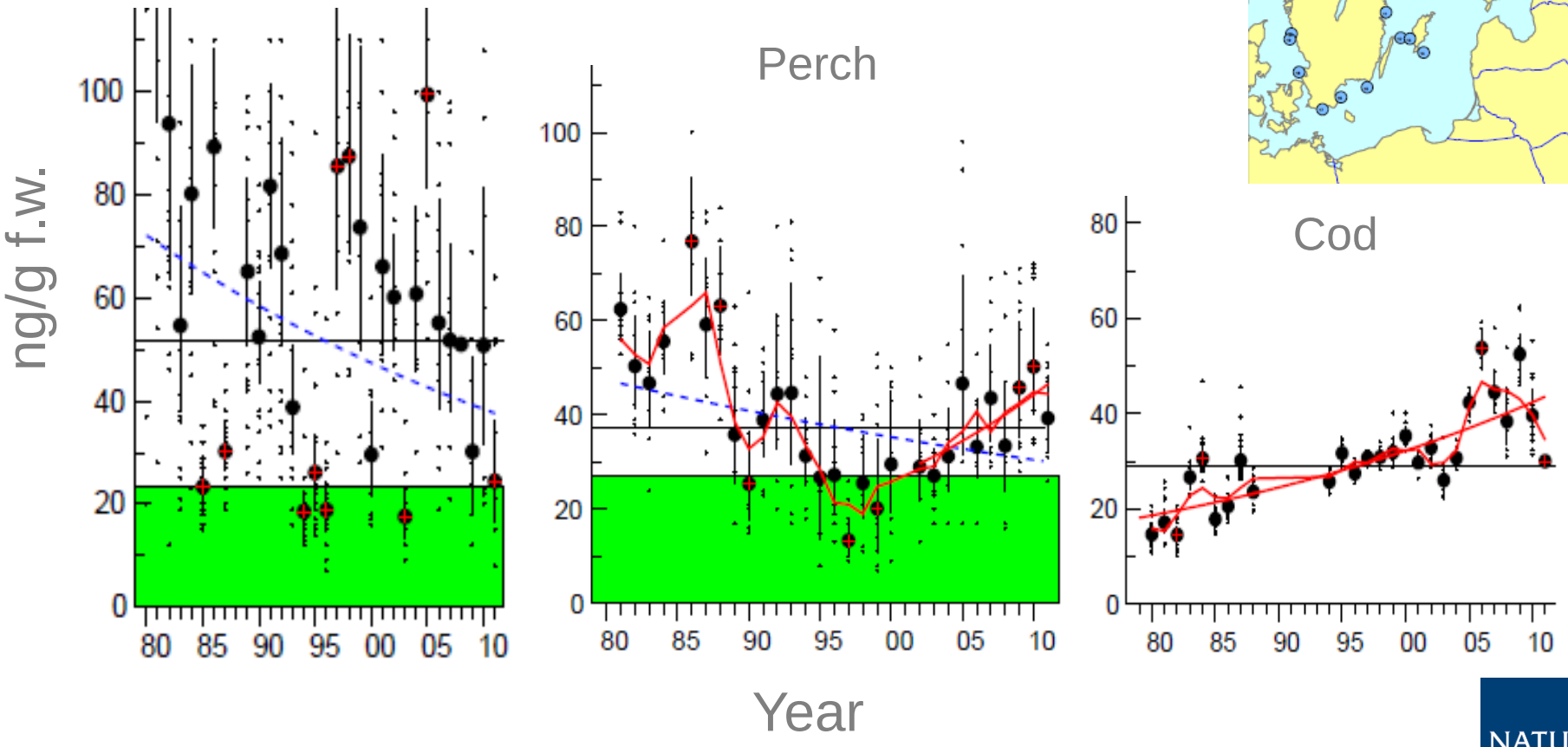




Mercury in fish from the Baltic Sea





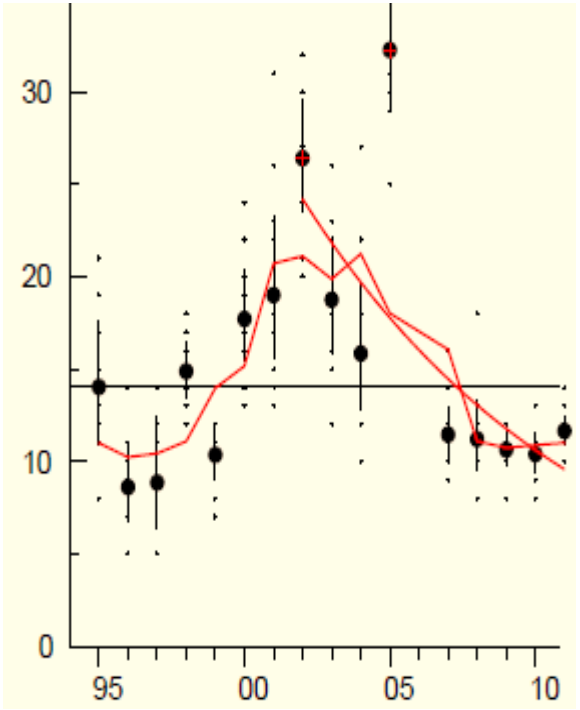


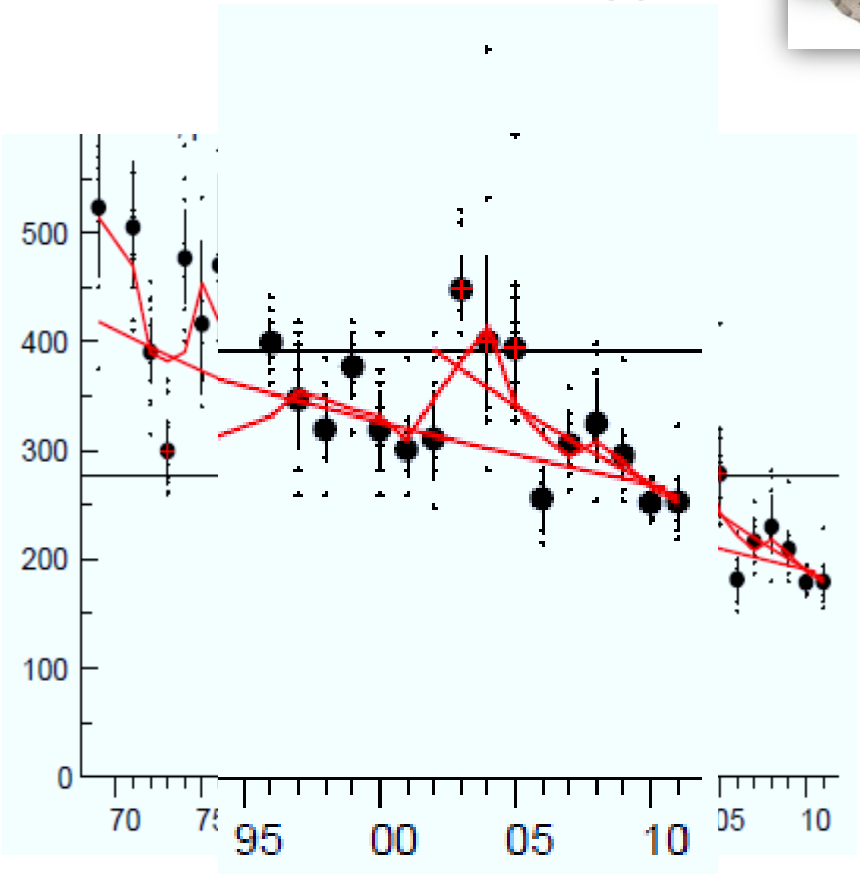
Mercury in the Baltic Sea

Blue Mussels

Guillemot egg

ng/g f.w.



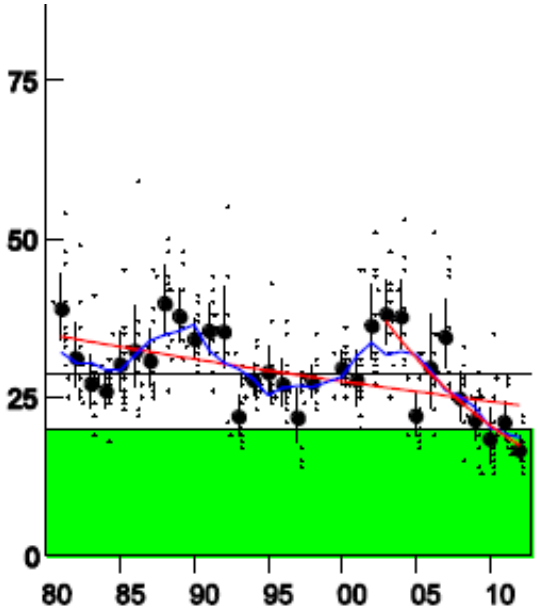


Year

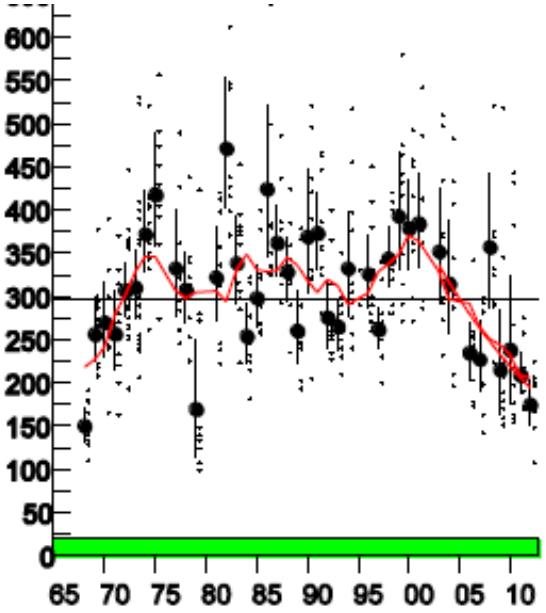
Year

Mercury in Swedish lakes

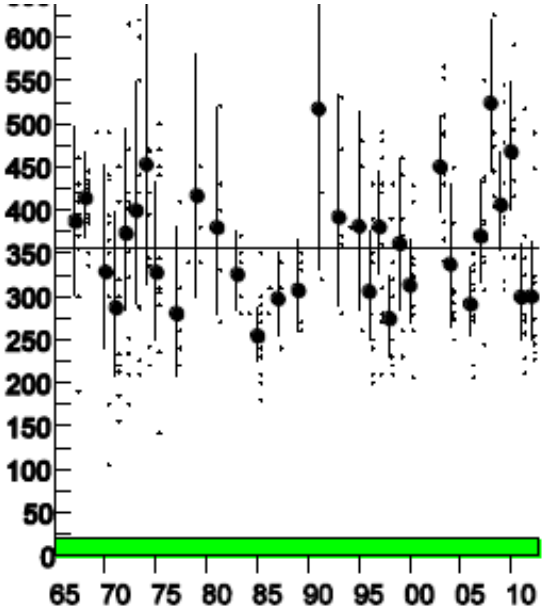
Hg in Arctic char



Hg in Pike



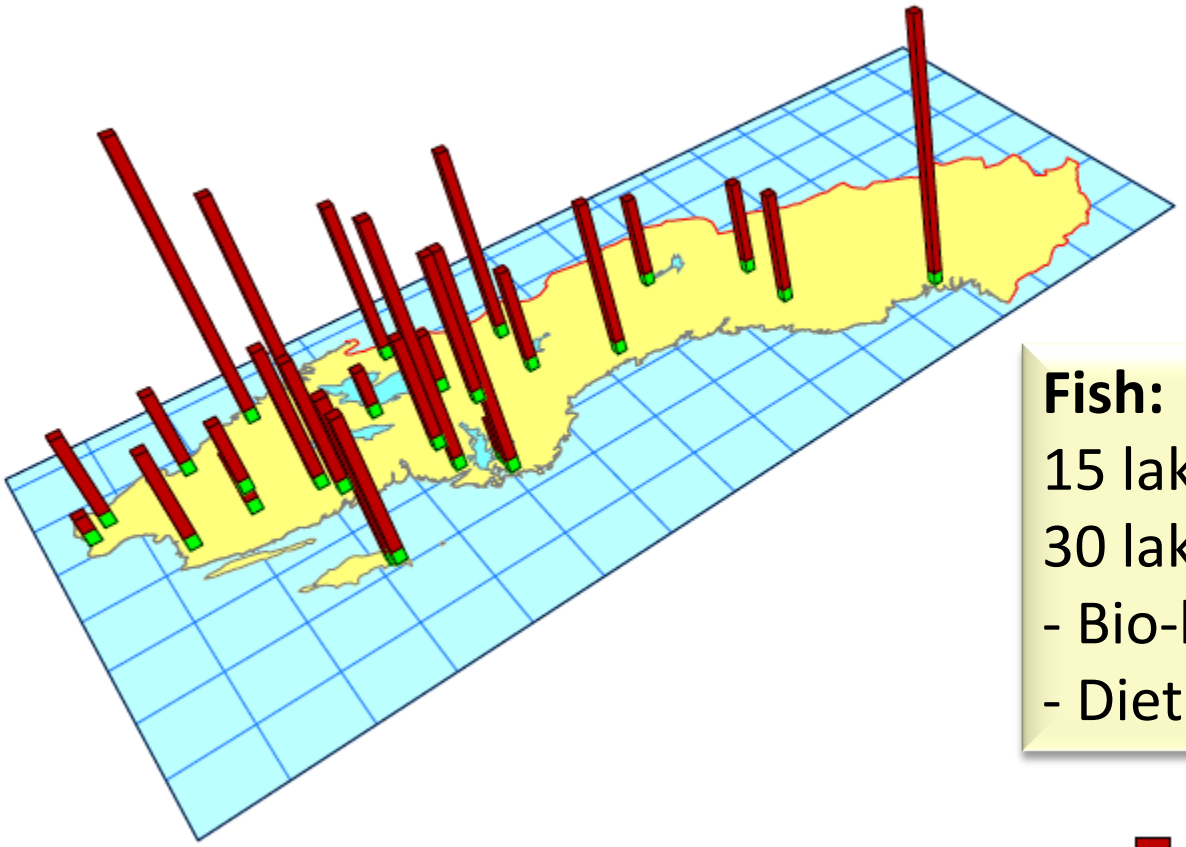
Hg in Pike



Mercury in Swedish lakes

Target level for Hg in fish = 20 ng/g wet weight
based on Environmental Quality Standards (EU)

Hg, perch muscle



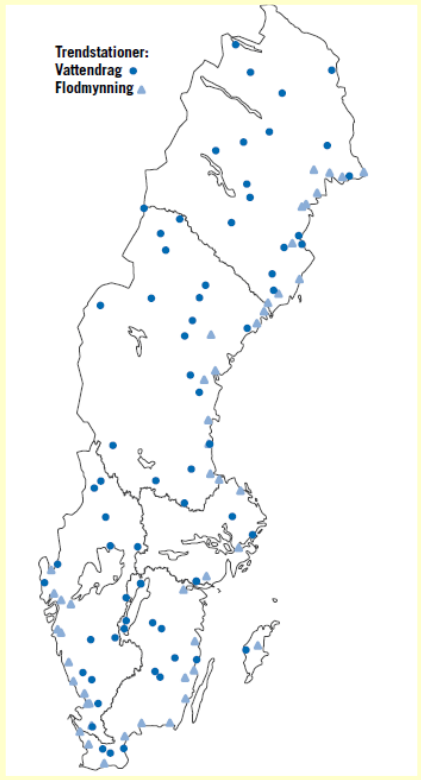
Fish:
15 lakes yearly
30 lakes every 6th year
- Bio-banked
- Diet guidelines

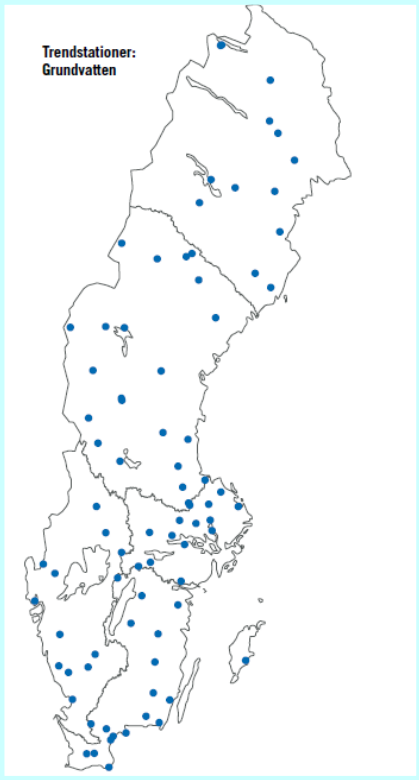
ng/g ww
> 20
< 20

Mercury in rivers and ground water

River mouths:
Runoff of nutrients and metals from 47 main drainage areas

Ground water:
Metals, eutrophication, acidification, Hg
- 80 stations yearly sampling
- 468 extra stations
(78 stations every 6th year)





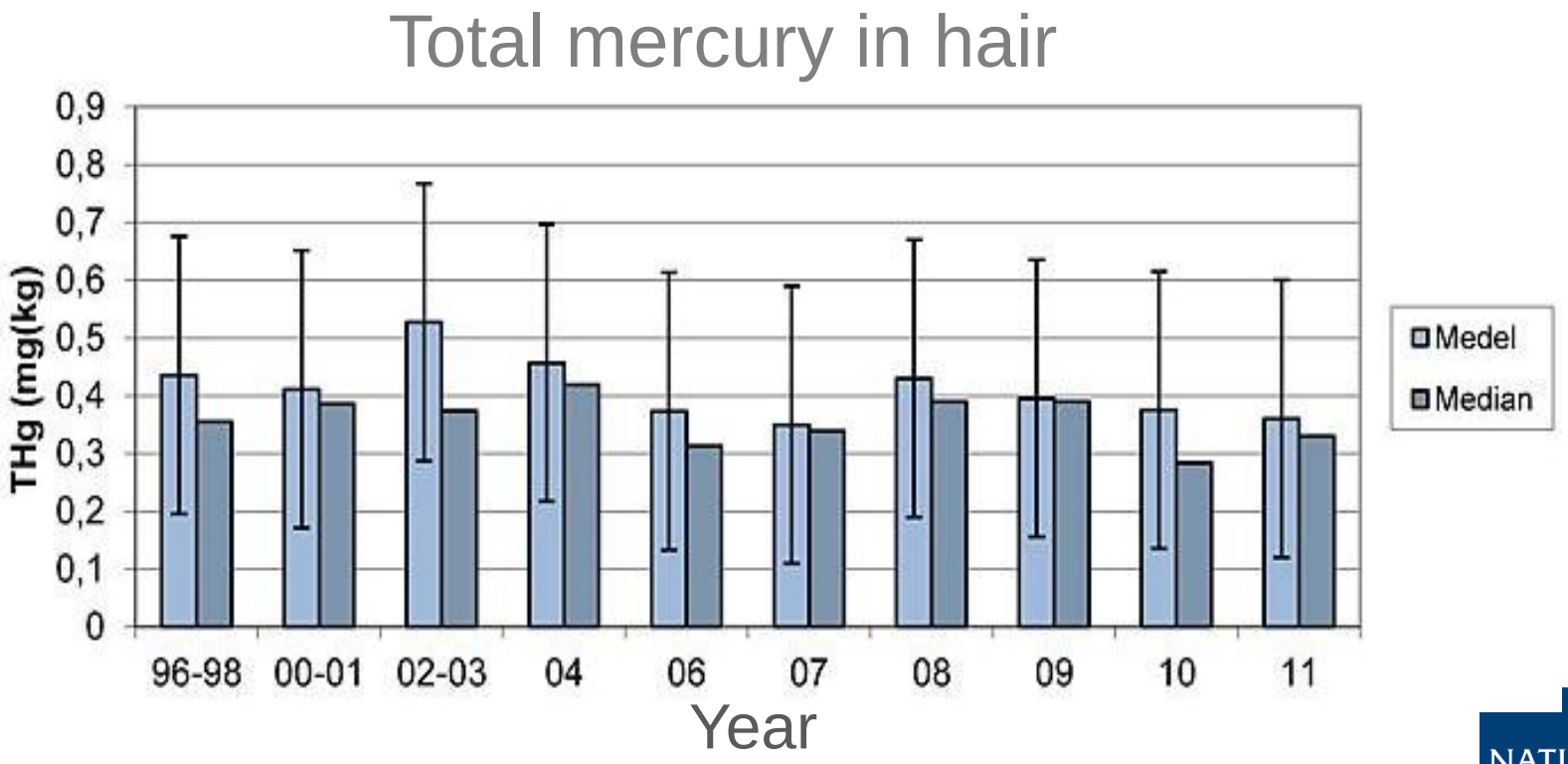
Human exposure to mercury

- Exposure to inorganic mercury is mainly through inhalation of metallic mercury (Hg^0) from dental amalgam or from work exposure.
- There are also some exposure to Hg^{2+} from food.
- For the main population, MeHg poses a greater risk.
- MeHg originate from food, mainly from intake of fish.

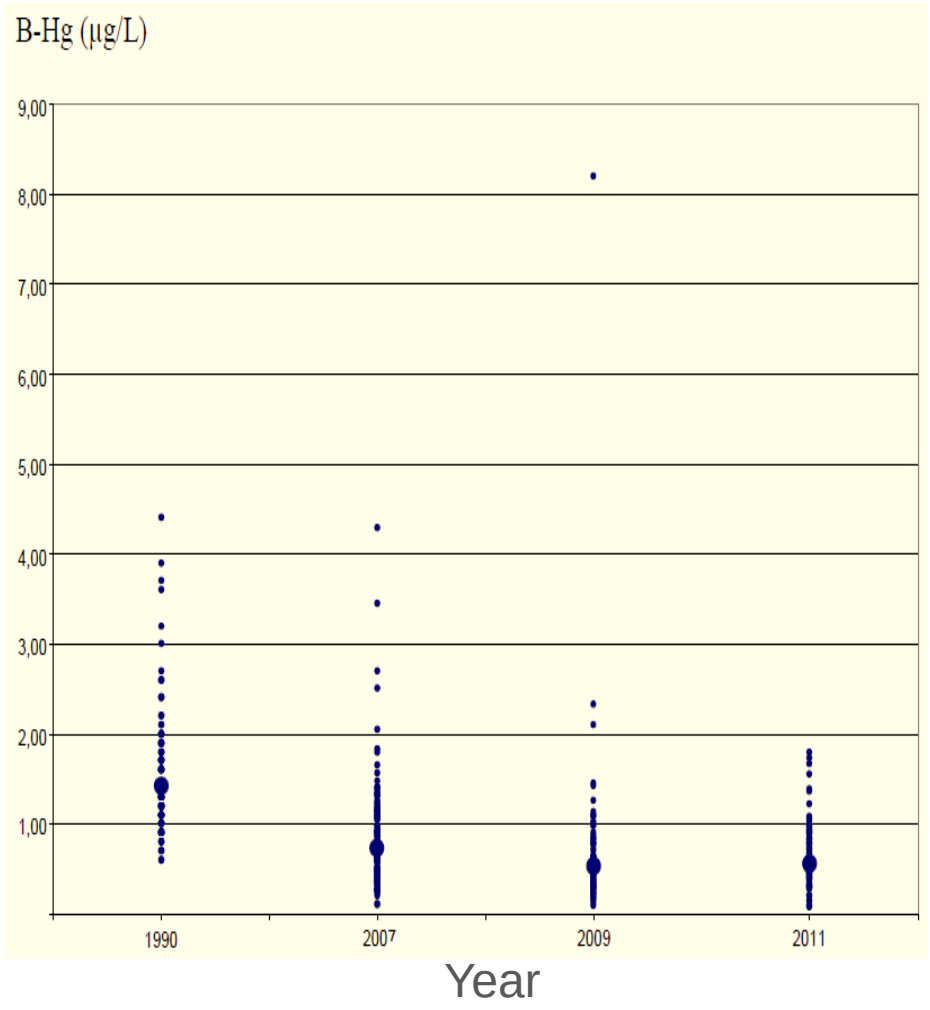
- Exposure to inorganic mercury can be determined in blood and/or urine.
- Exposure to MeHg can be monitored in blood and/or hair.
- Total Hg in blood reflects both exposure to Hg^0 and MeHg.

Human exposure to mercury

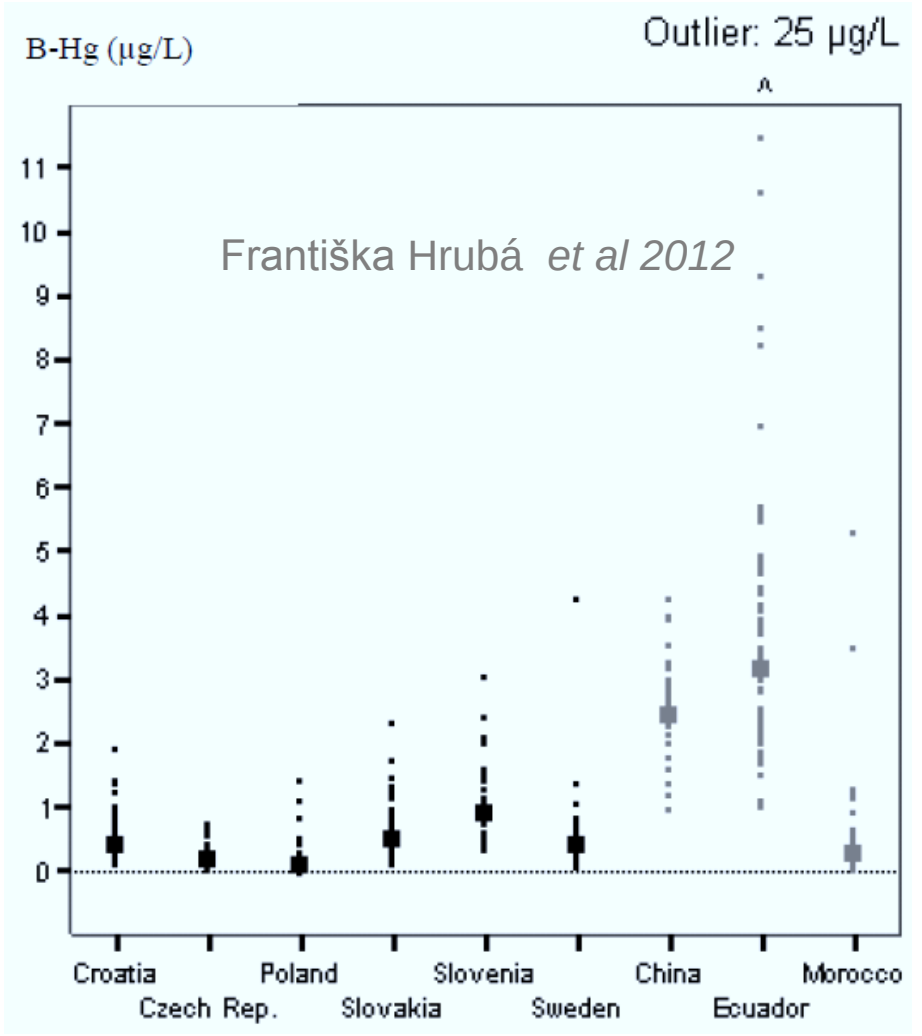
- Hair samples collected from women visiting maternity clinics
- Strong correlation with fish consumption
- No time-trend



Human exposure to mercury

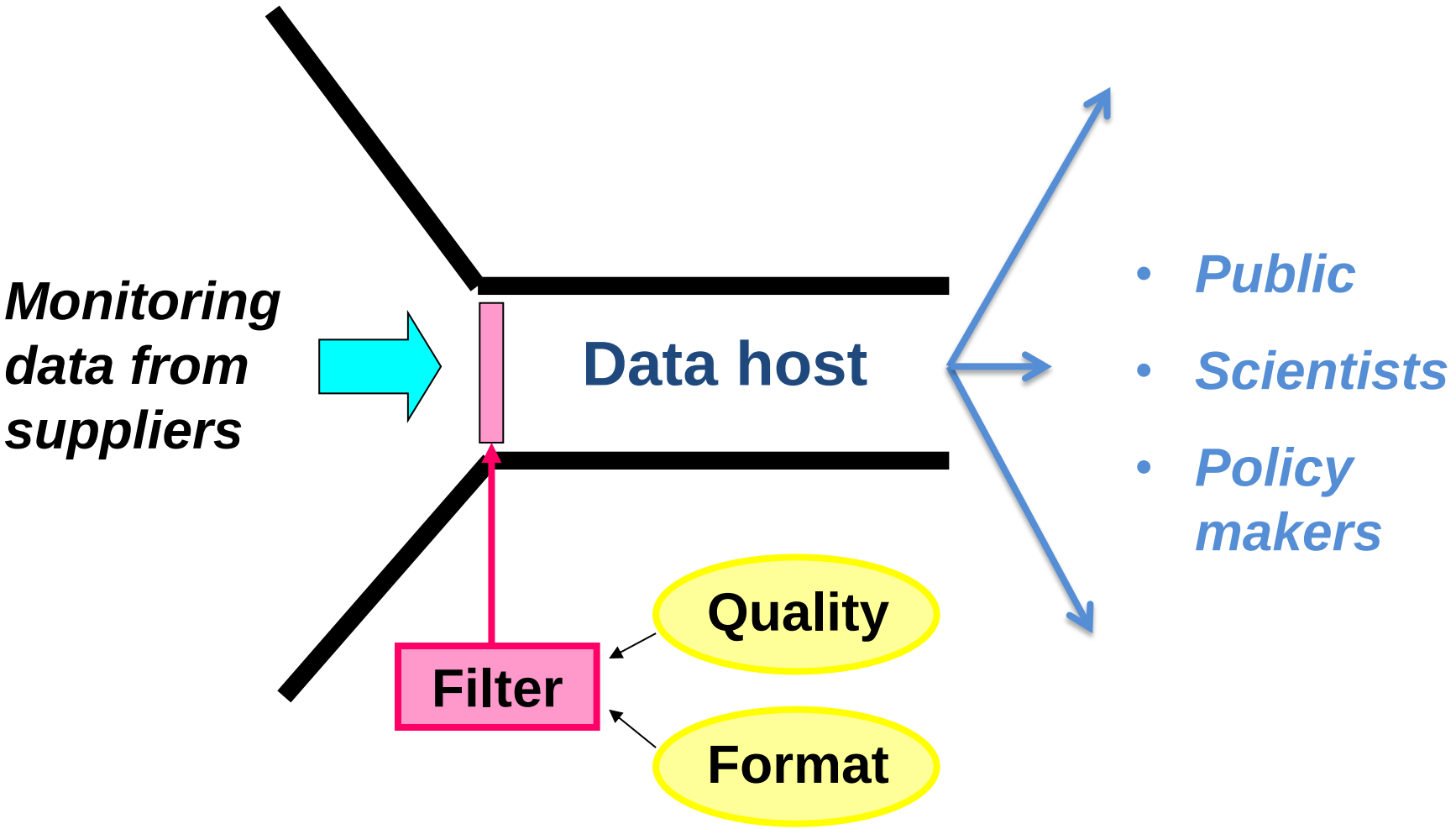


Blood Hg (geometric mean) in 1169 Swedish children 1990 – 2011



Blood Hg in children (7–11 years) from different countries

Monitoring data



Reports and links to monitoring data can be found at our web page:

www.naturvardsverket.se

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