

STOCKHOLM 7 DECEMBER 2022

The Swedish EPA and the Environmental Monitoring Programme

Karin Norström

Environmental pollutants and waste
statistics unit

Swedish Environmental Protection
Agency

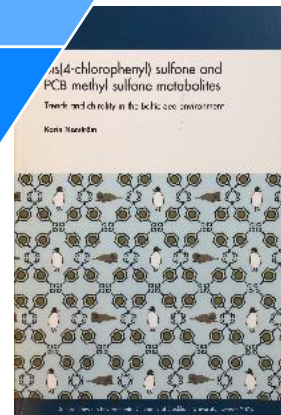


My background



Masters degree in
environmental chemistry

PhD Stockholm
University



Post
doc



Project
leader





800 employees
Stockholm
Östersund

”A good living environment
for humans and all
other living things,
now and for
future generations”



The Swedish EPA - our responsibility

- Environmental matters
- Within Sweden, EU and internationally

- Climate and air quality
- Soil
- Biodiversity
- Contaminated sites
- Circular economy and waste
- Environmental monitoring
- Environmental research.

The Generation Goal

"The overall goal of environmental policy is to hand over to the next generation a society where the major environmental problems are solved, without causing increased environmental and health problems outside Sweden's borders."



Environmental efforts in Sweden, the EU, and internationally



Environmental monitoring

Health-related environmental monitoring
Screening and
Government assignments

National environmental monitoring

- Air
- Landscape
- Mountains
- Forests
- Wetlands
- Agriculture
- Freshwater
- Sea & Coastal areas
- Health related environmental monitoring
- Toxic substances coordination
 - Screening
 - Environmental specimen bank
 - Hazardous substances in urban environments



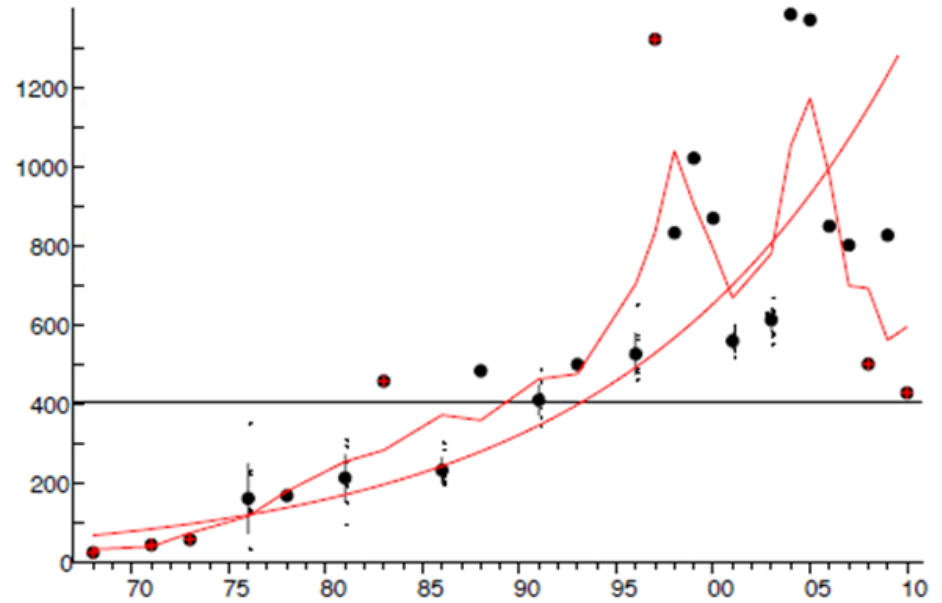
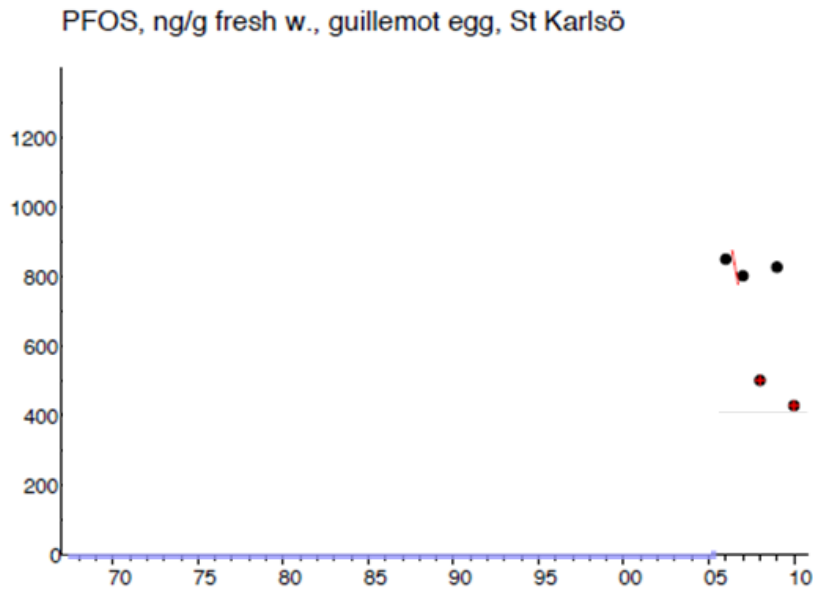
What is environmental monitoring?

- What?
 - a systematic approach of collecting, measuring and analyzing environmental data
 - physical, chemical and biological environment
- Why?
 - describe the state of the environment
 - track changes and trends
 - identify threats to the environment
 - provide data to motivate action
 - monitor implementation and effects of action



The Swedish Museum of Natural History

- Environmental specimen bank



Health-related environmental monitoring

Health related environmental monitoring

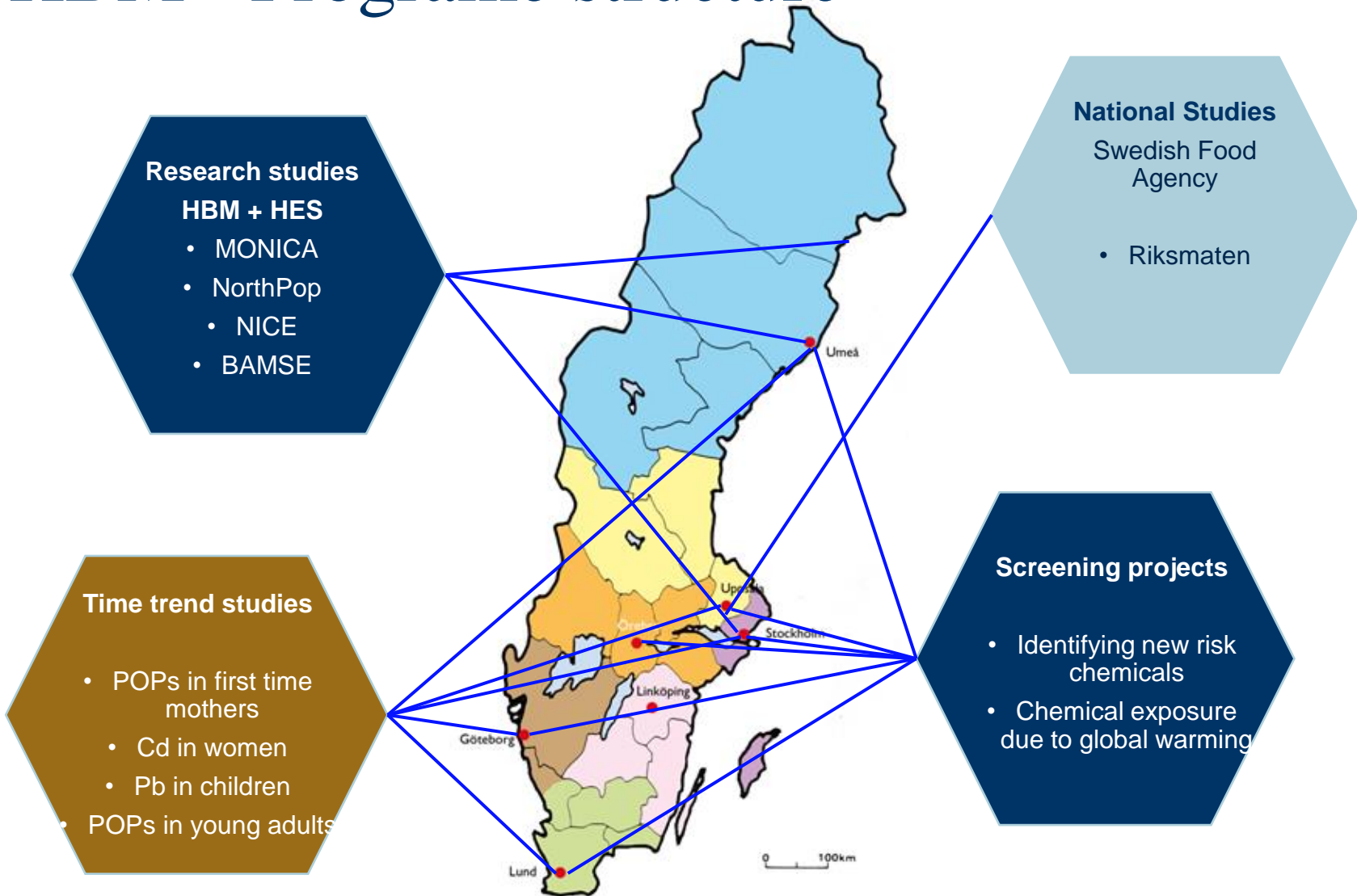


Program content

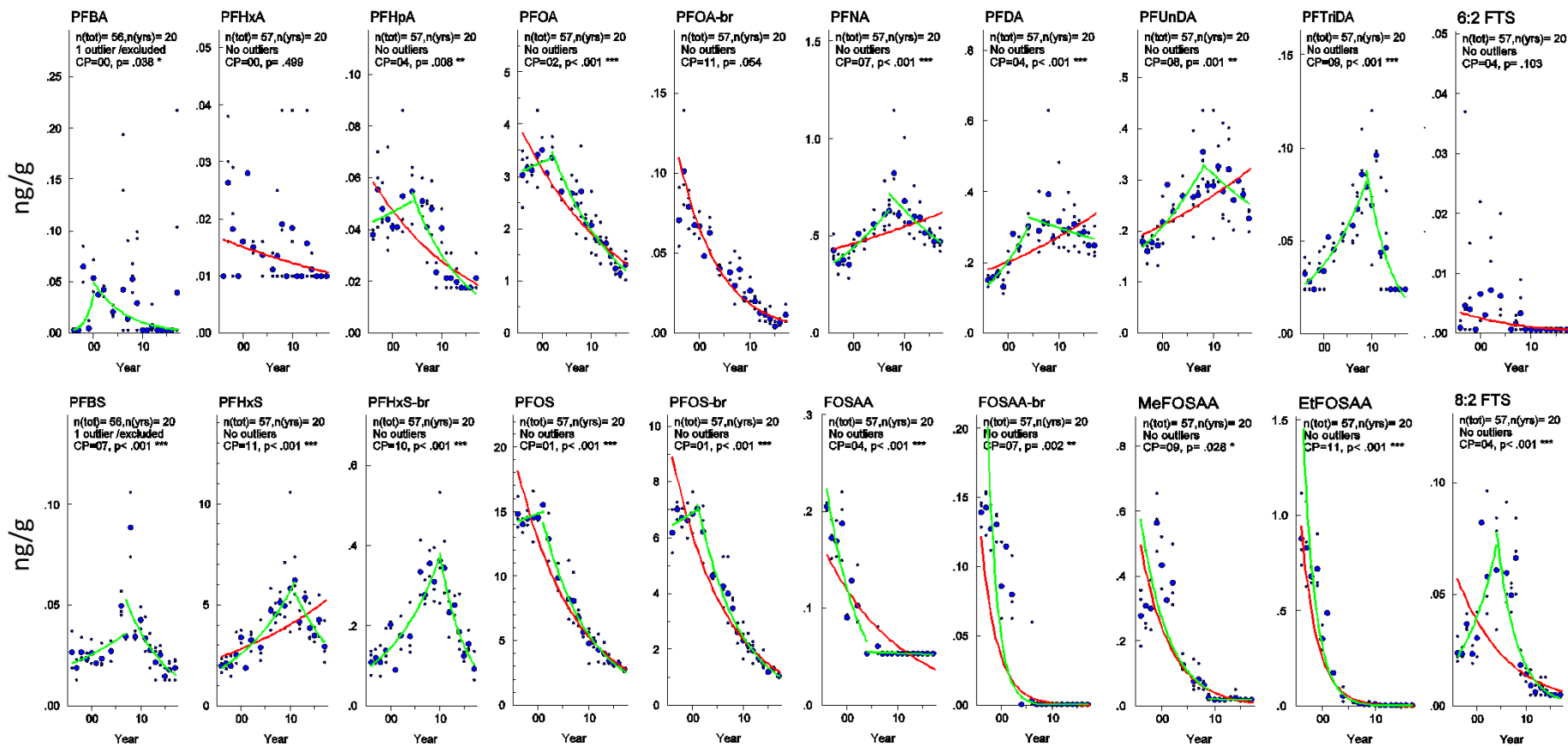
- **Exposure of environmental factors**
 - Organic substances and metals (HBM)
 - Breast milk
 - Blood & Serum
 - Urine
 - Hair
 - Air pollutants
 - Nois
- **Exposure sources**
 - Food
- **Population groups (HBM)**
 - Children and adolescens
 - Pregnant and breastfeeding women
 - Women, different ages
 - People living at contaminated sites
 - Immigrants



HBM - Programme structure



Examples of results: PFAS in serum in first time mothers from Uppsala



Livsmedelsverket

Swedish Food Agency

Health effects



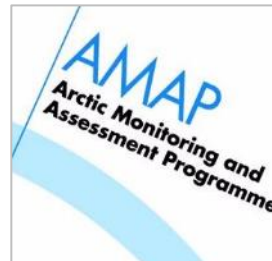
Children from the first time mothers: 4, 8 and 12 years

Health outcomes:

- Birth weight (PFAS)
- Asthma
- Ear infections (PFAS)
- Allergy

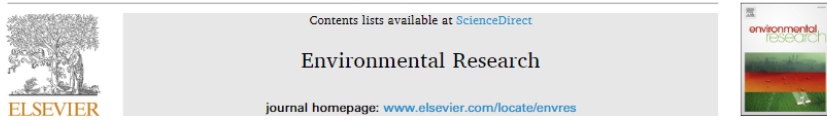
What is the HBM data used for?

- Evaluate national environmental goals
- Show trends in human exposure
- Evaluate measures and identify needs
- Exposure- and risk assessments
- Research
- International



Monitoring data used in science

Environmental Research 208 (2022) 112674



Demographic, life-style and physiological determinants of serum per- and polyfluoroalkyl substance (PFAS) concentrations in a national cross-sectional survey of Swedish adolescents

Jennifer Nyström^{a,*}, Jonathan P. Benskin^b, Merle Plassmann^b, Oskar Sandblom^b, Anders Glynn^a, Erik Lampa^c, Irina Gyllenhammar^d, Lotta Moraeus^d, Sanna Lignell^d

^a Department of Biomedical Sciences and Veterinary Public Health, Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden

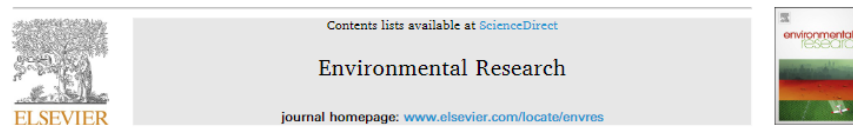
^b Department of Environmental Science and Analytical Chemistry (ACES), Stockholm University, Stockholm, Sweden

^c Department of Medical Sciences, Uppsala University, Uppsala, Sweden

^d Department of Risk and Benefit Assessment, Swedish Food Agency, Uppsala, Sweden



Environmental Research 212 (2022) 113170



Healthy eating index and diet diversity score as determinants of serum perfluoroalkyl acid (PFAA) concentrations in a national survey of Swedish adolescents^{*}

Jennifer Nyström^{a,*}, Jonathan P. Benskin^b, Merle Plassmann^b, Oskar Sandblom^b, Anders Glynn^a, Erik Lampa^c, Irina Gyllenhammar^d, Sanna Lignell^d, Lotta Moraeus^d

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^c Department of Medical Sciences, Uppsala University, Uppsala, Sweden

^d Department of Risk and Benefit Assessment, Swedish Food Agency, Uppsala, Sweden



Research

A Section 508-conformant HTML version of this article is available at <https://doi.org/10.1289/EHP67>



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Article
pubs.acs.org/est

Serum Half-Lives for Short- and Long-Chain Perfluoroalkyl Acids after Ceasing Exposure from Drinking Water Contaminated by Firefighting Foam

Yiyi Xu,¹ Tony Fletcher,² Daniela Pineda,³ Christian H. Lindh,³ Carina Nilsson,³ Anders Glynn,⁴ Carolina Vogs,⁴ Karin Norström,⁵ Karl Lilja,⁵ Kristina Jakobsson,^{1,6} and Ying Li¹

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²London School of Hygiene and Tropical Medicine, London, UK

³Division of Occupational and Environmental Medicine, Department of Laboratory Medicine, Lund University, Lund, Sweden

⁴Department of Biomedical Sciences and Veterinary Public Health, Swedish University of Agricultural Sciences, Uppsala, Sweden

⁵Swedish Environmental Protection Agency, Stockholm, Sweden

⁶Department of Occupational and Environmental Medicine, Sahlgrenska University Hospital, Gothenburg, Sweden

Perfluoroalkyl Acids (PFAAs) in Children's Serum and Contribution from PFAA-Contaminated Drinking Water

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National actors within the Swedish HBM program

- Environmental monitoring
- Chemicals regulation
- Food Safety
- Public health
- Research



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Livsmedelsverket
Swedish Food Agency



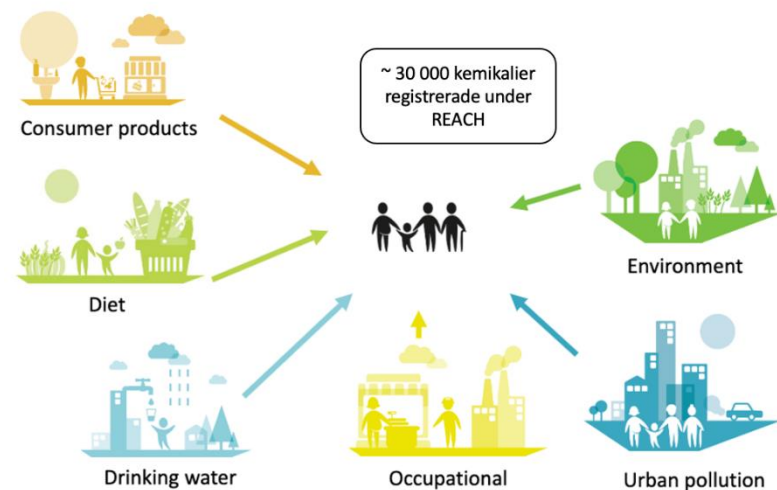
Folkhälsomyndigheten
PUBLIC HEALTH AGENCY OF SWEDEN



Karolinska
Institutet

Human Biomonitoring For Europe

- To develop and harmonize HBM to bring knowledge which can be used to make decisions - *based on science* – to protect human health
- Aim: a sustainable HBM-program on national and EU-level
- 2017-2022



Aligned HBM studies

Children 6-11 years






Teenagers 12-19 years



 Livsmedelsverket
Riksmaten adolocents
2016-17

Adults 20-39 years



April 2022  Northern Europe  Eastern Europe  Southern Europe  Western Europe

Human Biomonitoring Guidance Values (HBM-GVs)

Based on 3 scientific methods

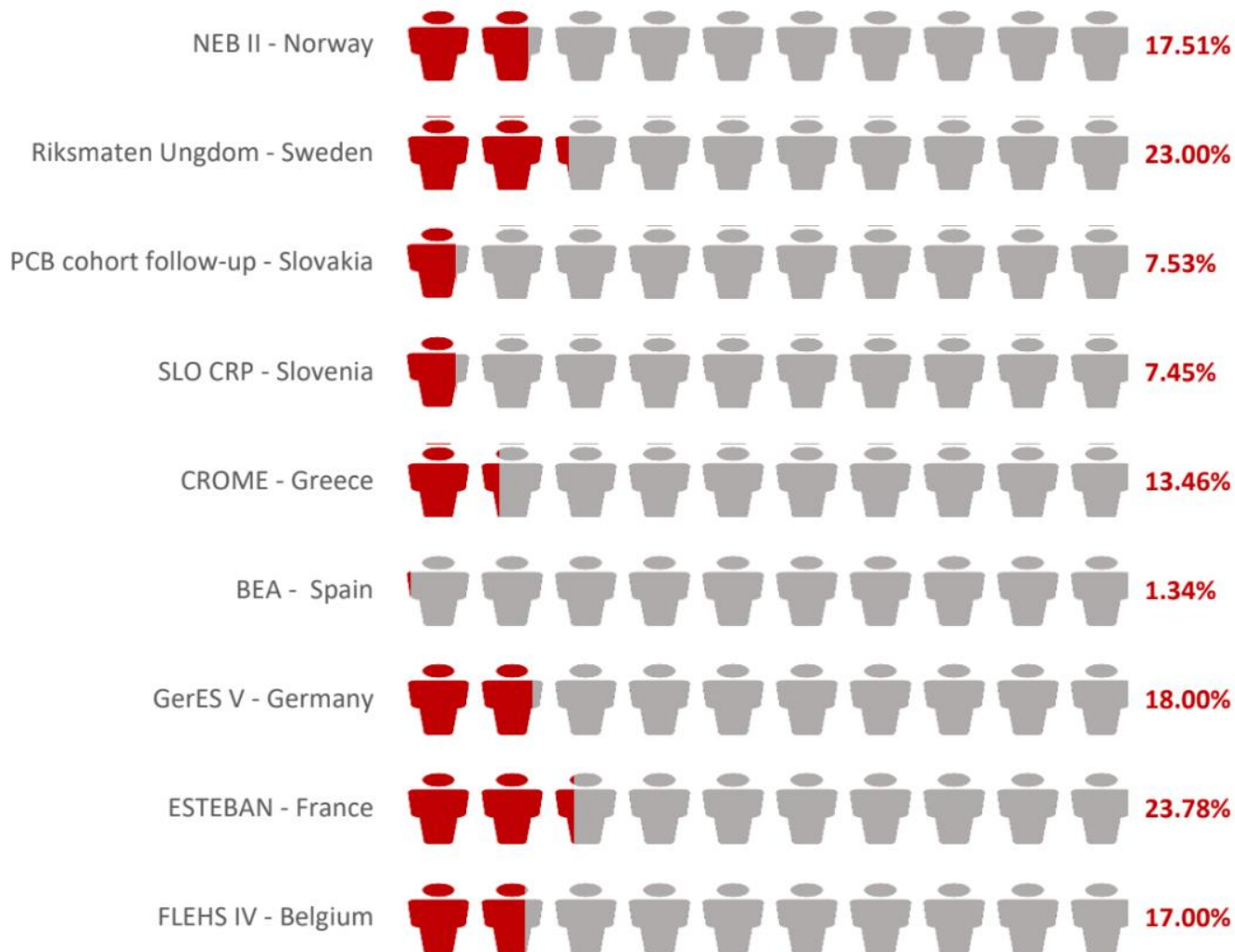
(Apel et al., 2020):

- 1) Human data based on internal dos and relations to health effects
- 2) Reference values regarding toxicity (ADI, TDI, TWI, BLV)
- 3) Data from experimental studies on animals

Reviewed and approved by experts in 28 countries

HBM4EU	EFSA + UBA
Ftalater (5) + DiNCH	PFAS
Kadmium	Bly
Pesticider (2)	Arsenik
Bisfenoler	med flera
Mykotoxiner (1)	
Aprotiska lösningsmedel (2)	
Benzofenoner	
Akrylamid	
Krom VI	

Adolocents (12-19 years) with exposure levels of the sum (PFOS + PFOA + PFNA + PFHxS) above the 6,9 µg/L blood (EFSA HBM-GV)



- 14 % > EFSA HBM-GV
- Men higher concentrations
- Connection to lifestyle and socioeconomy

And now...



Spirit of PARC

To develop **strong networks**

To **co-create** and **collaborate**

- Projects
- Case studies

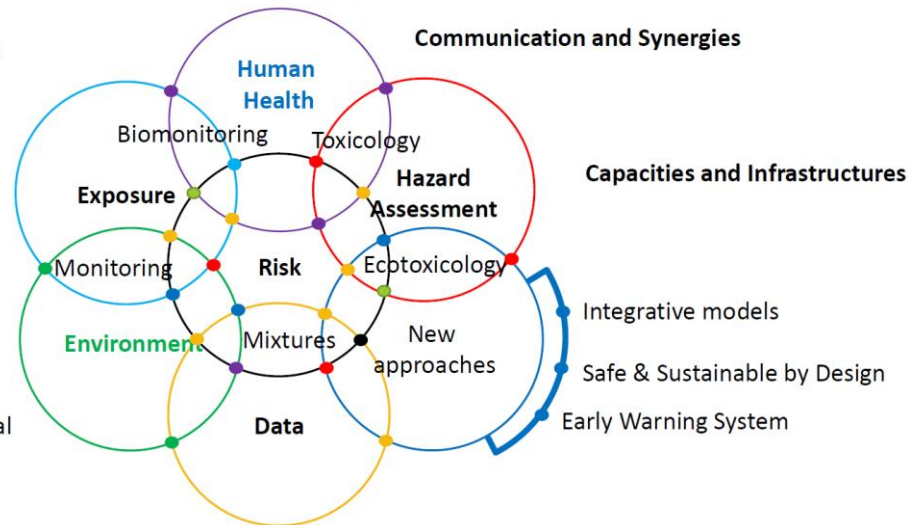
To **enhance communication**

To **share** common

- Data
- Methods
- Tools
- Knowledge

To **participate** in international harmonization process

Science to Policy Agenda



Screening and government assignments (GA)

Screening (part of Toxic substances coordination)

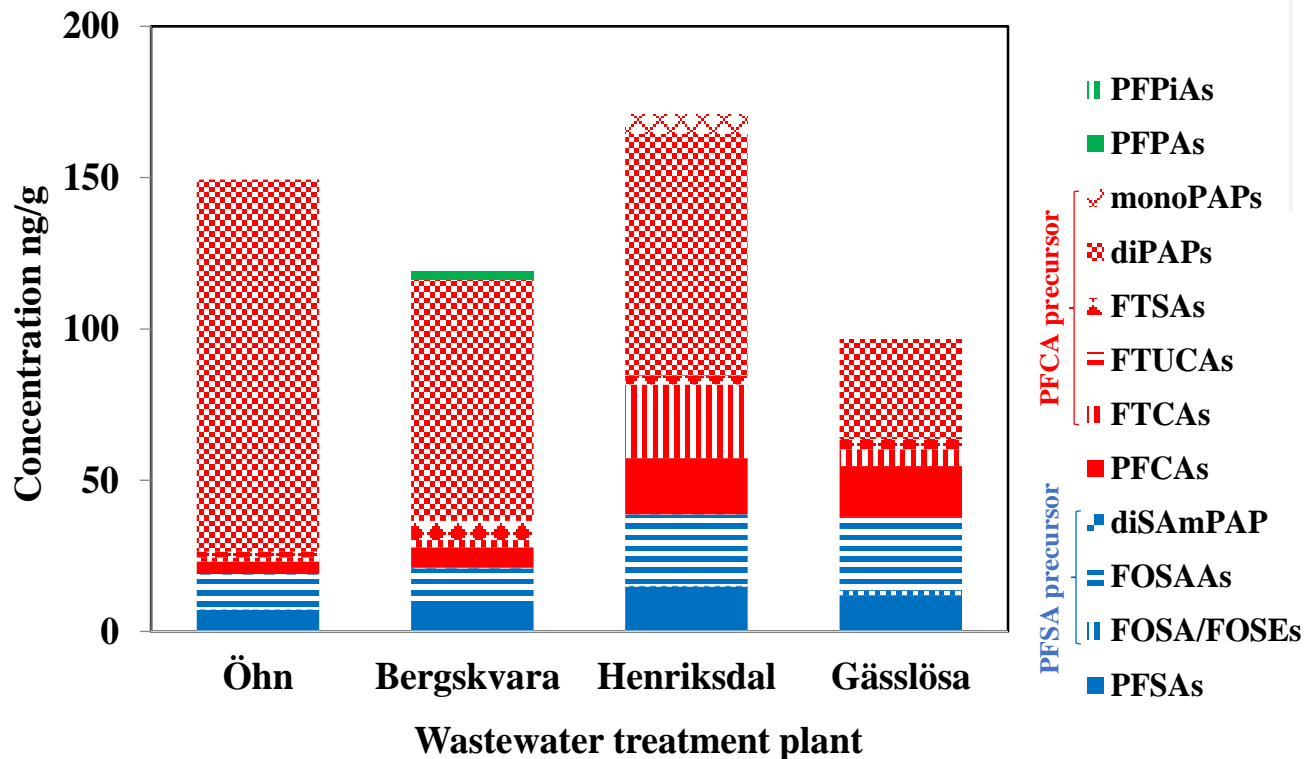


- Screening of new and potentially harmful substances
 - In environment or humans
- Specific substances or “non-target screening”
- Collaboration with the Nordic Screening Group:
<http://nordicscreening.org/>

Method development – increased knowledge about “new” PFAS



PFAS concentration (ng/g) in sewage sludge collected in 2015



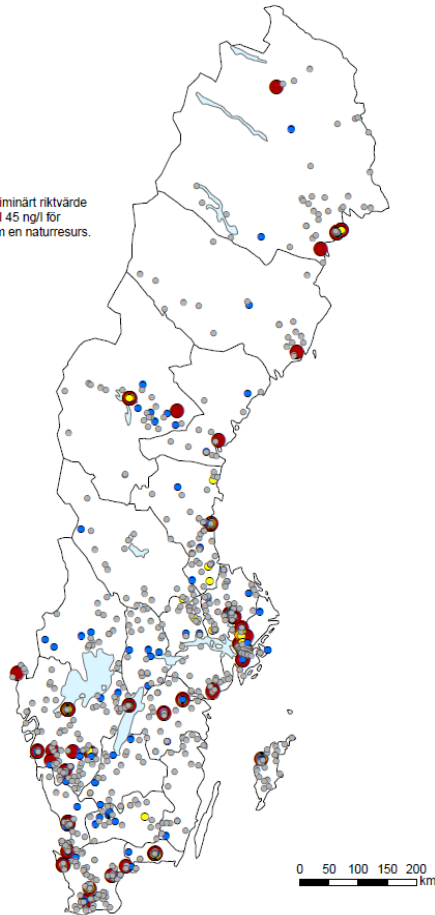
GA 2015 Screening of PFAS in the environment

Ground water

Medelhalter av PFOS i grundvatten

- Ej detekterat
- 0-10 ng/l
- 10-45 ng/l
- 45-90 ng/l
- >90 ng/l

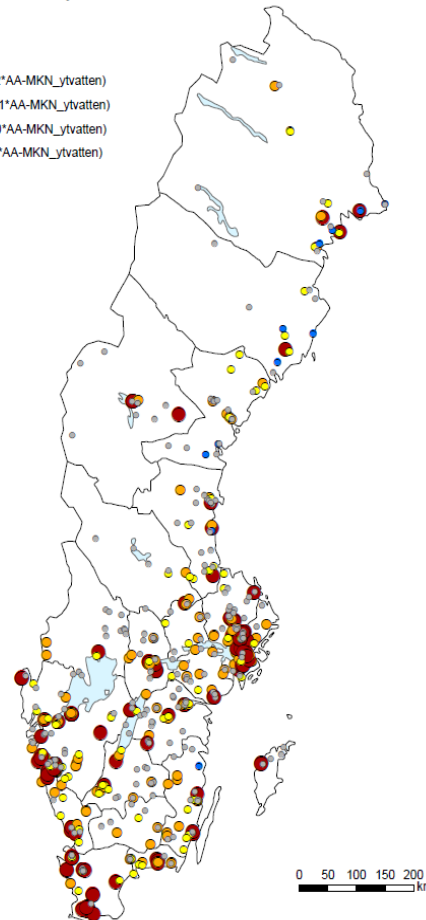
SGI har tagit fram ett preliminärt riktvärde för PFOS i grundvatten till 45 ng/l för skydd av grundvatten som en naturresurs.



Surface water

Medelhalter av PFOS i ytvatten

- Ej detekterat
- <0,13 ng/l (<0,2*AA-MKN_ytvatten)
- 0,13-0,65 ng/l (0,2-1*AA-MKN_ytvatten)
- 0,65-6,5 ng/l (1-10*AA-MKN_ytvatten)
- >6,5 ng/l (>10*AA-MKN_ytvatten)

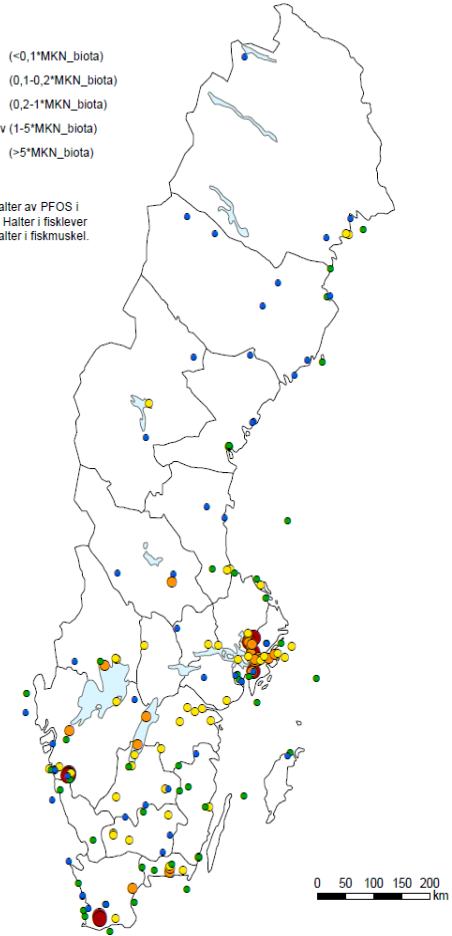


Fish muscle

Halter av PFOS i fiskmuskel

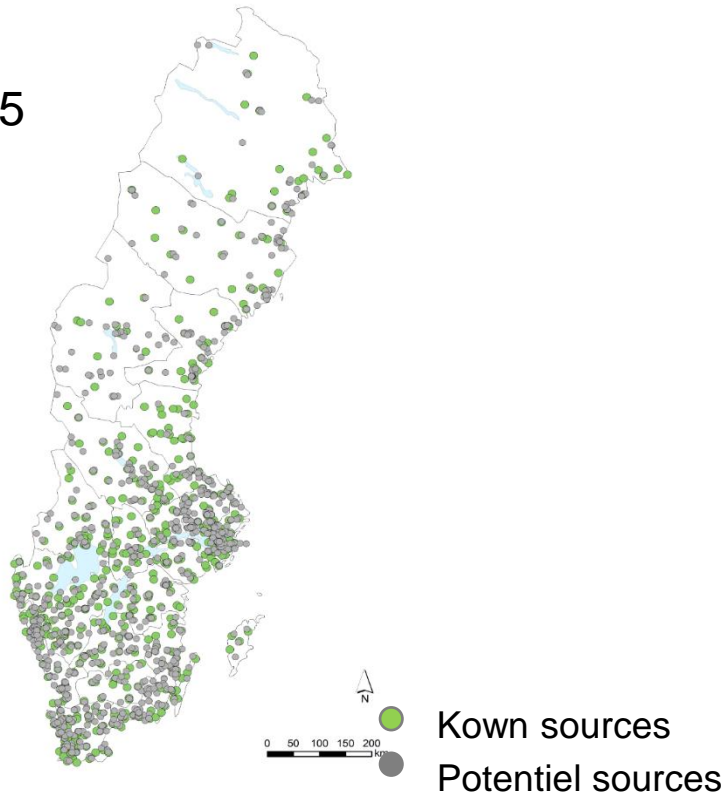
- <0,9 ng/g vv (<0,1*MKN_biota)
- 0,9-1,8 ng/g vv (0,1-0,2*MKN_biota)
- 1,8-9,1 ng/g vv (0,2-1*MKN_biota)
- 9,1-45,5 ng/g vv (1-5*MKN_biota)
- >45,5 ng/g vv (>5*MKN_biota)

Kartan visar medelhalter av PFOS i fiskmuskel per lokal. Halter i fisklever har omvandlats till halter i fiskmuskel.



GA 2017 Evaluation of the impact on groundwater from places where firefighting foam has been handled

2015



Riskbedömning och inventering av data på nationell nivå

Utvärdering av påverkan på grundvatten från platser där släckskum hanterats

Lars Rosenqvist

oktober 2020

Underlag och kunskapsstöd till seminarier 12 och 19 oktober 2020



SGU Sveriges geologiska undersökning





GA 2022-2024

Knowledge about PFAS in food and environment

Cooperation with the Swedish Food Agency and
the Swedish Board for Agriculture

Including:

- Swedish University of Agricultural Sciences (SLU)
– *risk assessment of exposure from food from farms located at contaminated sites*
- Linköping University – *human exposure from fish and health effects*
- Örebro University – *analytical work*
- Linné University - *fishing*
- SFA – *PFAS in different food items från grocery stores*

Communication



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Data management

Institute of Environmental Medicine (IMM), Karolinska Institutet

- HBM
- Website:

ki.se/imm/halsorelaterad-miljoovervakning

Geological Survey of Sweden (SGU)

- Environmental pollutants in biota, sediment, screening

Swedish Meteorological and Hydrological Institute (SMHI)

- Air quality

Swedish University of Agricultural Sciences (SLU)

- Pesticides



Communication

- Annual reports to the government
- Newsflash
- Popular science reports
- Scientific reports
- National conferences
- Network



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Hämi-konferens
1 264 visningar • Streamades live 27 apr. 2021

Regionala skillnader – relativt små och inga mönster

Region	PM10-10 (µg/m³)	PM10-2.5 (µg/m³)	PM2.5 (µg/m³)
Stockholm	~15	~10	~5
Uppsala	~15	~10	~5
Örebro	~15	~10	~5
Skåne	~15	~10	~5
Småland	~15	~10	~5
Västergötland	~15	~10	~5
Östergötland	~15	~10	~5
Östernorrland	~15	~10	~5
Centralnorrland	~15	~10	~5
Östernorrland	~15	~10	~5
Centralnorrland	~15	~10	~5
Östernorrland	~15	~10	~5
Centralnorrland	~15	~10	~5

PM10-10 (µg/m³)
PM10-2.5 (µg/m³)
PM2.5 (µg/m³)

PM10-10 (µg/m³)
PM10-2.5 (µg/m³)
PM2.5 (µg/m³)

PM10-10 (µg/m³)
PM10-2.5 (µg/m³)
PM2.5 (µg/m³)

What is lacking in the knowledge of PFAS?

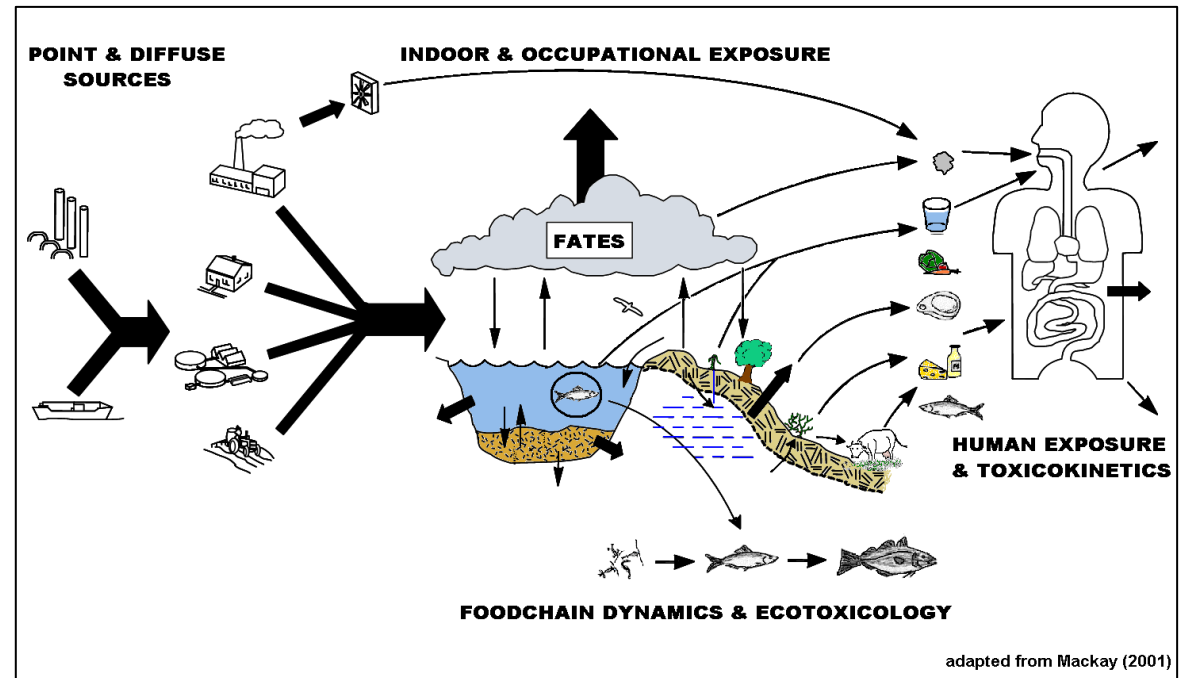
SEPA research area 2023:

Non-toxic cycles of environmental pollutants

- Tracking of sources
 - industrial use of PFAS
- Distribution pathways
 - PFAS in incineration plants

.... and...

- Exposure
- Health effects
- Analytical methods
- Treatment techniques
- Risk assesment



Competences

SEPA responsible for 7 of the environmental goals

Risk assessment

Guidance values

- Environment pollution

○ Soil

○ Aquatic environment

○ Air

○ Humans

Health effects

Risk management

- Tools for control (styrmedel)

- Guidance

Risk communication

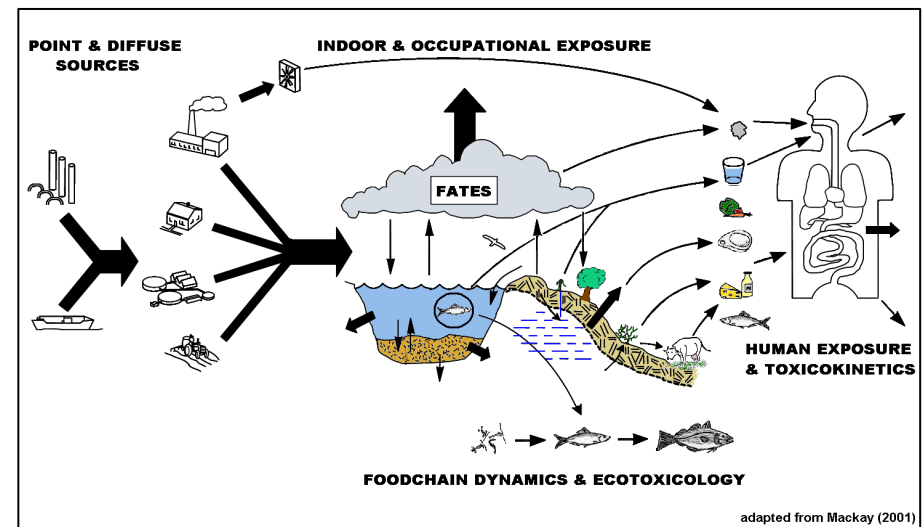
To make the right contracts

To interpret data

Evaluate results from our contractors

What are the risks with the levels that we find in the environment?

Convert knowledge to action



Next seminar from SEPA - Niclas Johansson



- Contaminated sites
- Landfills
- The SEPA strategy on PFAS

Thank you!



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