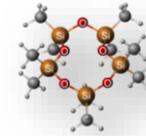
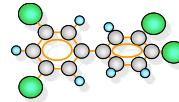


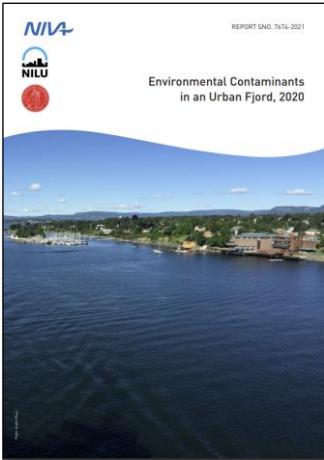
Miljøgifter og Oslofjordens urbane tilknytning



Kilder

- «Gamle synder»
- Nedbørsfelt/elver
- Overvann
- Aktiviteter og produkter
- Renseanlegg





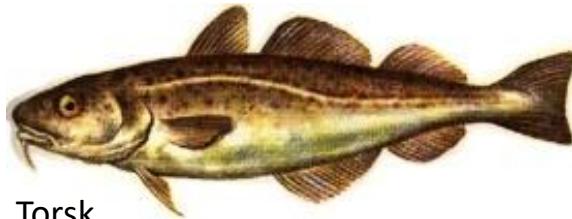
Miljøovervåking



Mål:

- Anslå graden av bioakkumulering av utvalgte miljøgifter på flere trofiske nivåer i marine næringskjeder.
- Koble eksponeringen av miljøgifter til toksiske effekter på ulike biologiske nivåer.
- Identifisere kilder og sluk for miljøgifter i fjordsystemer, og utforme målrettede tiltak.
- Frembringe data som vil være til hjelp i å gjennomføre kravene i Vanndirektivet.

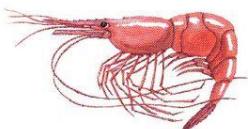
Fokus



Torsk



Sild



Reke

Zooplankton
(Her: Krill)



Blåskjell



Børstemark
(Polychaeta)



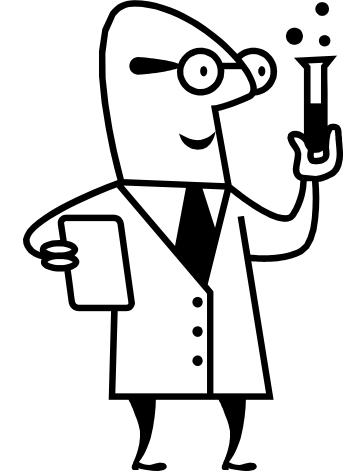
Gråmåke



Sediment

Fokus

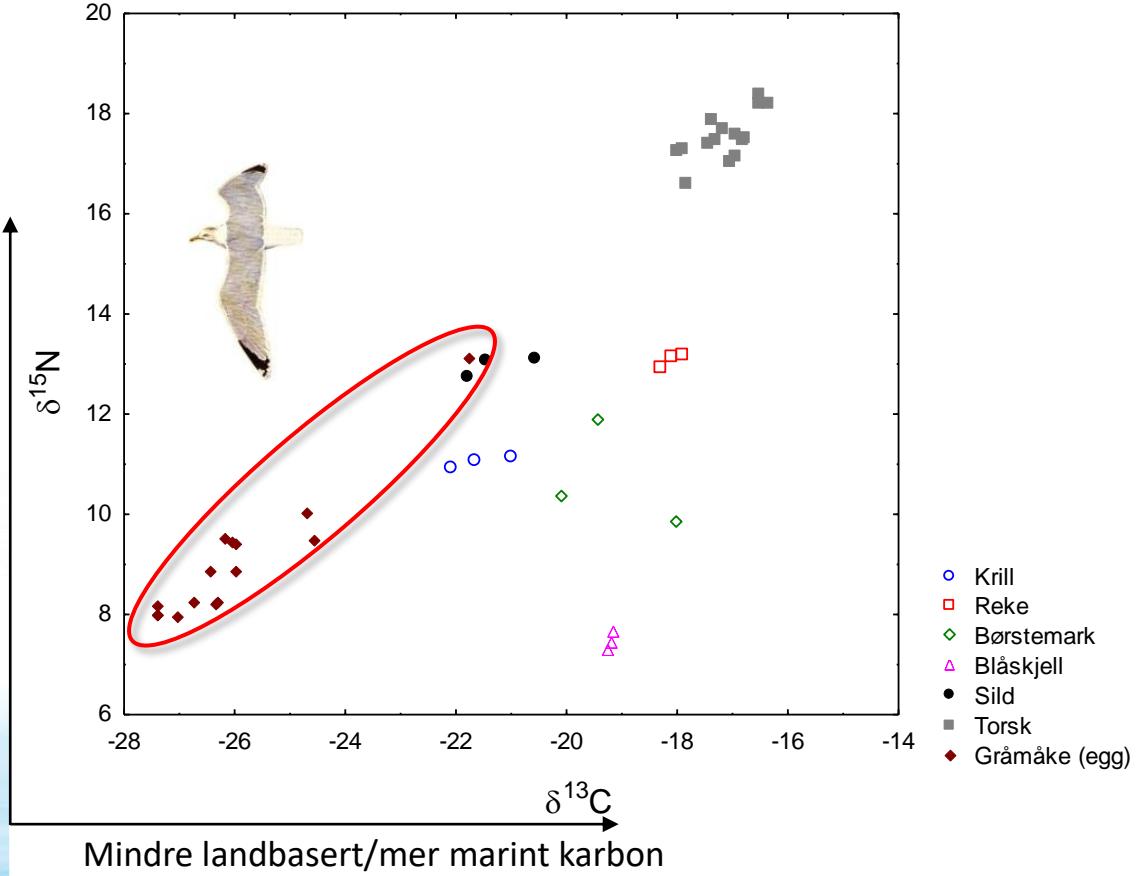
- Stort antall kjemiske parametere
 - ~260 i 2020
- «Legacy contaminants»
- «Emerging contaminants»



Bruk av stabile isotoper

$\delta^{13}\text{C}$ $\delta^{15}\text{N}$

Høyere i næringkjeden



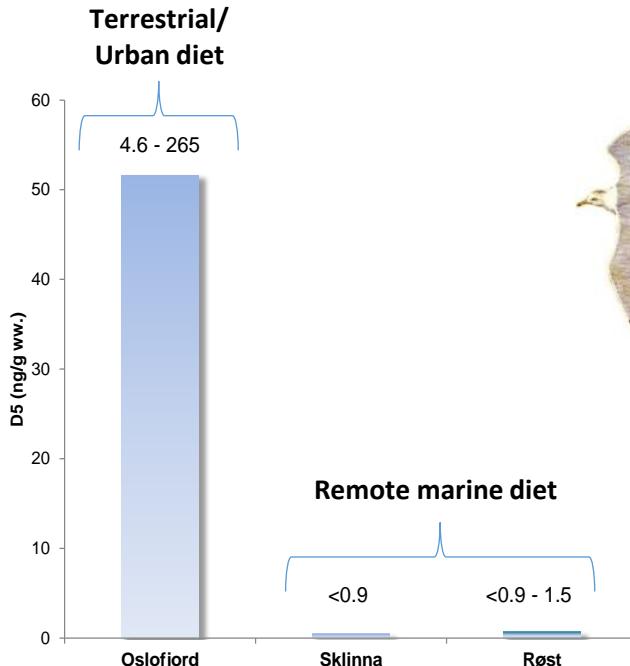
Gråmåke spiser ikke så mye sjømat



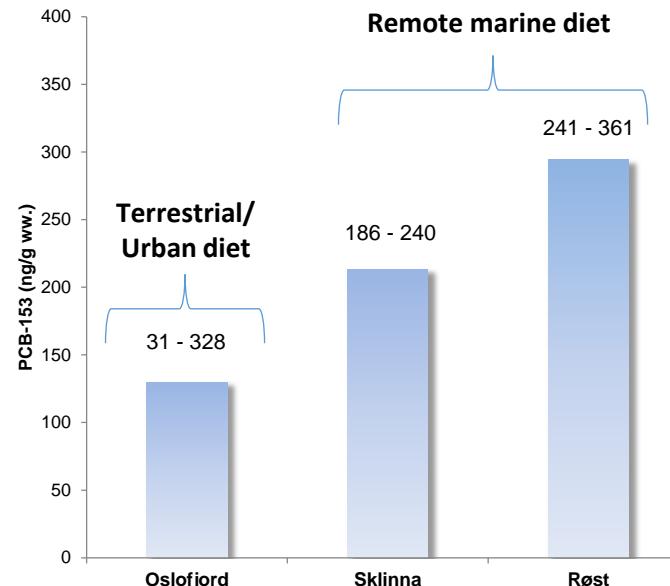
Foto: Morten Helberg

Urbane måker

D5

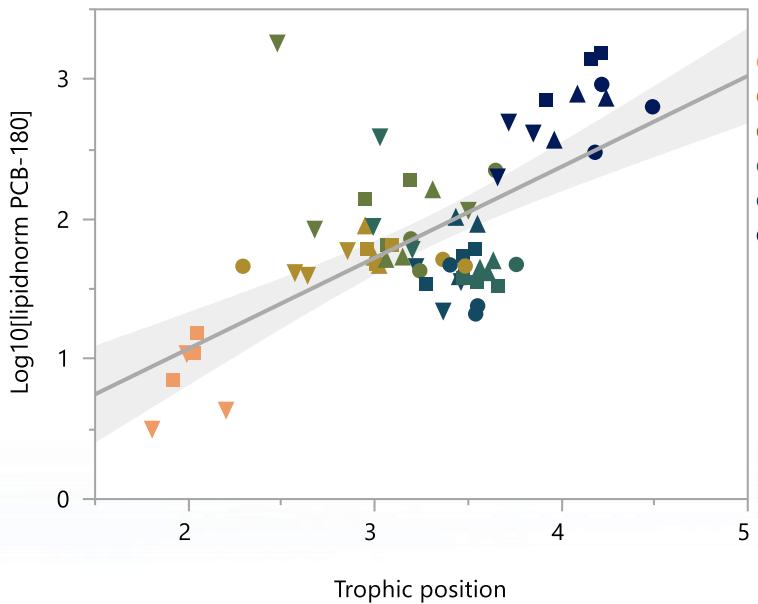


PCB-153



Huber et al. 2015. Environ Toxicol Chem 34:1296-1308.

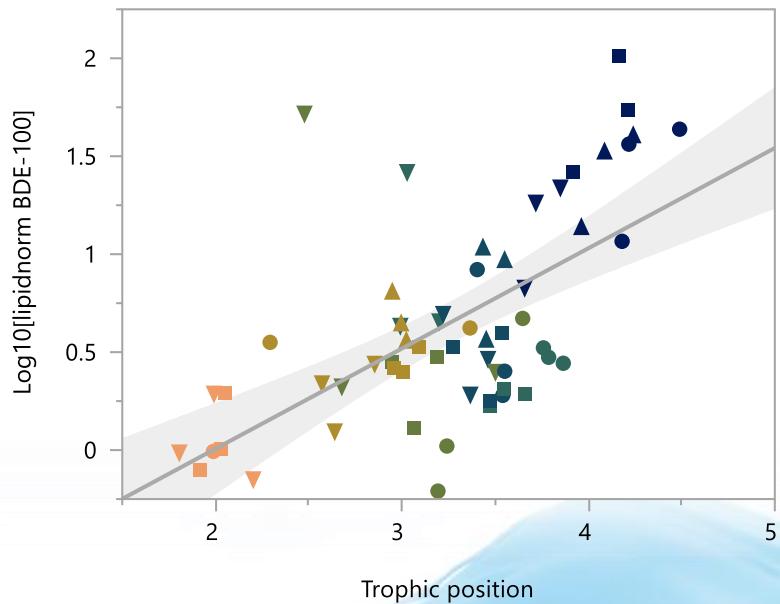
Næringsnettet i Oslofjorden



PCB-180; TMF=4.5

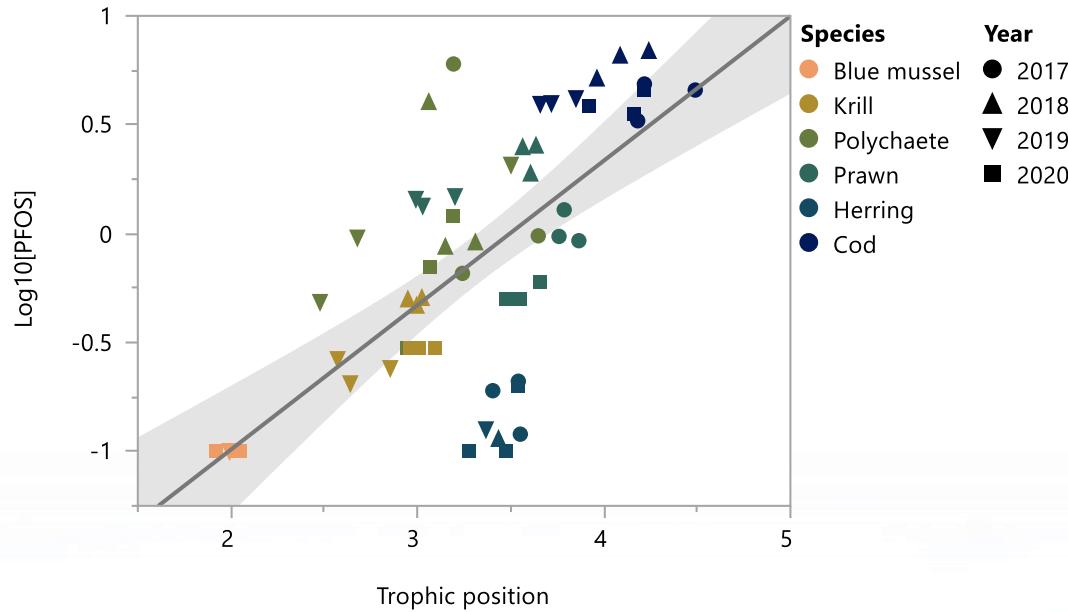
Species
● Blue mussel
▲ Krill
▼ Polychaete
■ Prawn
◆ Herring
● Cod

Year
● 2017
▲ 2018
▼ 2019
■ 2020



BDE-100; TMF=3.2

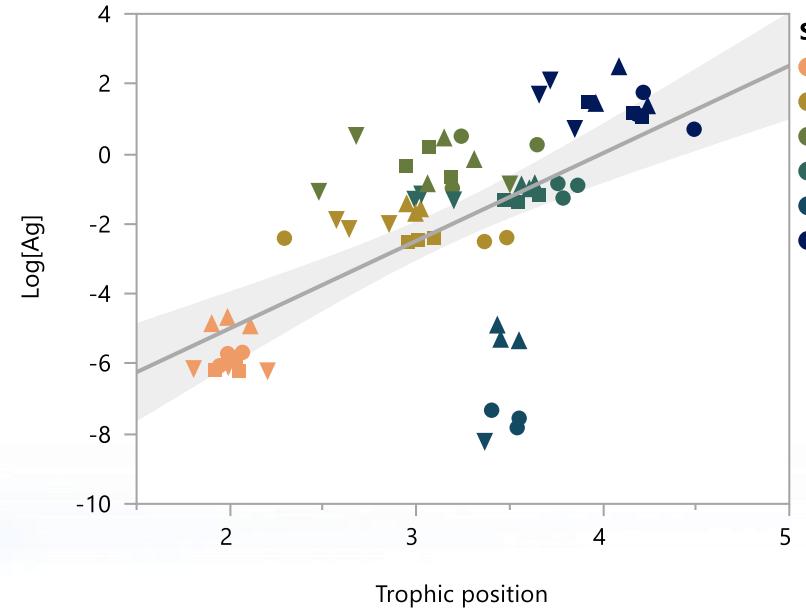
Næringsnettet i Oslofjorden



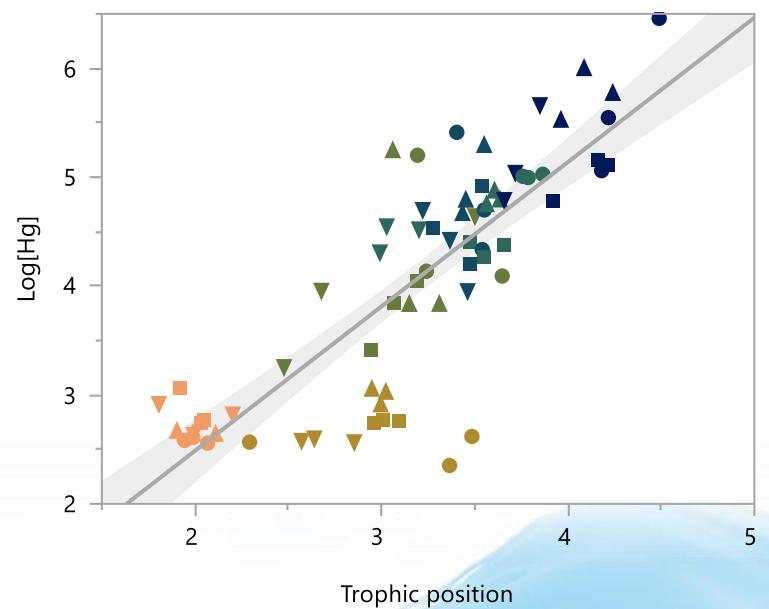
PFOS; TMF=4.6

Næringsnettet i Oslofjorden

80
Hg
200.59

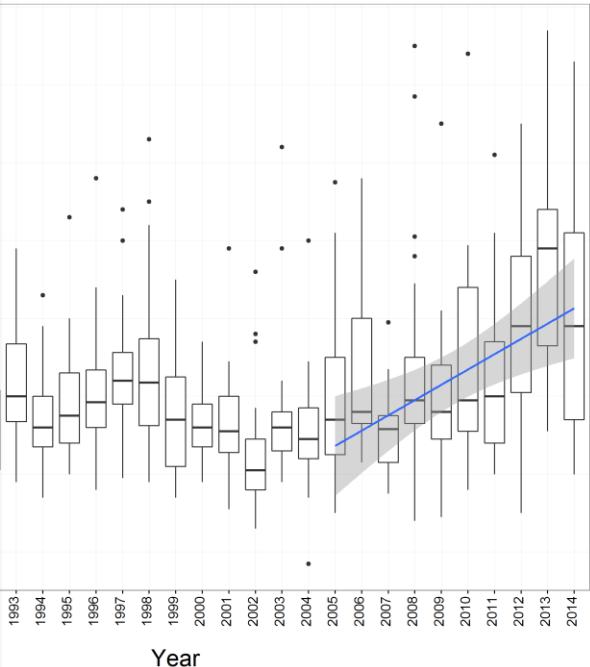
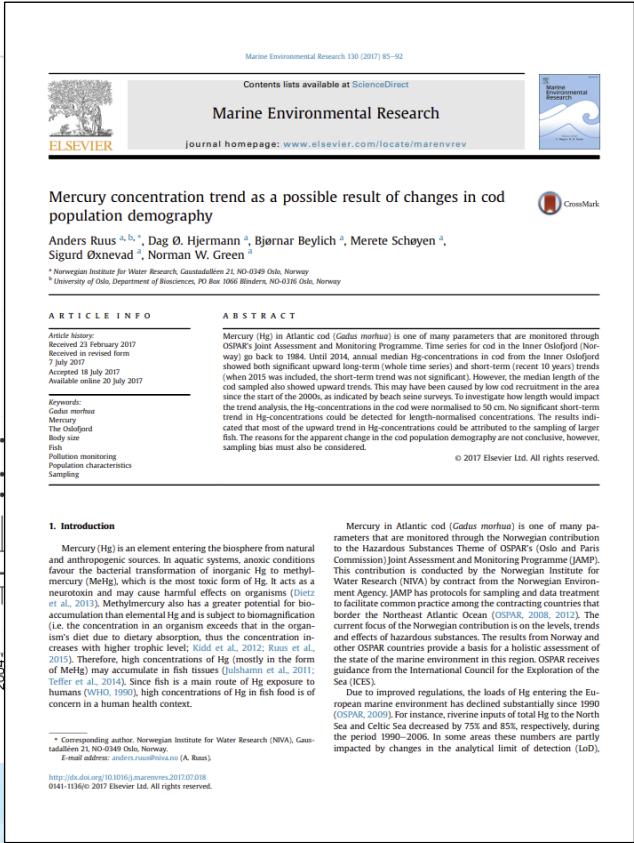
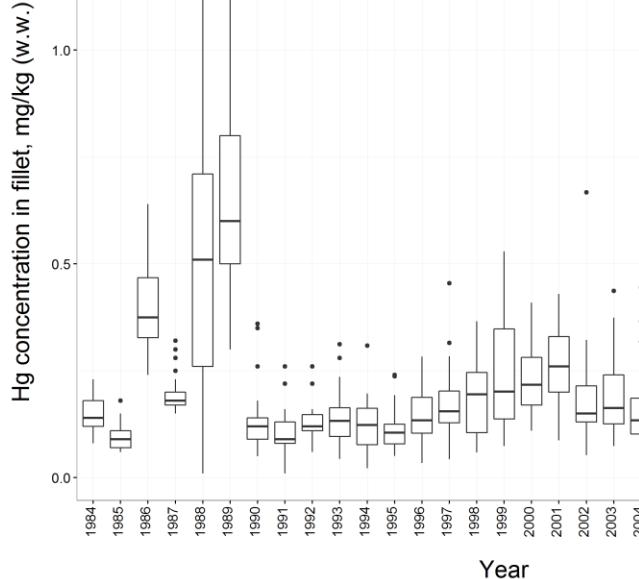


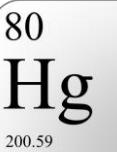
Ag; TMF=12



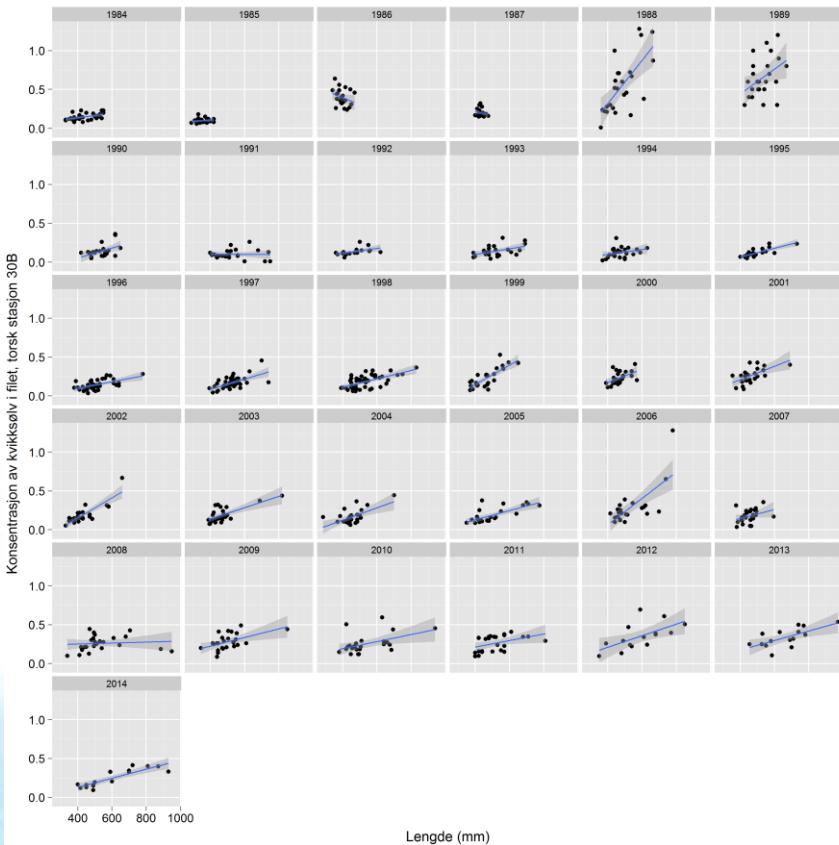
Hg; TMF=3.8

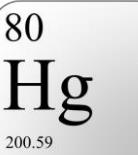
Tidstrend: Hg i torsk fra Oslofjorden



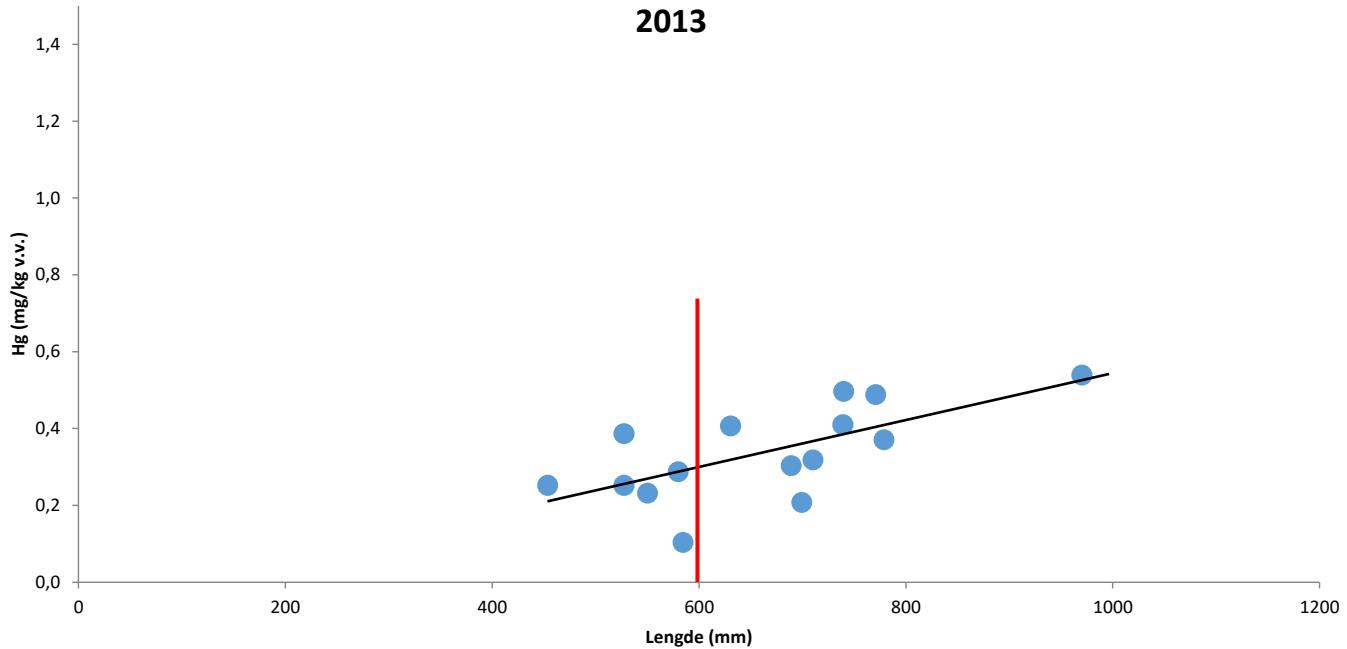


Lengde vs. Kvikksølv, 1984-2014

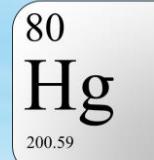
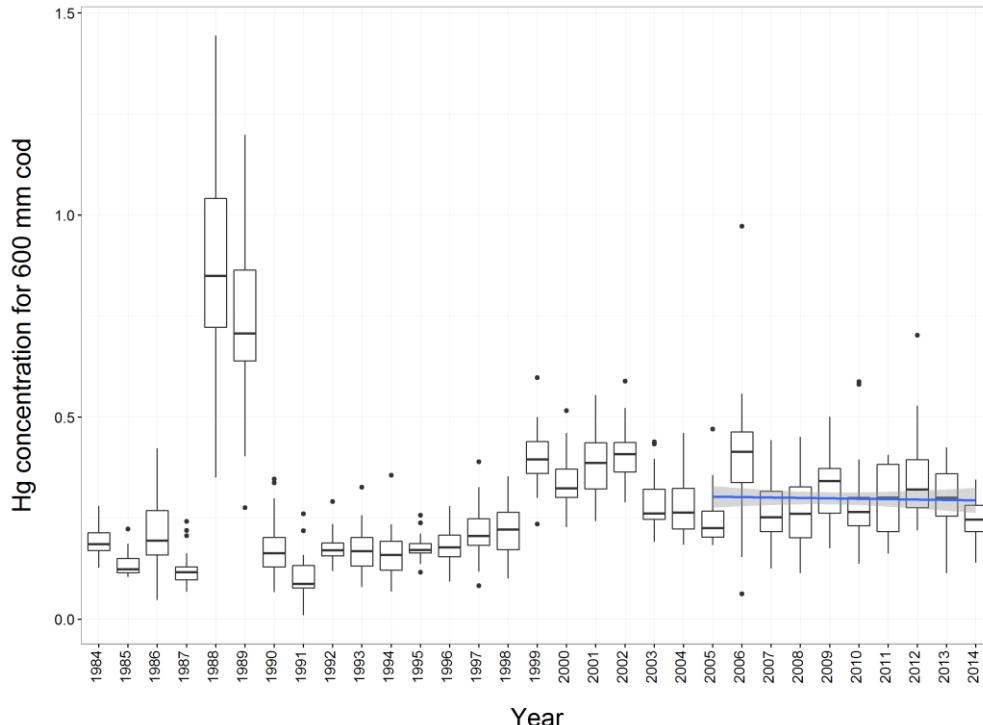


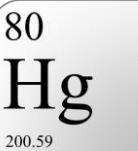


Normalisering

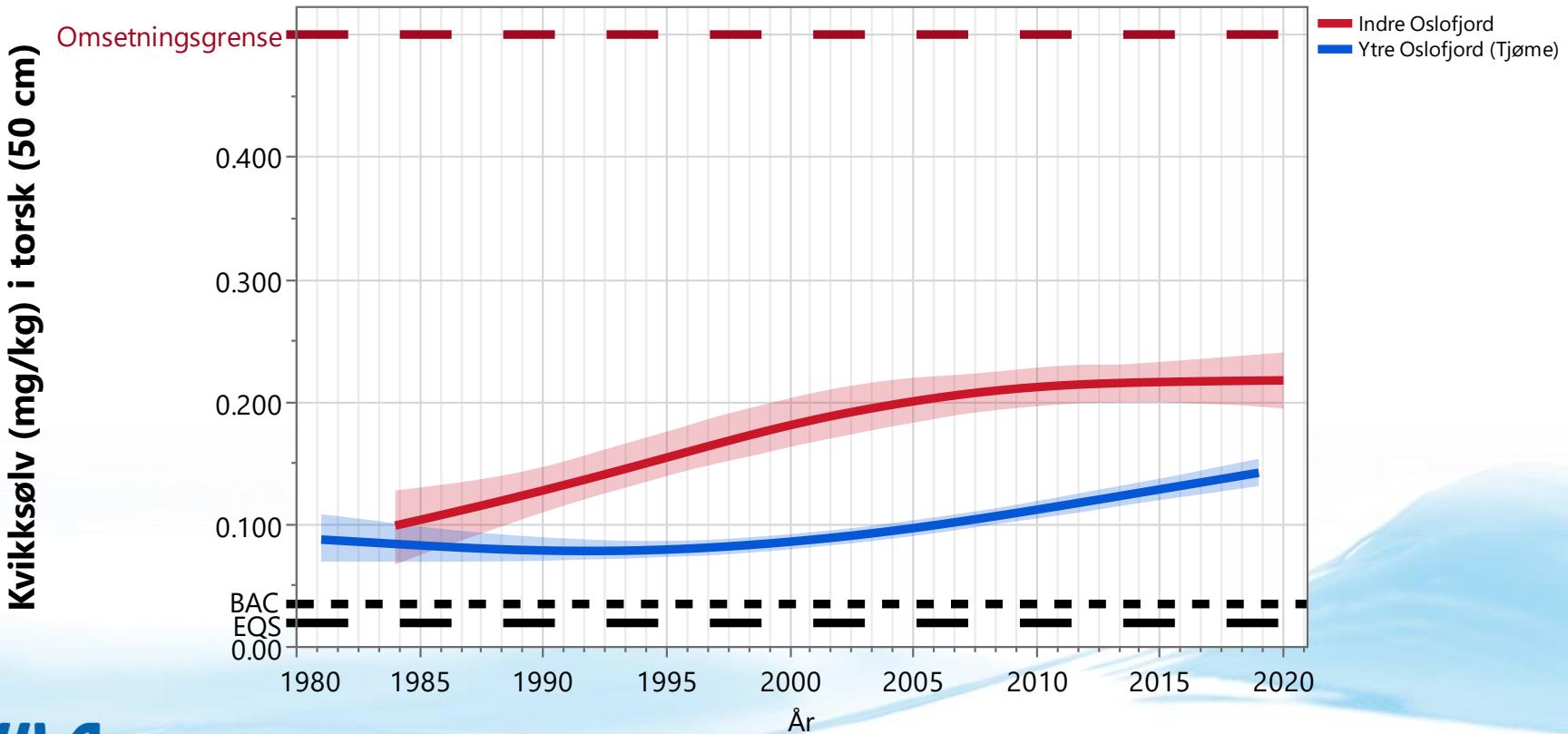


Kvikksølv i torsk (normalisert til 60 cm)





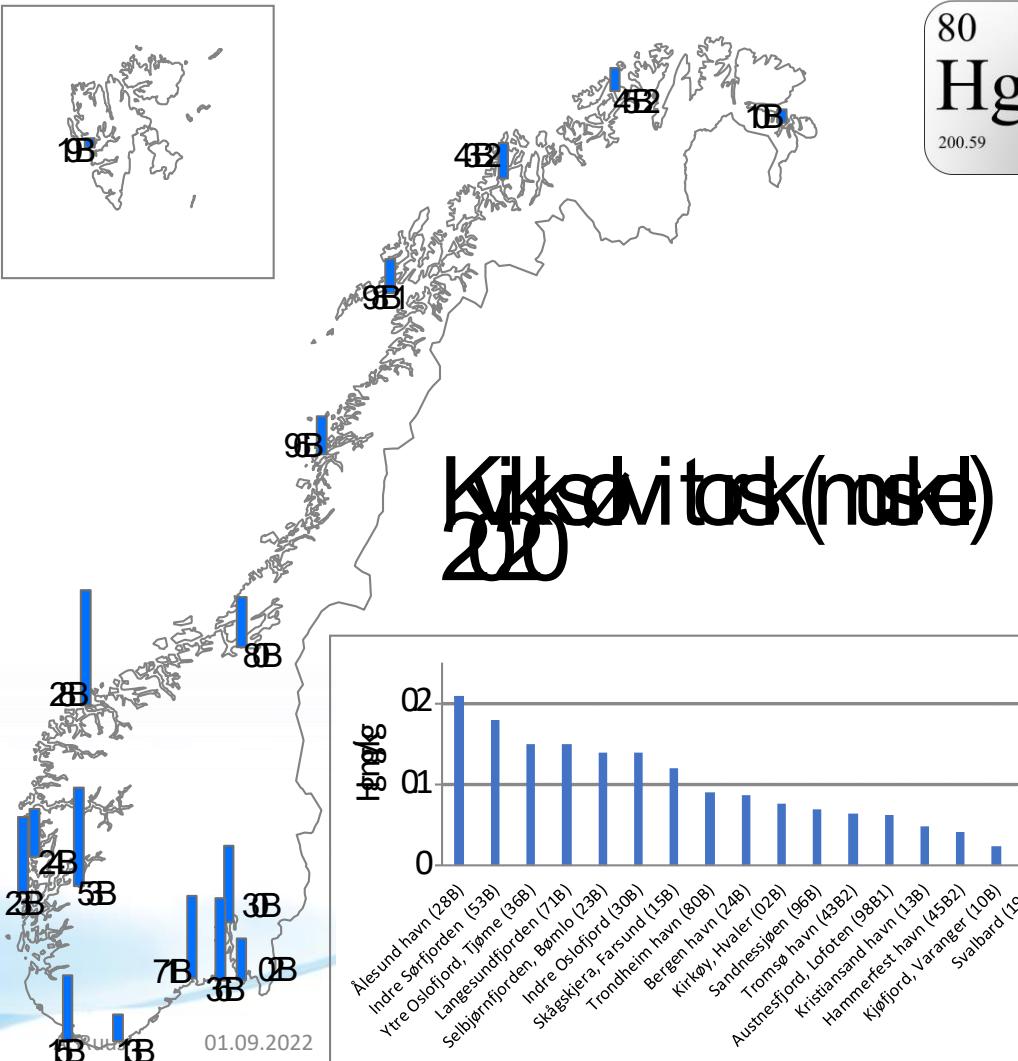
Trend mot 2020





2
8
18
32
18
2

Kysten for øvrig

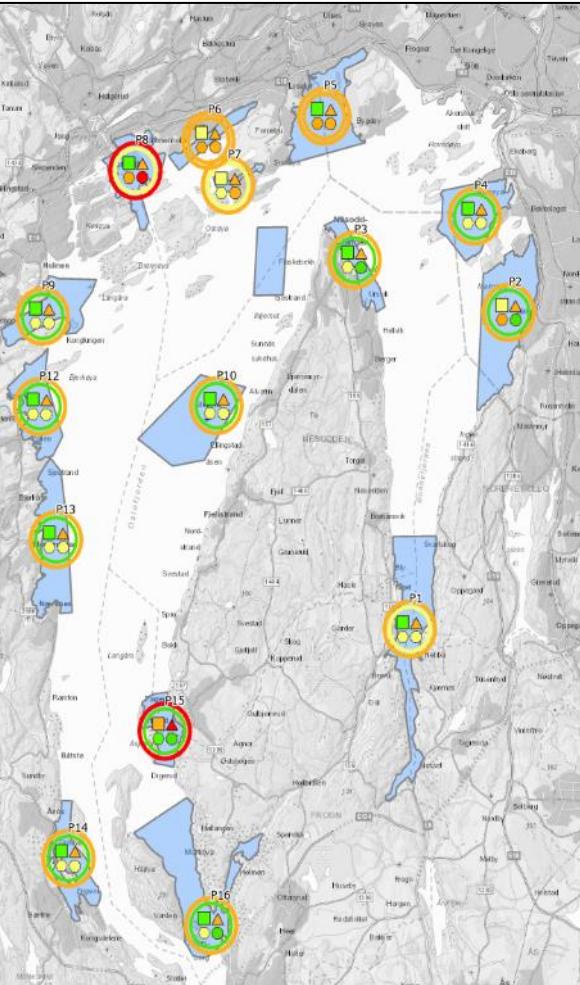
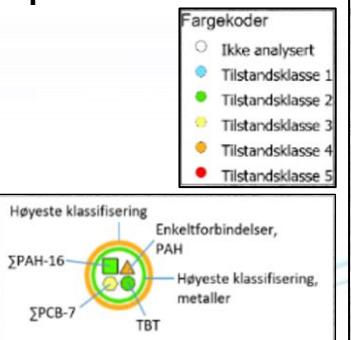


Tilstand sedimenter



Gøril Aasen Slindre

- Trinn 1: Forenklet risikovurdering
- Konklusjon trinn 1: ingen områder har akseptabel økologisk risiko – alle områder med videre til trinn 2
- PAH-forbindelser styrer miljøtilstand i veldig mange sedimentstasjoner i indre Oslofjord



Utfordringer

- Kilder?
 - Hvordan fordeles?
 - Hvordan stoppe?
- Overvann?
 - Bisfenol A, Cu, Zn, As, PFOS
- Havet f.ø. ikke «sink» for PFOS
 - Overflateaktivt; sjøsprøyte sender tilbake i atmosfæren



