



# Eksempler på bruk av miljø-DNA i vannforvaltningen

Frode Fossøy  
Seniorforsker



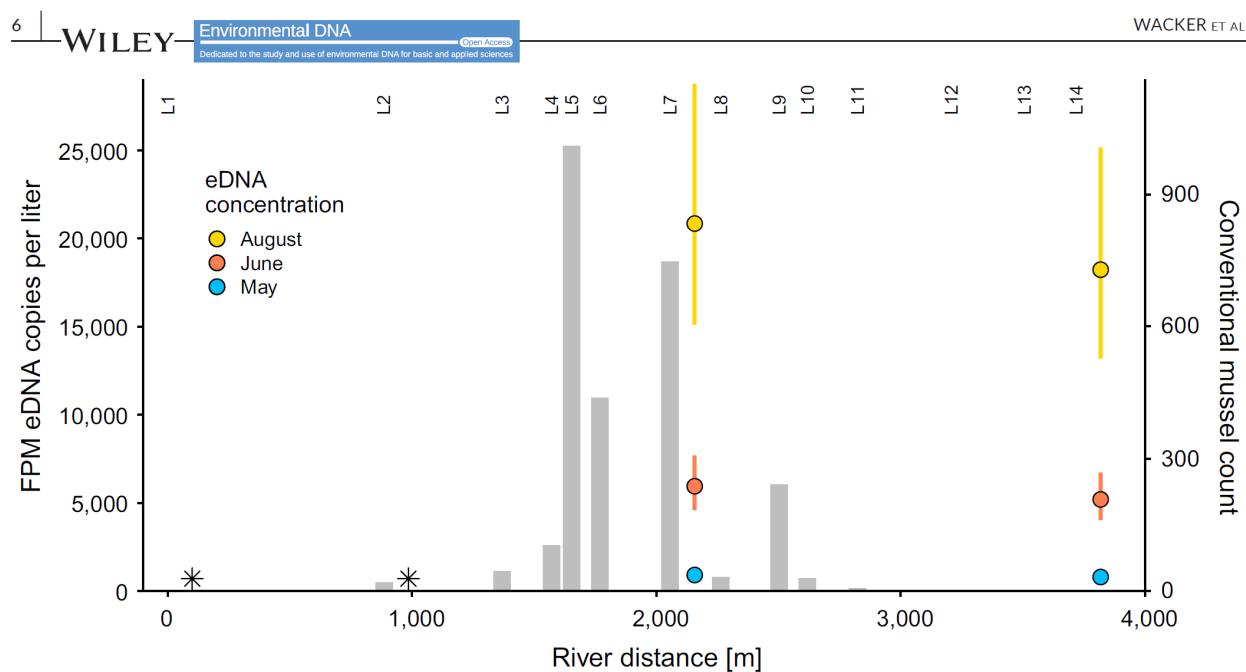
**Artsspesifikke analyser**

**qPCR/ddPCR**

# Trua arter Elvemusling



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Received: 2 November 2018 | Revised: 20 March 2019 | Accepted: 27 March 2019  
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**ORIGINAL ARTICLE**

**Downstream transport and seasonal variation in freshwater pearl mussel (*Margaritifera margaritifera*) eDNA concentration**

Sebastian Wacker  | Frode Fossøy  | Bjørn Mejdell Larsen | Hege Brandsegg | Rolf Sivertsgård | Sten Karlsson

# Trua arter

## Stor- og småsalamander

www.nina.no

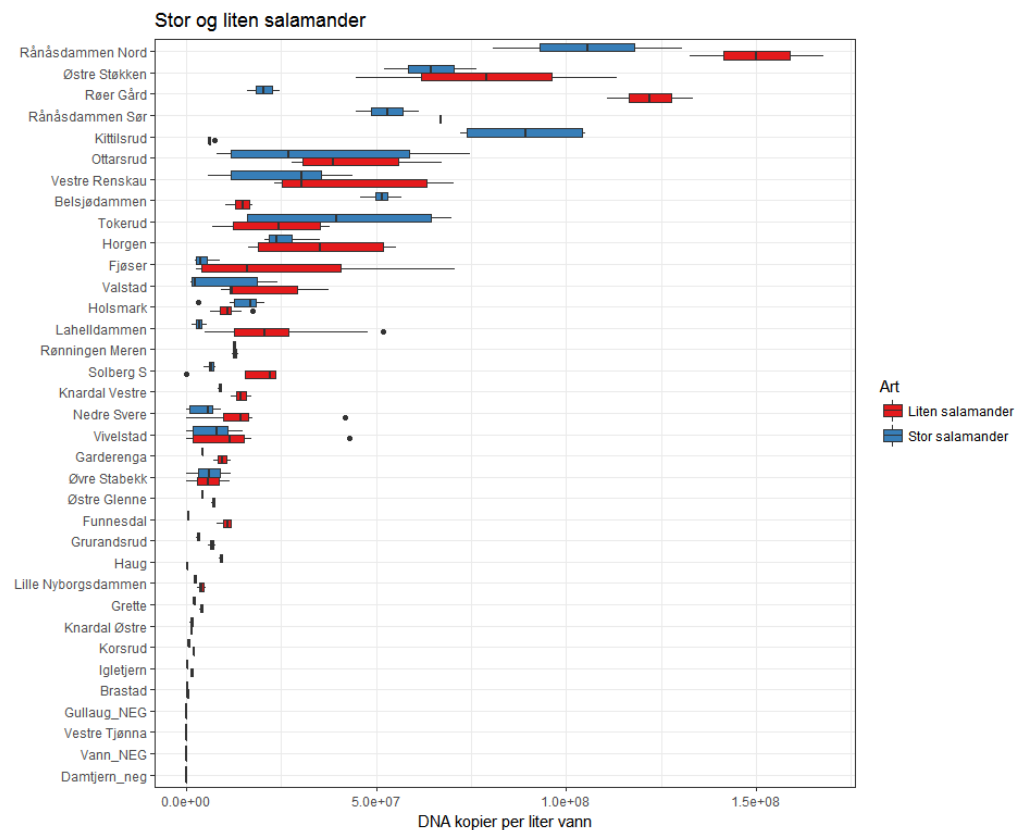
**1476** NINA Rapport

### Bruk av miljø-DNA til overvåkning av små- og storsalamander

Annette Taugbøl, Børre K. Dervo, Rolf Sivertsgård, Hege Brandsegg og Frode Fossøy.



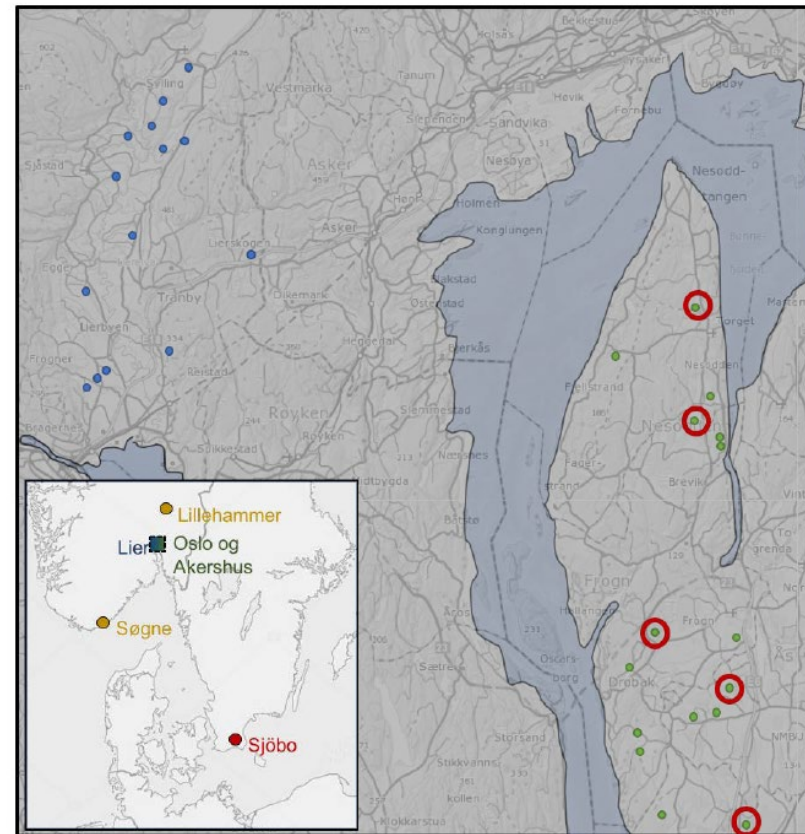
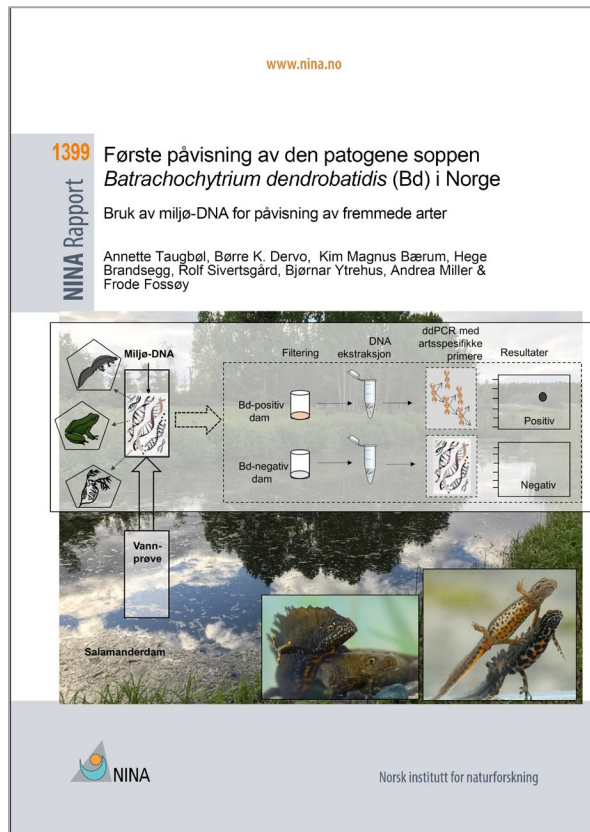
NINA  
Norsk institutt for naturforskning





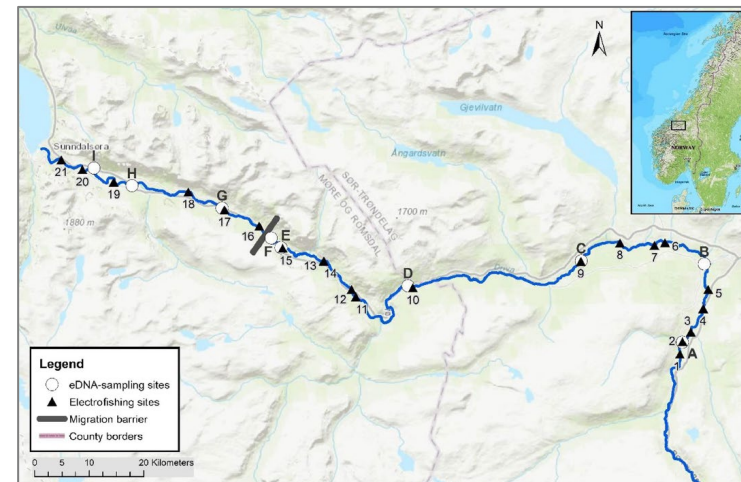
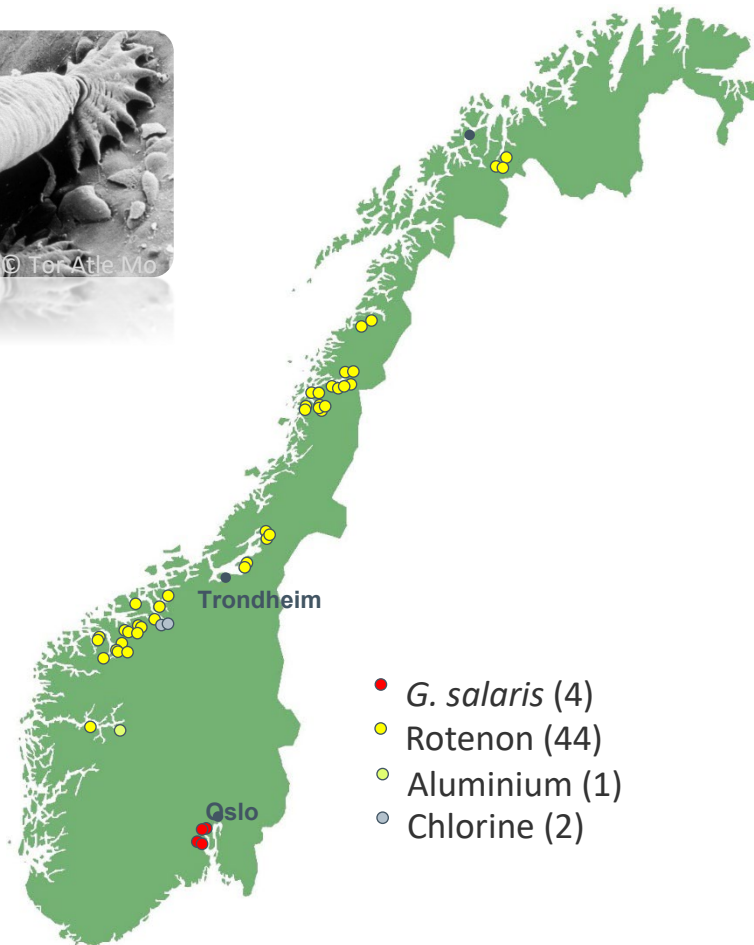
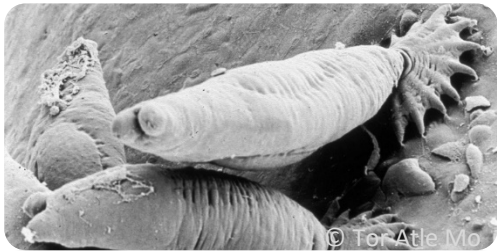
# Fremmede arter

## *Batrachochytrium dendrobatidis* (Bd)



# Fremmede arter

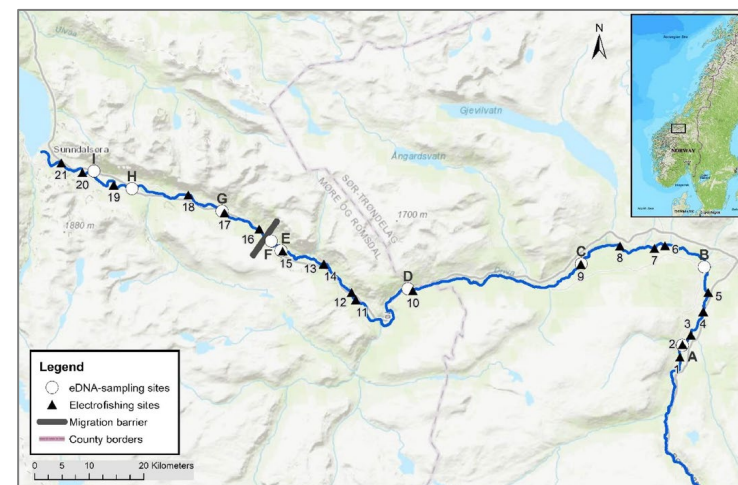
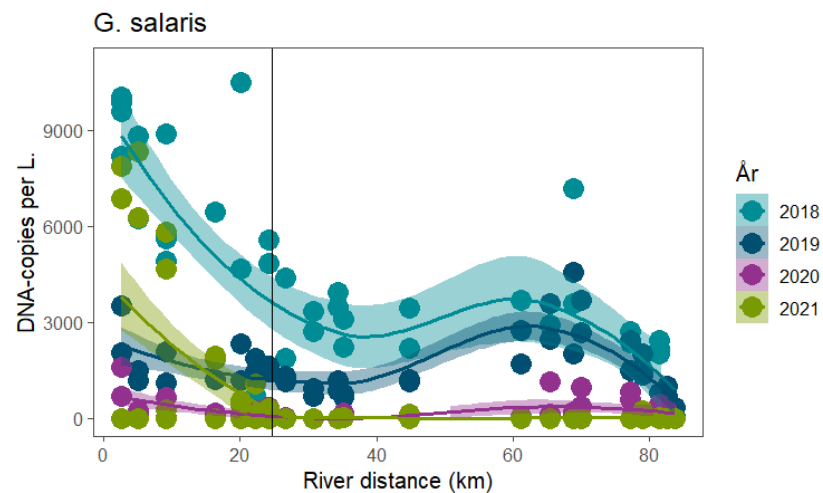
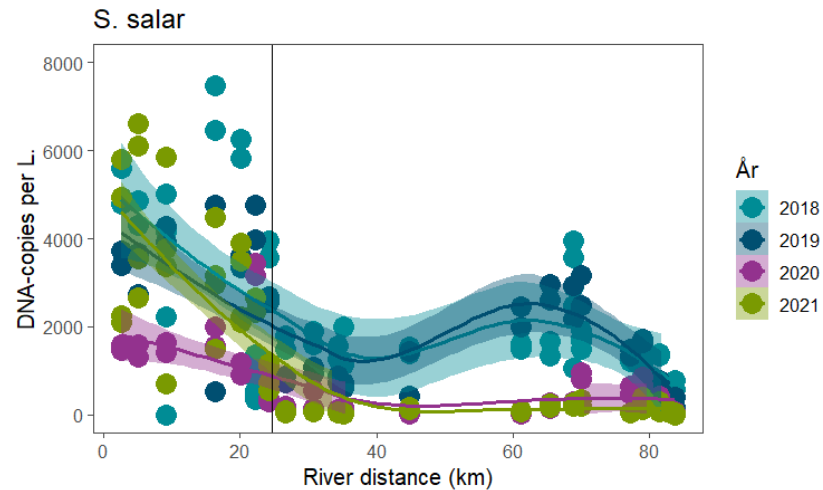
## *Gyrodactylus salaris*





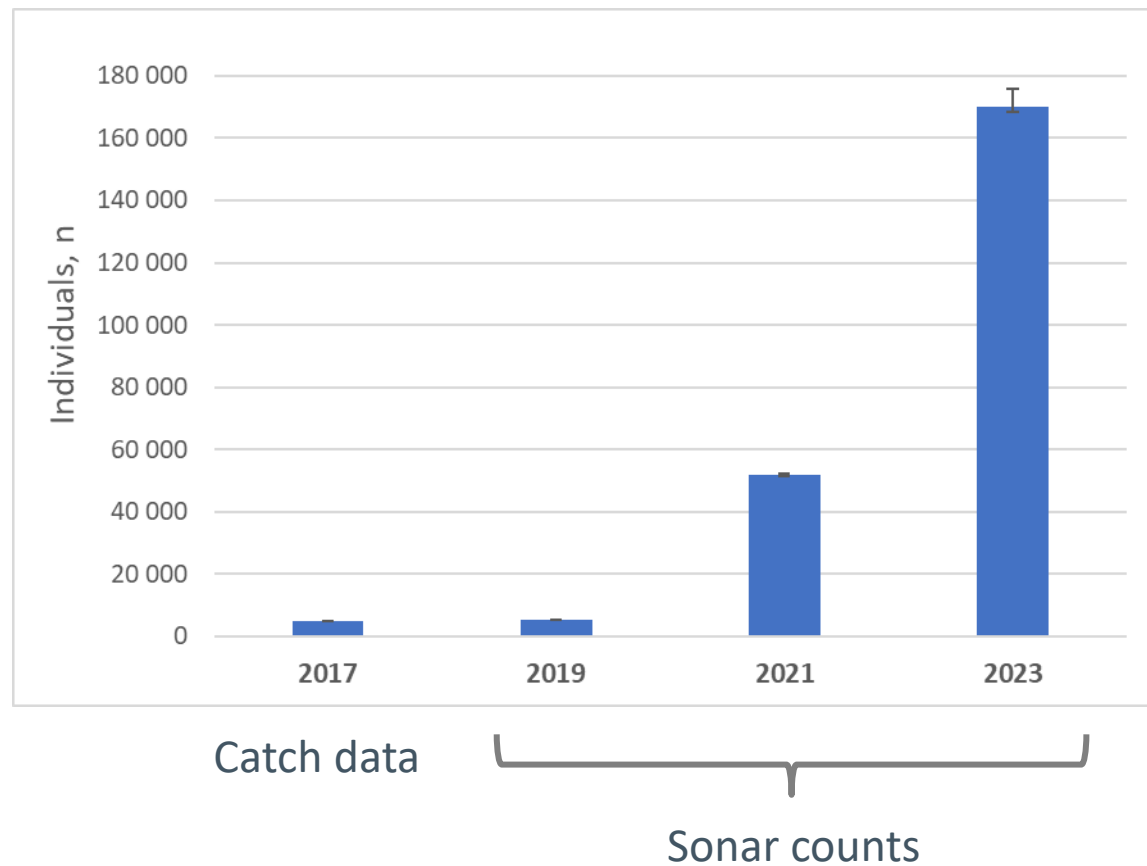
# Fremmede arter

## *Gyrodactylus salaris*





# Fremmede arter Pukkellaks

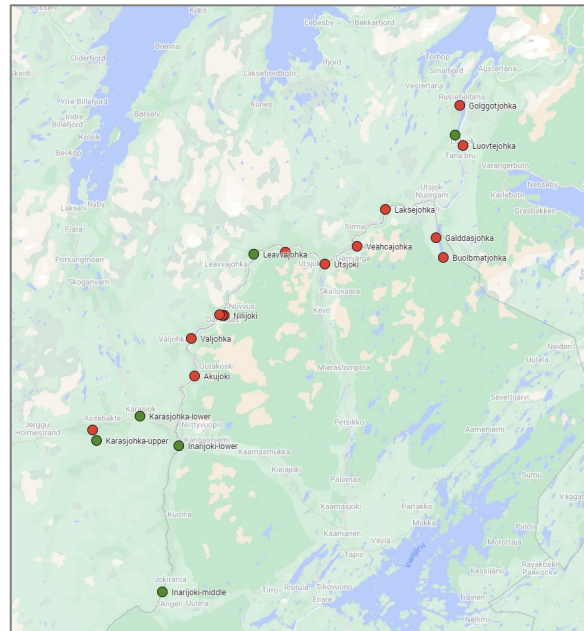


Hvordan overvåke  
når fiske blir stengt?

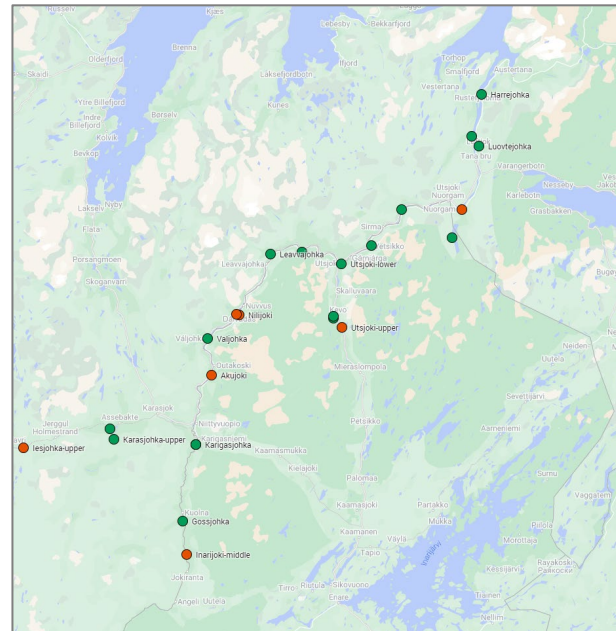
# Fremmede arter Pukkellaks



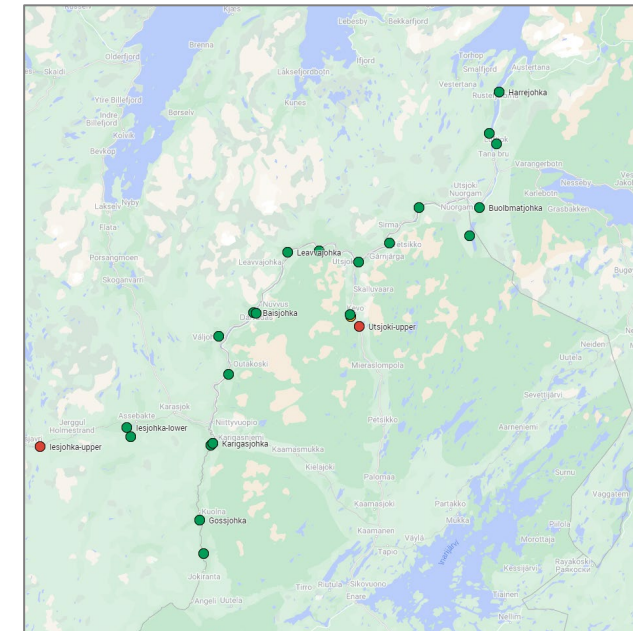
Tana 2019



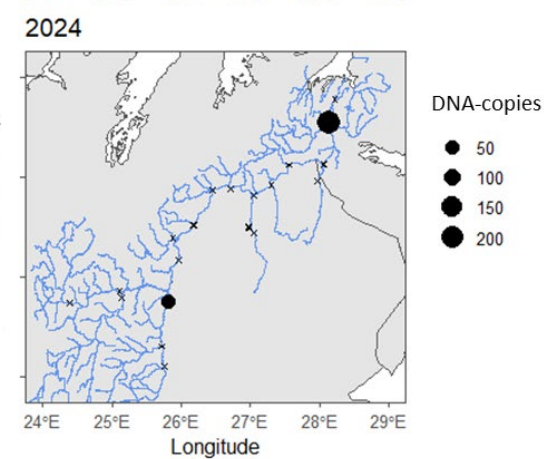
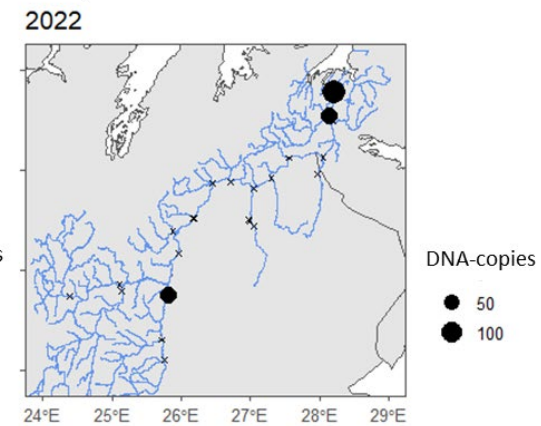
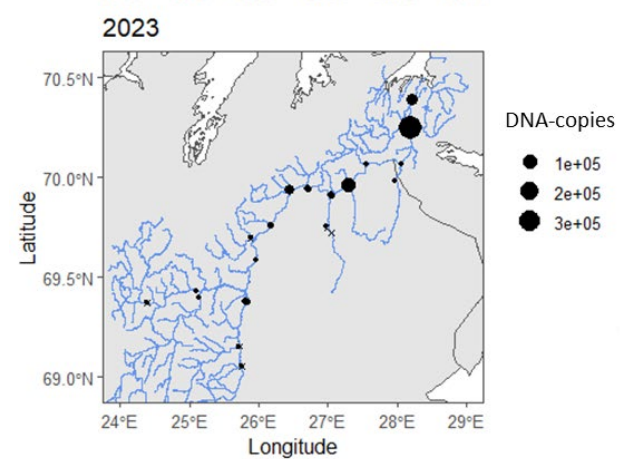
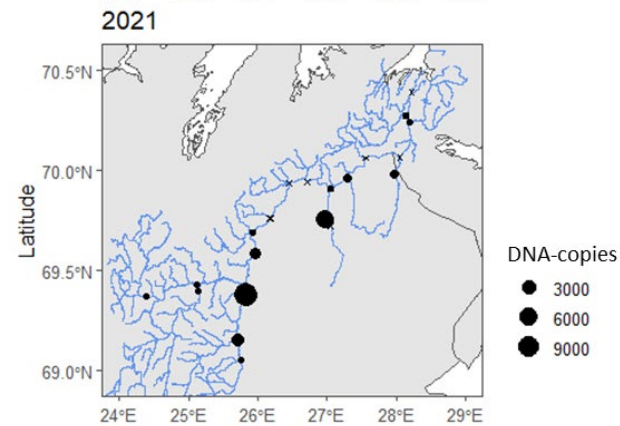
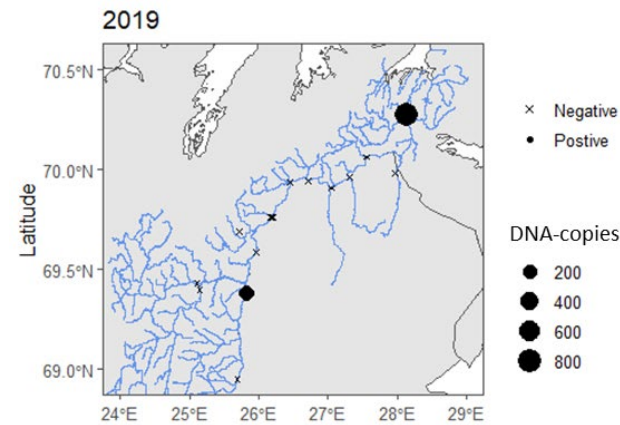
Tana 2021



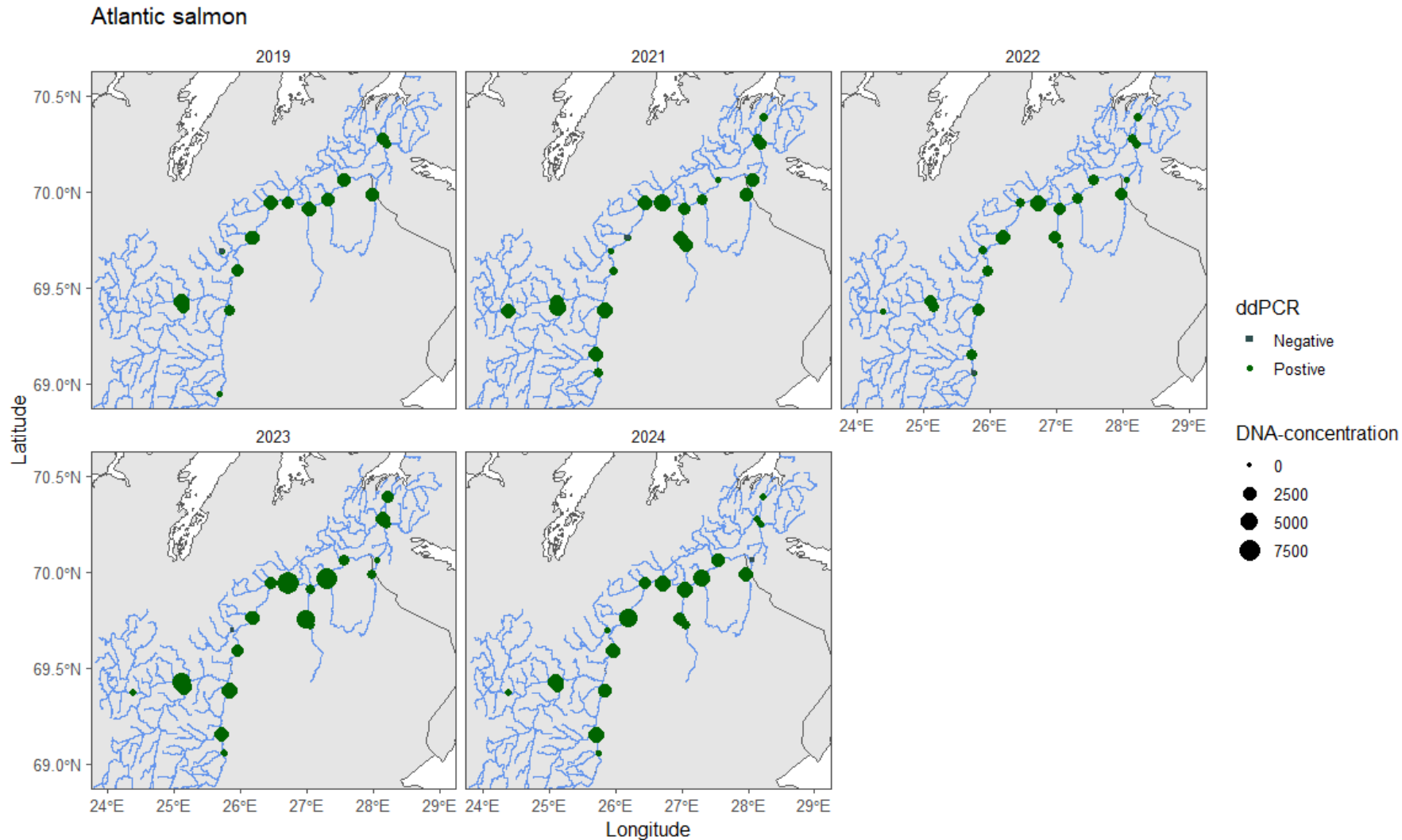
Tana 2023



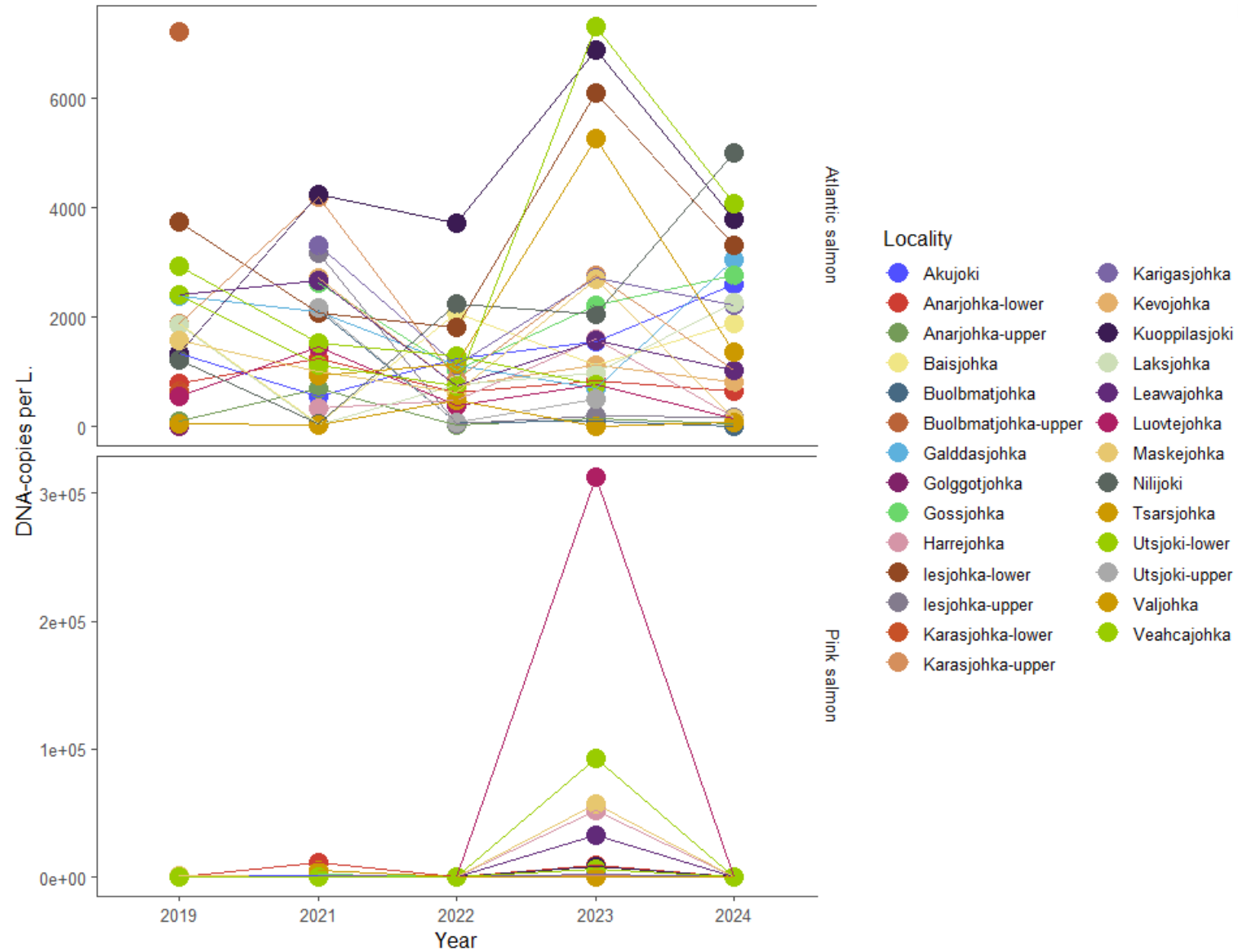
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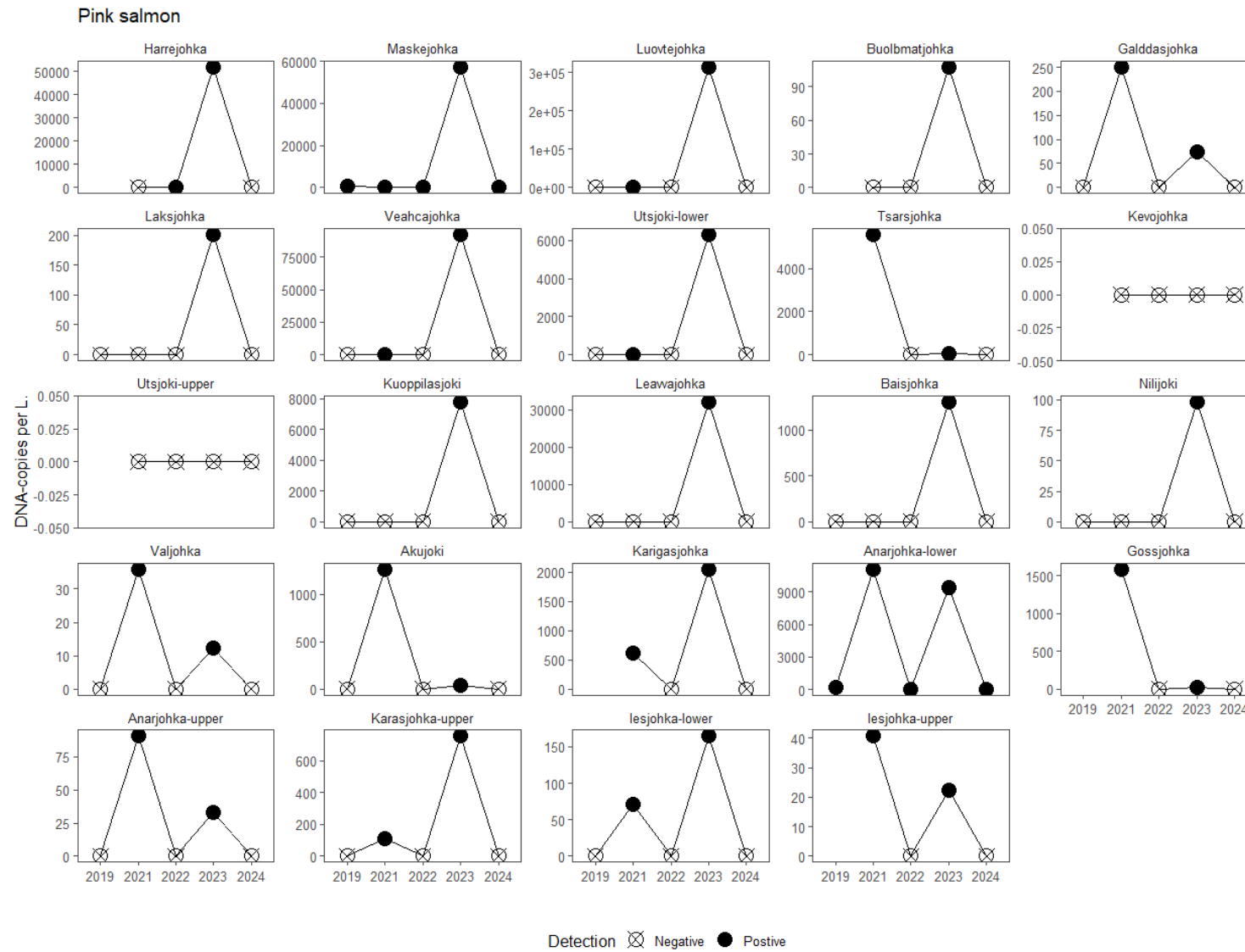


# Fremmede arter Pukkellaks

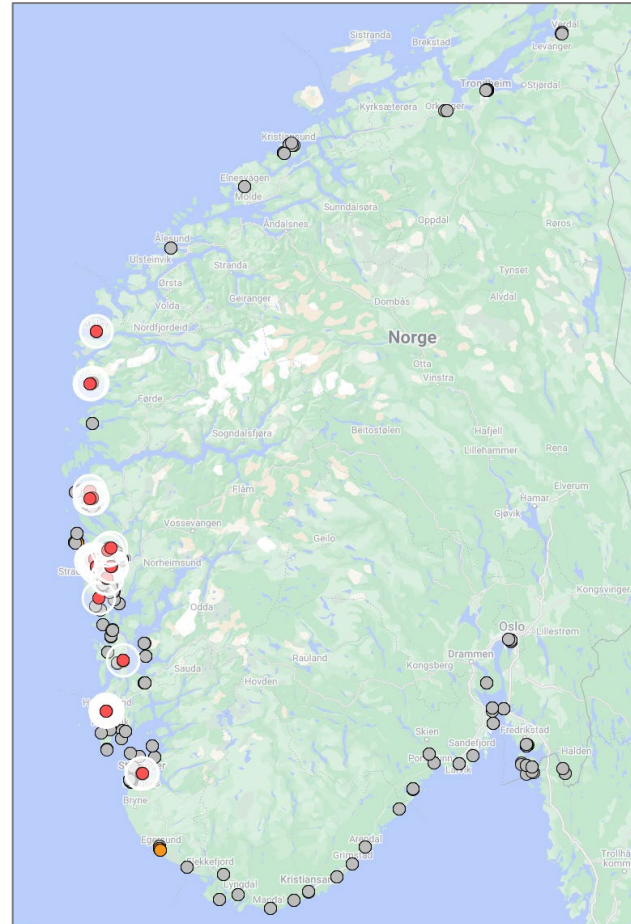








# Fremmede arter Havnespy





**Arts-generelle analyser**

**DNA-metastrekkoding**

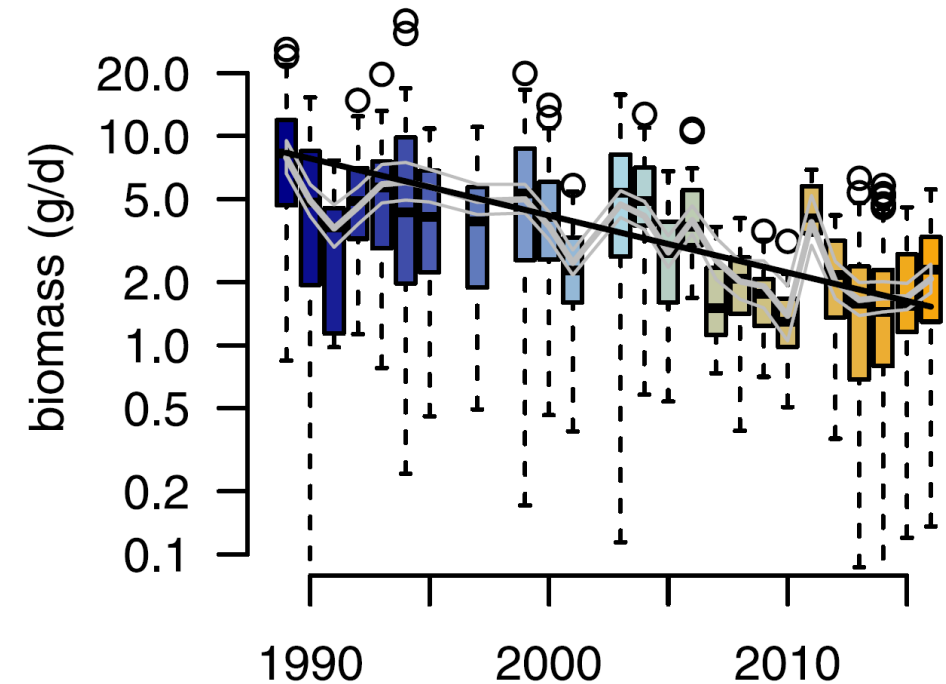


# Stort tap av insekter globalt

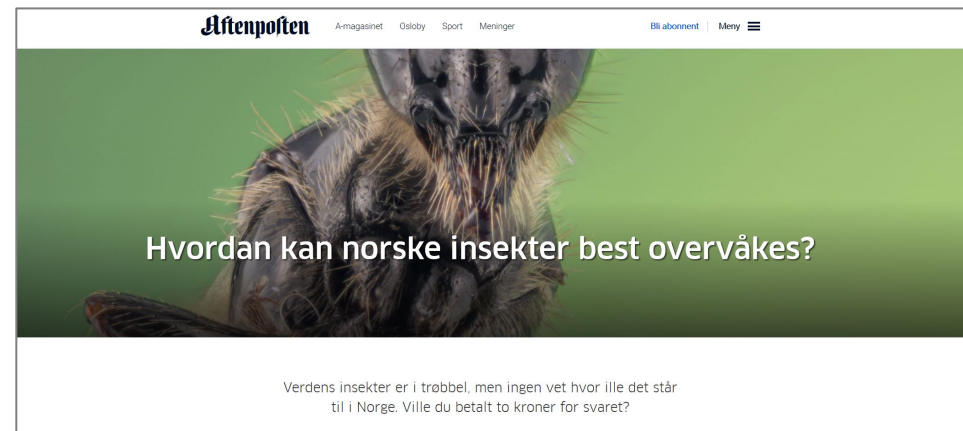
RESEARCH ARTICLE

## More than 75 percent decline over 27 years in total flying insect biomass in protected areas

Caspar A. Hallmann<sup>1\*</sup>, Martin Sorg<sup>2</sup>, Eelke Jongejans<sup>1</sup>, Henk Siepel<sup>1</sup>, Nick Hofland<sup>1</sup>, Heinz Schwan<sup>2</sup>, Werner Stenmans<sup>2</sup>, Andreas Müller<sup>2</sup>, Hubert Sumser<sup>2</sup>, Thomas Hörrén<sup>2</sup>, Dave Goulson<sup>3</sup>, Hans de Kroon<sup>1</sup>



# Norsk insektovervåking





# Norsk insektovervåking



**Samfunnsøkonomisk beregning:**  
- MENON Economics

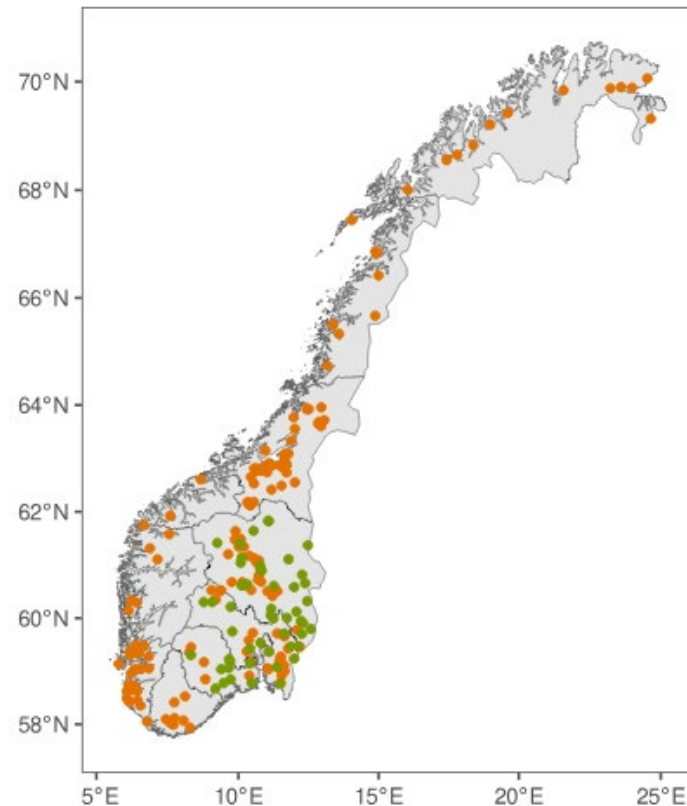
**Morfologisk identifikasjon:**

**480 millioner NOK per år**

**DNA-basert identifikasjon:**

**19.3 millioner NOK per år**

# Norsk insektovervåking



- Ca. 19.000 insektarter registrert i Norge (Artsdatabanken)
- **Ca. 27.000** flyvende insekter estimert fra DNA per nå

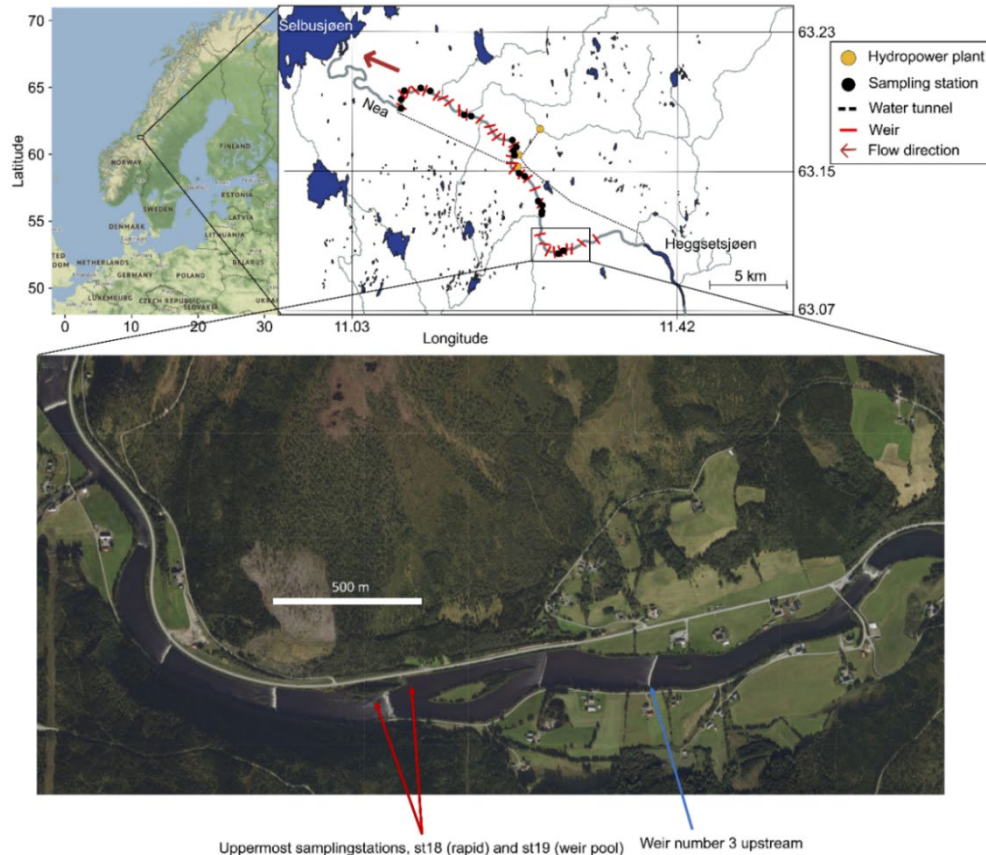


# Vannforskriften og arts mangfold



# Nea i Trøndelag

## Avbøtende tiltak: 34 terskler på 32 km



Hydrobiologia  
<https://doi.org/10.1007/s10750-023-05448-4>

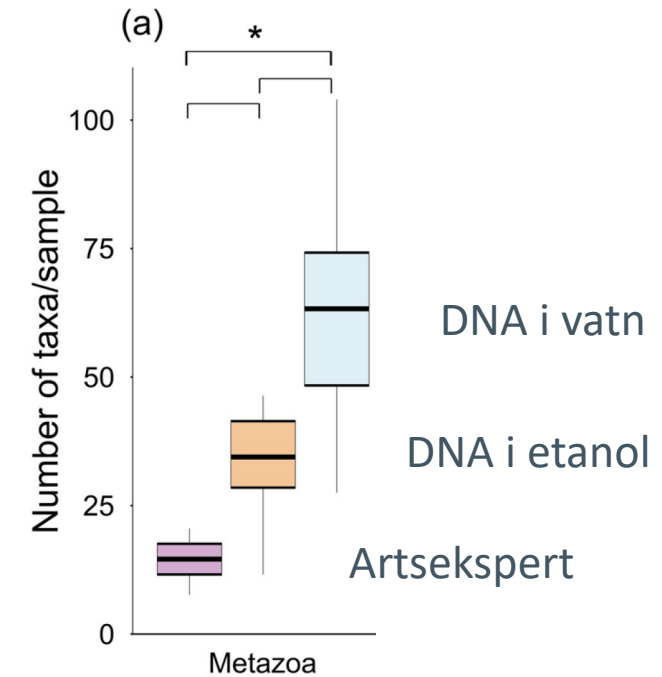
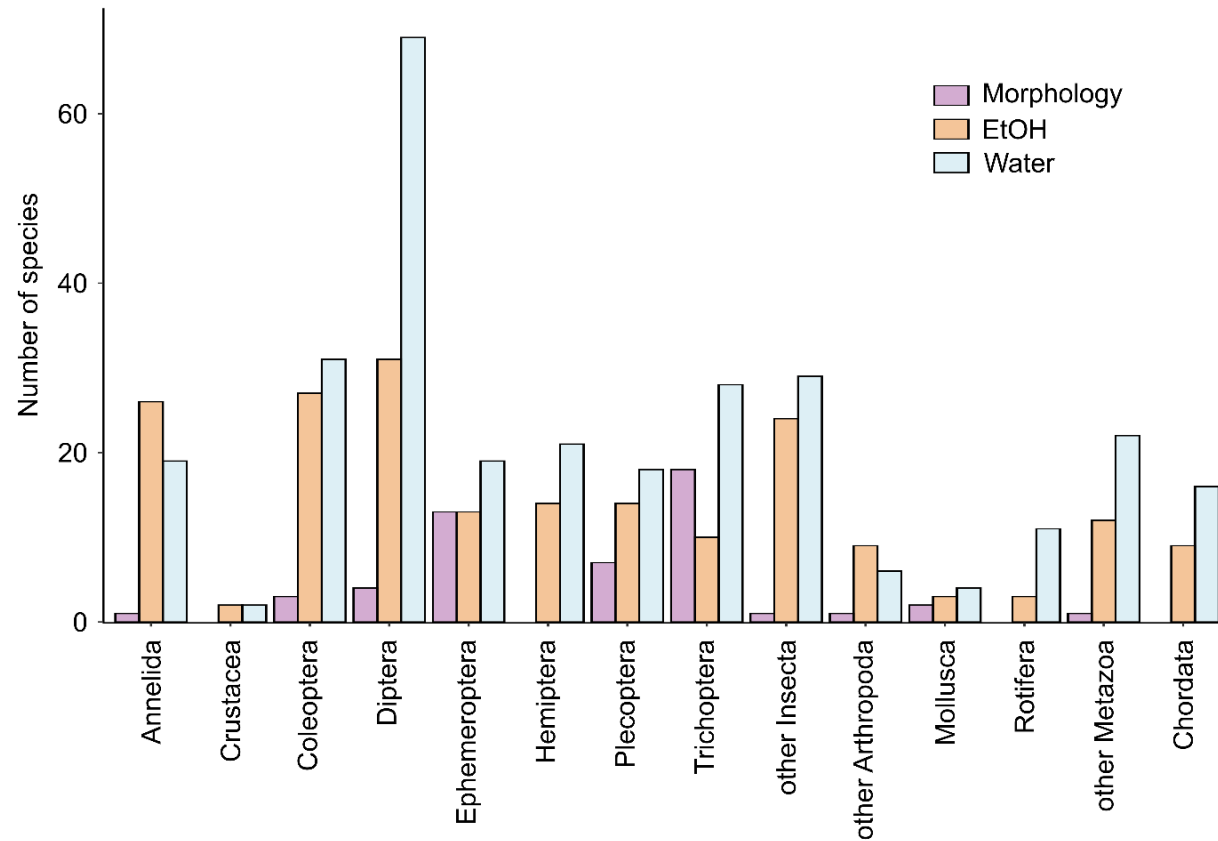
PRIMARY RESEARCH PAPER



## Comparing methods and indices for biodiversity and status assessment in a hydropower-regulated river

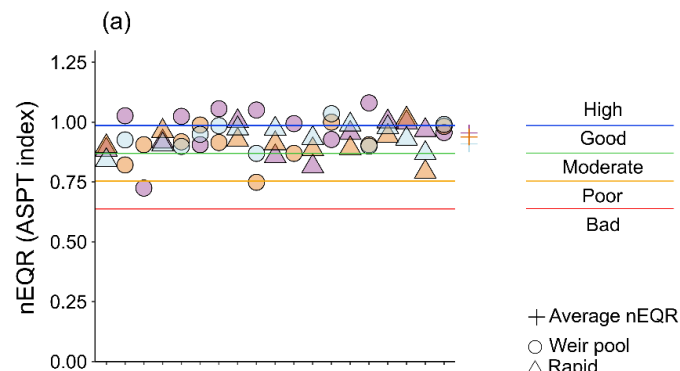
Markus Majaneva  · Line Elisabeth Sundt-Hansen  · Hege Brandsegg  ·  
Rolf Sivertsgård · Terje Bongard  · Frode Fossøy 

# Vannforskriften og arts mangfold

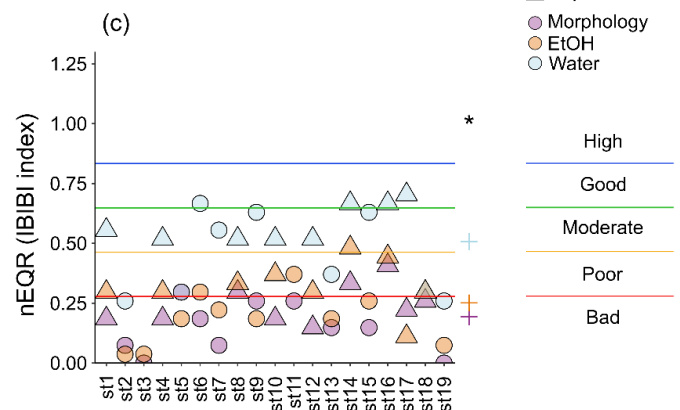


# Vannforskriften og arts mangfold

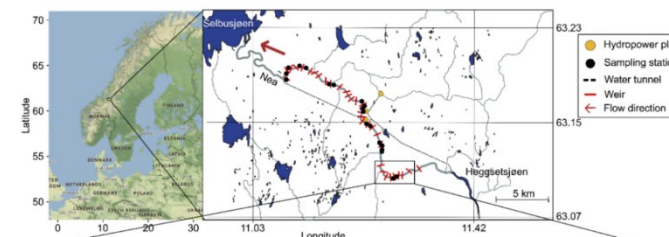
Vannforskriften: ASPT



Alternativ indeks: IBIBI



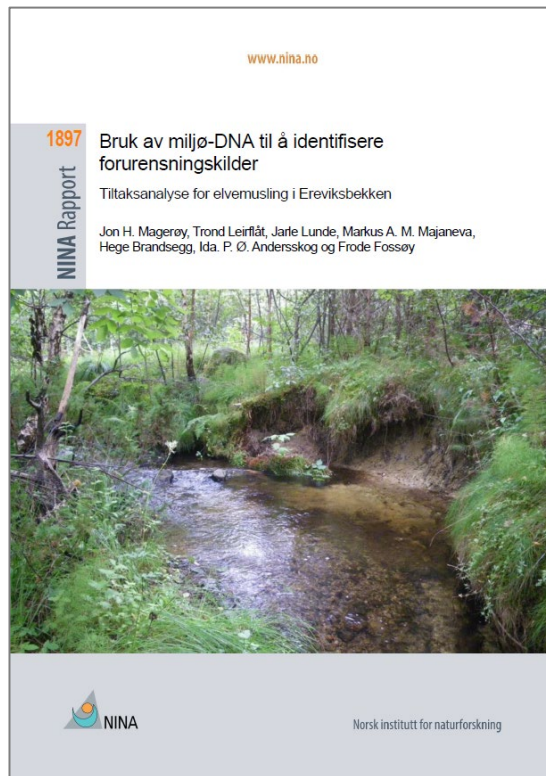
## Elva Nea i Selbu - 34 tersklar på 32 km



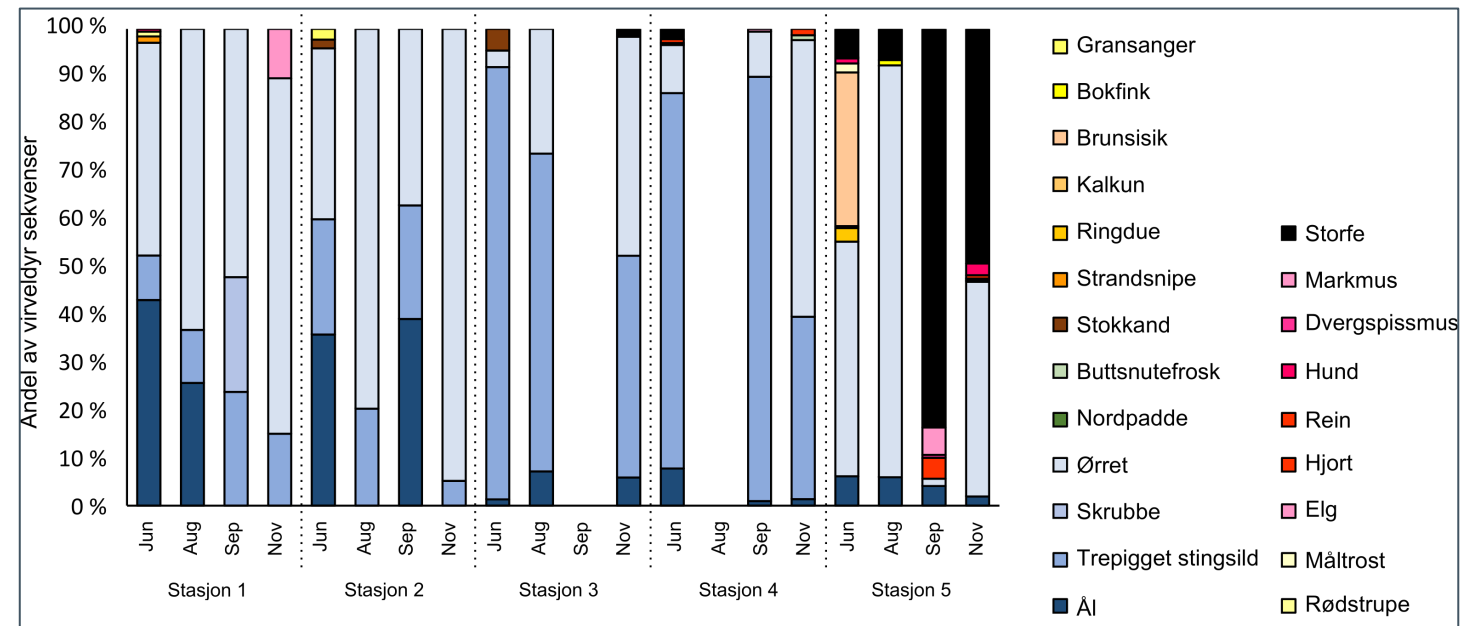
Uppermost sampling stations, st18 (rapid) and st19 (weir pool) Weir number 3 upstream



# Forurensningskilder og miljø-DNA



Decreasing mussel population - increasing nitrate concentrations



# Marine fremmede arter

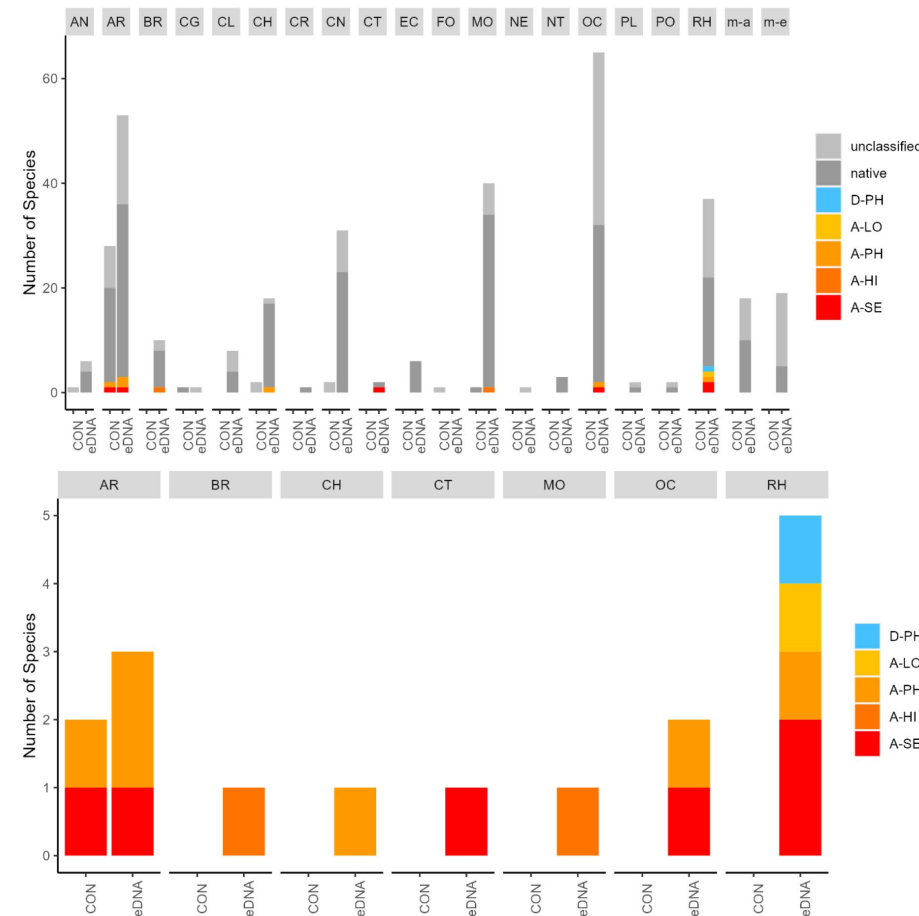


# Marine fremmede arter

Monitoring marine alien species in Norway  
A pilot study for implementing a national program



**Authors:** Vivian Husa, Frode Fossøy, Marie Davey, Ann-Lisbeth Agnalt, Hege Brandsegg, Leif Bruntveit, Mette Eilertsen, Elisabeth Forsgren, Ellen Sofie Grefsrud, Barbro Taraldset Haugland, Siri Aaserud Olsen, Ragni Olsson, Rudolf Svensen, Øyvind Svensen.



Zooplankton



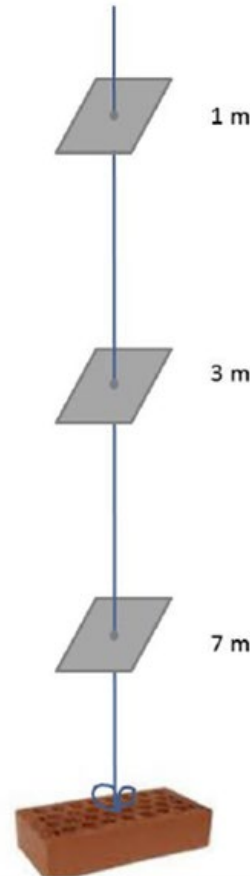
# Marine fremmede arter

## Begroingsplater

Monitoring marine alien species in Norway  
A pilot study for implementing a national program



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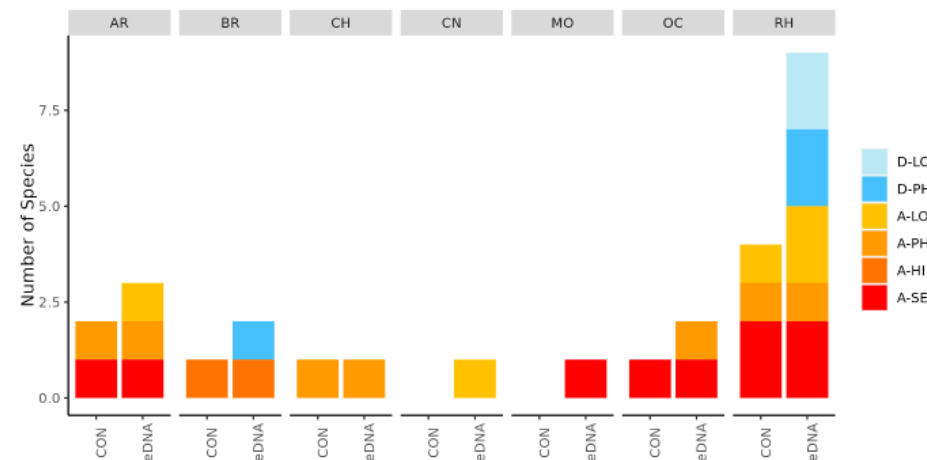
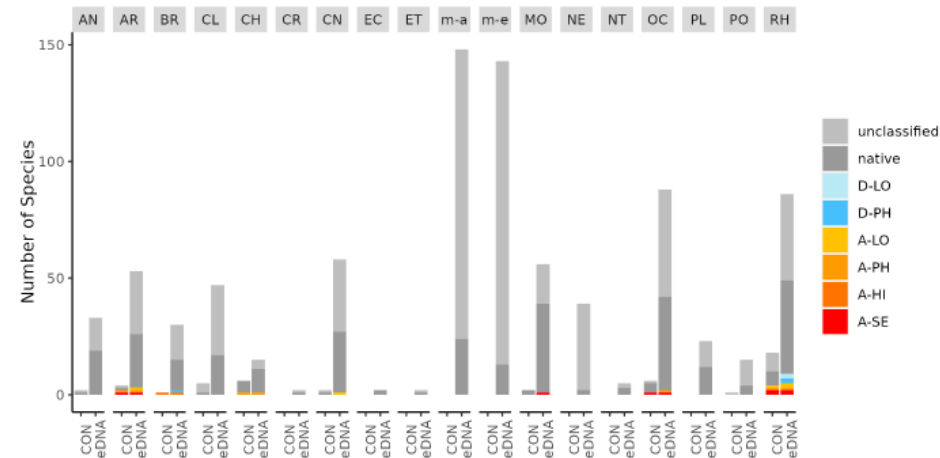


# Marine fremmede arter

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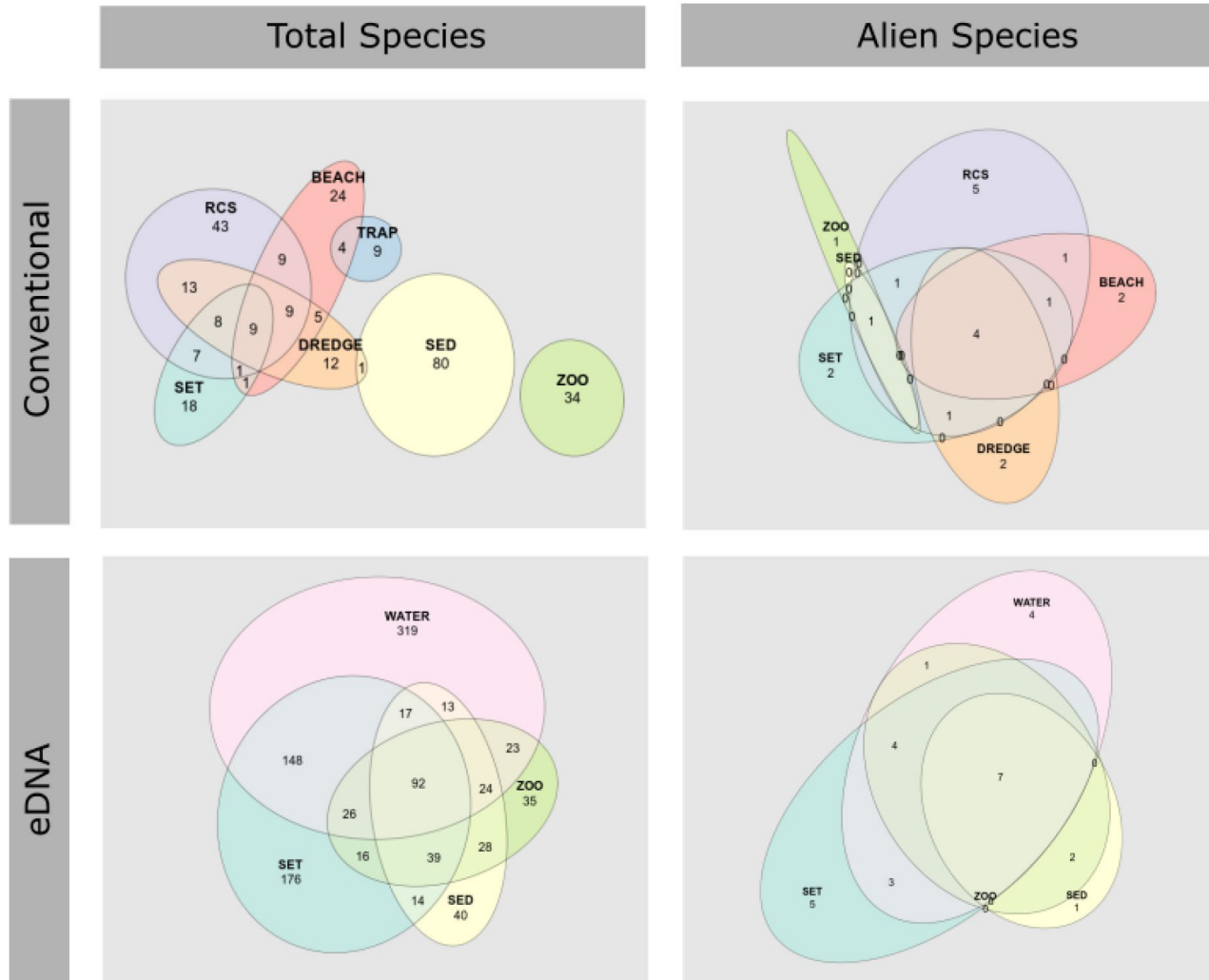


**Authors:** Vivian Husa, Frode Fossøy, Marie Davey, Ann-Lisbeth Agnalt, Hege Brandsegg, Leif Bruntveit, Mette Eilertsen, Elisabeth Forsgren, Ellen Sofie Grefsrud, Barbro Taraldset Haugland, Siri Aaserud Olsen, Ragni Olsson, Rudolf Svensen, Øyvind Svensen.



Begroingsplater

# Marine fremmede arter



# Hva kan vi bruke miljø-DNA til?

- Påvise ørret, laks, ål, gjedde eller andre fiskearter
- Påvise amfibier
- Påvise sykdommer og patogener
- Beskrive hele fiskesamfunn
- Beskrive bunndyrssamfunn (ASPT-indeks med mer)
- Identifisere forurensningskilder

