

eDNA:

New technology for assessing
biodiversity in lakes and rivers

Frode Fossøy

HydroCen UDoE Webinar 16. June 2020

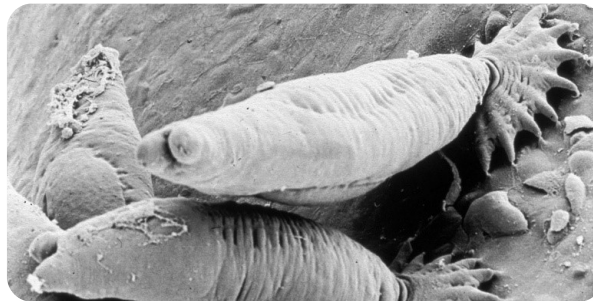


NINA and eDNA

River pearl mussel



Gyrodactylus salaris



Northern pike



Bees and pollination



Reindeer and CWD



Great-crested newts



Insects



NINA eDNA kit



MS EDNA



MS EDNA

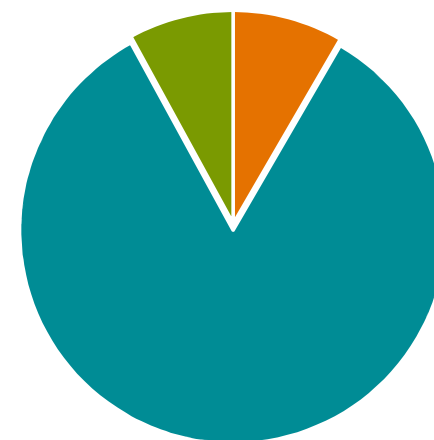


Video: Jan Arne Stokmo og MS EDNA

eDNA – 2 technologies

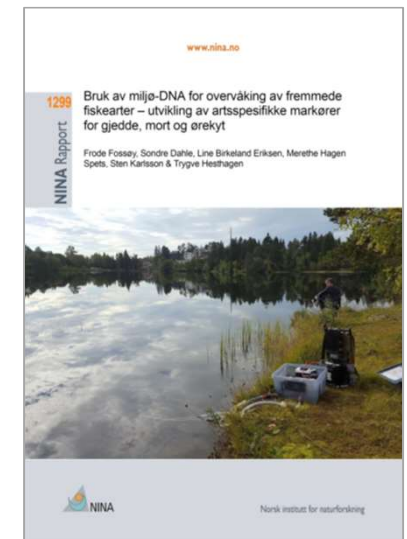
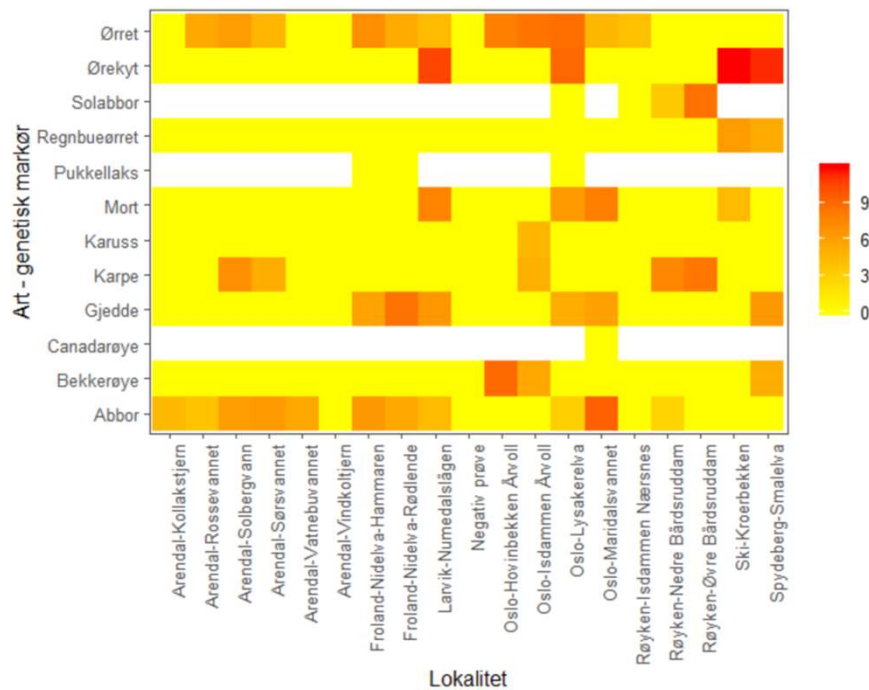
- A. Species-specific primers
- ▶ Detecting single species
 - ▶ qPCR or digital-PCR
 - ▶ Absolute quantification

- B. Species-general primers
- ▶ Biodiversity and species communities
 - ▶ “Next-gen” sequencing
 - ▶ Reference database (Genbank, BOLD)
 - ▶ Relative quantification

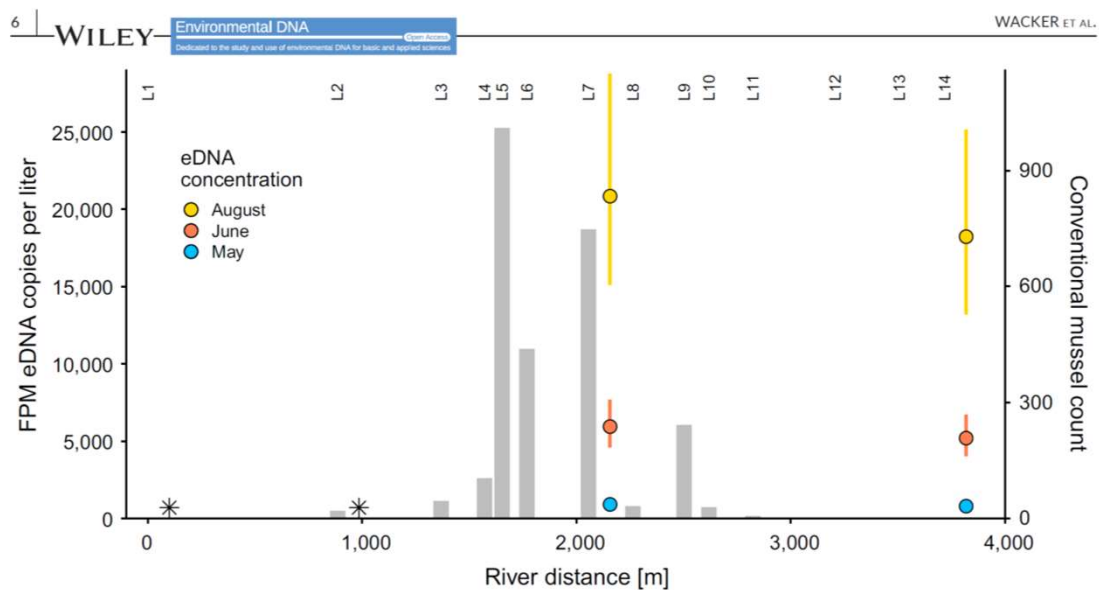


■ Trout ■ Pike ■ Roach

eDNA and invasive freshwater fish



Freshwater pearl mussel



Received: 2 November 2018 | Revised: 20 March 2019 | Accepted: 27 March 2019
 DOI: 10.1002/edn3.10

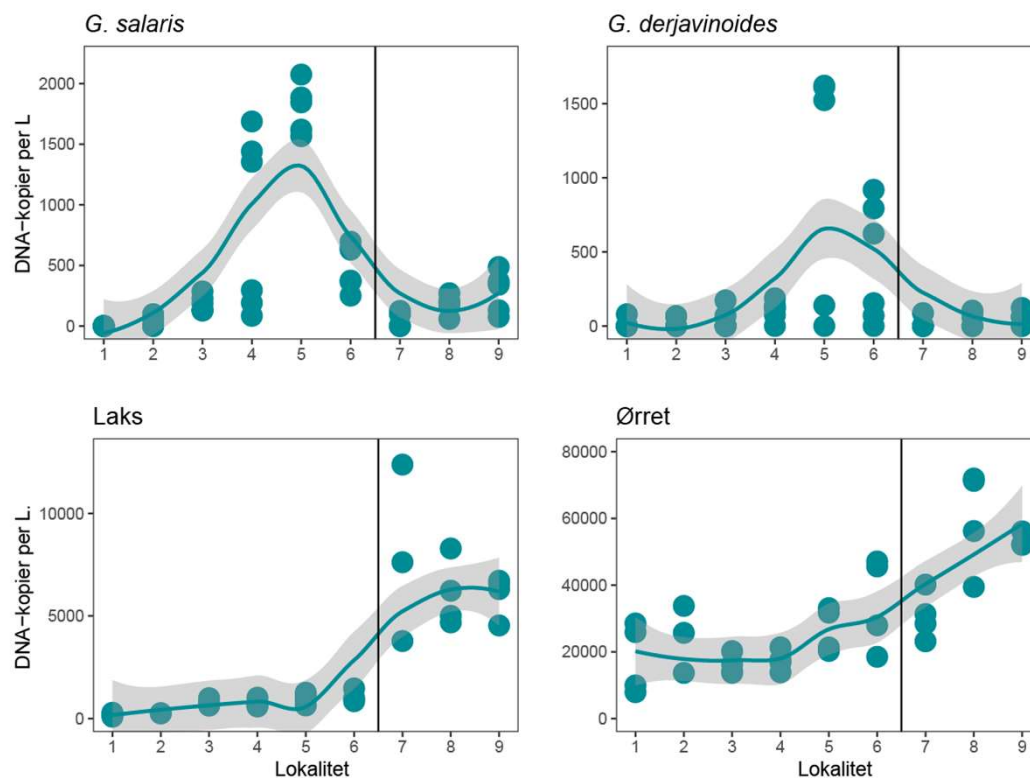
ORIGINAL ARTICLE

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

Elvemusling på fremgang? Vi finner stadig nye lokaliteter, første funn på Frøya!

Gyrodactylus salaris – salmon parasite

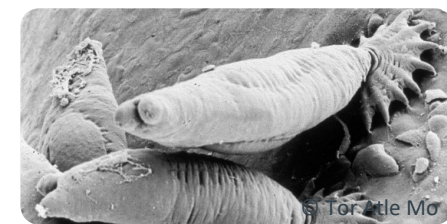


Received: 10 December 2018 | Revised: 28 September 2019 | Accepted: 4 October 2019
DOI: 10.1002/edn3.45

ORIGINAL ARTICLE Environmental DNA **WILEY**

Monitoring presence and abundance of two gyrodactylid ectoparasites and their salmonid hosts using environmental DNA

Frode Fossøy | Hege Brandsegg | Rolf Sivertsgård | Oskar Pettersen | Brett K. Sandercock | Øyvind Solem | Kjetil Hindar | Tor Atle Mo



Great-crested and smooth newt

www.nina.no

1476 NINA Rapport

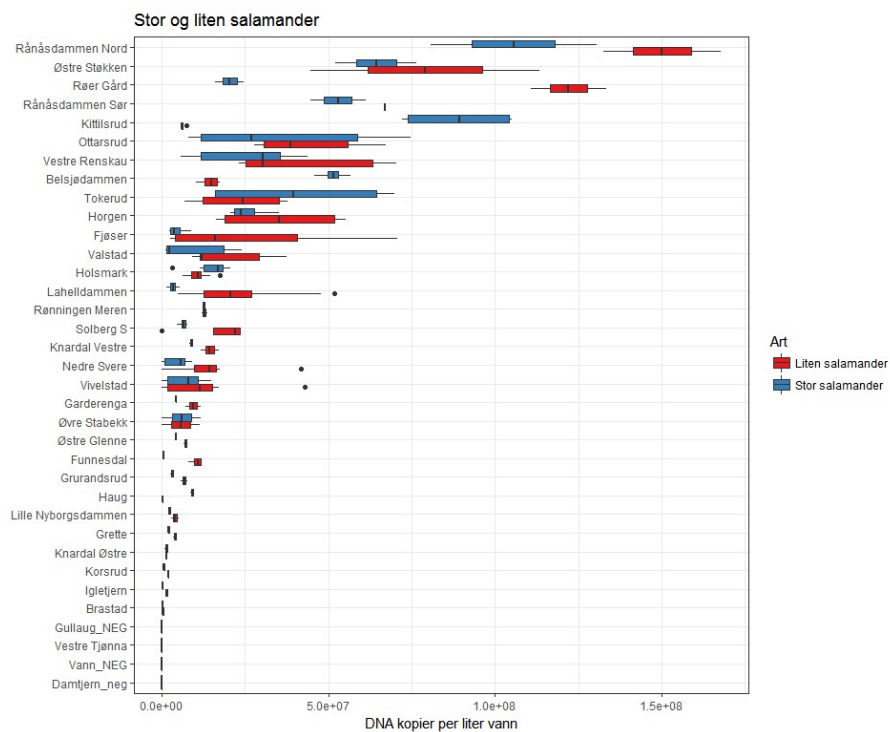
Bruk av miljø-DNA til overvåking av små- og storsalamander

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

Miljø-DNA

Vannprøve

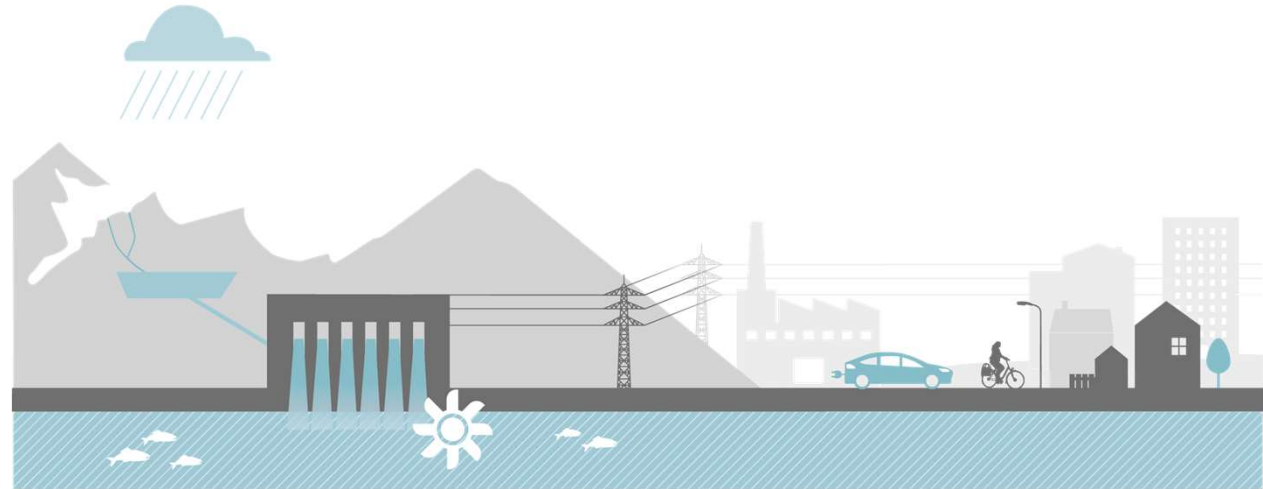
NINA Norsk institutt for naturforskning





HydroCen

NORWEGIAN RESEARCH CENTRE
FOR HYDROPOWER TECHNOLOGY



42 partners

8 years: 2016 - 24

45 million EUR

**Norwegian University of Science and
Technology (NTNU) is host**
Main research partners:

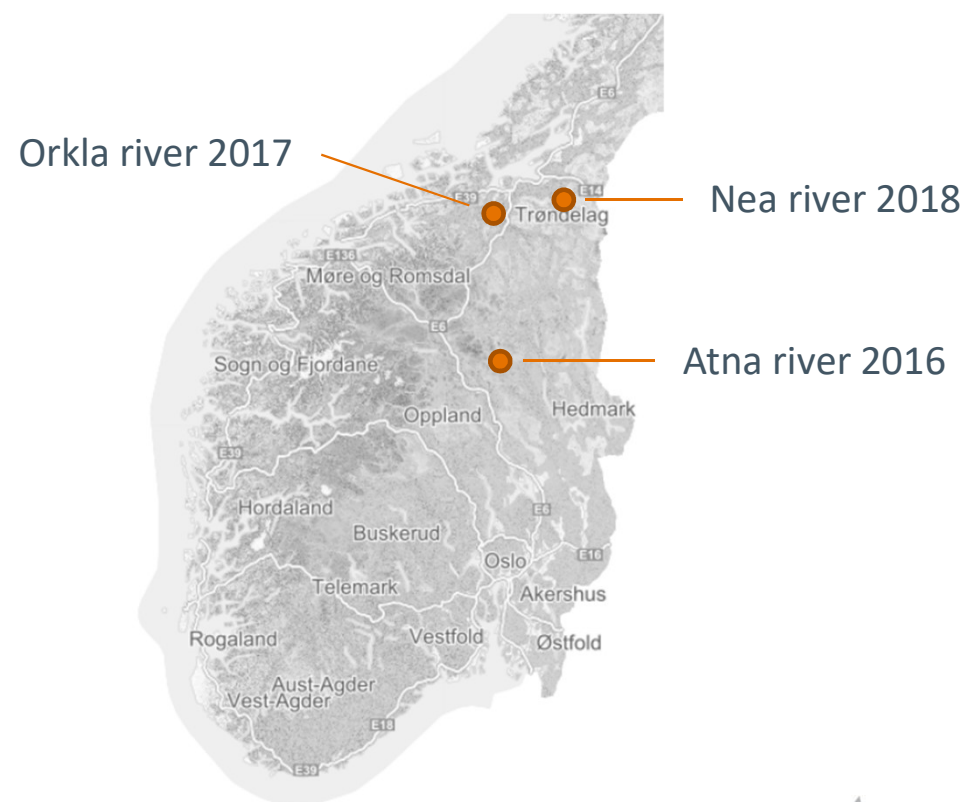
SINTEF Energy

Norwegian Inst. for Nature Research (NINA)



HydroCen – river projects

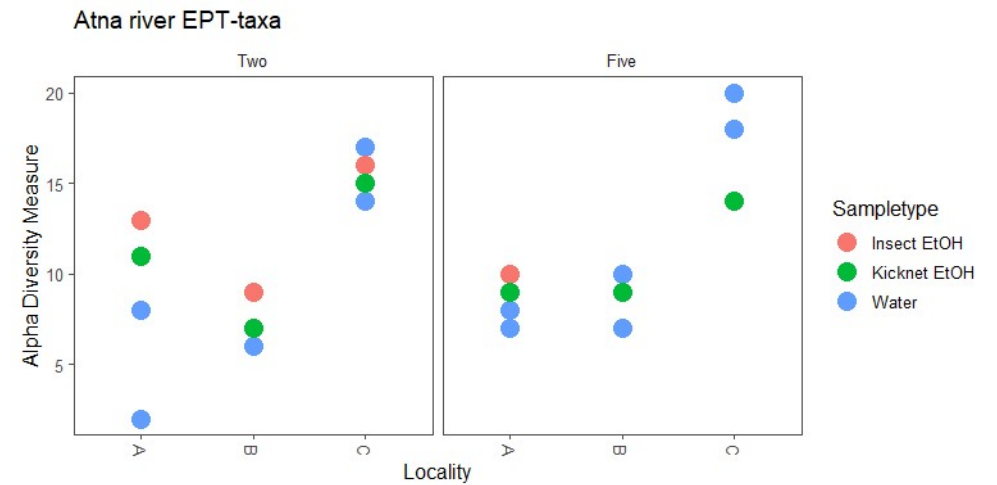
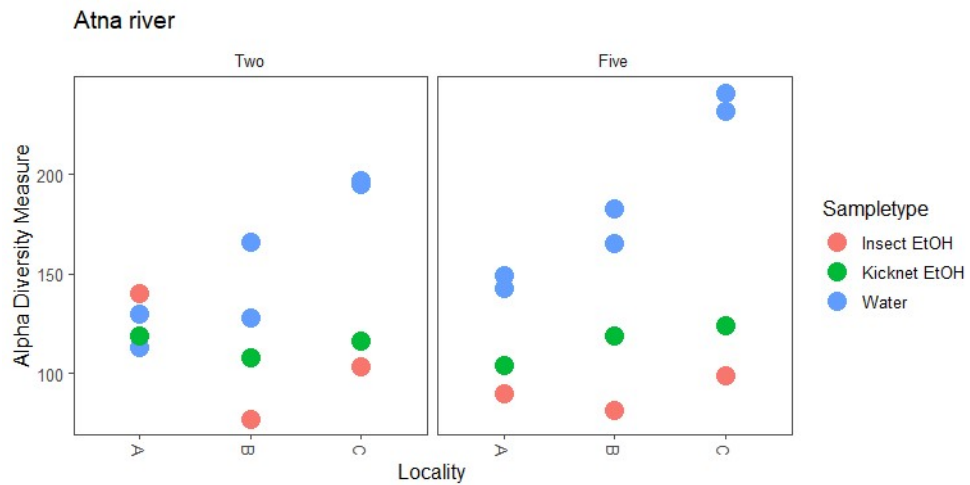
- Benthic diversity
 - ▶ Water Frame Directive
 - Ecological status
 - ▶ EPT-index (eutrophication)
 - Order Ephemeroptera
 - Order Plecoptera
 - Order Trichoptera
 - ▶ Kicknet-sampling and eDNA



| Atna river

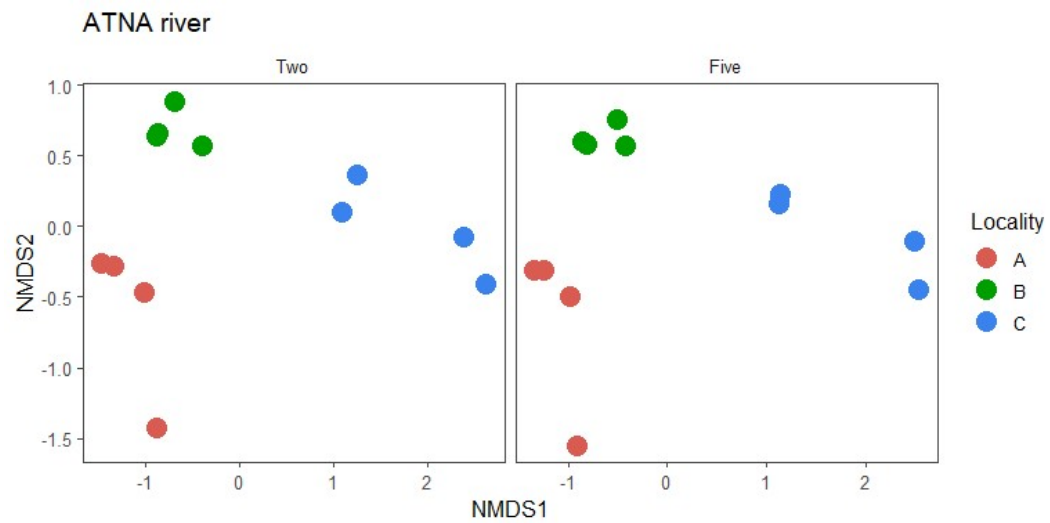
Atna river

- Number of taxa



Atna river

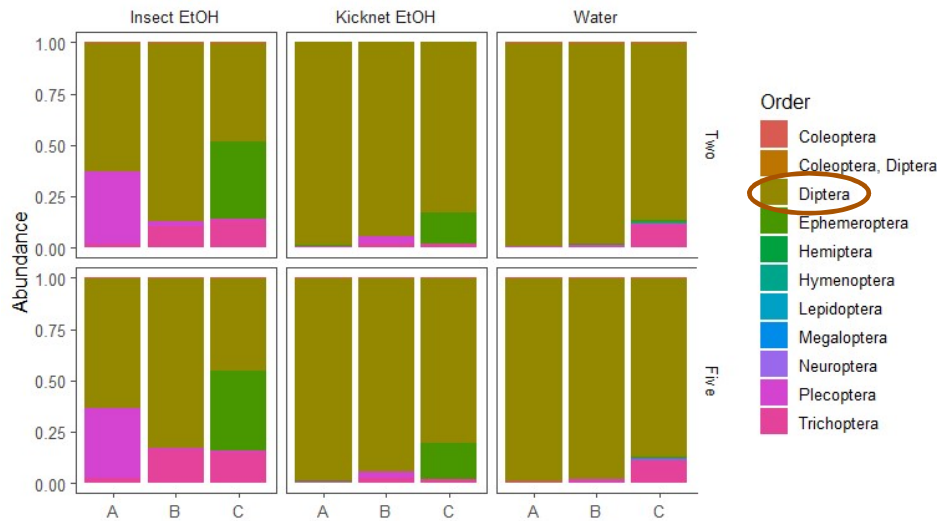
- NMDS plot



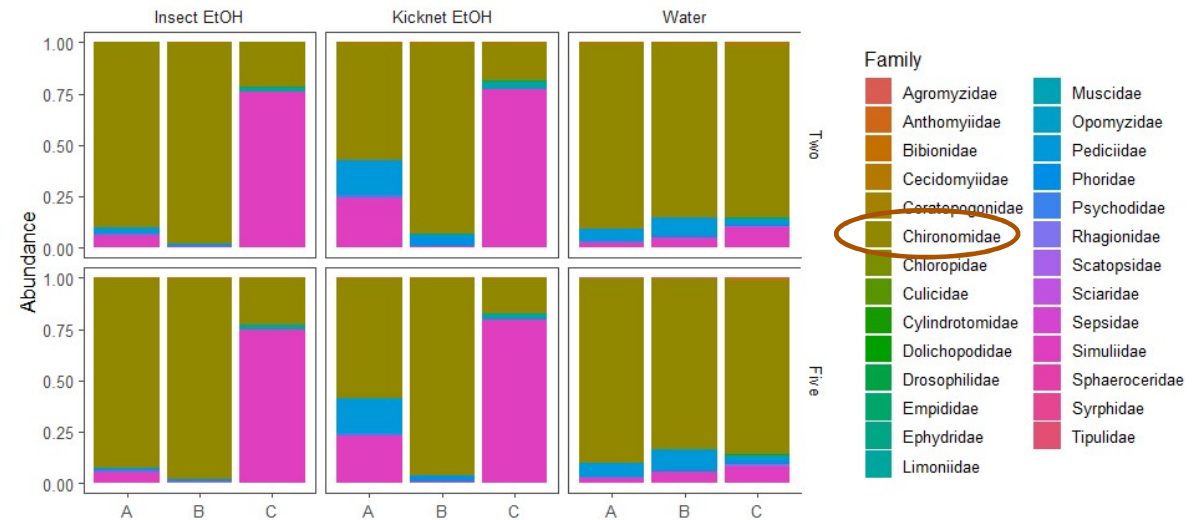
Atna river



ATNA river - Class Insecta



ATNA river - Order Diptera



Order Diptera and Family Chironomidae dominates the DNA-data!



| Nea river

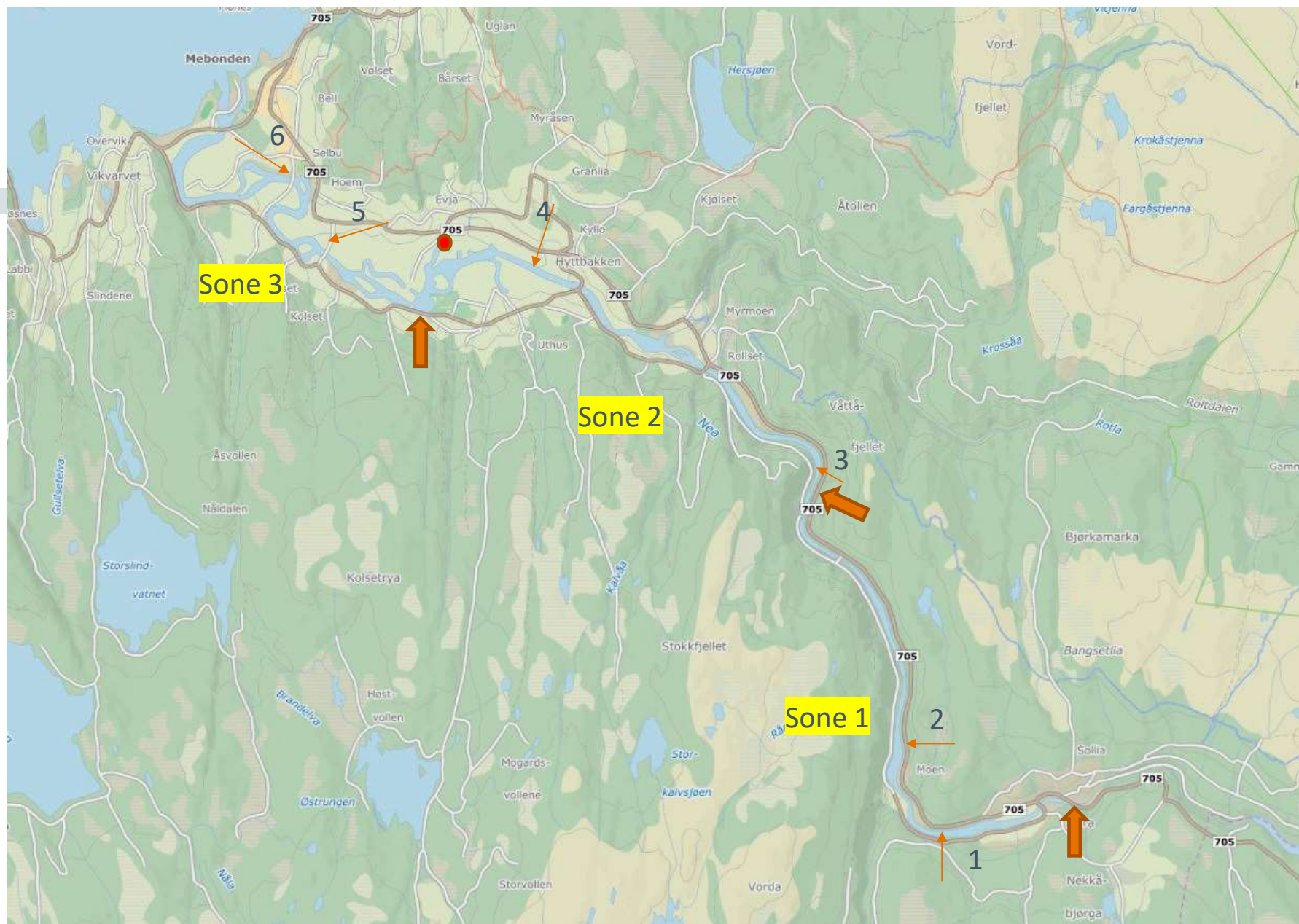


Stasjon 1-6.

- Vannprøver, sammenfallende med bunndyr stasjoner.
- I tillegg to stasjoner for vannprøver Heggsetdammen

↑ Blå piler viser kraftverk utløp

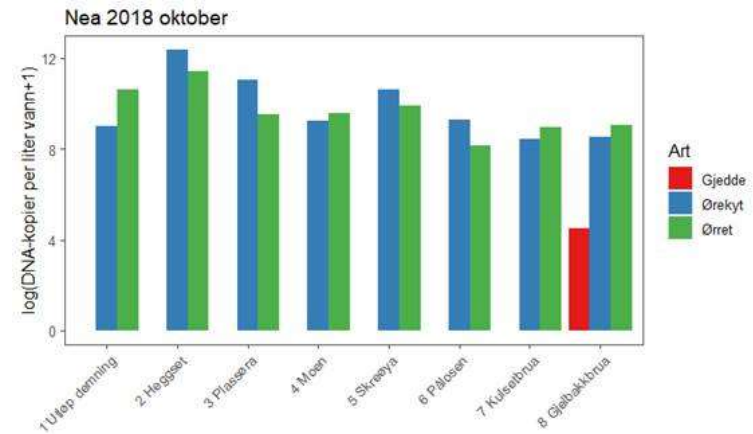
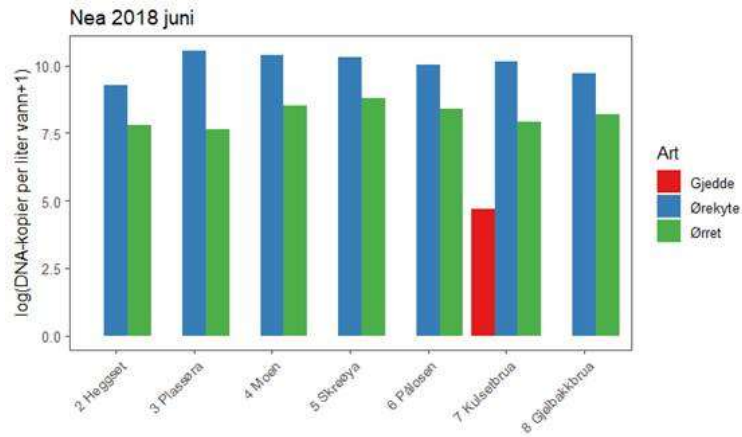
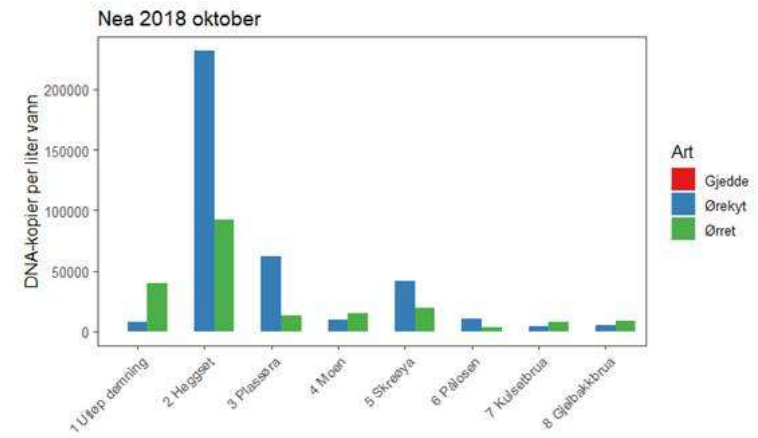
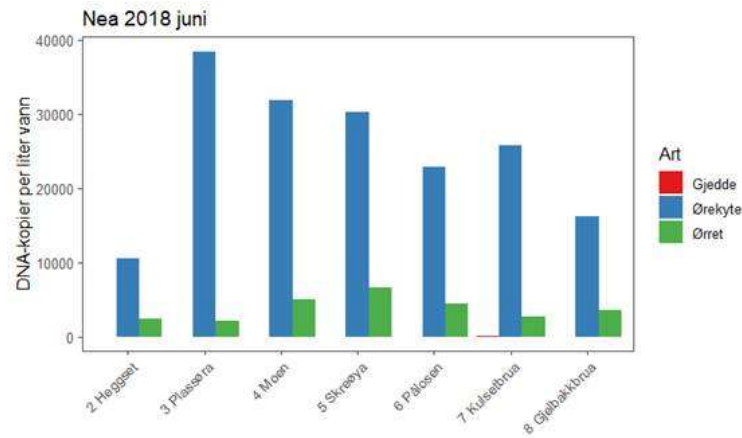
- Øverste kjente fangst av gjedde.



Stasjonsnett i Nea



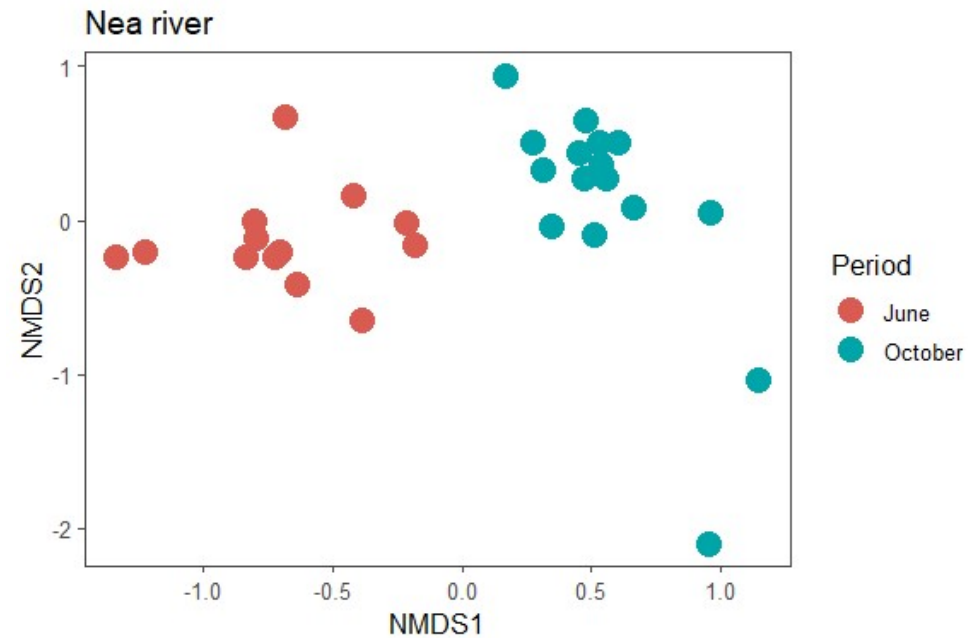
Nea river – fish eDNA density



Nea river



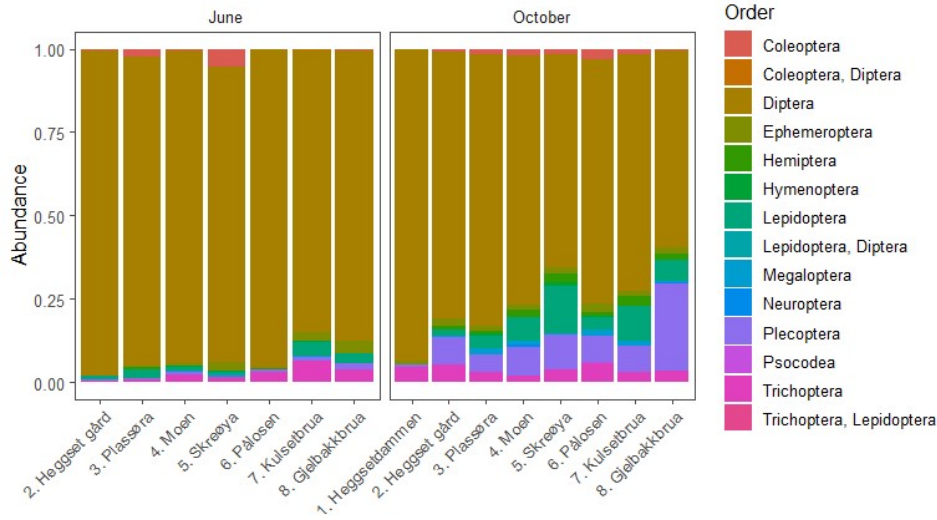
- NMDS plot



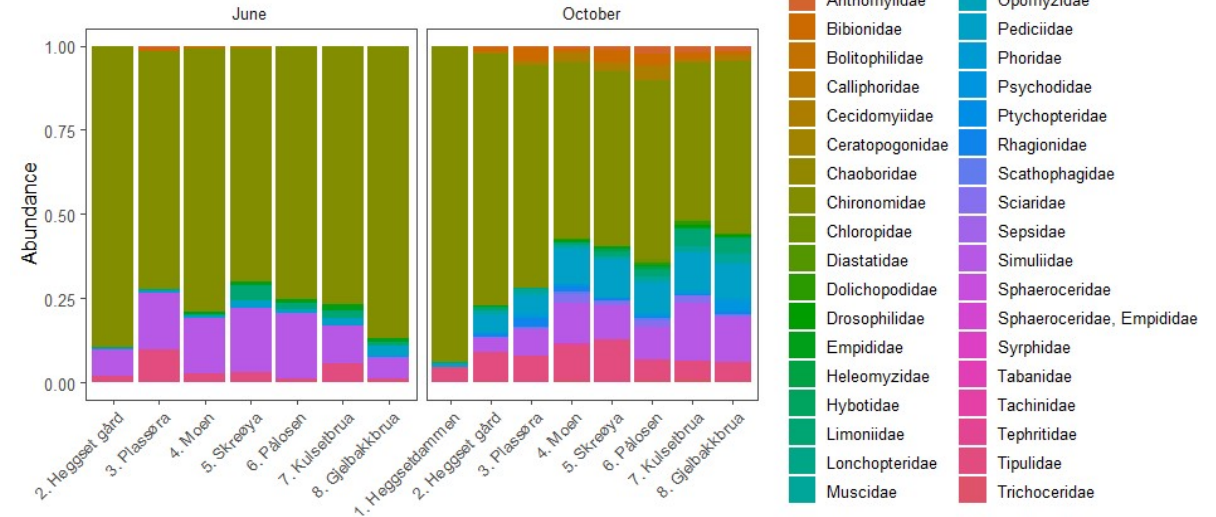
Nea river



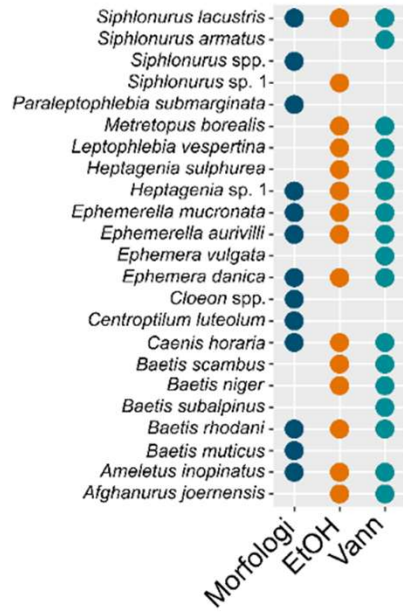
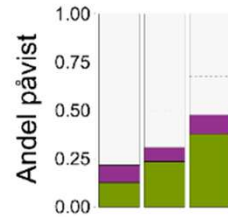
Class Insecta



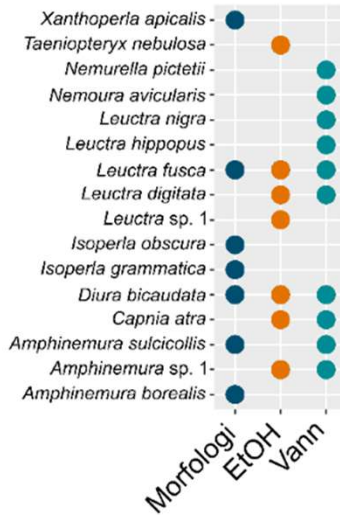
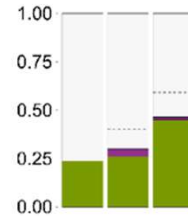
Orden Diptera



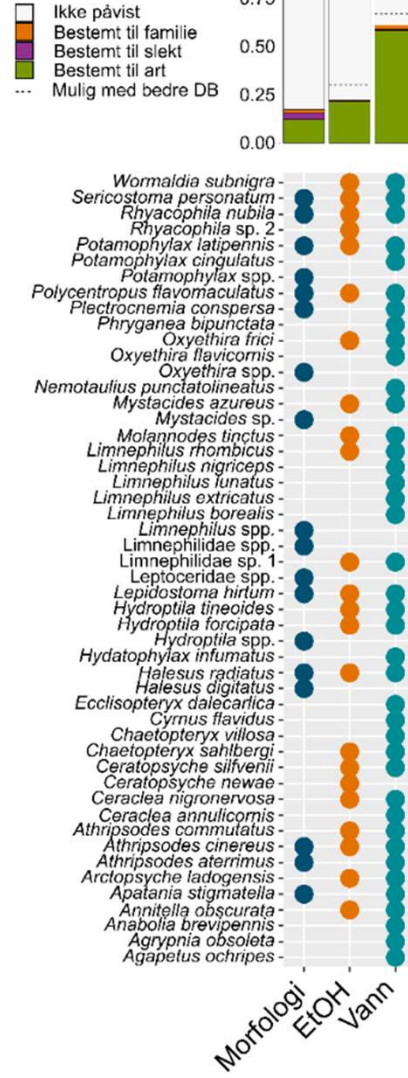
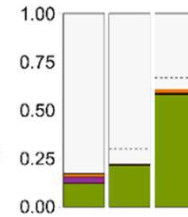
Døgnfluer

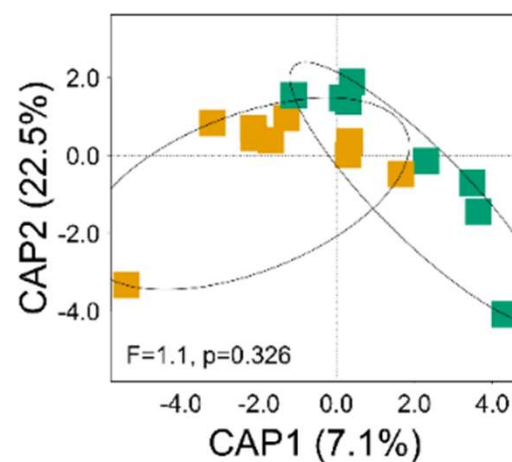
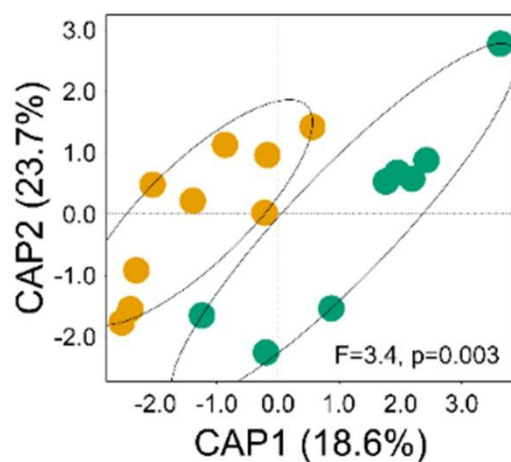
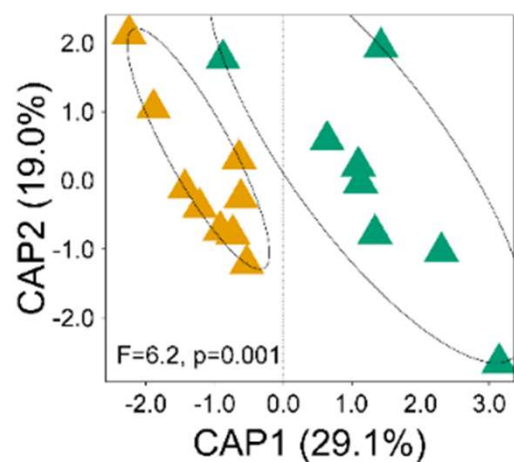
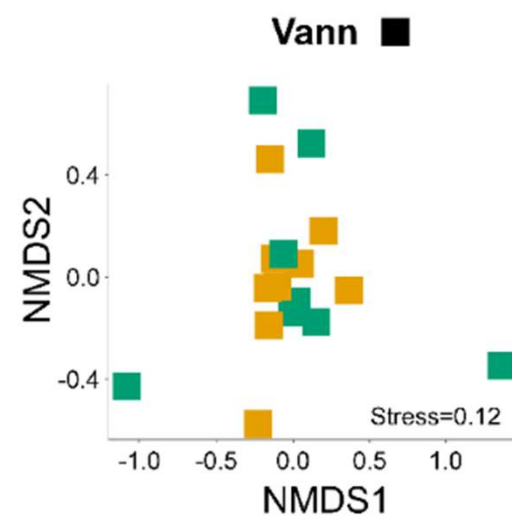
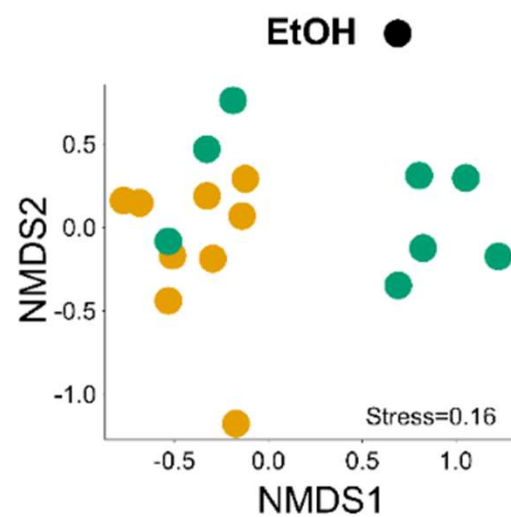
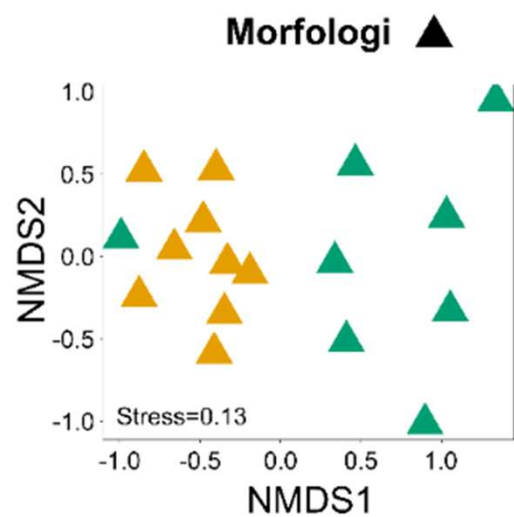


Steinfluer



Vårfluer





● Terskel ● Stryk

Cooperation and expertise for a sustainable future

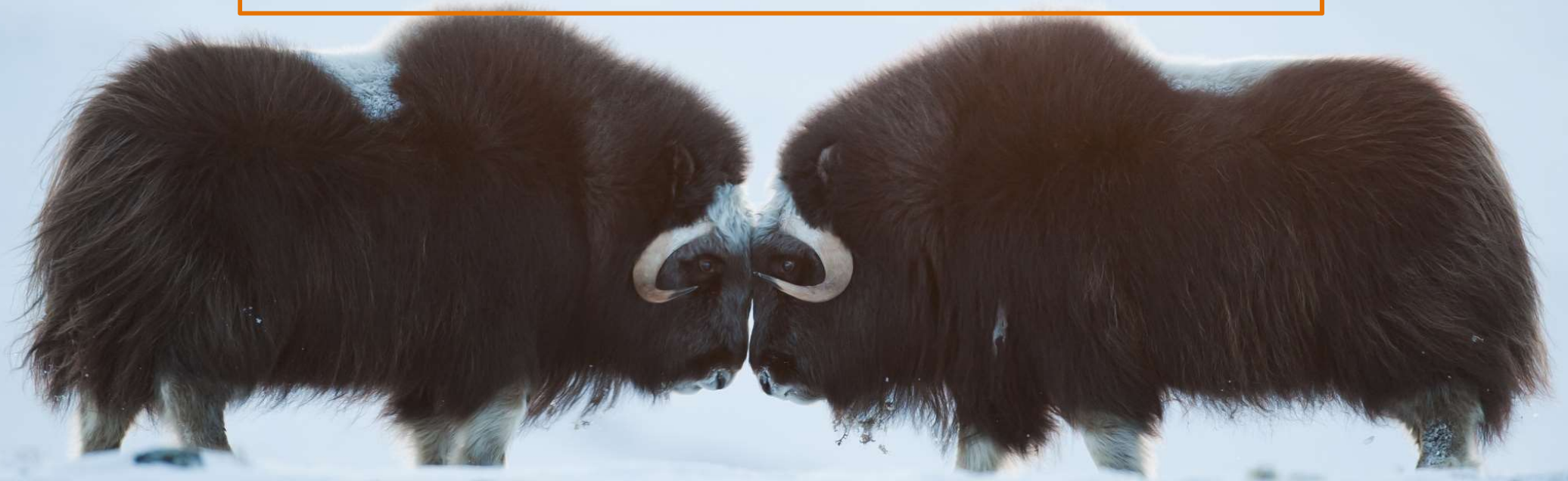


Foto. A. Staverløkk