

Camille Leblanc¹, Krista M. Veijonen¹, Bjarni K. Kristjánsson¹, Leivur Janus Hansen², Ragnhildur Guðmundsdóttir³, Kári H. Árnason², Hilmar J. Malmquist³, Kirsten S. Christoffersen⁴, and Agnes-Katharina Kreiling²
¹Hólar University, Iceland, ²Faroe Islands National Museum, Faroe Islands, ³Icelandic Museum of Natural History, Iceland
⁴University of Copenhagen, Denmark

Background

- Small subarctic lakes are in general pristine cold water ecosystems with simple but unique communities.
- Contemporary threats are: warming, eutrophication, water level changes, non-native species, etc...

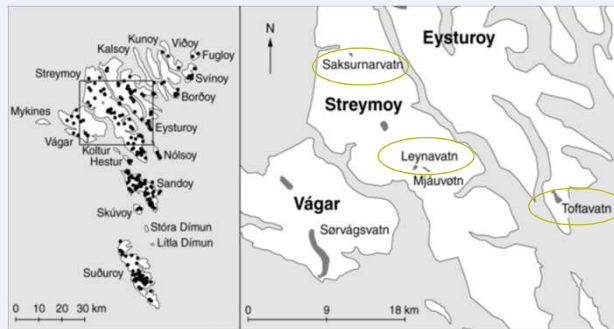


Fig 1. The locations of the three lakes sampled in August 2022. (Mortensen 2002)¹

Goals of the project

1. Have fish communities and their prey changed in the last 20 years in Faroese lakes?
2. Have water parameters during the summers changed?
3. How does fish diversity within and among species vary across lakes?

Why is this important: we study how cold water lakes respond to warming and anthropogenic changes



Methods

- We sampled 3 lakes with various fish communities using similar methods as the NORLAKE project in 2000.^{2, 3}
- Each lake was also sampled for benthic and pelagic invertebrates at the shore and in deep water.
- Fishes were caught by standardized gill nets and minnow traps.
- Loggers record daily temperature at various depths (2022 to 2023).

From top left to bottom right

Fig 2. Plankton sampling from the littoral station in lake Leynavatn

Fig 3. Fishing with minnow traps in lake Toftavatn

Fig 4. Brown trout (BT) *Salmo trutta*, and Arctic charr (AC) *Salvelinus alpinus* from Leynavatn (two males).

Fig 5. Sampling lake bottom sediment using kayak corer.



Preliminary results

- Number of fish have increased in the 3 lakes in 20 years (Fig.6)
- Different fishes were found across lakes:
Toftavatn: BT and sticklebacks
Sakunnavatn: BT and eels
Leynavatn: BT and AC
- BT are now more numerous than AC in **Leynavatn** (ratio BT/AC [2022: 85/66] vs. [2000: 51/138])

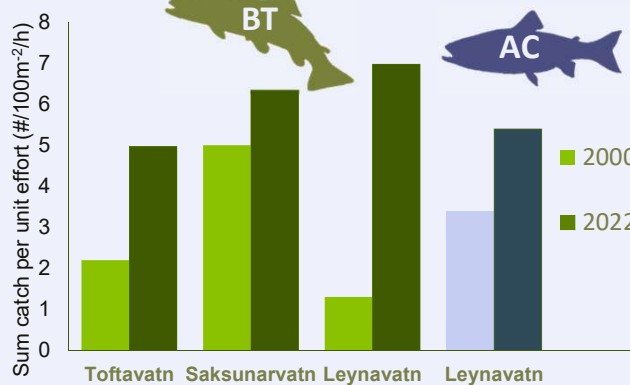


Fig.6 Number of brown trout (green) and Arctic charr (blue) caught in three Faroese lakes in 2000 and 2022.

Future research

- Within species diversity of BT: does BT eat and look different in presence/absence of other fish species?
- How does food availability vary across lakes and across time?
- Has the phenology of fishes changed in 20 years? Are there more fish but smaller/ younger fish?