

Length at age distribution of the glacier lanternfish, *Benthosema glaciale*, in Norwegian fjords



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A light in the twilight zone

Lanternfish, Myctophidae, is one of the most common families of mesopelagic fish in the world. They are commonly found 200-1000m below the surface, but undertakes diel vertical migration where they move between scattering layers.

A common lanternfish in Norwegian fjords is the glacier lanternfish, *Benthosema glaciale*. The fish has a lifespan of 8 years and can grow up to 10cm in length. It grazes on zooplankton and is usually found at 1-200m below the surface at night, and below 300m at day. The eyes are large, and the small body is covered in luminescent photophores.

As the world population continues growing, the demand for new food recourses grows as well. Underutilized recourses like mesopelagic fish, will therefore be even more important in the future. With this in mind, the knowledge of life history traits like growth patterns, reproduction and offspring ratio will be important factors. In this study we will therefore focus on comparing the growth rate between fjords and coastal locations in Norway.

Hypothesis:

The hypothesis is that there will be larger individuals of *Benthosema glaciale* in Fensfjorden compared to Masfjorden. There will also be larger individuals in the fjords compared to the coastal location, Buefjorden.



Results

Due to late arrival of dataset, not everything we intend to do has been analysed yet. Still, we can show some preliminary results and thoughts based in this!

Results in the figure below show us that there are some apparent differences between the fjords and the coast, as well as in samplings done at day and night. We observe a difference mainly between day and night sampling, with considerably more fish caught at night.

The plots also suggests that Masfjorden is a fjord with higher densities of *Benthosema glaciale*.

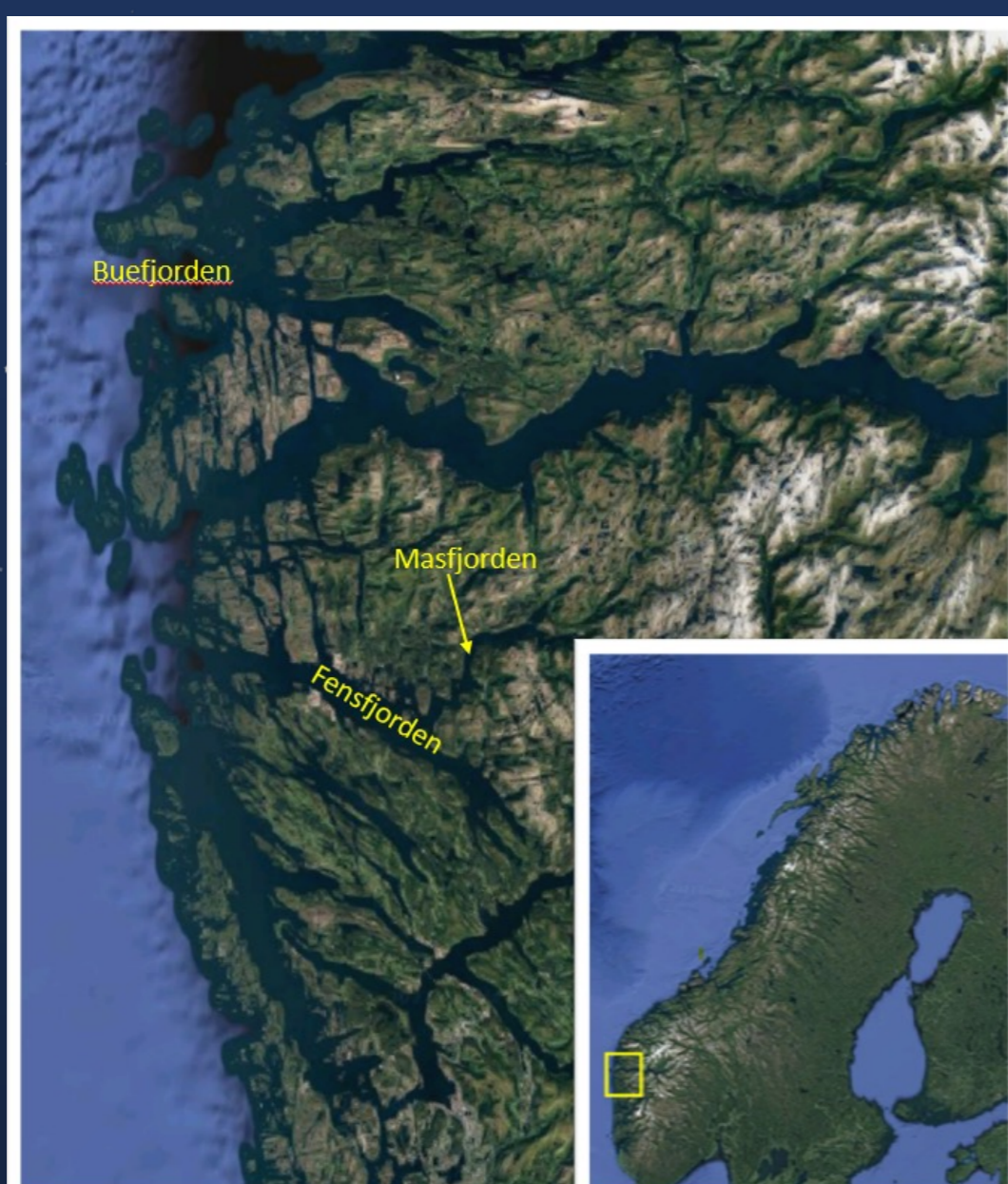
For Buefjorden there was only done one sampling at night, explaining the low numbers. However, the fish seem to have a mean larger length than Masfjorden and Fensfjorden.

Study site

Masfjorden: shallow sill, 70m depth. Formerly hypoxic from 300m depth

Fensfjorden: deep sill, 370m.

Buefjorden: coastal, no sill.



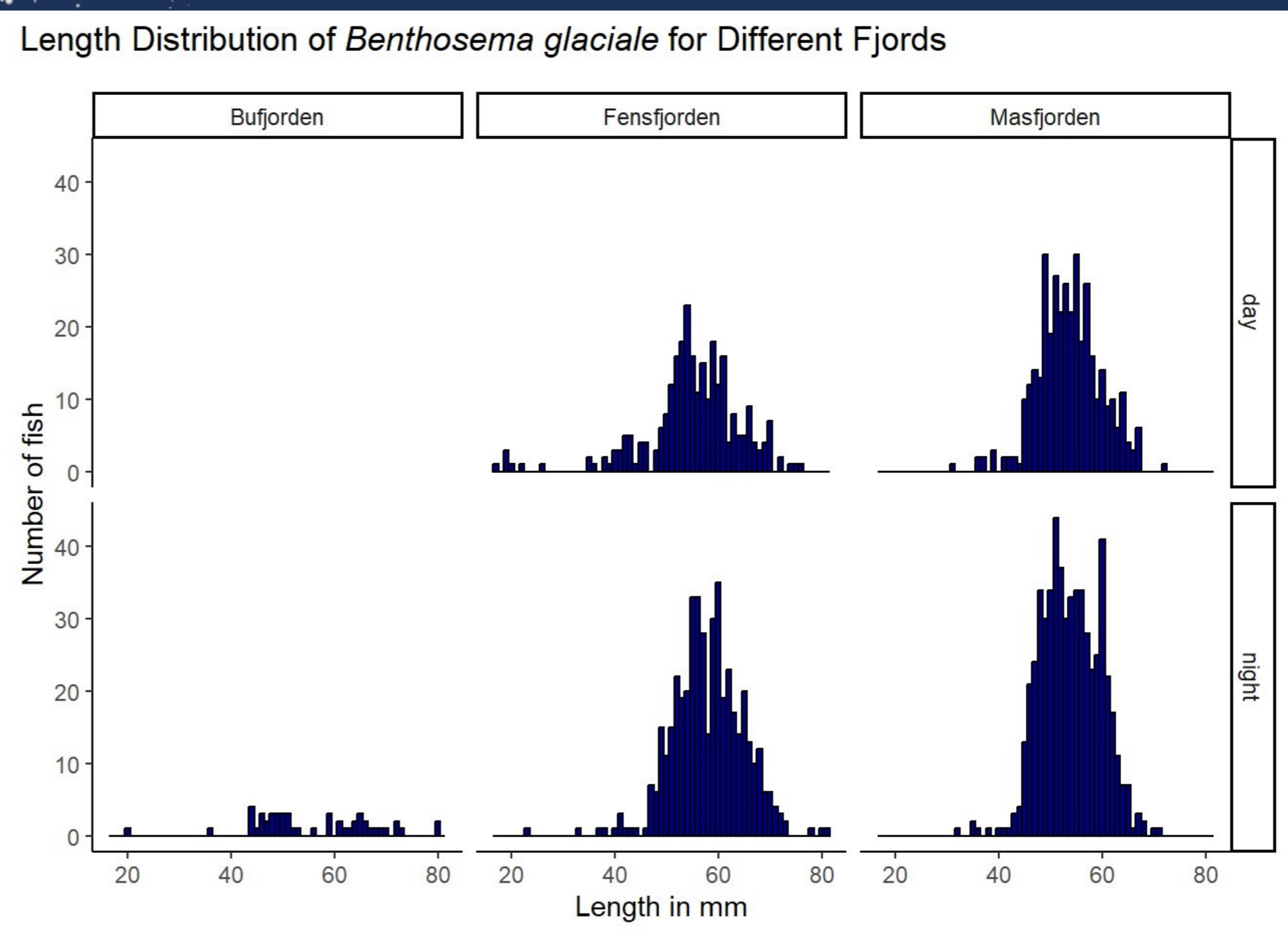
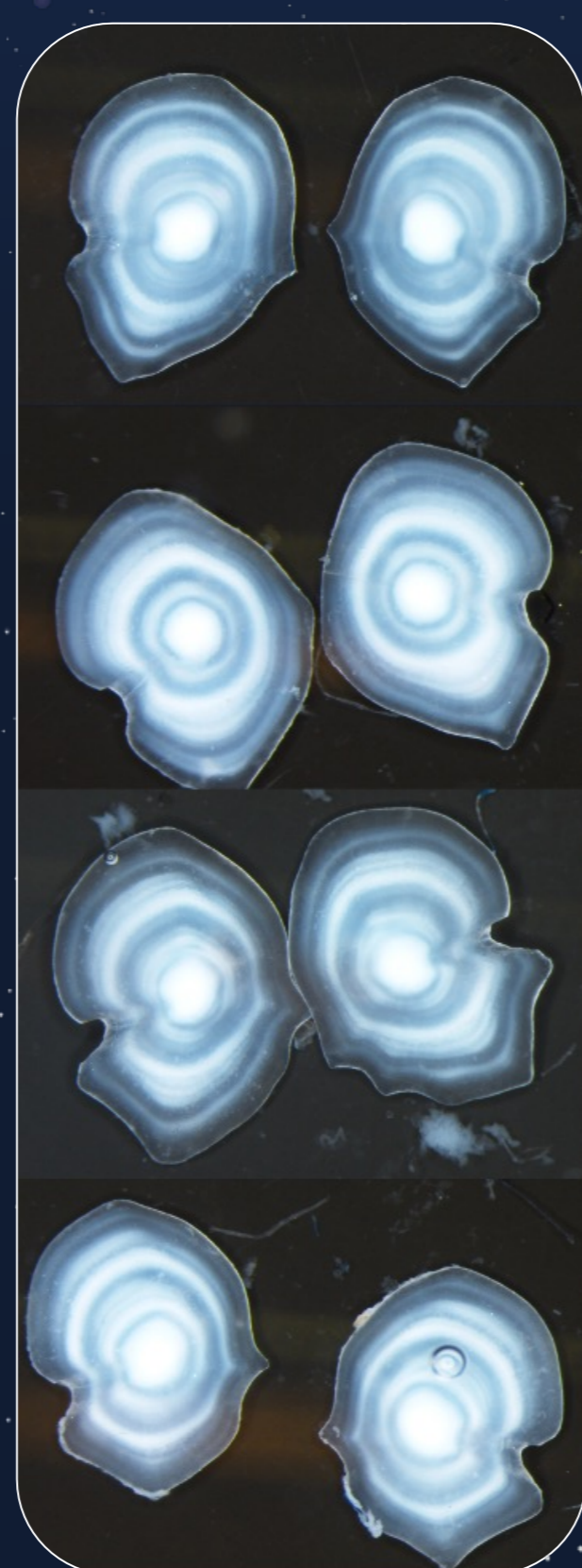
Material and methods

All samples were collected using a multisampler with 3 codends, trawling at the designated depth at 10 min each. T1 was trawled from ~300-200m below the surface, T2 at ~200-100m and T3 at ~100-0m.

Subsamples of 50 *B. glaciale* was taken from each codend and placed on a transparent sheet to be scanned. Later, the fish was individually length measured using ImageJ.

Otoliths were extracted from the fish in two trawl replicas with 3 codends from day and night in Fensfjorden, and one codend in Buefjorden.

All 282 otolith pairs were placed under a microscope, and had their picture taken. They were then age read individually.



Diving into the data collected

The increase of individuals caught at night could be explained by diel vertical migration. More fish moves up to the surface to feed and is therefore caught in our trawls!

The increased amounts of fish in Masfjorden could possibly be explained by Masfjorden being a more "productive" fjord, as there could be more runoff from the terrestrial environment into a fjord with limited water exchange.

Lastly, Buefjorden provided us with some interesting preliminary results when we looked at otolith-samples. Large individuals that based on literature should not get that large until they are older, were large size already at age 2. Providing us with some interesting data to analyse forwards.

