Trophodynamics of Atlantic cod in East Greenland and the Barents Sea in 2010

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Trophodynamic studies are an essential link to understand **effects of climate change on the performance of top predators** in marine ecosystems. **Greenland and Spitsbergen** shelf ecosystems undergo rapid changes in terms of warming and of primary production, with subsequent effects on species composition and prey availability and thus significant effects on feeding conditions for cod as top demersal predator. In order to evaluate and compare the biological and competitive performance of cod in its northernmost areas of distribution, "**Index of Relative Importance**", "**Fulton`s K**" and "**Total Fullness Index**" were estimated and compared for the East Greenland shelf and the Barents Sea.

East Greenland

Barents Sea

Methods

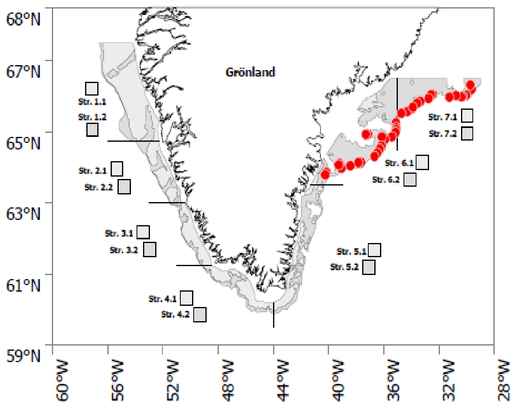


Figure 1: Sampled station locations East Greenland 2010

- Sampling in October 2010 : Length, Weight, Stomach & STT/BT
- Bottom trawl <400 m (mean 221 m)
- n (sampled fish) =163

- Sampling in June 2010: Length, Weight, Stomach & Sea Surface Temperature (SST) Bottom Temperature
- Bottom trawl <400 m depth (mean 269 m)
- n (sampled fish) = 206

RI (Index of Relative Importance): Calculates importance of different prey species based on their frequency of occurence, abundance and weight

Fulton`s K: $100^* (W/L^3)$, where W = gutted weight (cm) and L = total length (g)

TFI (Total Fullness Index): Provides an index of stomach fullness (feeding success) based on stomach content weight, weight of individual predator and total number of predators (n)

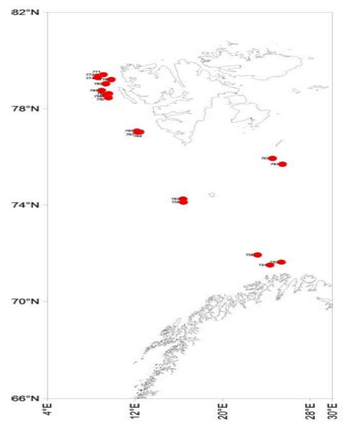


Figure 5: Sampled station locations Barents Sea 2010

Results

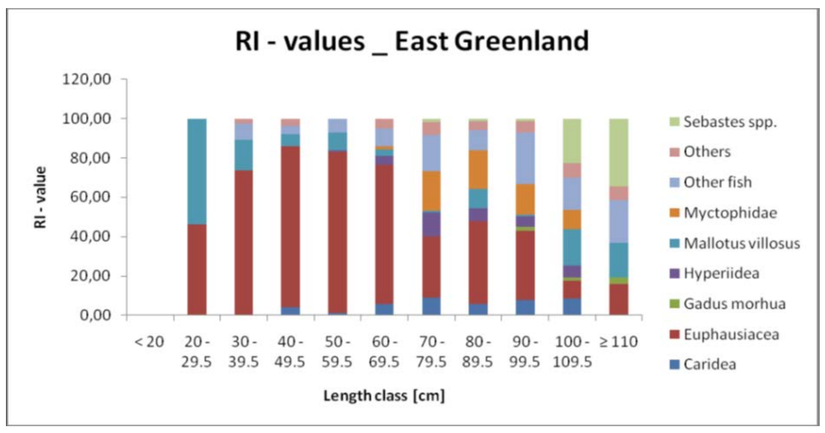


Figure 2: Relative Importance (RI) values for each length class for East Greenland samples

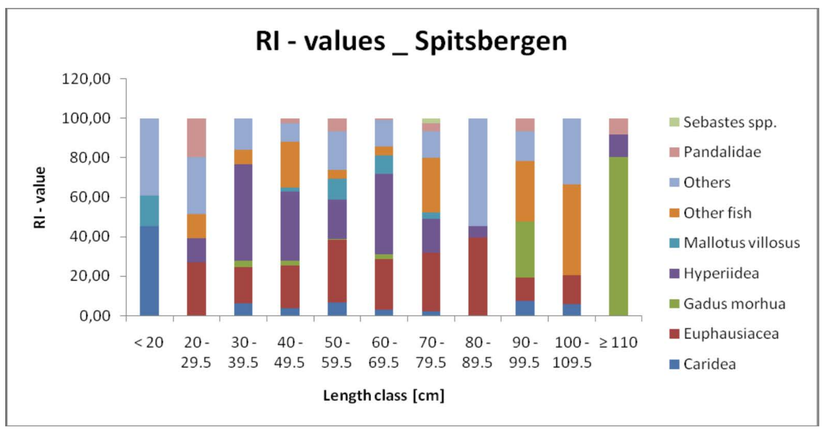


Figure 6: Relative Importance (RI) values for each length class for Barents Sea samples

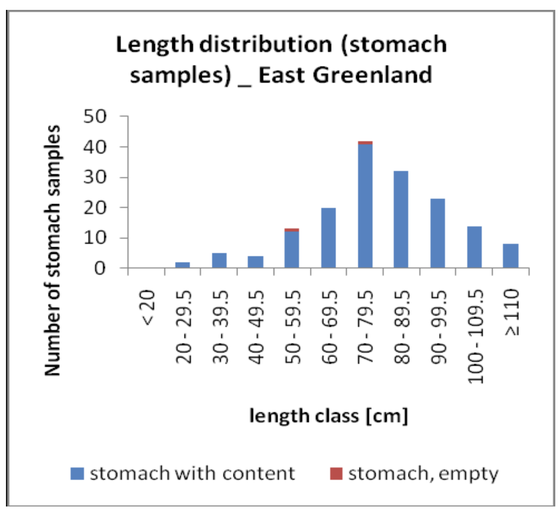


Figure 3: Length distribution of sampled fish from East Greenland with proportion of full and empty stomachs

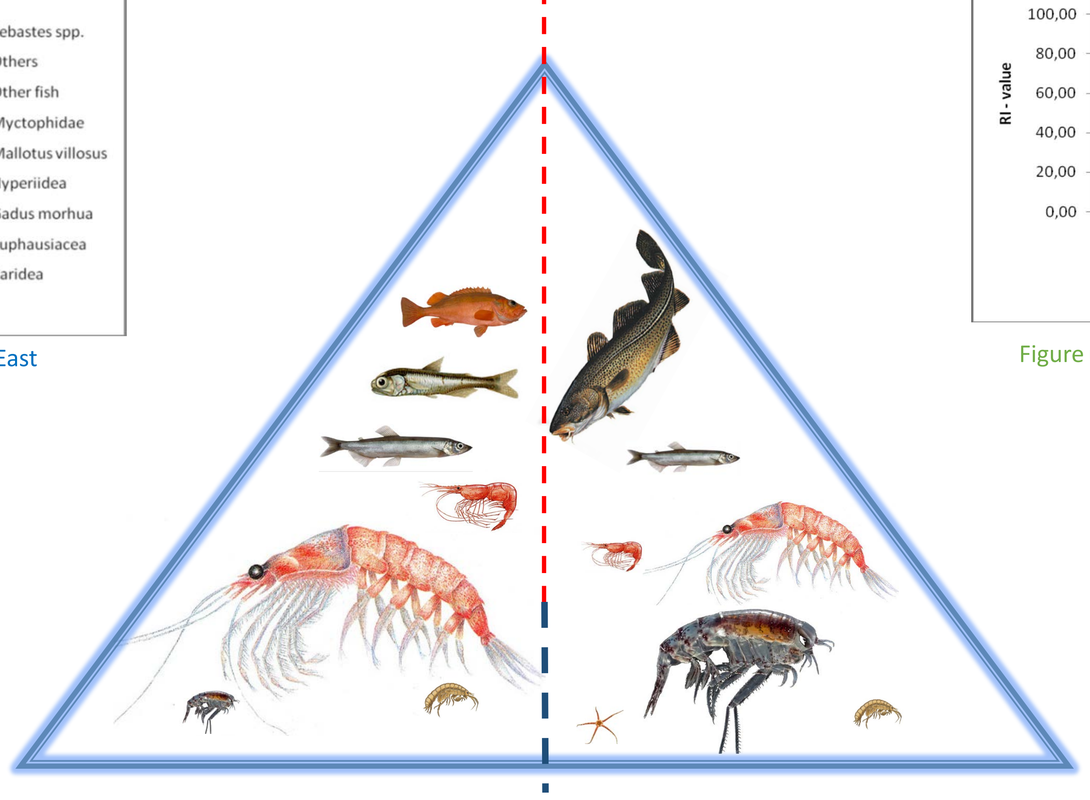


Figure 4: Main prey species in East Greenland (left part) and the Barents Sea (right part) according to their trophic level. Size of species-symbol represents their total Relative Importance (RI) as mean for all length classes.

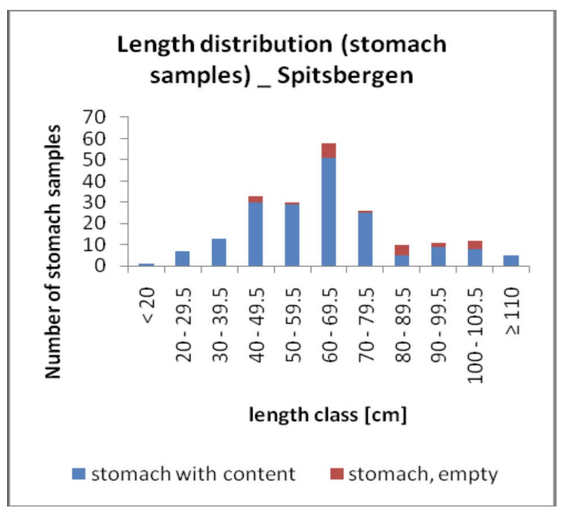
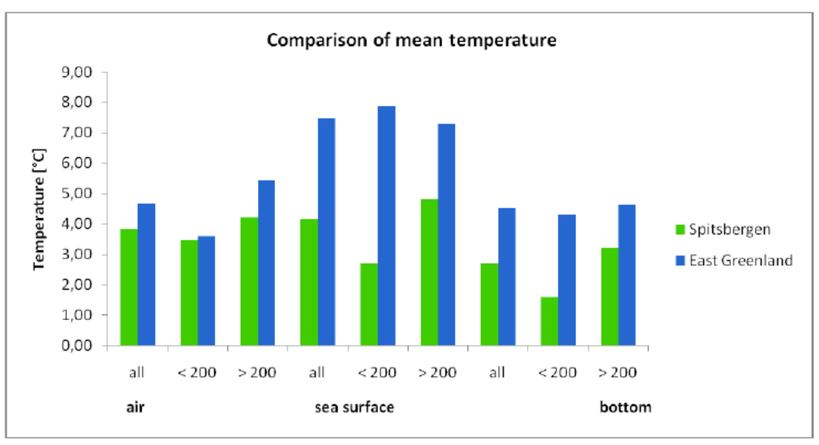


Figure 7: Length distribution of sampled fish from the Barents Sea with proportion of full and empty stomachs

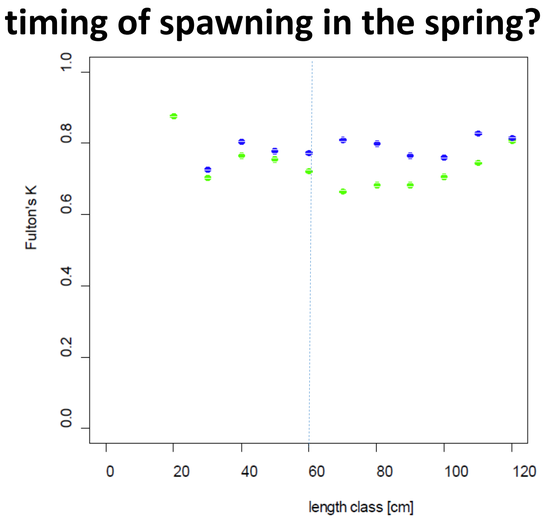
	East Greenland	Barents Sea	Lloret & Rätz (2000)
Fulton's K (mean)	0.789 ± 0.084	0.711 ± 0.084	Fulton's K was lowest in East Greenland and the Barents Sea compared to all other Atlantic cod stocks and showed to increase with temperature
Total Fullness Index (mean)	3.589 ± 3.128	1.192 ± 2.568	

Table 1: Results of Fulton's K and TFI for East Greenland and the Barents Sea. Fulton's K compared to Lloret & Rätz (2000)

Question 1: What can possibly cause higher Fultons's K and Total Fullness Index values in East Greenland? (**Hint: See figure below)**



Question 2: How would you explain diverging curves of Fulton's K in length classes > 60 cm (see Figure below)? **Hint: How does timing of the survey match with timing of spawning in the spring?**



Answers: Find me, ask me and discuss with me ☺

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