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Diet composition of young-of-the-year Atlantic herring in the southern Gulf of St. Lawrence, Canada

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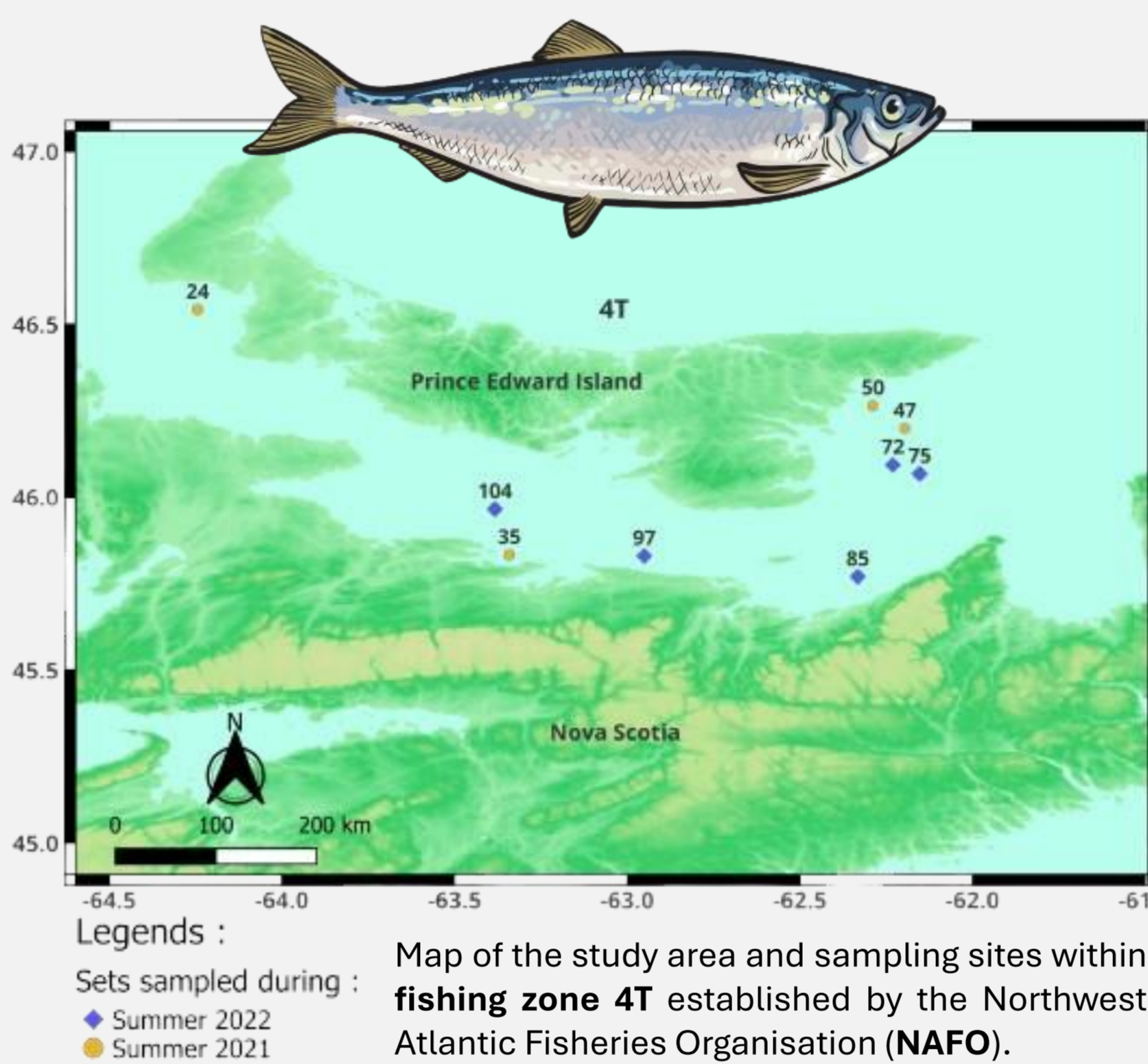
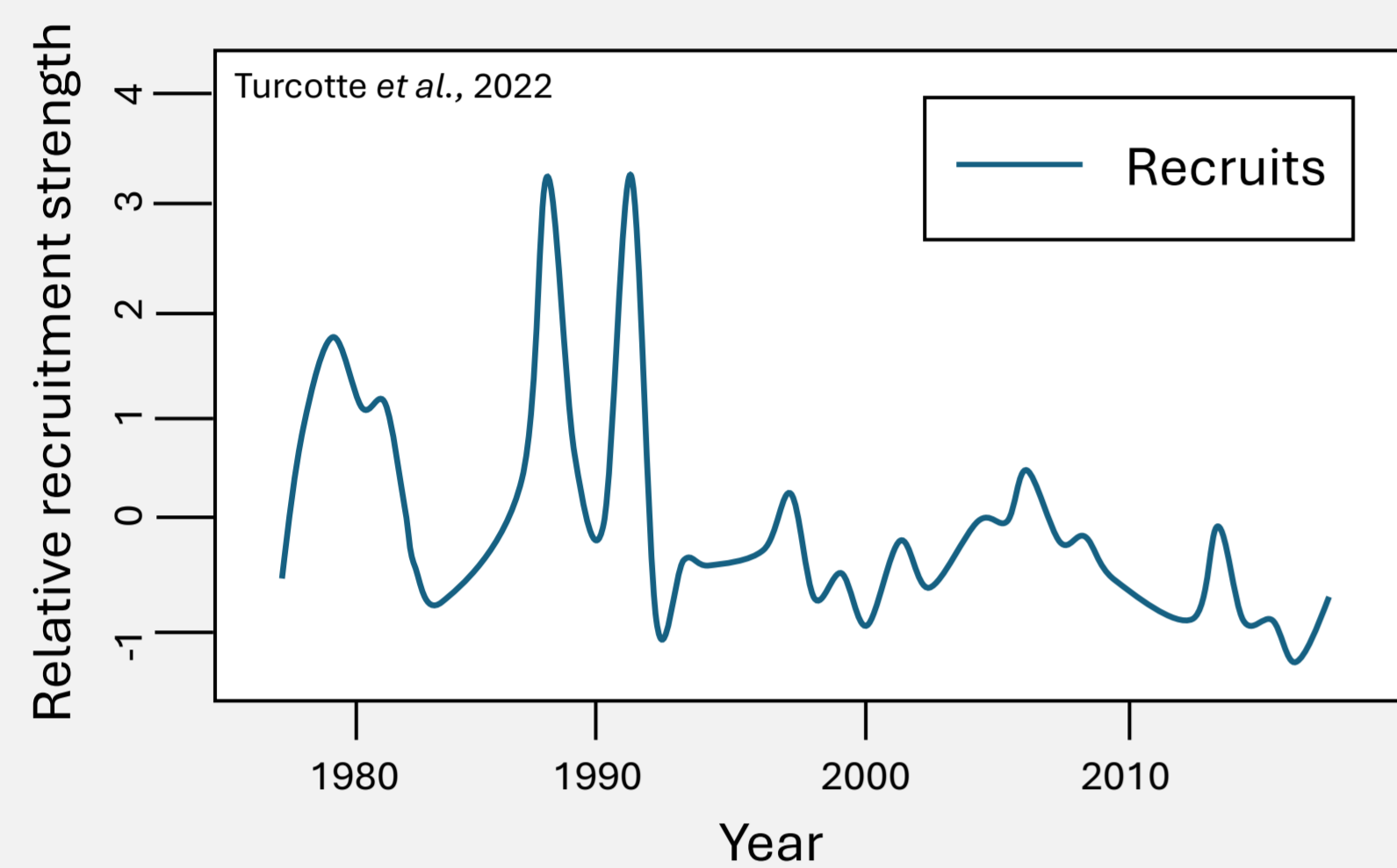
²Fisheries and Oceans Canada, 343 Université Avenue, Moncton, NB E1C 9B6, Canada

Study context

Atlantic herring (*Clupea harengus*) is a planktivorous pelagic fish of high economic and ecosystem importance in Atlantic Canada^{1,2}.

Two contingents in the southern Gulf of St. Lawrence (sGSL) : spring spawners and fall spawners^{3,4}.

Since 1990, poor recruitment of spring spawners has led to the collapse of the sGSL stock, followed by a fishing closure in 2023^{3,4}.

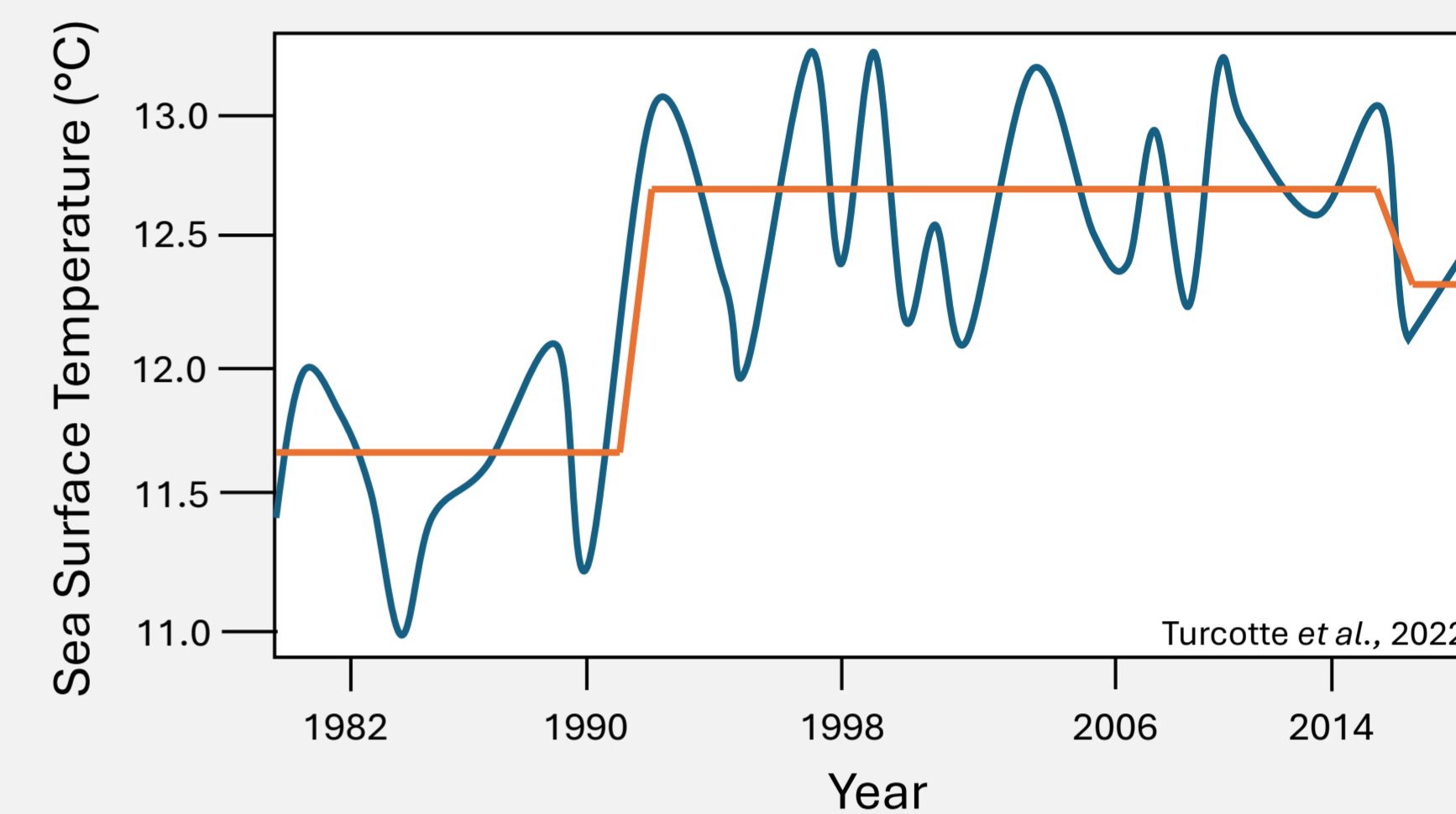


It is hypothesized that recruitment failure is associated with a shift in the taxonomic composition of zooplankton assemblage during early life stages associated to climate warming.

Recruitment is influenced by multiple factors, including prey availability and water temperature^{4,5}.

The GSL ecosystem is currently changing, notably due to the increase in surface water temperature occurring since 1990⁶.

Shift in abundance of zooplankton species: Decrease of cold water species (highly nutritious) Increase of warm water species (less nutritious)⁶.



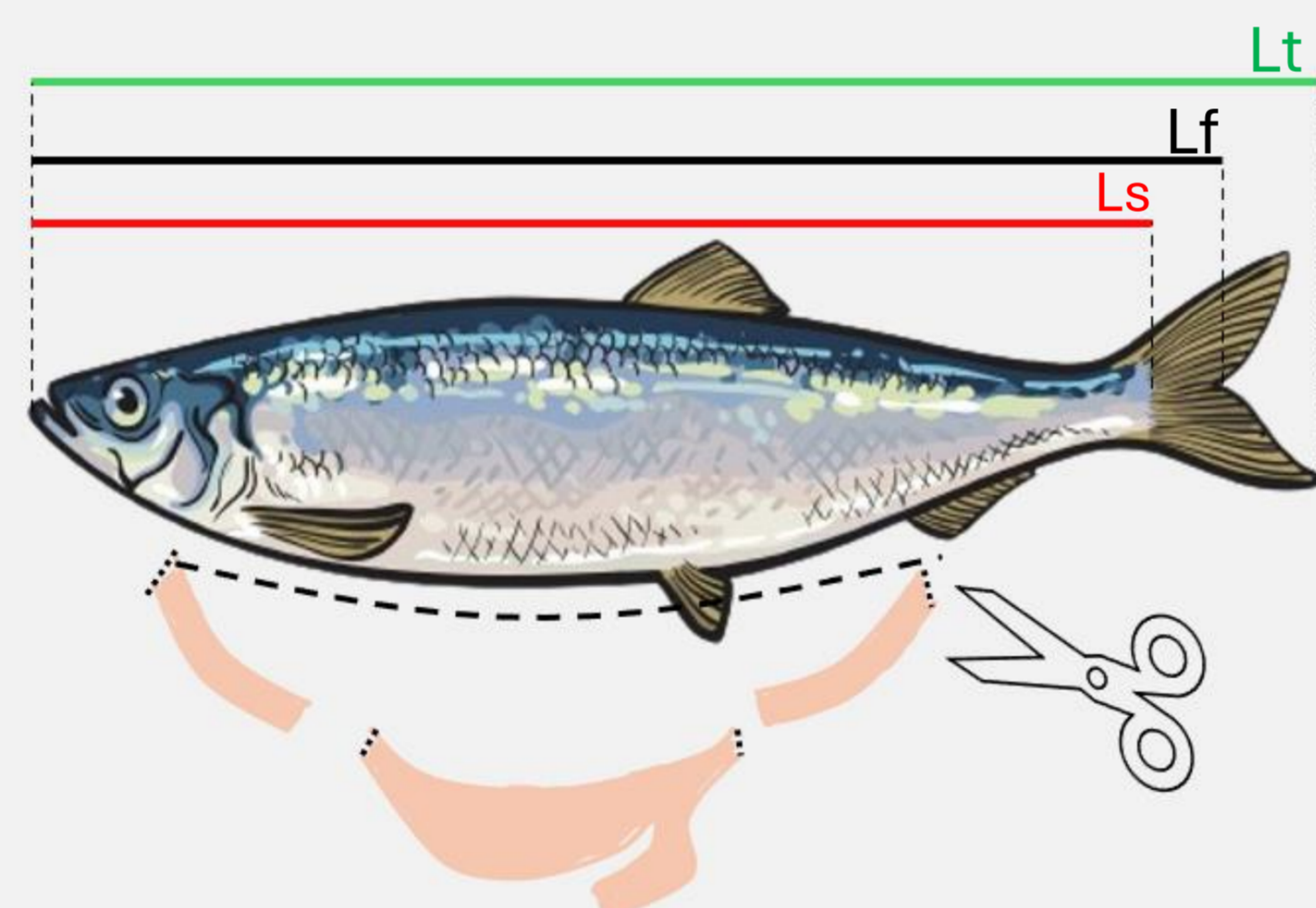
Objective of the study

Describe diet composition at the highest resolution possible to identify key prey taxa on which Young-Of-the-Year (YOY) herring rely prior to their first overwintering.

Materials & Methods

1 Dissection

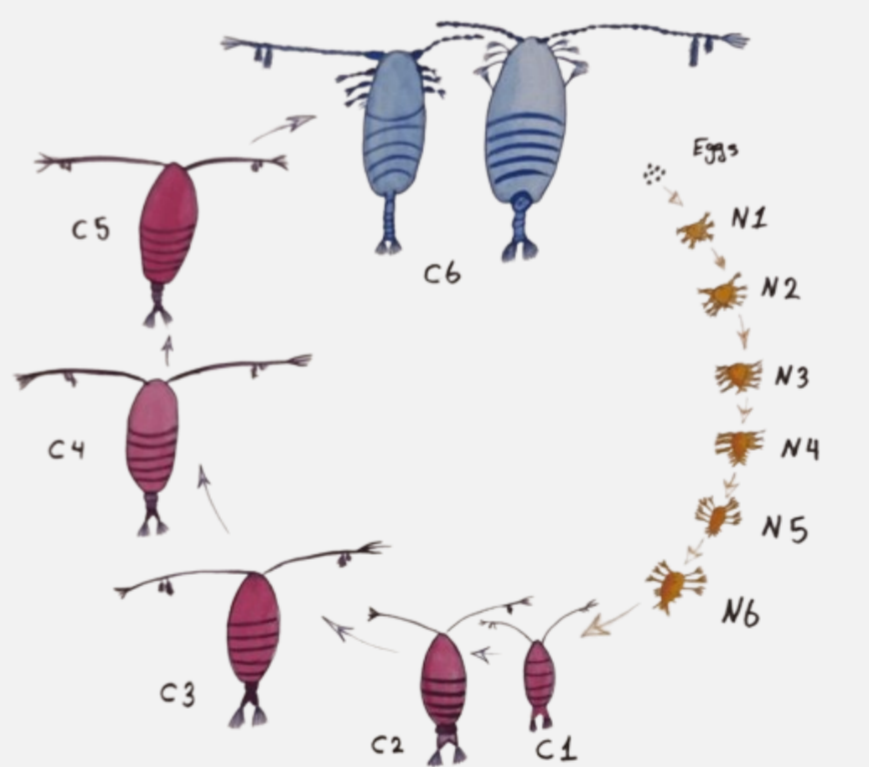
YOY were measured and weighed.



Each stomach was removed, weighted and opened to identify each prey.

2 Prey identification

Each prey was sorted, identified at the highest resolution possible, and staged (copepods only⁷) with a microscope.



Total numbers for each prey taxon were compiled. Weight of ingested prey was estimated based on weight-to-length conversion factors⁸.

3 Analysis

Fulton's condition factor (K) will be used to establish condition.

$$K = \frac{100 * W}{L^3}$$

L : Total length (cm) of herring
W : Total weight (g) of herring

Partial stomach fullness index (PFI) transformed into a percentage (%FI) will be used to obtain the contribution of each prey to diet of herring.

$$PFI_{ij} = M_{ij} \times L_j^{-b} \times 10^4$$

M_{ij} is the mass of prey i in herring j
L_j is the Ls (cm) of herring j
b is the allometric exponent for herring

Preliminary Results (Set 72)

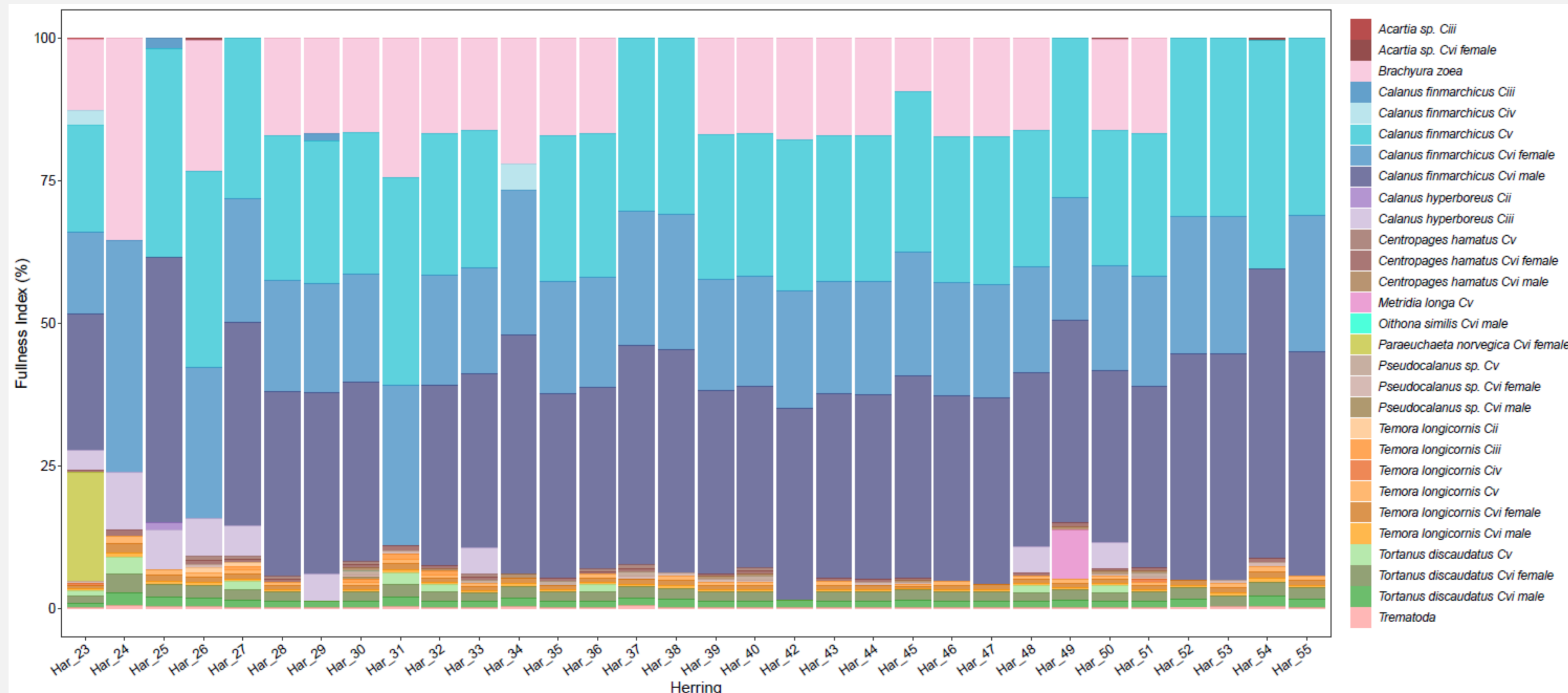


Figure 1: Individual diet composition expressed in % Fullness Index of the 33 herring (Standard length range : 5.2 – 7.6 cm) sampled in 2021 in the eastern section of the study area (set 72)

→ 11 prey taxa distributed on 8 life stage.

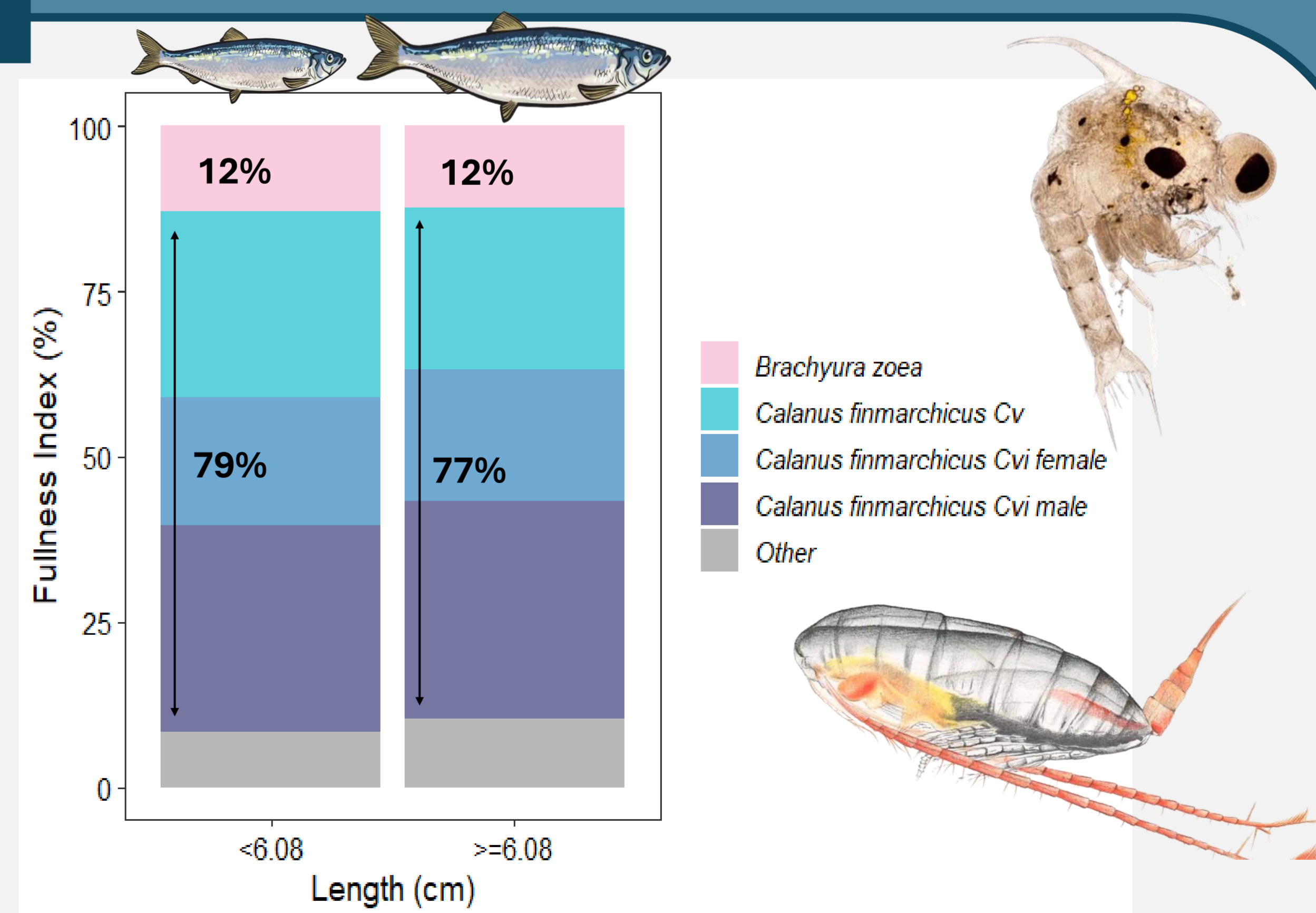


Figure 2: Contribution of prey expressed in % Fullness Index according to herring size class (larger and smaller than average fish length)

→ 2 taxa contributed to 90% of the diet.

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