

# Tracking spatial and temporal pattern in zooplankton trophic dynamics in the eutrophic Elbe estuary (Germany): A multiple stable isotope approach

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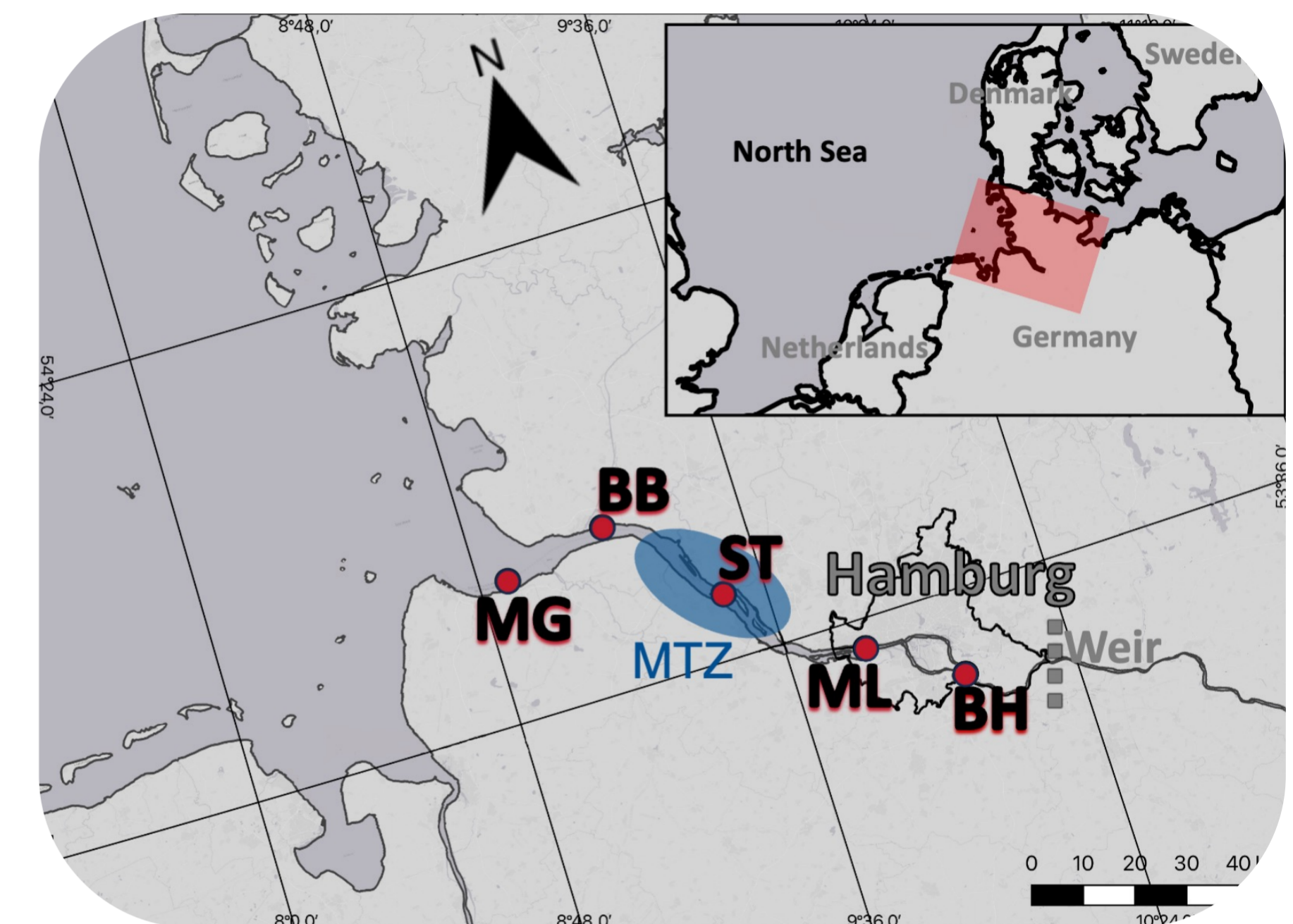


## Background

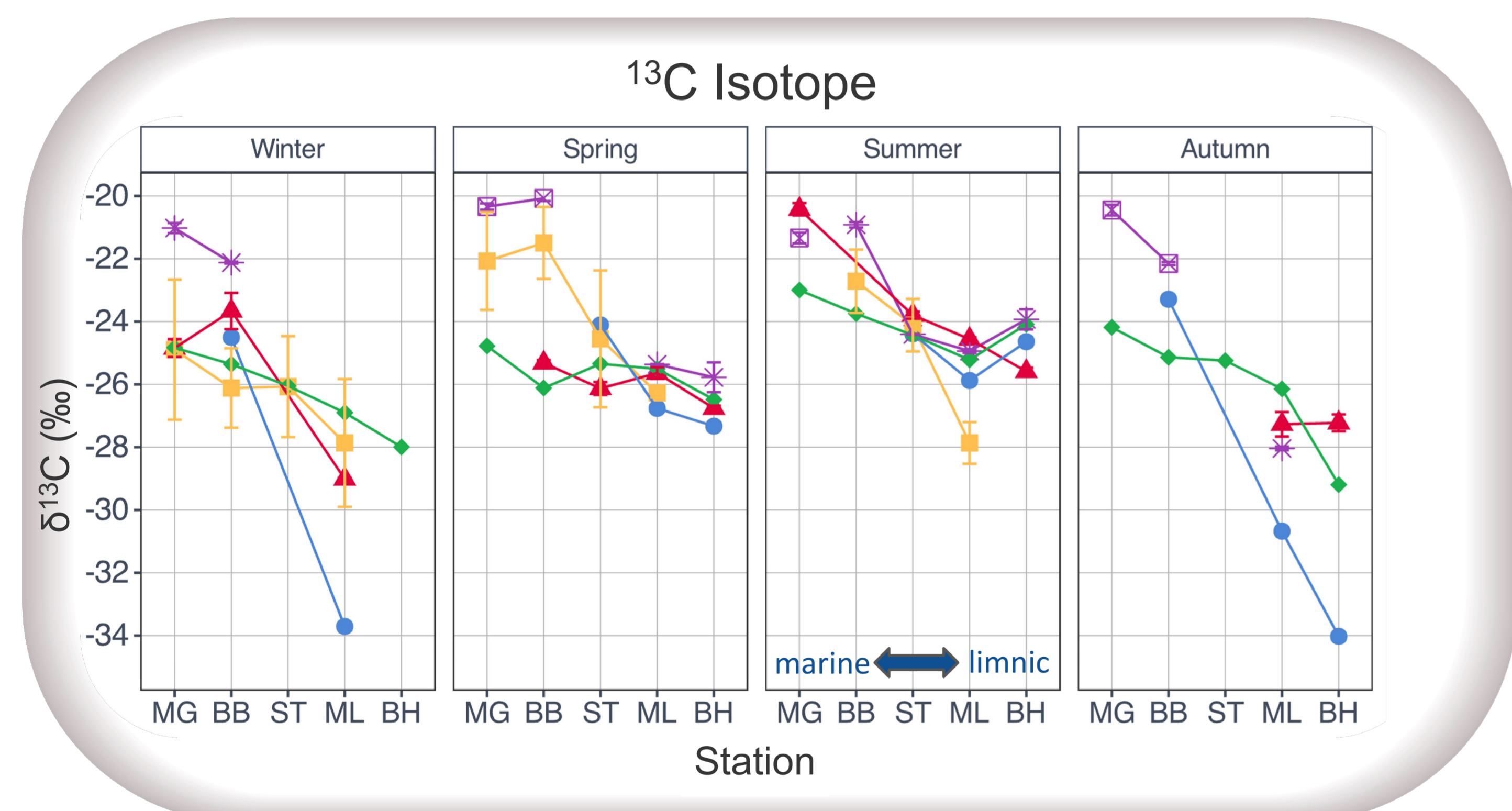
- The ecosystem of the Elbe estuary is affected by recurring dredging activities, eutrophication and climate change
- Zooplankton plays a crucial role in the trophic transfer within aquatic food webs
- Critical gaps exist in understanding trophic pathways in the planktonic food web of the Elbe estuary
- Here we present preliminary data on the spatio-temporal variability of trophic structures and the use of different carbon sources

## Methods

- What?** Five dominant planktonic taxa and POM
- Where?** Five stations along the salinity gradient of the Elbe estuary
- When?** At all seasons in year 2022
- How?** Sampling of zooplankton with two nets (100 & 1000  $\mu\text{m}$  mesh size) and POM by filtration; application of multiple stable isotope approach

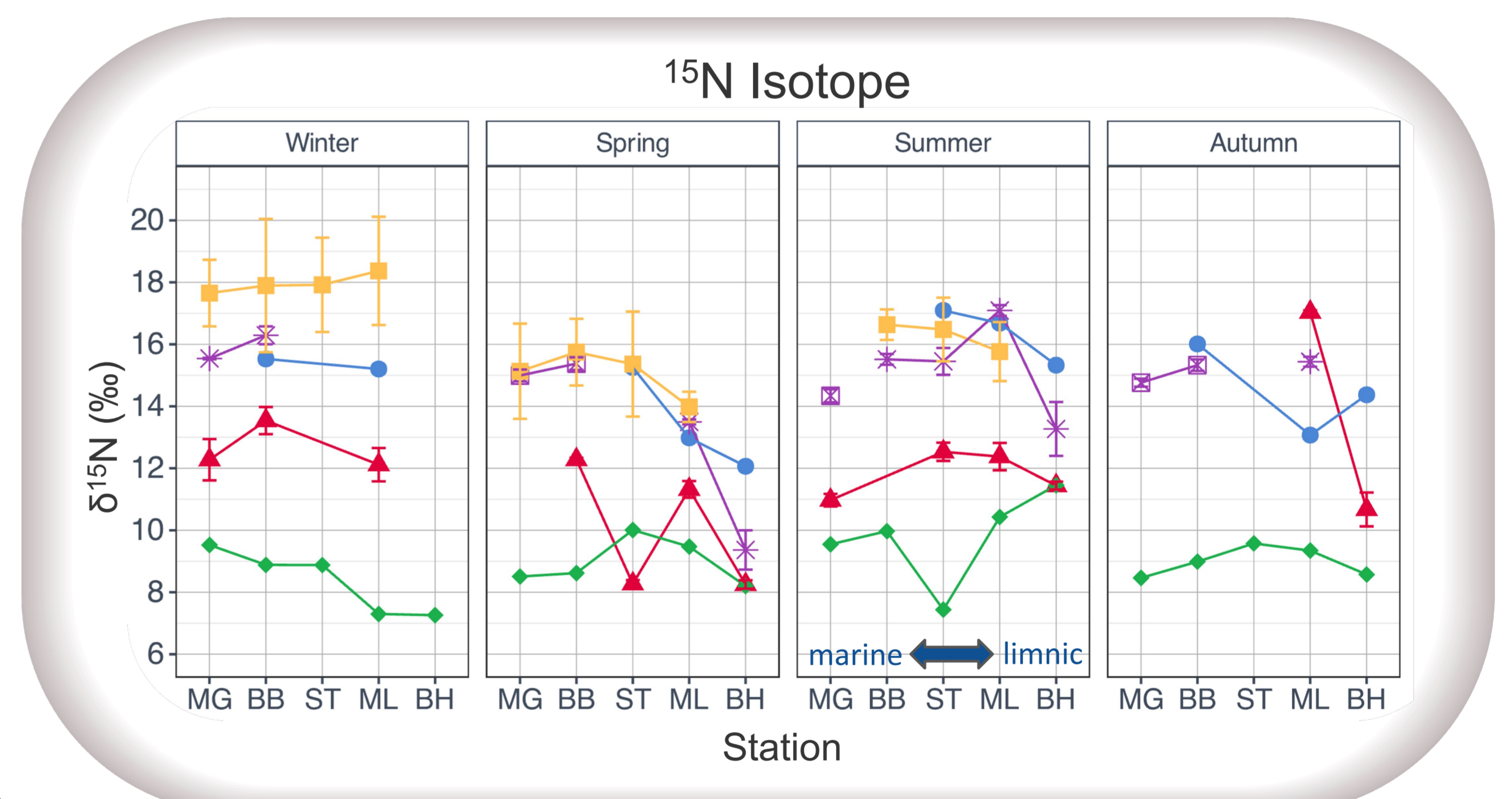
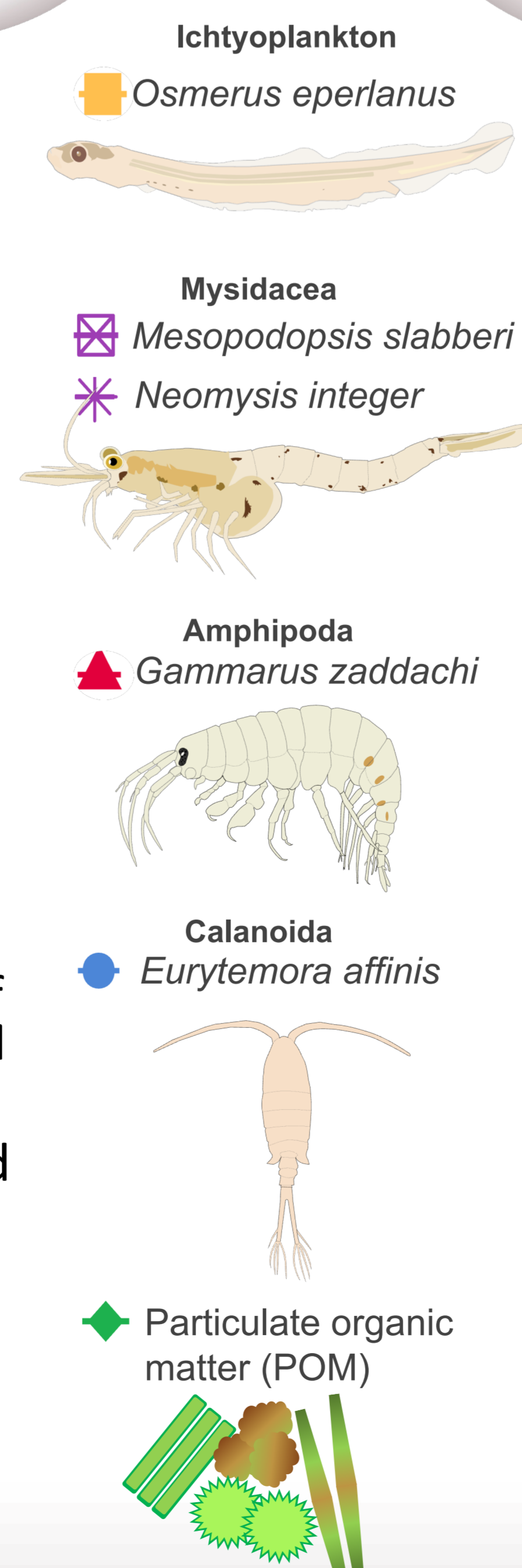


## Results



- Downstream enrichment in  $\delta^{13}\text{C}$  ratio of all taxa by conservative mixing of riverine and coastal POM sources
- River discharge rates significantly impact carbon sources, with more depleted  $\delta^{13}\text{C}$  values in winter than in spring and summer (Dunn's test,  $p < 0.01$ ), since the terrestrial carbon source shifted downstream due to high discharge rates
- Mesopodopsis slabberi* is significantly more enriched in  $\delta^{13}\text{C}$  than other taxa (Dunn's test,  $p < 0.05$ ) suggesting that the diet is mainly based on marine phytoplankton or microphytobenthos

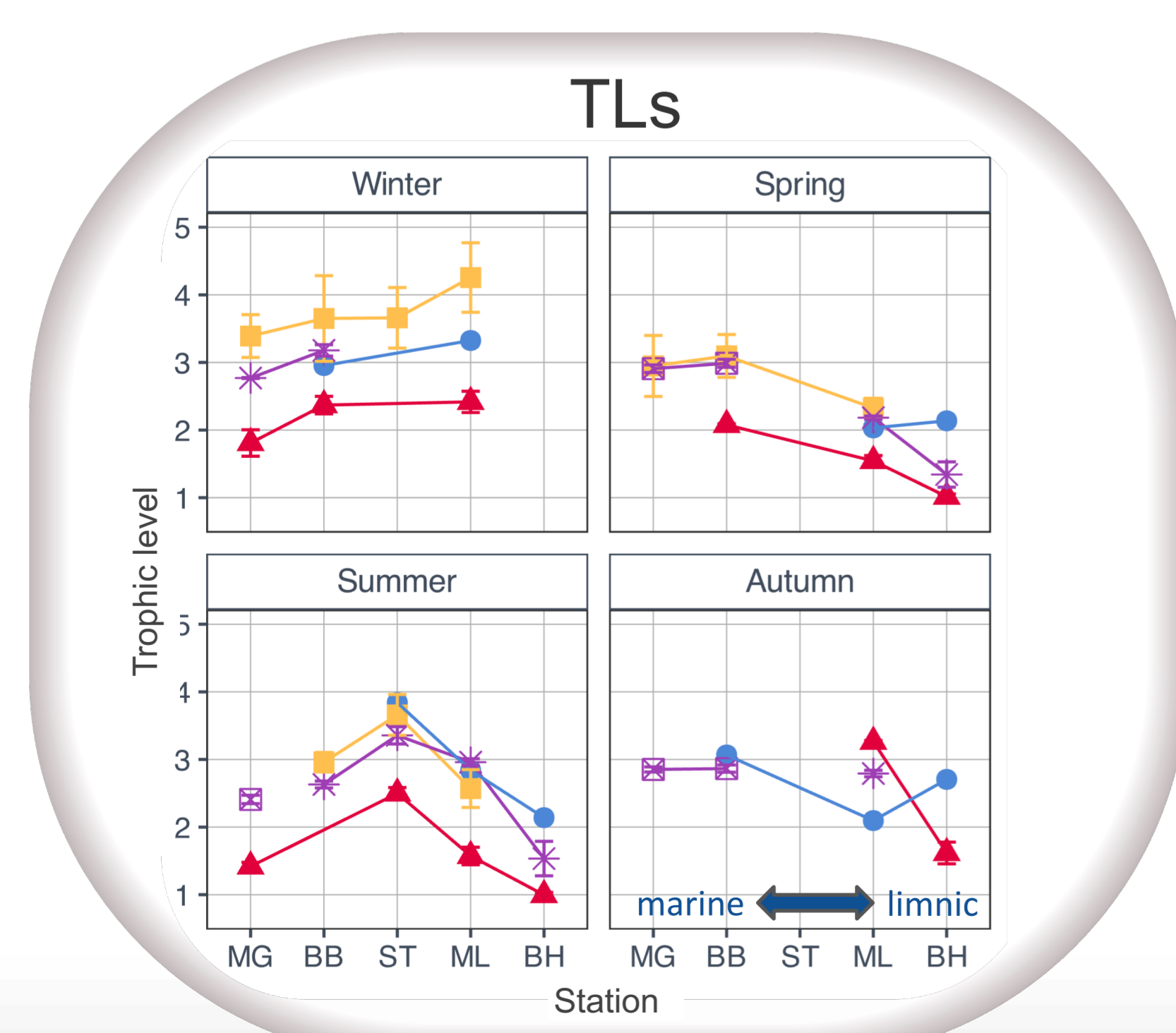
### Taxa



- Increased  $\delta^{15}\text{N}$  ratio for taxa located close to the maximum turbidity zone (MTZ) due to a change to more carnivorous feeding behavior
- Due to reduced primary production rates in winter, carnivorous feeding strategies gained importance reflected in the enriched  $\delta^{15}\text{N}$  ratios of most taxa
- Low  $\delta^{15}\text{N}$  values of *Gammarus zaddachi* indicate benthic associated trophic sources

## Take home message

- Our study highlights the importance to include spatial and temporal gradients when assessing trophodynamics of a highly variable estuarine environment
- Increased carnivorous feeding exists in winter and at stations close to the MTZ when primary production is limited



- Calculations of trophic levels (TLs) assuming an enrichment factor of 3.4‰ based on POM
- Higher TLs occupied by taxa in winter and in the MTZ likely indicate a transition to carnivorous feeding strategies

### Project information



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