Trophic interactions and niche differentiation among conspecific mysids in the St. Lawrence Estuary, Canada

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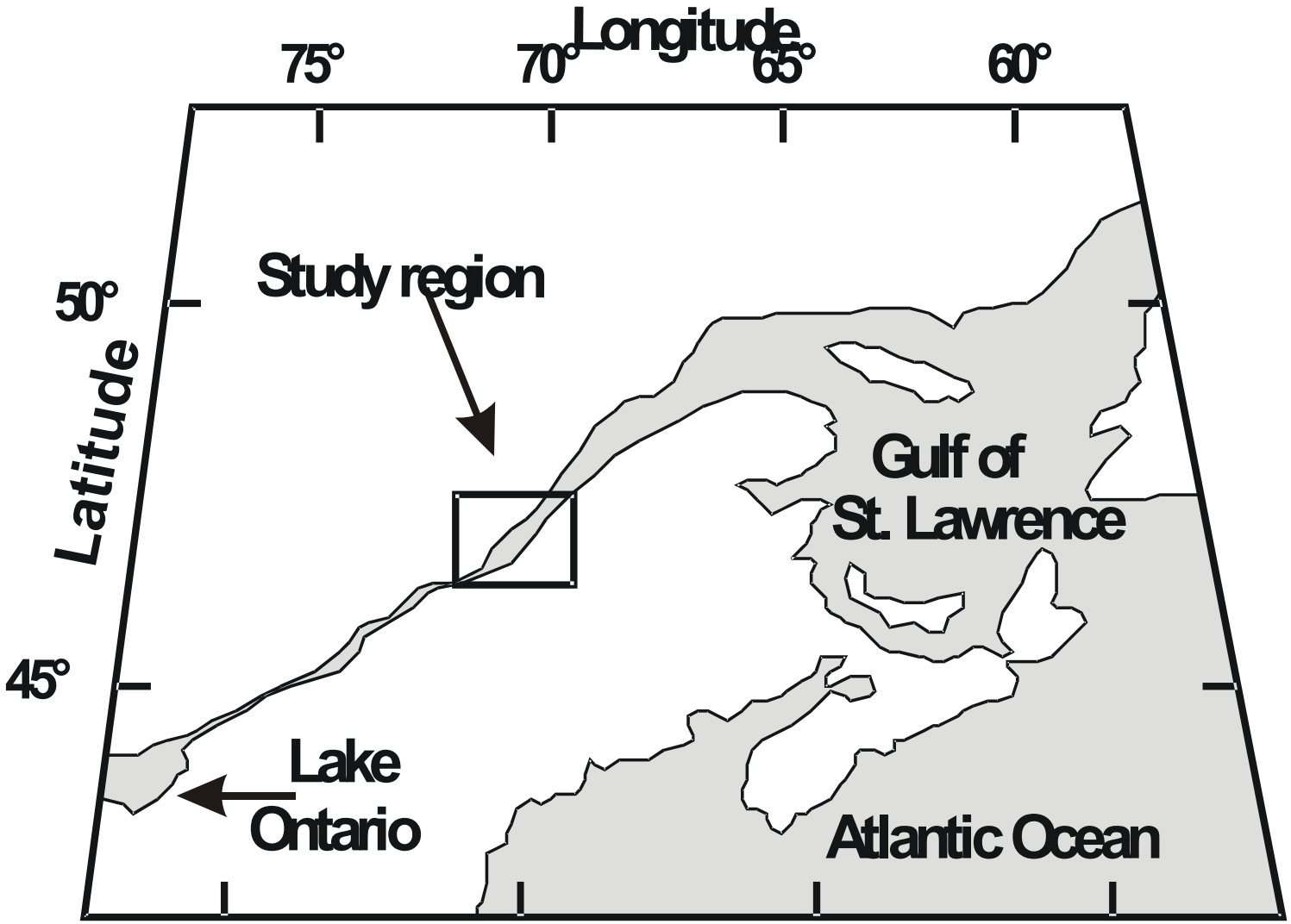
St. Lawrence Estuary



Zooplankton communities along the salinity gradient

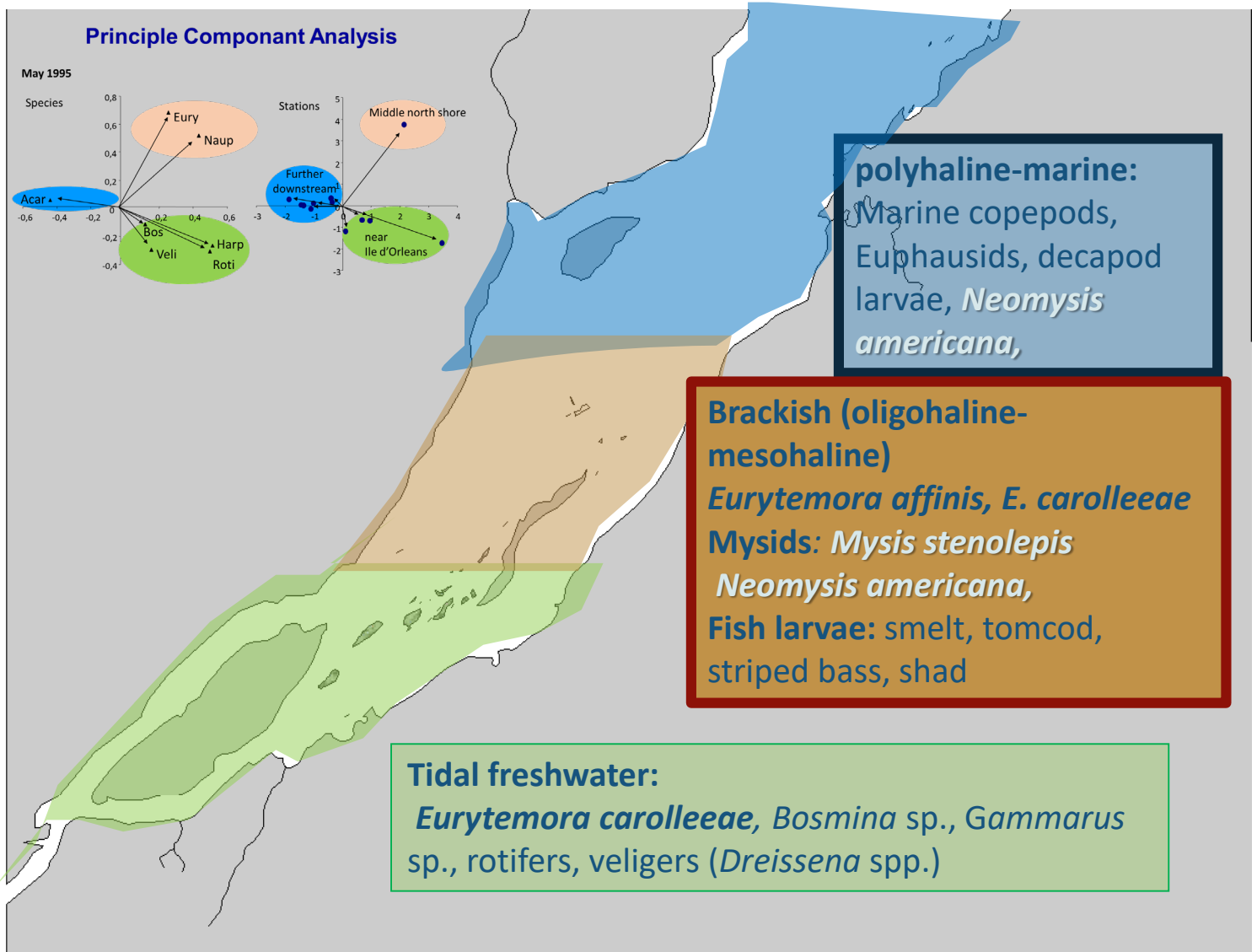
ETZ: estuarine transition zone

High turbidity
Strong gradients: S, T

High primary + secondary production
→ Important nursery area

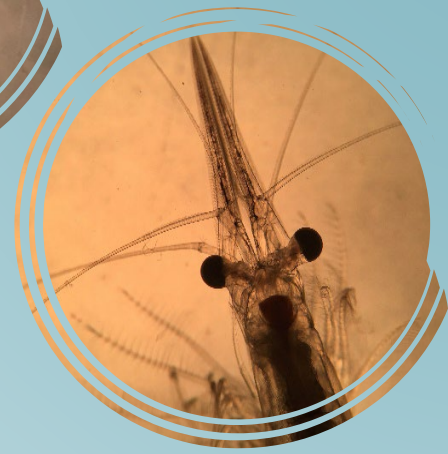
3 zooplankton communities

→ **Low biodiversity**



(Vincent et al.1996, Laprise and Dodson 1994, Winkler et al. 2003, Winkler et al. 2005, Favier and Winkler 2014, Vanalderweireldt et al. 2020)

Biodiversity



Low biodiversity → Simple Food web

However, **cryptic diversity** is found in several taxonomic groups

- copepods (*Eurytemora*),
- mysids (*Neomysis*),
- fish (*smelt*)

→ Ecological consequences of this genetic diversity of consumers and prey on ecosystem functioning?

Mysids: “KRILL of shallow coastal zones”

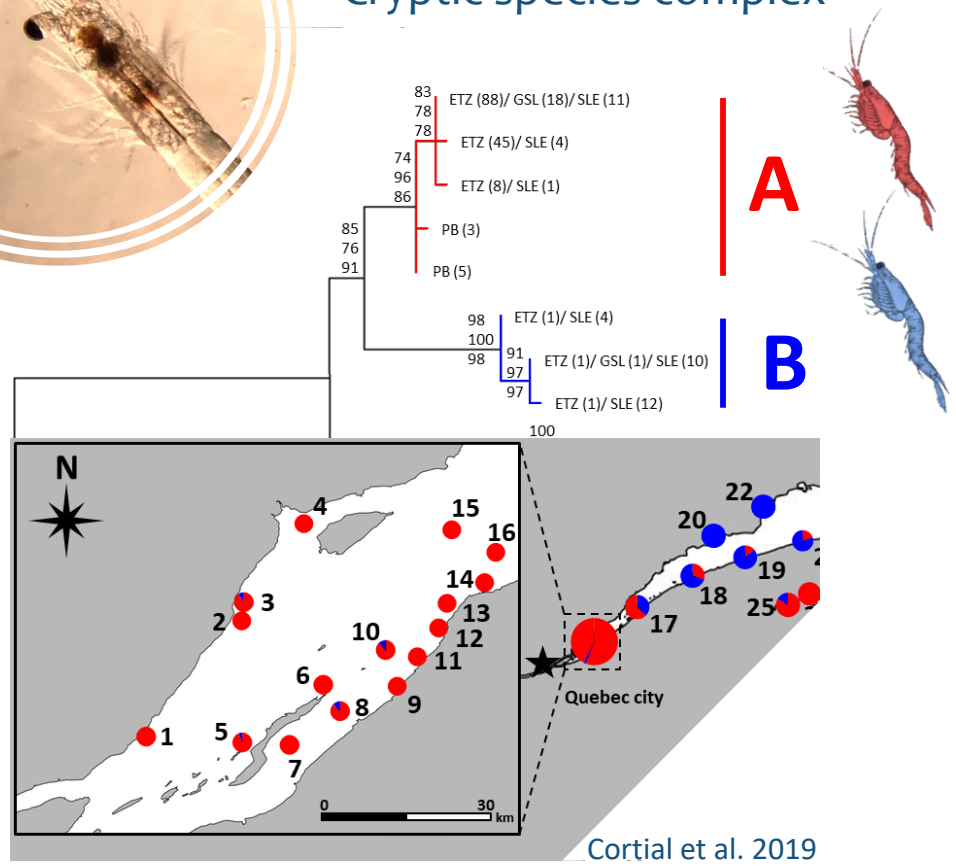
Mysis stenolepis

Adult: 2.4 cm

Neomysis americana

Adult: 0.6- 1.6 cm

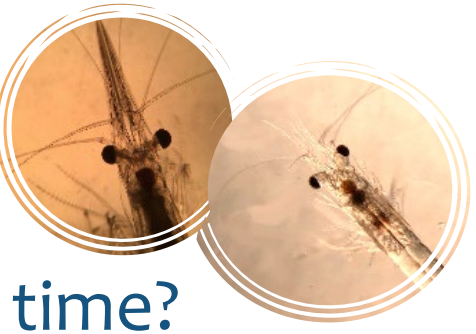
Cryptic species complex



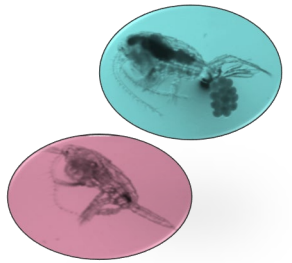
Cortial et al. 2019

→ Emerging questions on the understanding of the trophic functioning

Emerging questions



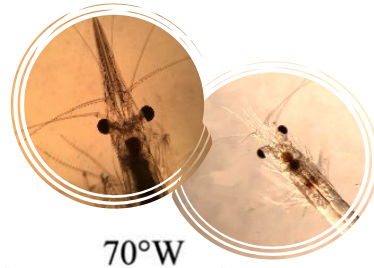
- Do the trophic niches vary between sympatric mysids over time?

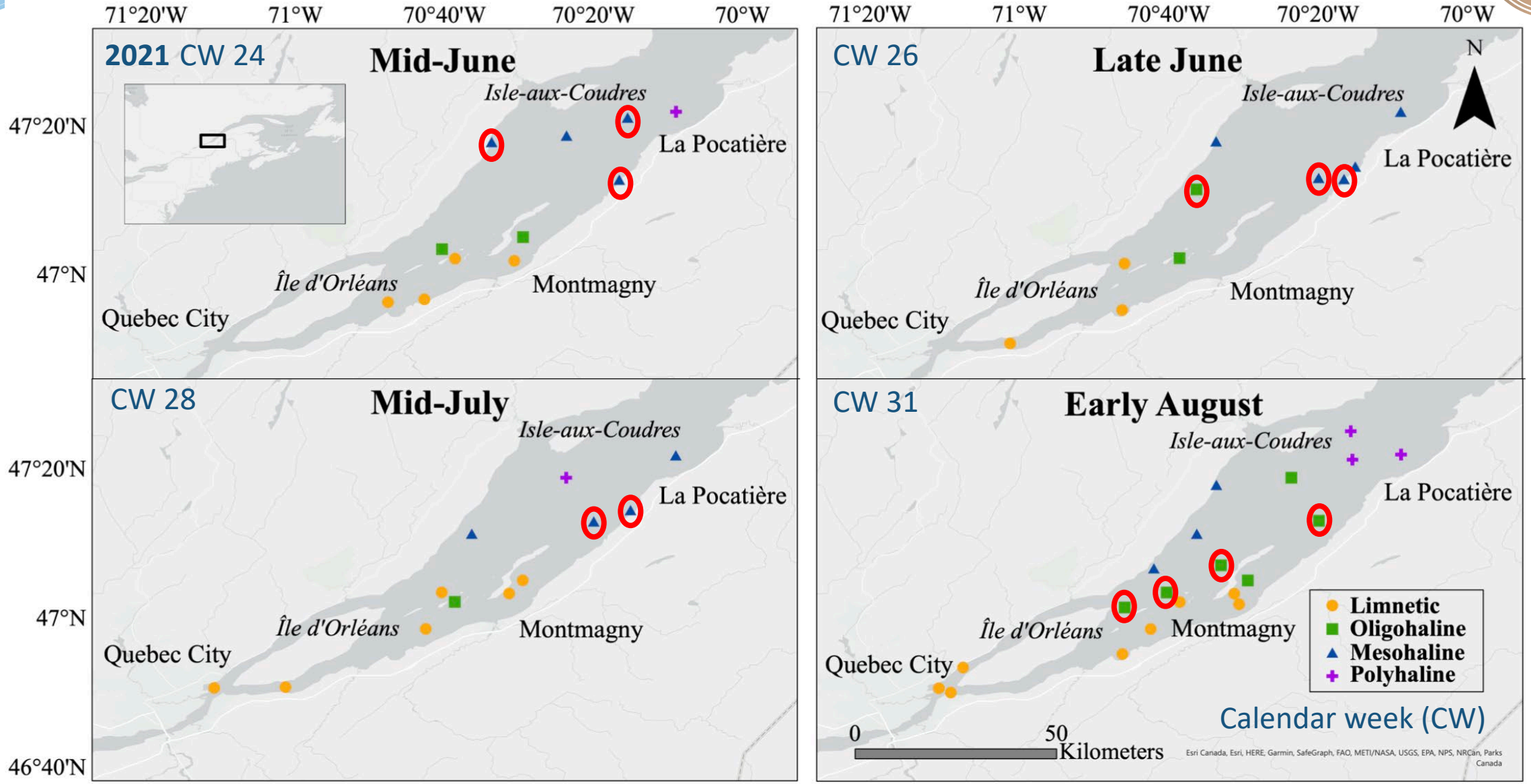


- Do mysids feed on the principal copepod prey of the ETZ, the two cryptic species of the *Eurytemora affinis* complex ?

- Do *N. americana* complex show intraspecific differences in trophic niches?

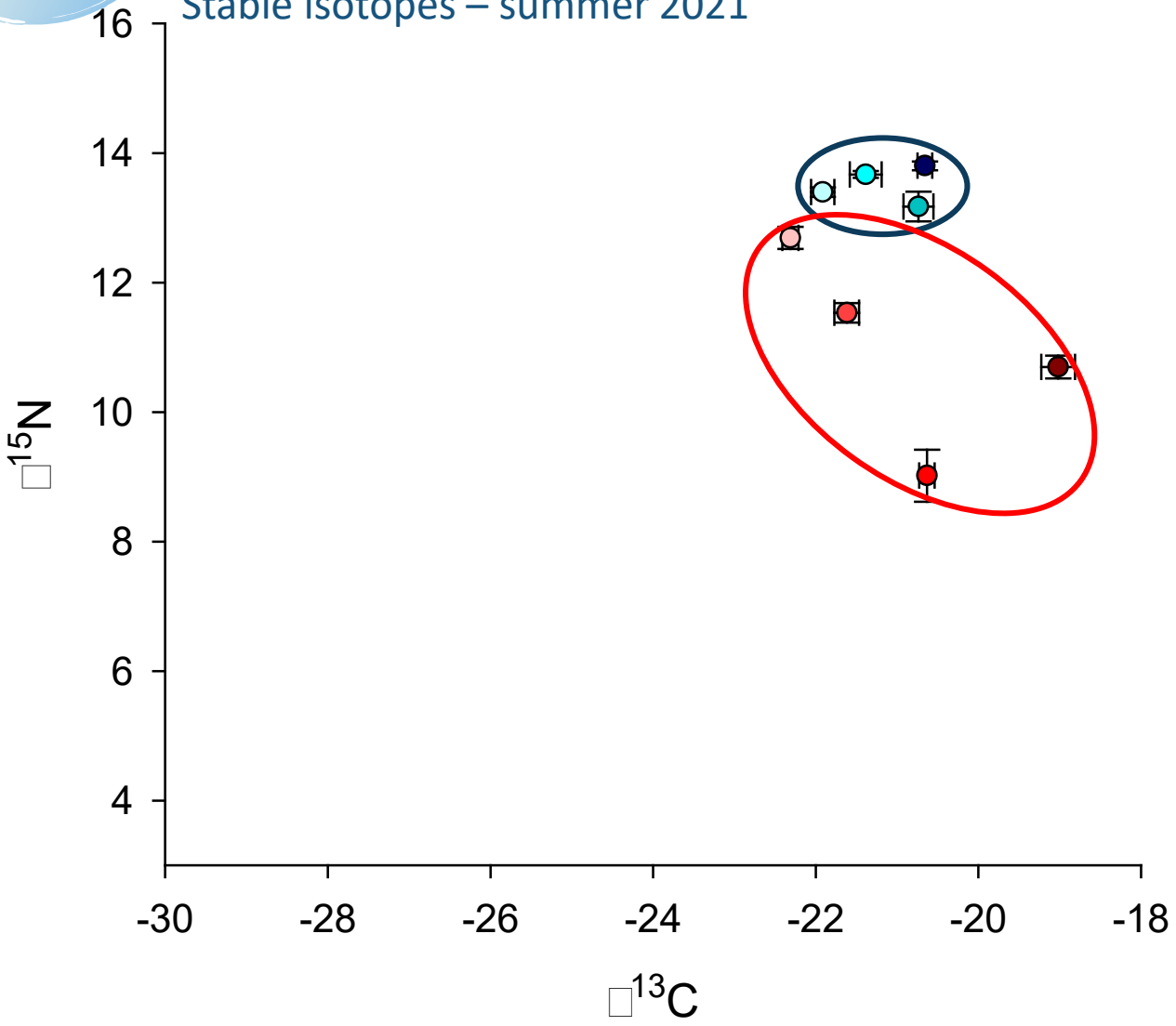
Distribution of sympatric mysids in summer 2021



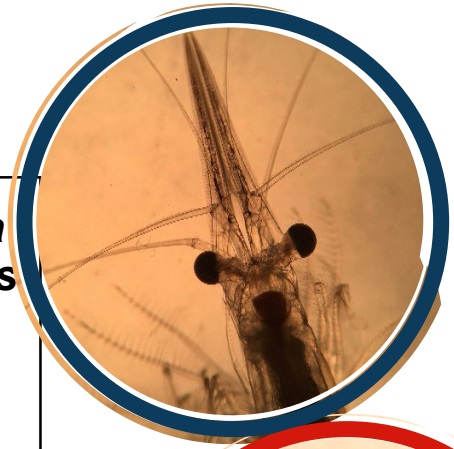


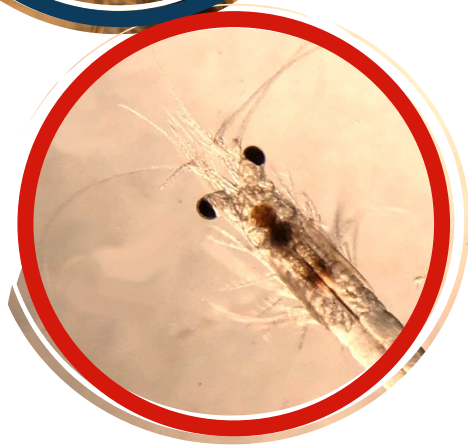
Trophic niches of sympatric mysids

Stable isotopes – summer 2021



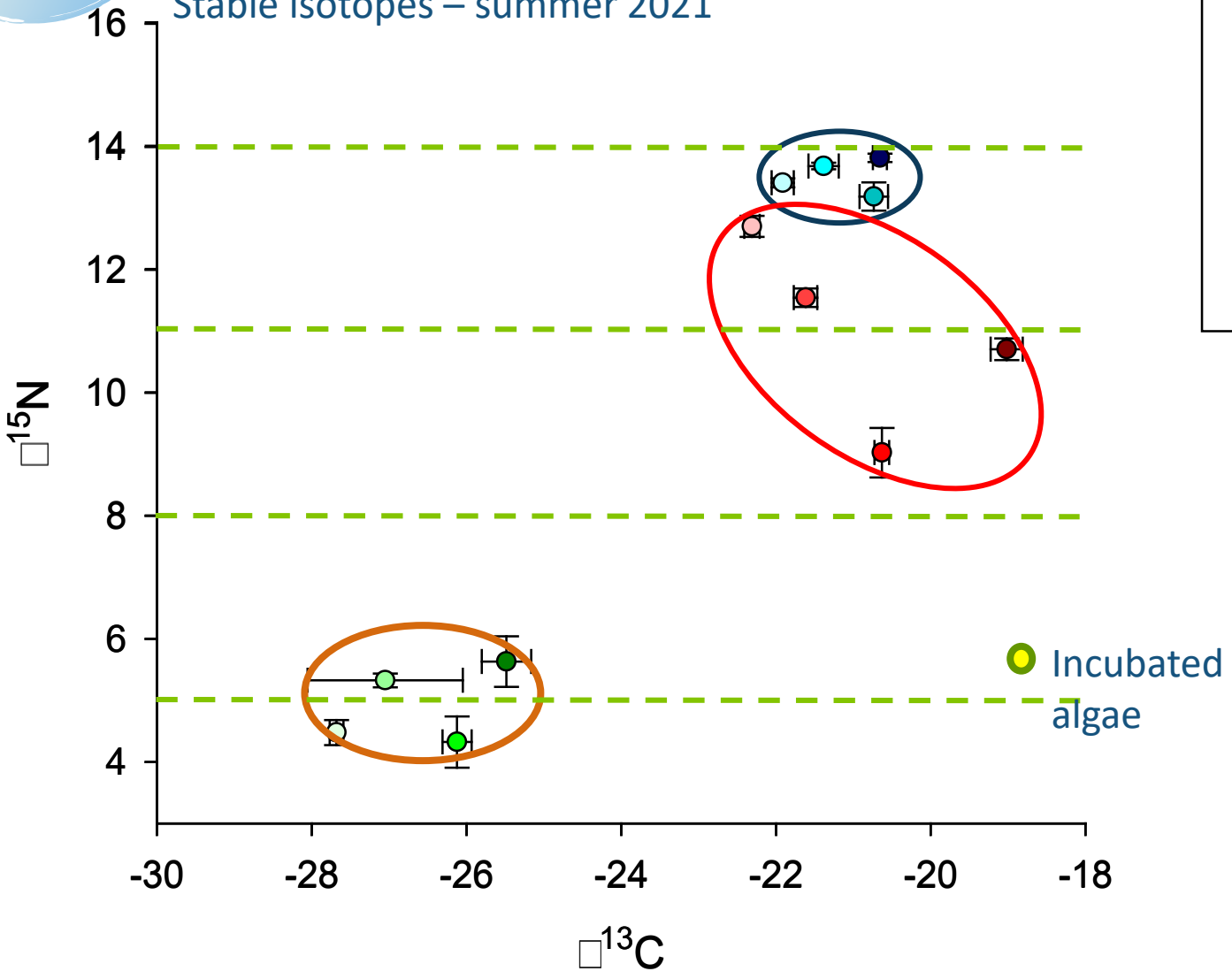
CW 24 - ***N. americana***
- ***M. stenolepis***
CW 26
CW 28
CW 31





Trophic niches of sympatric mysids

Stable isotopes – summer 2021



CW 24 - ***N. americana***
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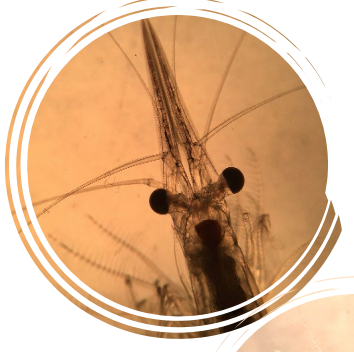
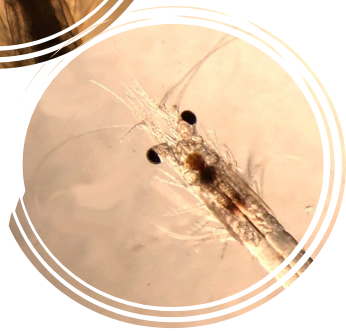
CW 26
CW 28
CW 31

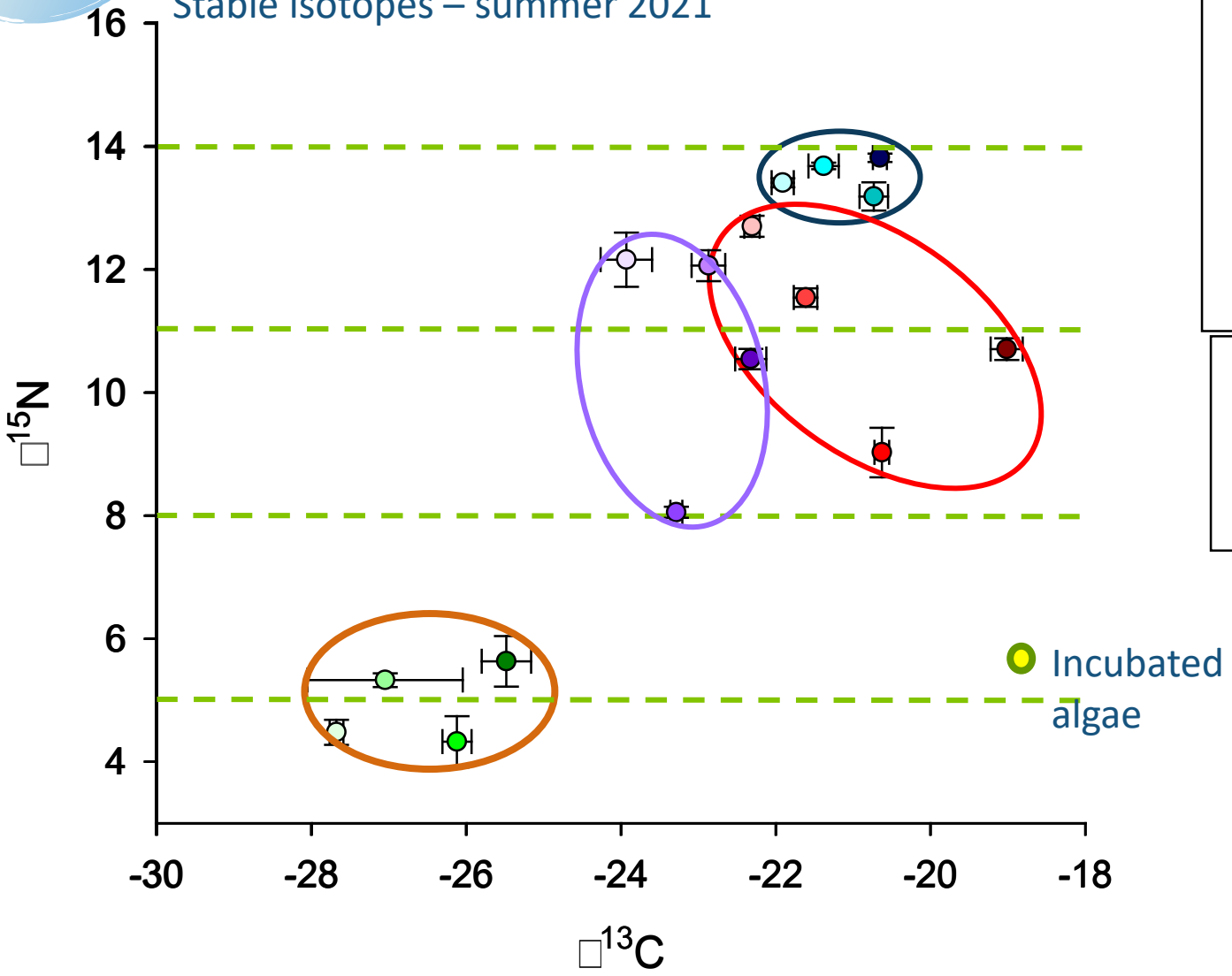
CW24 - POM
CW26
CW28
CW31





Trophic niches of sympatric mysids

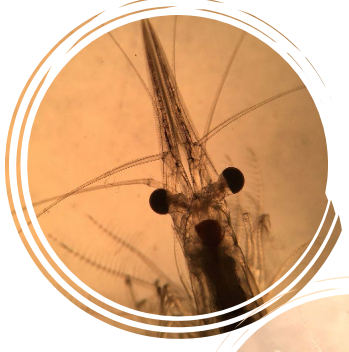
Stable isotopes – summer 2021

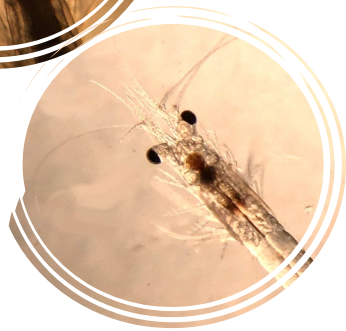


CW 24 - ***N. americana***
- ***M. stenolepis***
CW 26
CW 28
CW 31

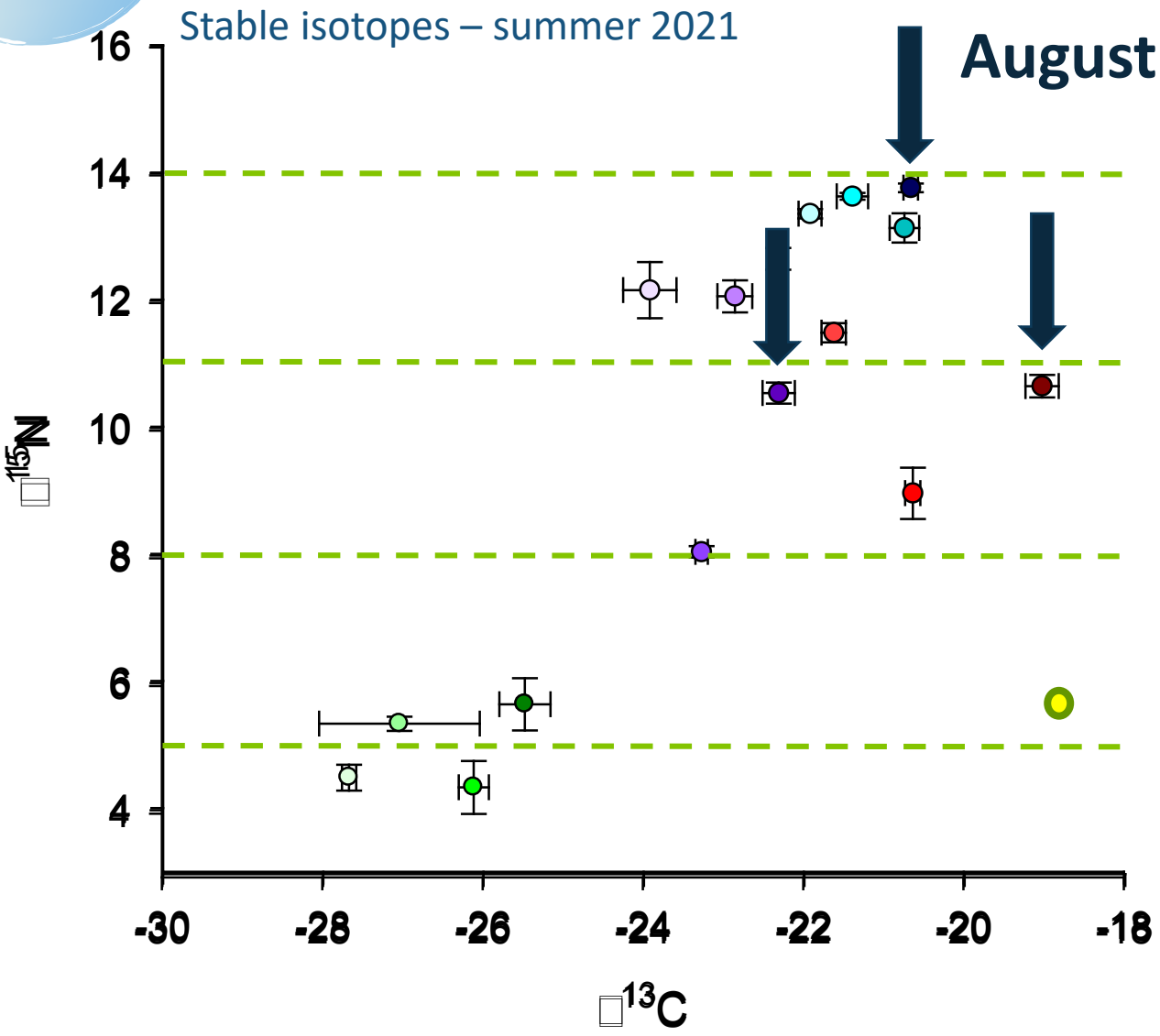
CW24 - ***E. affinis***
CW26
CW28
CW31

CW24 - POM
CW26
CW28
CW31





Trophic niches of sympatric mysids

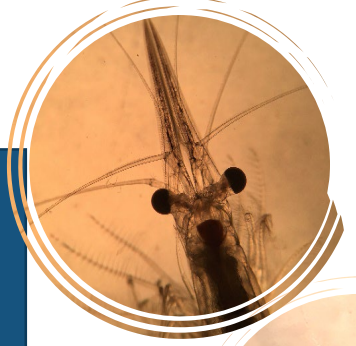


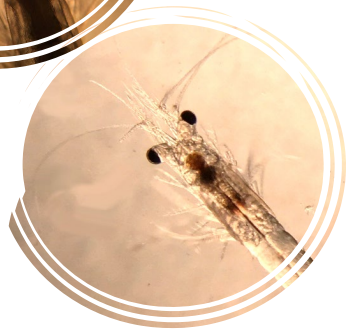
Feeding on *Eurytemora* spp.?

Mysis +

Neomysis -

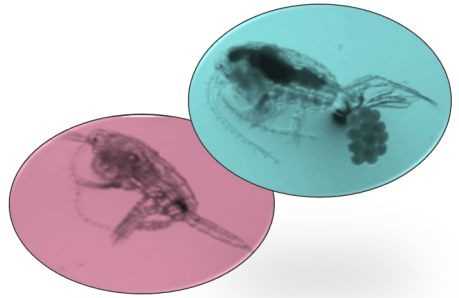
Which cryptic species ?
-available?
-in diet?



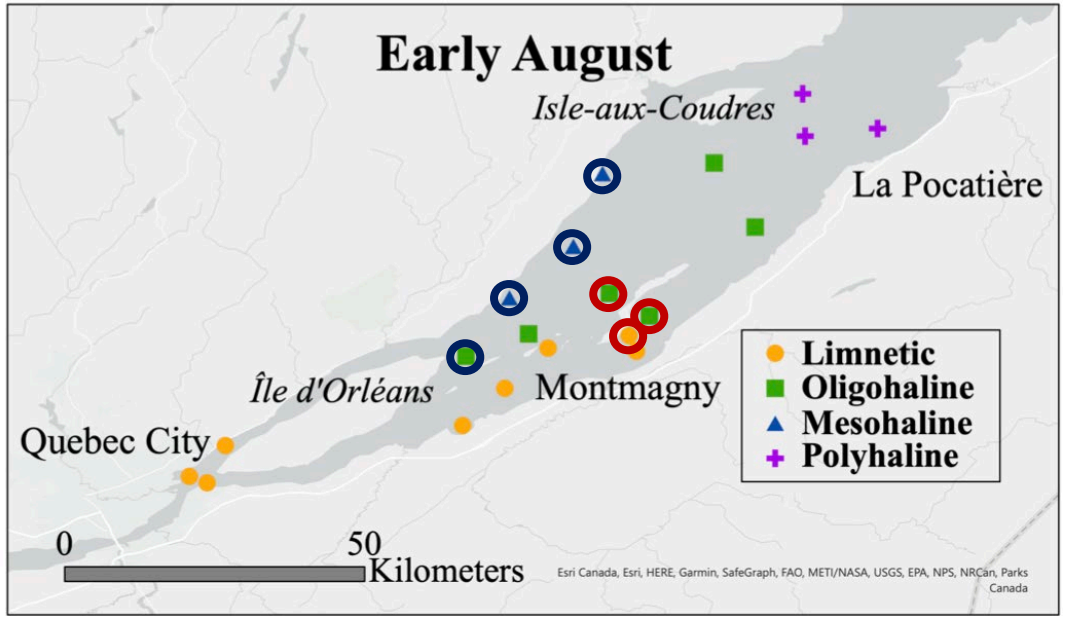


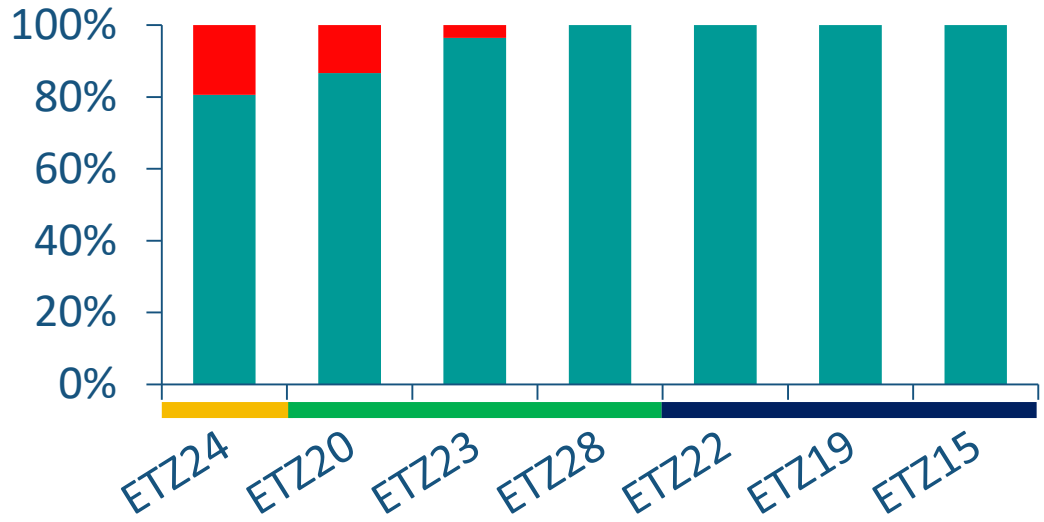
Copepod prey availability:

Cryptic species complex: *Eurytemora affinis & E. carolleae*



Distribution in the ETZ August 2021

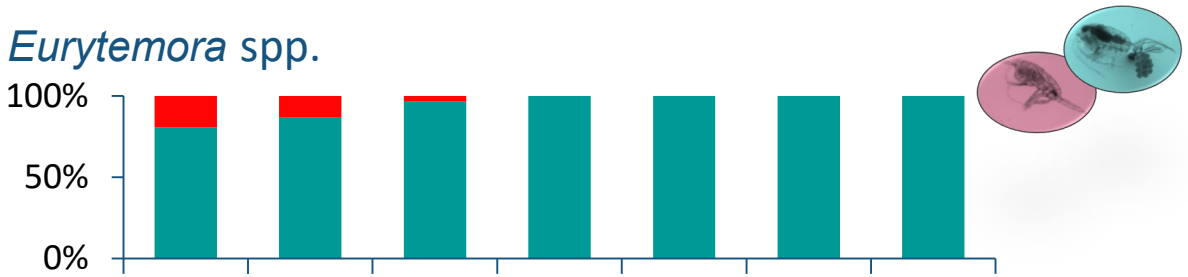


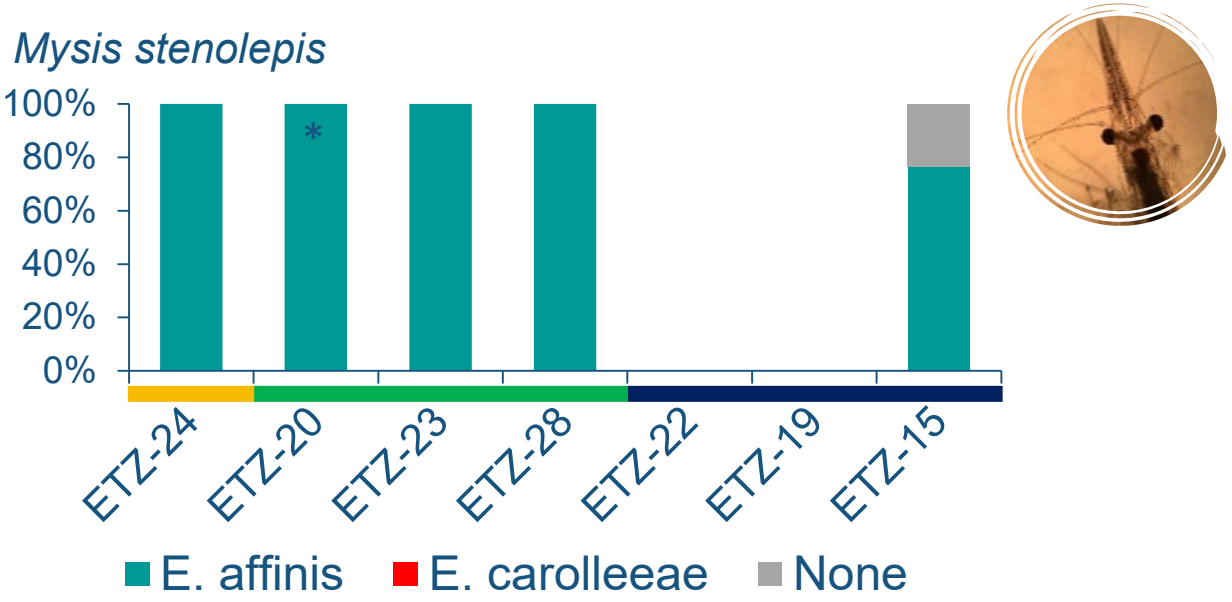


- N = 24 ind./station;
- COI – species specific primers *E. affinis & E. carolleeae*
- *E.a- 173bp; Ec- 266bp*

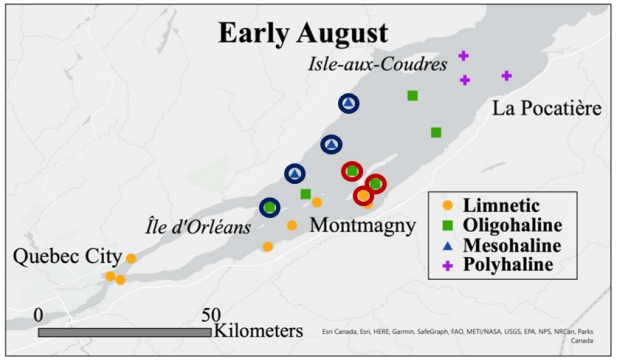
Winkler, Martinez (in prep.)

Do mysids feed on the dominant *Eurytemora affinis* complex?





* N = 15



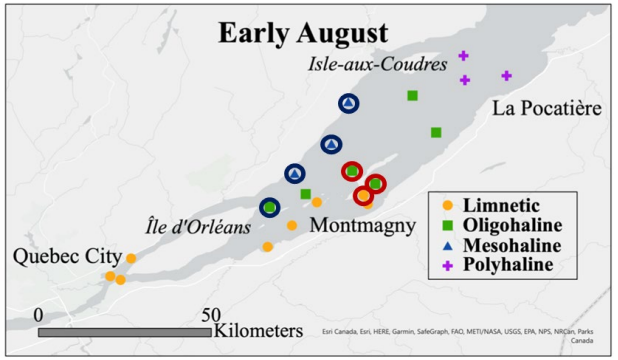
- Consumers

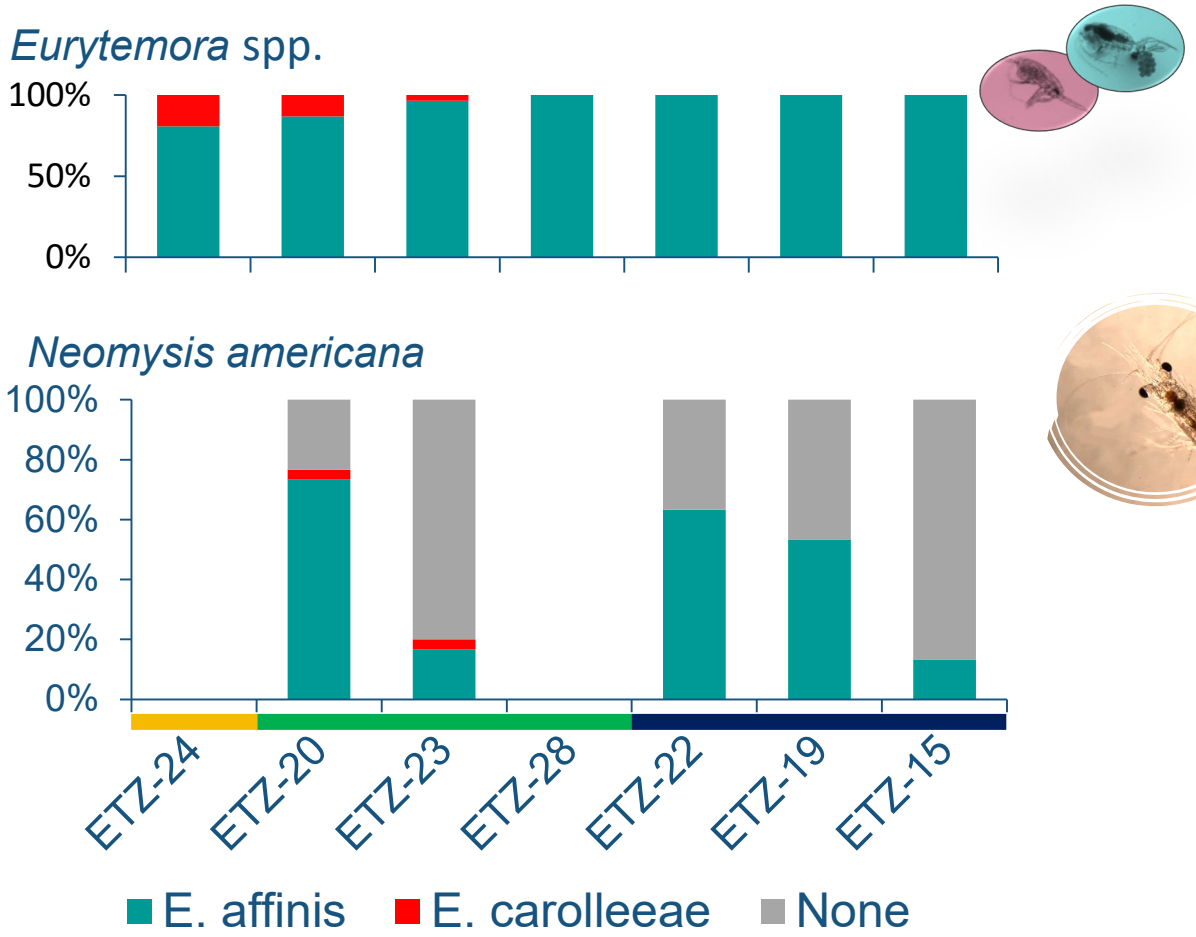
  → N = 30 ind./station;

- qPCR-approach –COI spp. primers *E. affinis & E. carolleeae*
- *E.a- 173bp; Ec- 266bp*

Winkler, Martinez (in prep.)

Do mysids feed on the dominant *Eurytemora affinis* complex?





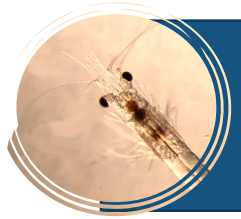
N = 30 each station; qPCR-approach – specific primers *E. affinis & E. carolleeae*

* N = 15

Winkler, Martinez (in prep.)

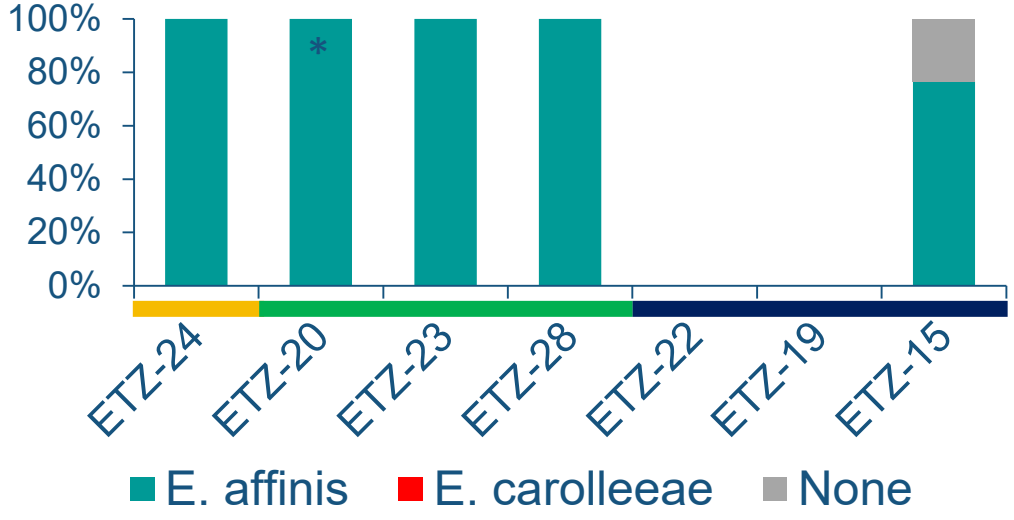
Do mysids feed on the dominant *Eurytemora affinis* complex?

Energy channeled through ***E. affinis***

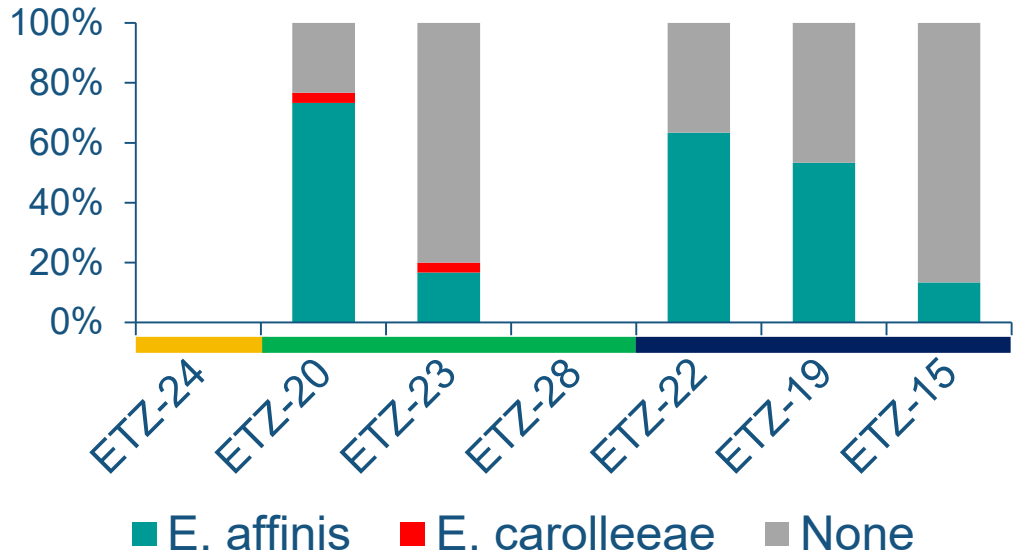


E. affinis & *E. carolleeae* & other food

Mysis stenolepis



Neomysis americana

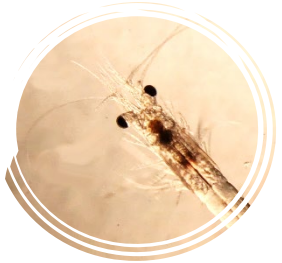


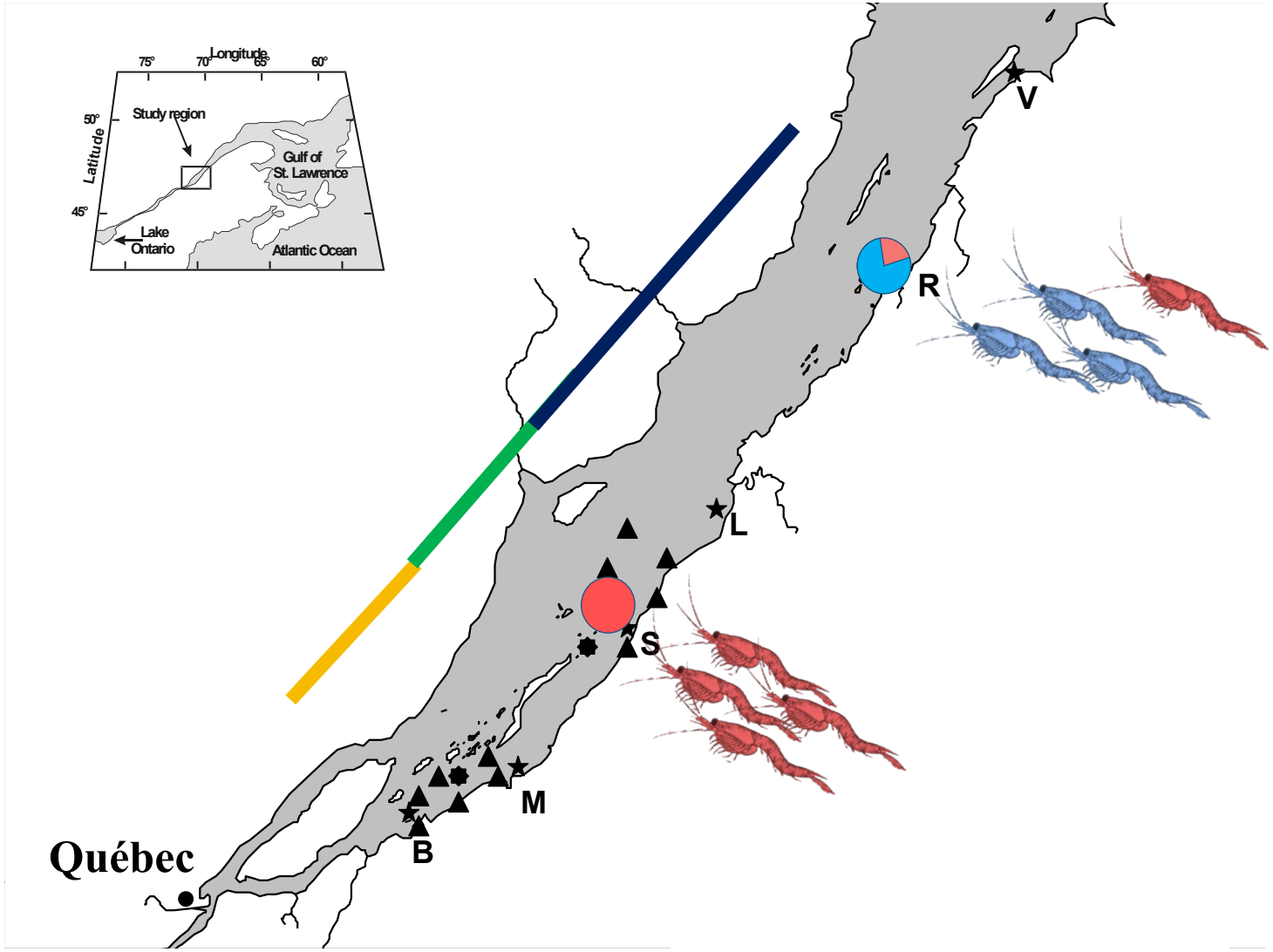
N = 30 each station; qPCR-approach – specific primers *E. affinis* & *E. carolleeae*

* N = 15

Winkler, Martinez (in prep.)

Do intraspecific differences *N. americana* in trophic niches exist?





Trophic marker approach:

Fatty acid profiles

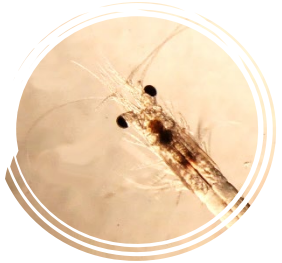
Trophic markers

→ Between clades A+B

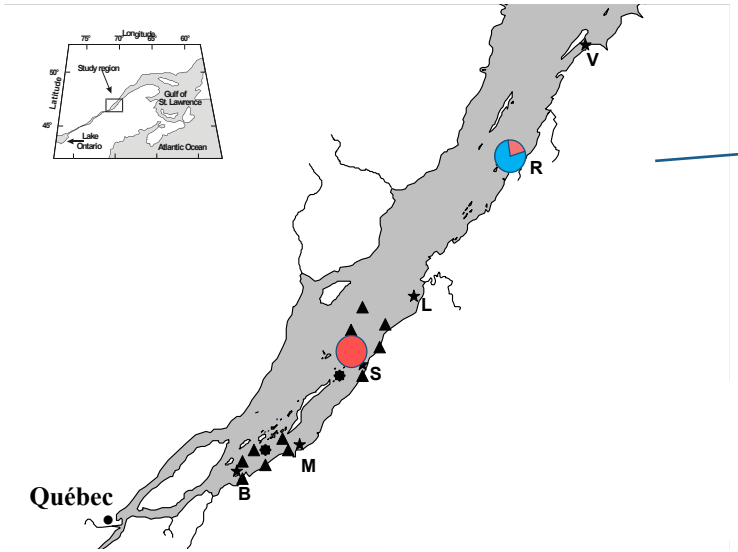
→ Between habitats clade A

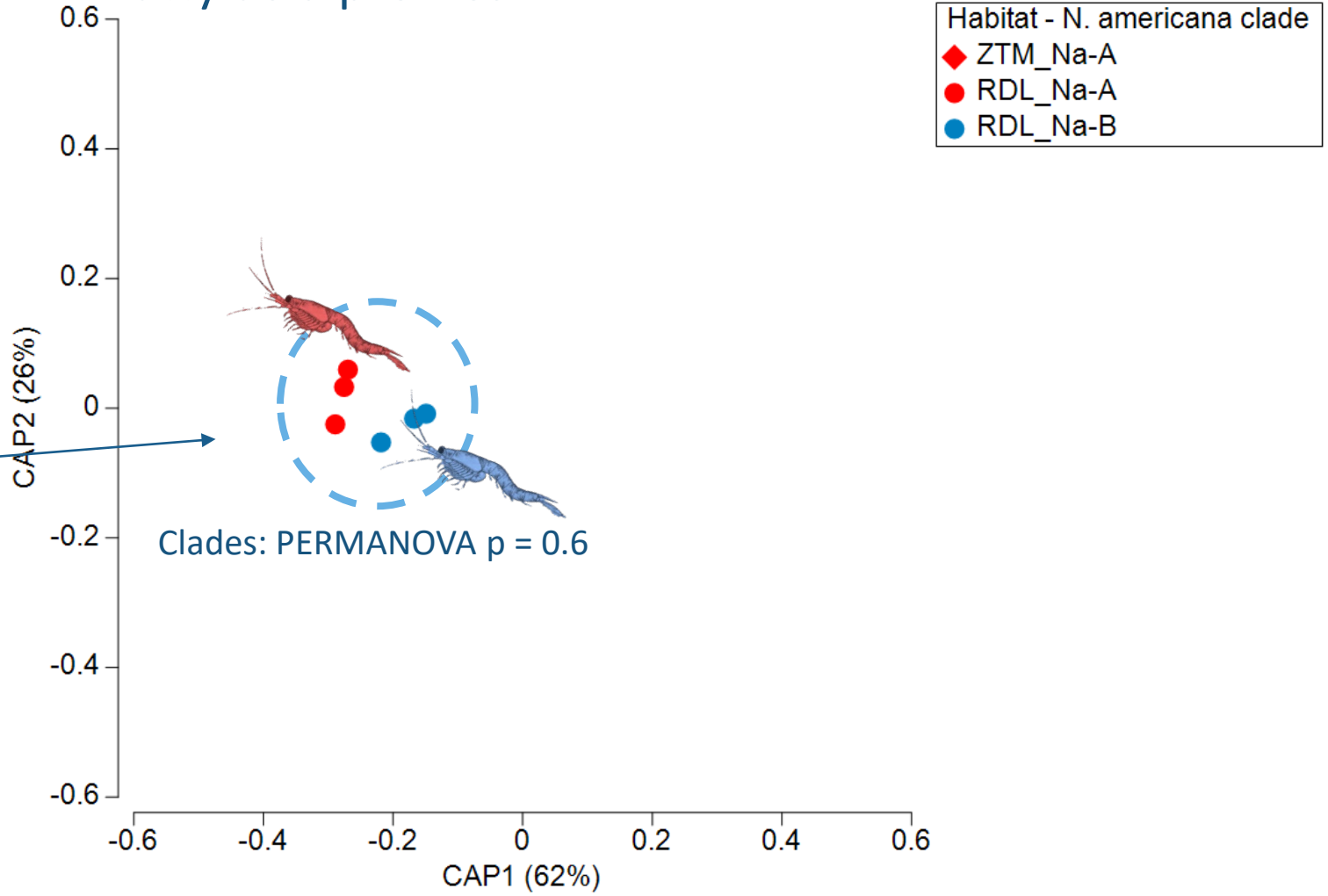
Garcia Gonzalez (MSc thesis)

Do intraspecific differences *N. americana* in trophic niches exist?



Fatty acid profiles





Clades: PERMANOVA p = 0.6

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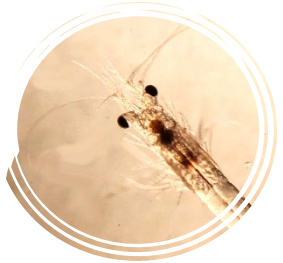
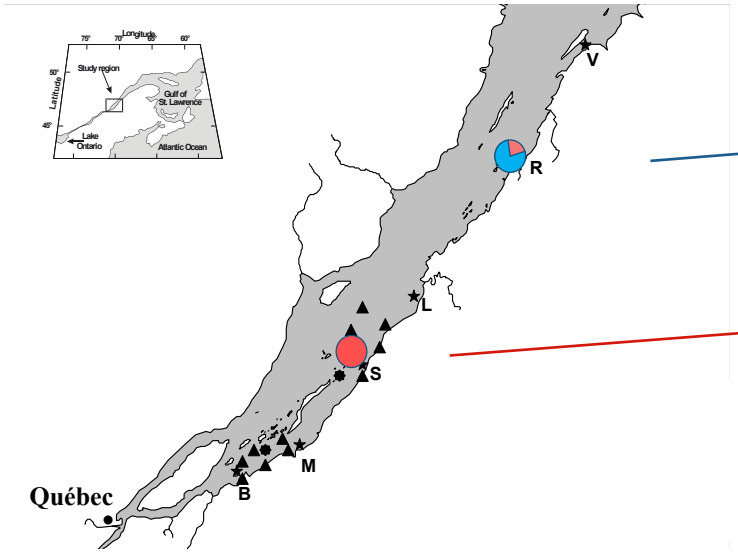
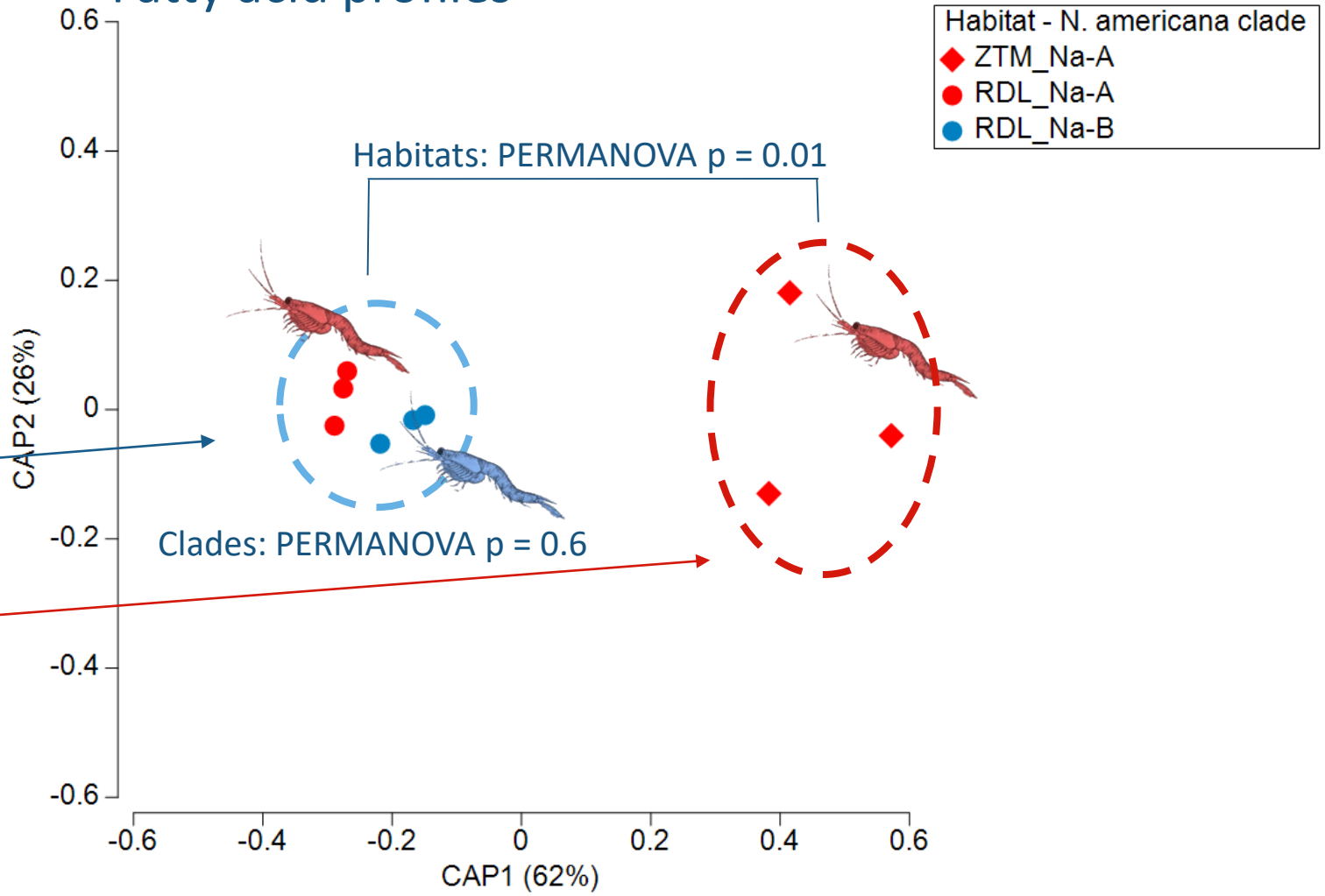
Do intraspecific differences *N. americana* in trophic niches exist?



Fatty acid profiles

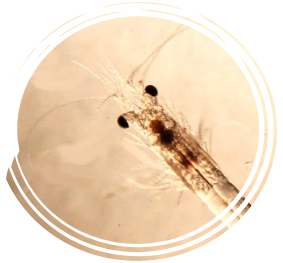
Resemblance: D1 Euclidean distance



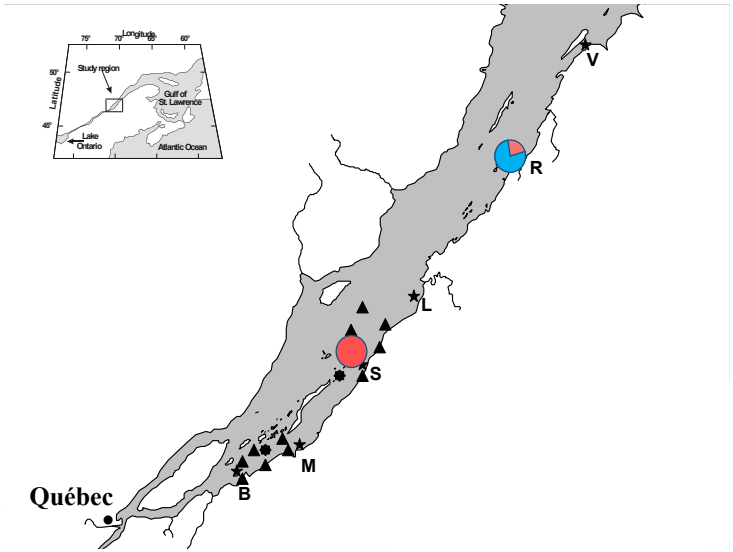


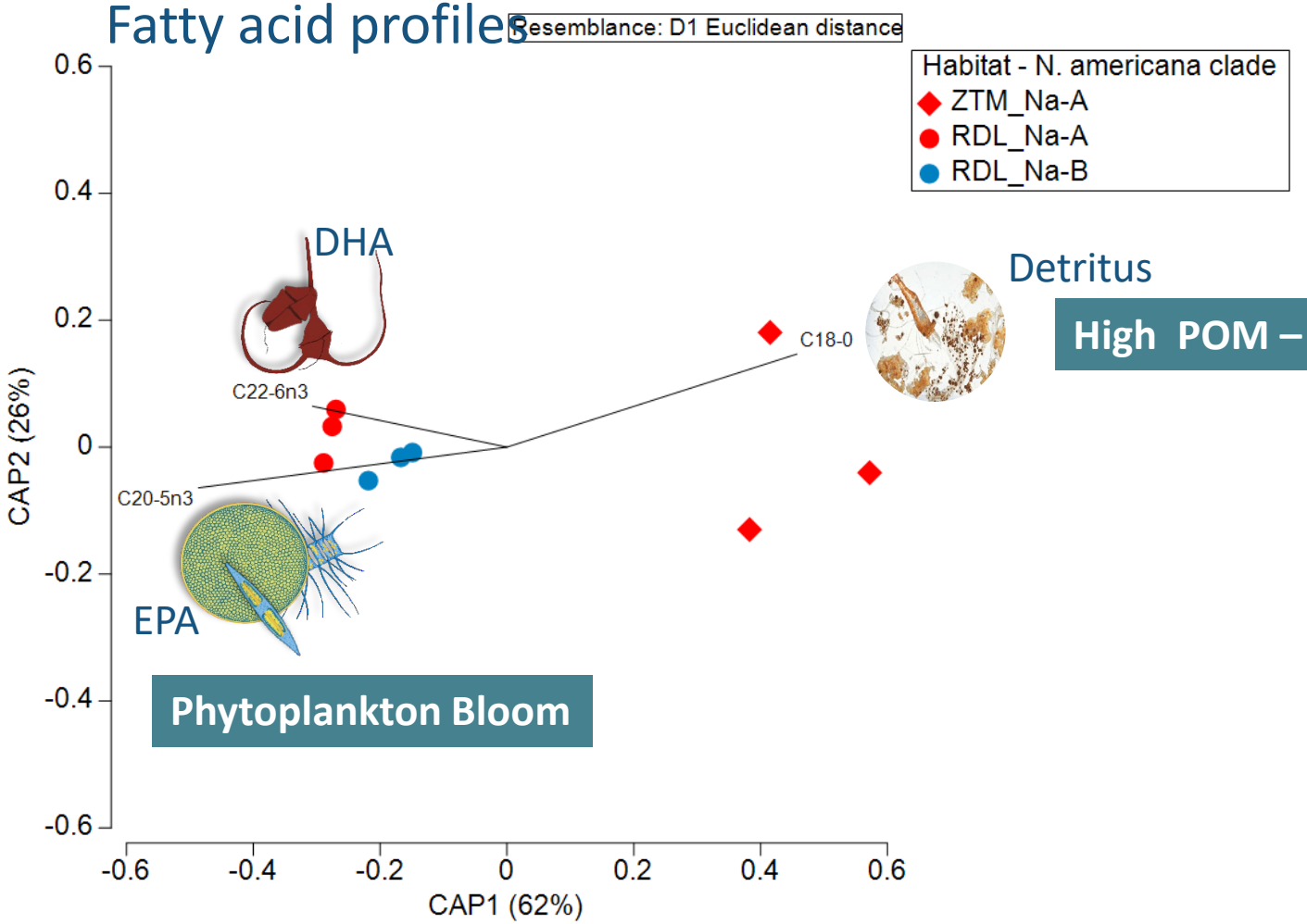
Garcia Gonzalez (MSc thesis)

Do intraspecific differences *N. americana* in trophic niches exist?



Fatty acid profiles





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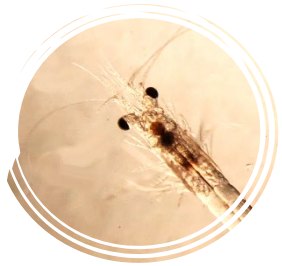
In a nutshell:

Interspecific:

→ trophic niche partitioning

→ *E. carolleeae* only found in *N. americana*



Intraspecific:

→ Small to no differences between clades

→ Spatial variability between habitats

→ occupy different trophic levels in time and space

→ Still a long way to go to determine ecological consequences of genetic biodiversity

Thanks – Merci:

- Team of the survey on the MACOMA and the LAMPSILIS.
- Captain Bruno Cayouette., Sylvain Blondeau
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