# Tracing the Energy Pathways of Macroinvertebrates in Saltmarsh Food Webs Using Carbon and Nitrogen Stable Isotopes

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## Representative Invertebrates

Midge (Larva de mosquito)

Ant (Hormiga)

Mud Crab (Cangrejo de barro)

Tick (Garrapata)

Amphipod (Anfípodo)

Polychaete worm (Poliqueto)

Springtails (Insectos de agua)

## Saltmarsh Food Webs

Saltmarsh food webs are complex because they sustain both benthic (grasses, insects) and pelagic (algae, fish) communities. Macroinvertebrates are small organisms (visible to the naked eye) abundant in both zones. We know invertebrates serve different functional roles within food webs and help sustain saltmarsh habitats. However, the role that macroinvertebrate communities play in food web foundation is less understood.

Carbon and nitrogen stable isotopes are widely used in food web studies because they can shed some light on the energy flow and trophic structure, respectively. $\delta^{13}C$ is used to determine energy source (benthic vs. pelagic) and d15N to determine trophic level.

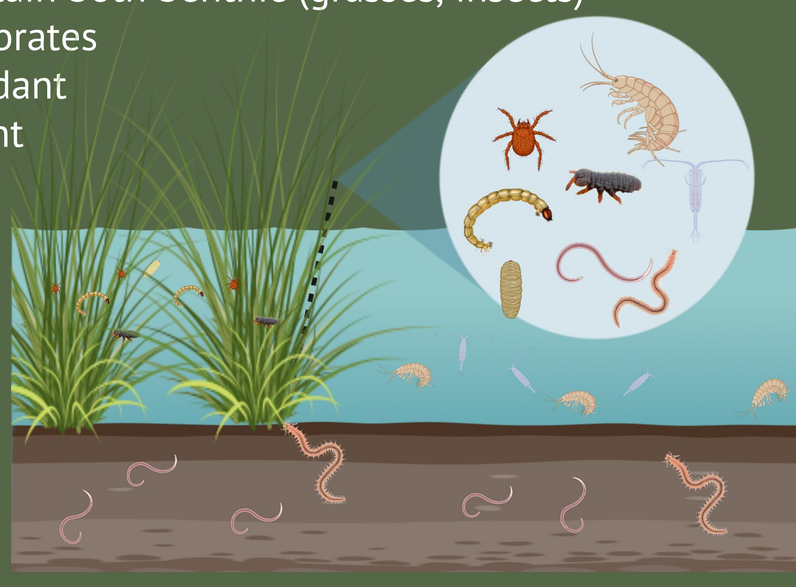


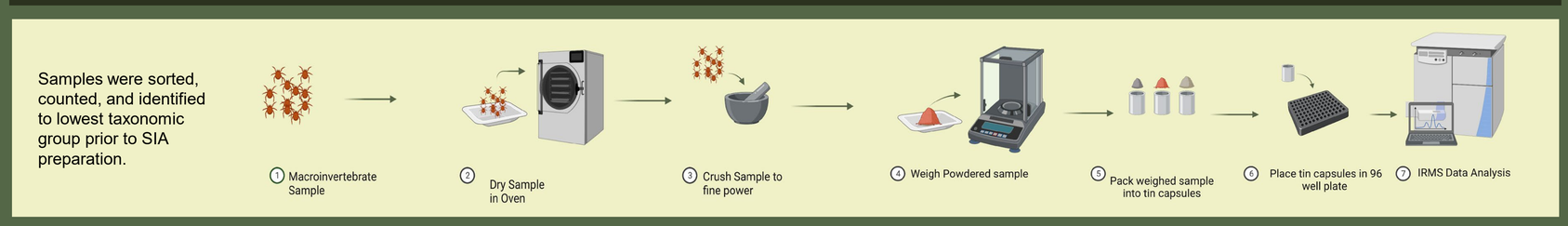
Figure 1. Shows the benthic and pelagic zones invertebrates inhabit.

We took advantage of an existing macroinvertebrate archive from two newly-created saltmarshes and
one reference (natural) site to evaluate the SI composition of representative groups (abundant and
commonly occurring).

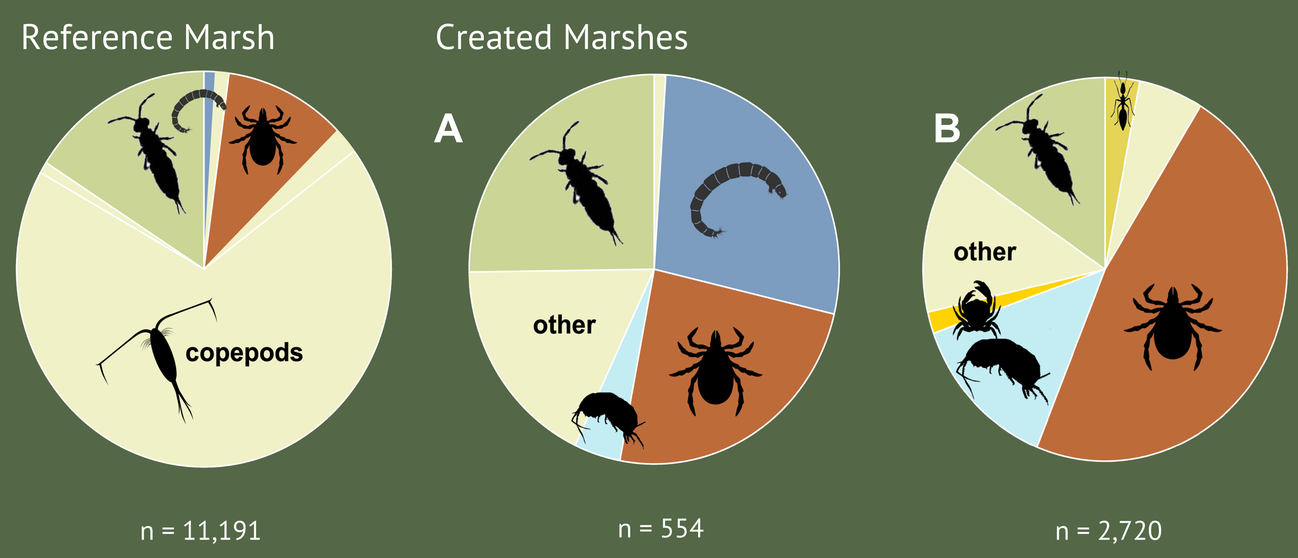
### Objectives

1. To depict the relative abundance of different macroinvertebrate taxa at our study sites
2. To identify representative macroinvertebrates for SIA.
3. To determine the energy source and trophic level of these taxa relative to existing primary production and consumer data.

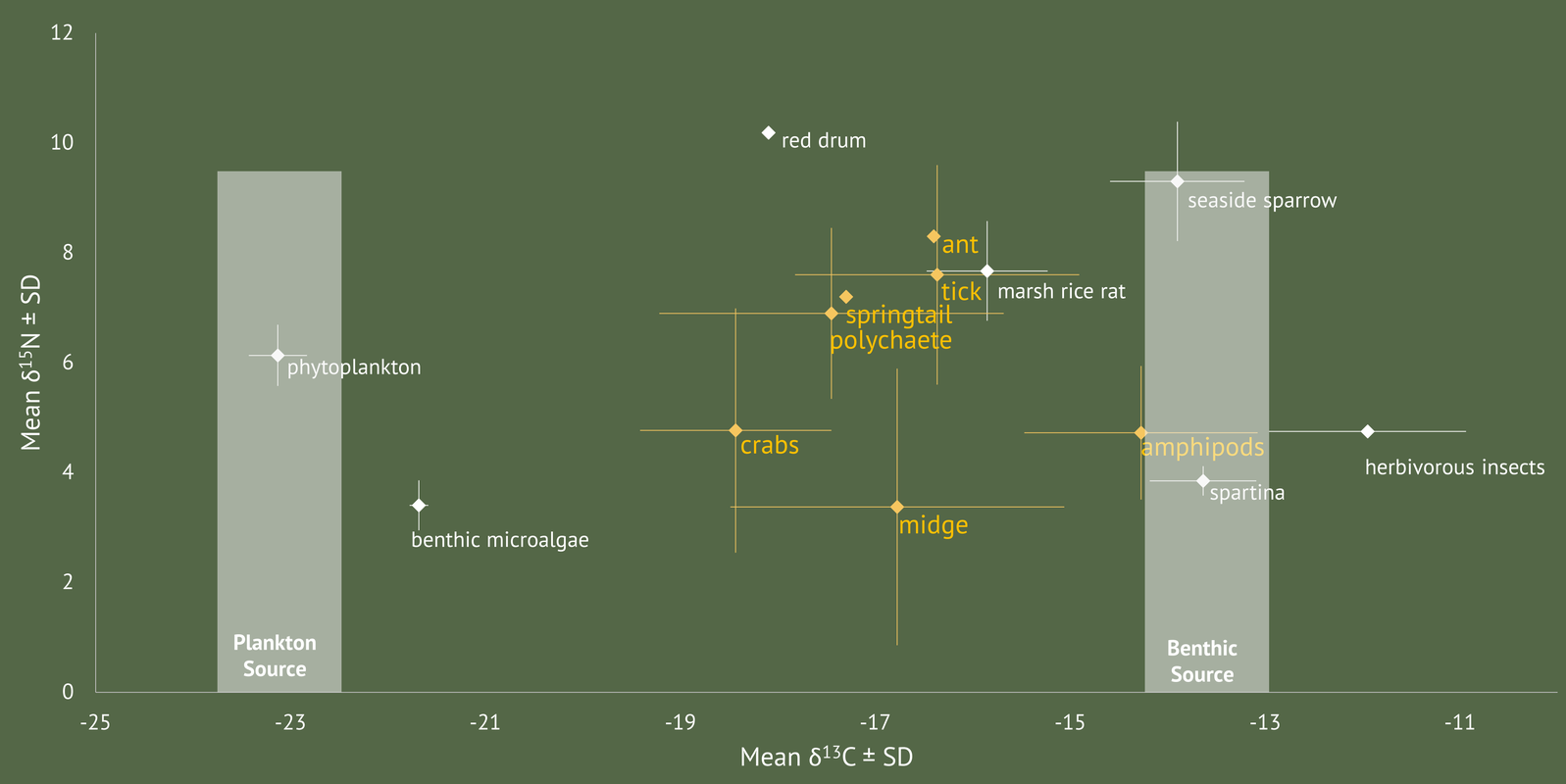
## Stable Isotope Preparation & Analysis




## Results and Conclusions




Total macroinvertebrate abundance is evidently larger at reference marshes than at newly created marshes for the representative groups. Relative abundance charts depict the most abundant species by site excluding nematodes, which amount to well over 80% of all species. In reference marshes, copepods are most abundant followed by springtails and ticks. At the created marshes (A, B), the distribution is more even across ticks, springtails, and amphipods.




Stable Isotope values ($\delta^{13}C$, $\delta^{15}N$) from prior work (white) and this study (yellow). Macroinvertebrates have variable C& N signatures, indicating possible differences across sites and/or marsh habitat. Next steps are to identify the source of variability of isotopic signatures.

Thank you to all the undergraduate students who have contributed to this project by sorting and identifying the macroinvertebrate samples. Sherry Dijkstra and YGR took the pictures. The stable Isotope analysis was performed at Michigan Technological University. The invertebrate and plant icons were obtained from the Integration and Application Network (ian.umces.edu/media-library) and the Noun Project (thenounproject.com). Lastly, this study is part of the Linking Community and Food-Web Approaches to Restoration project, funded by the NOAA RESTORE Science Program.