Interactions between invertebrate communities, water chemistry, and organic matter processing in the Everglades

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BACKGROUND

Research Questions:

- What are the relative contributions of top-down and bottom-up pathways on organic matter processing in coastal wetlands?
  - Top-down: Invertebrates altering detritus breakdown
  - Bottom-up: Water chemistry altering detritus breakdown
- How do environmental characteristics and litter quality shape invertebrate community composition in the Everglades?

METHODS

- Litter reciprocal transplant experiment
  - Bags deployed at six FCE LTER sites containing sawgrass, spikerush, mangrove, or seagrass litter. The sites were located in marsh (freshwater), ecotone, or mangrove (marine) ecosystems.
- Four months later, the litter bags were collected and invertebrates inside were identified and measured.

RESULTS

- Invertebrate community composition varied among sites (Fig 1). Areas with similar water chemistry had similar community compositions, even if they were in different ecosystems and sloughs.

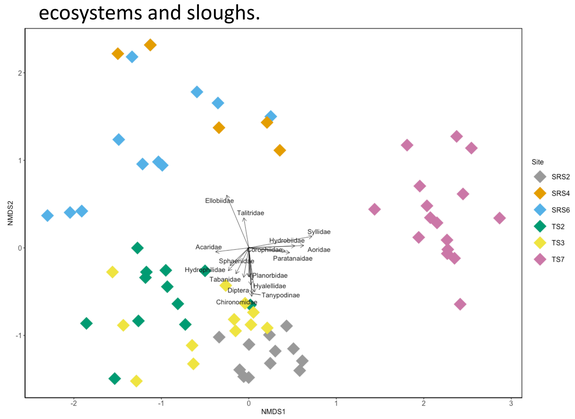


Fig 1. Non-metric multidimensional scaling ordination based on the major invertebrate taxa found in litter bags at six FCE LTER sites. Distance in space represents degree of similarity in community composition.

- Despite large differences in invertebrate density across sites (Fig 2A), density did not correspond to litter breakdown rates (Fig 3), suggesting that invertebrates had a minimal impact on litter breakdown.

Along fresh-to-marine water coastal gradients, wetland ecosystem **productivity** and **resource stress** shape **invertebrate community composition** more than detritus quality.

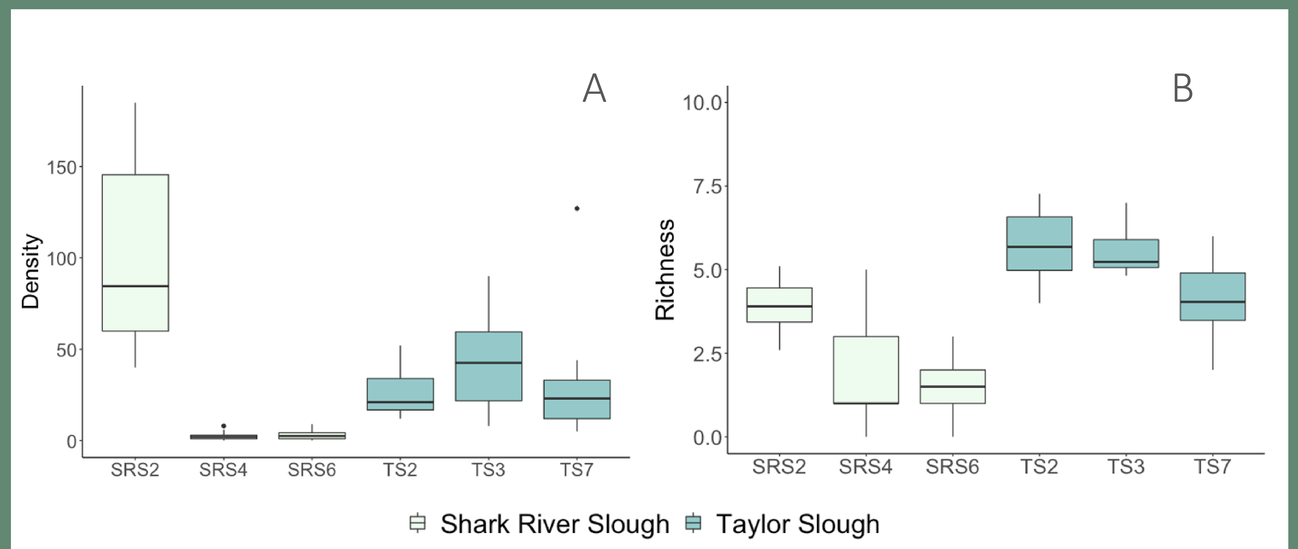
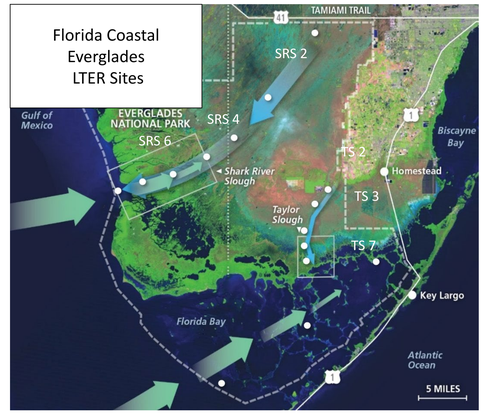


Fig 2. Invertebrate density (A) and taxa richness (B) across FCE LTER sites (error bars represent 95% CI).

FIU Coastal Ecosystems REU Site



RESULTS *(continued)*

- Shark River Slough is a highly productive environment, explaining the higher density of invertebrates at SRS2 compared to Taylor Slough sites (Fig 2A). Tidal stress at SRS4 and SRS6 resulted in lower density compared to SRS2.
- Taylor Slough sites had higher taxa richness than Shark River Slough sites (Fig 2B). Environmental conditions in Taylor Slough could promote such richness through dry-down limitation of fish predation and/or refugia in periphyton.

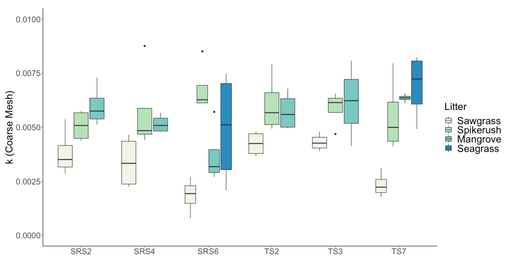


Fig 3. Litter breakdown rates (k d^{-1}; coarse mesh) across FCE LTER sites (error bars represent 95% CI).

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