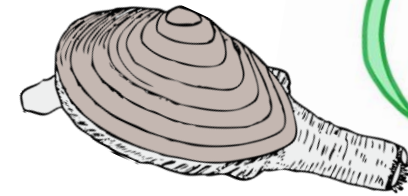


Context dependencies of eelgrass-bivalve interactions: importance for multitrophic aquaculture in the GOM



Everett Horch

Bowdoin College Class of 2024



Katie DuBois, Callie Hundley, Fiona Ralph, Eban Charles, Nicky Yoong, Mallory Palmer, Justin Baumann, Brian Beal, David Carlon



Mussel, Oyster, and Clam Industries in Maine

Production of these shellfish all overlap with eelgrass (*Zostera marina*) habitat...



Eelgrass + Bivalve Interactions: **Facilitative?**

+/-???



- Changes in seawater chemistry
- Direct food provisioning
- Altered flow regimes
- Altered interactions with predators
- Changes in microbial community

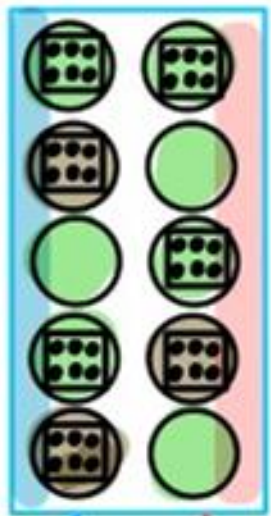
Experiments: Schiller Coastal Studies Center

Bucket 1.0 (Oysters) Summer of 2021

Temperatures

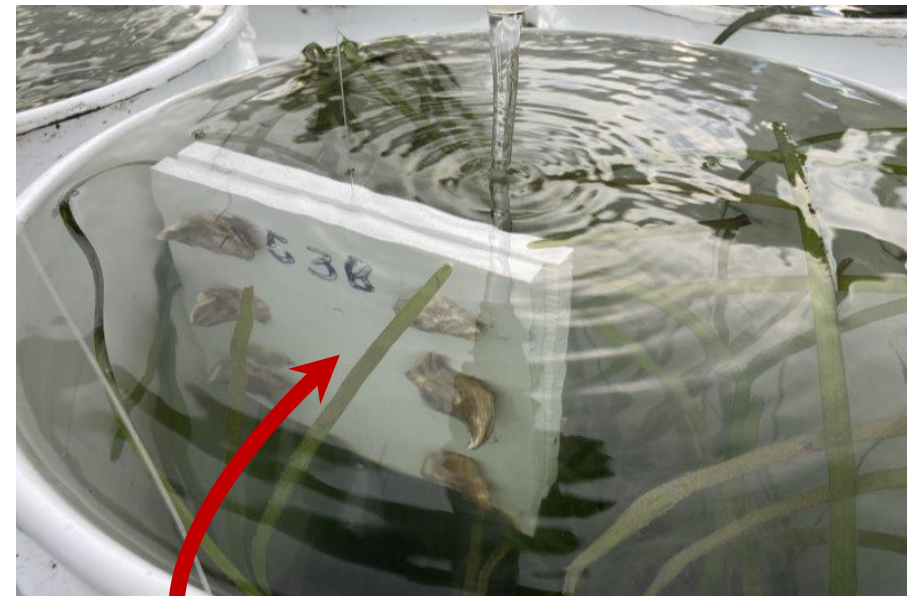
2021: 17.5 & 19 C

Duration: 1 Month



Cold ↑
Hot ↑

- Eelgrass Only
- Eelgrass + Oysters
- Oysters Only



Oysters

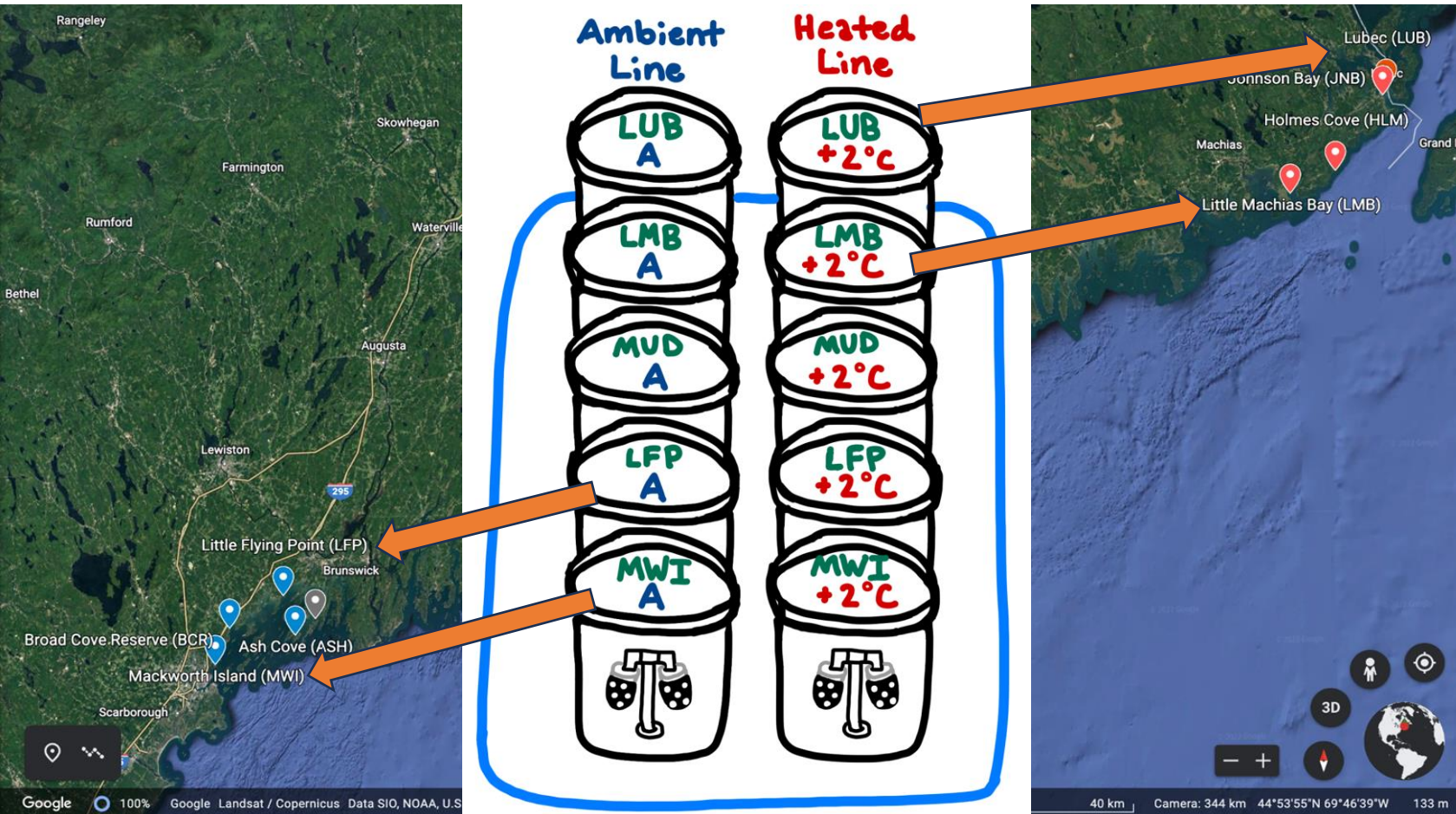
Experiments: Schiller Coastal Studies Center

Bucket 2.0 (Blue Mussels) Summer 2022

Temperatures

2022: 19 & 21 C

Duration: 1 Month



Blue Mussels

Experiments: Schiller Coastal Studies Center

Bucket 1.0 (Summer 2021) & Bucket 2.0 (Summer 2022)

Rusack Coastal Studies Fellows

Kianne Benjamin



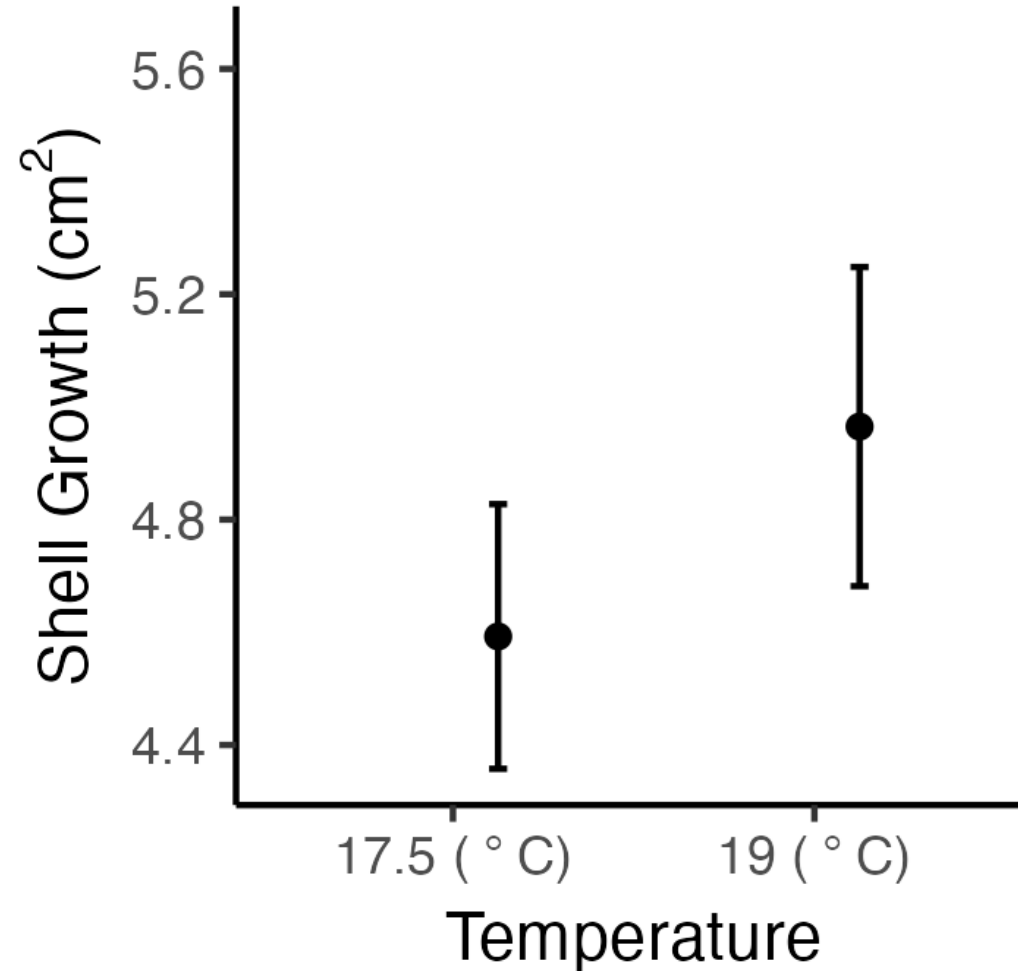
Fiona Ralph

Everett Horch

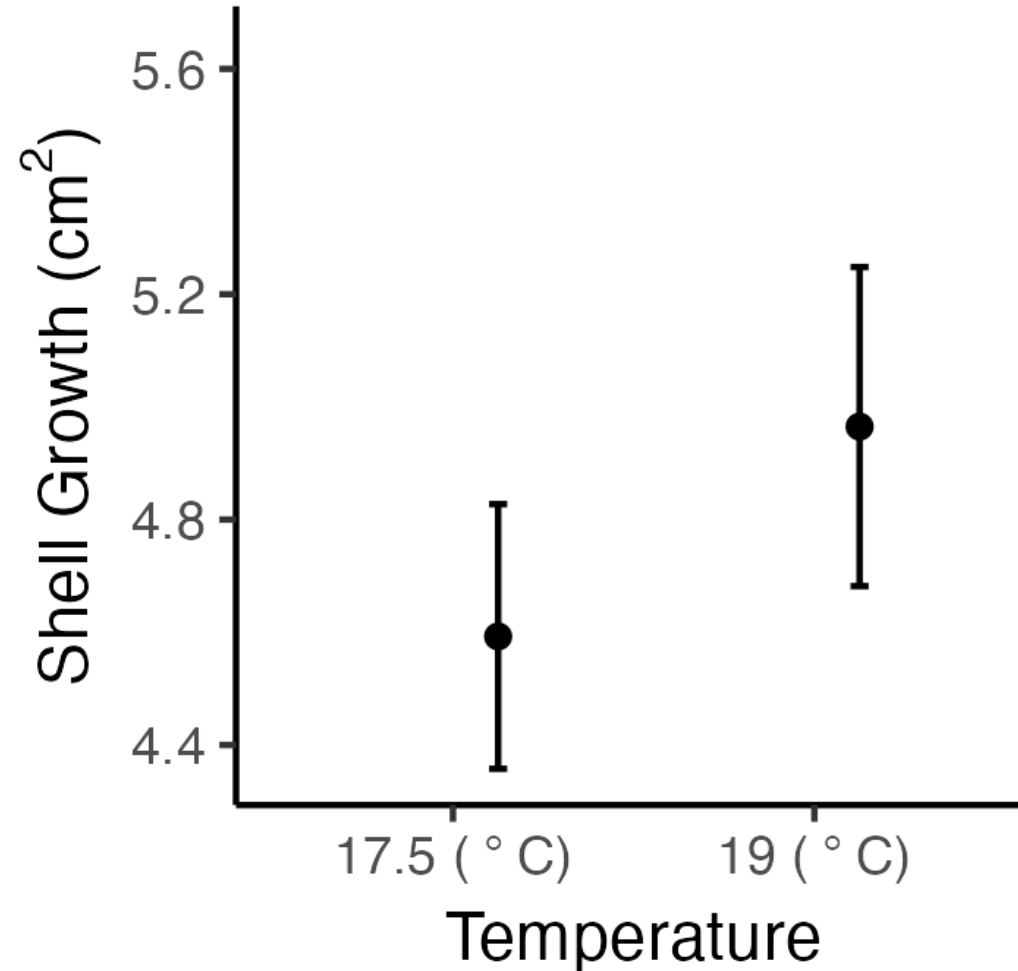


Callie Hundley

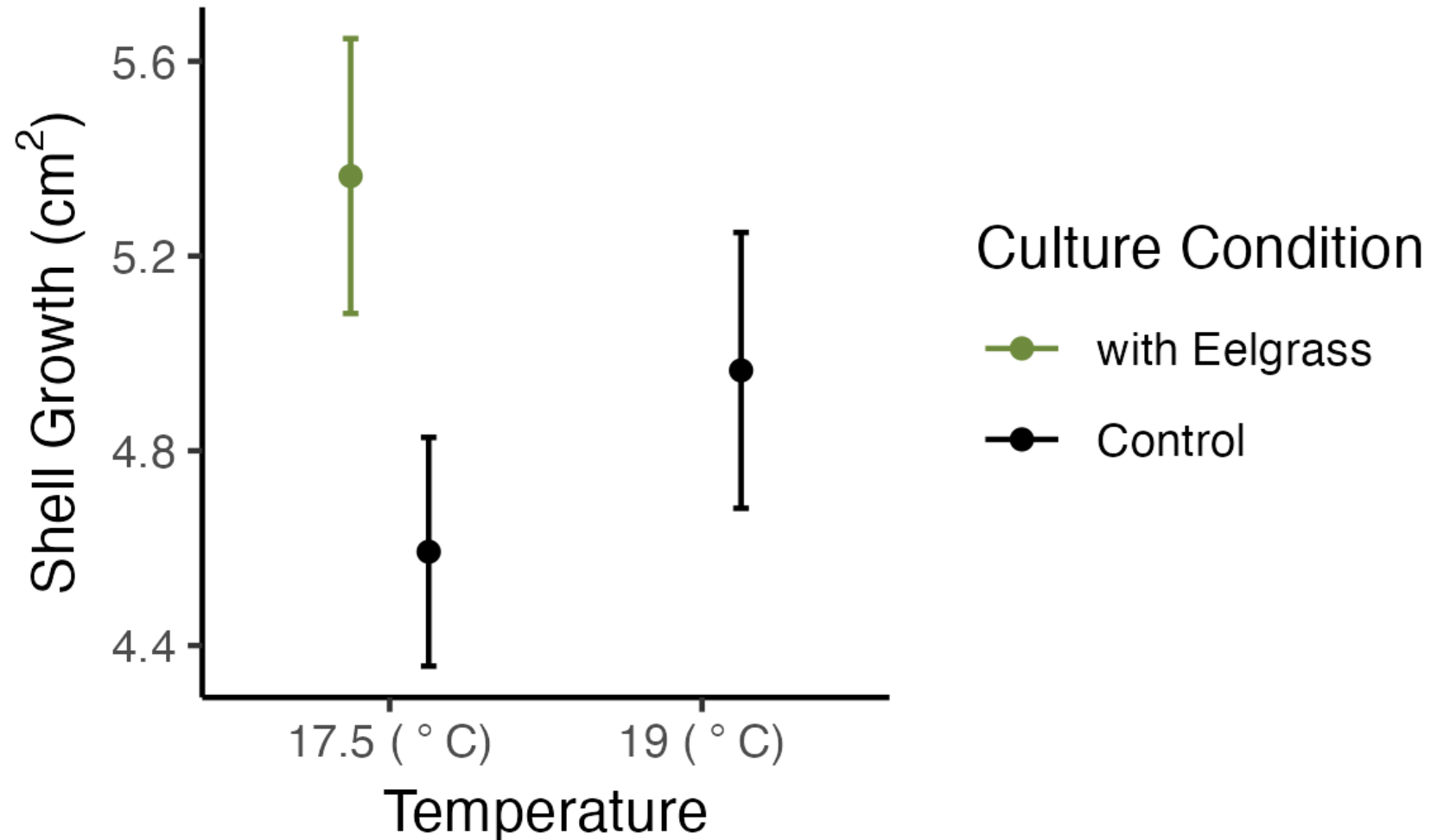
+1.5C warming does not affect oyster growth



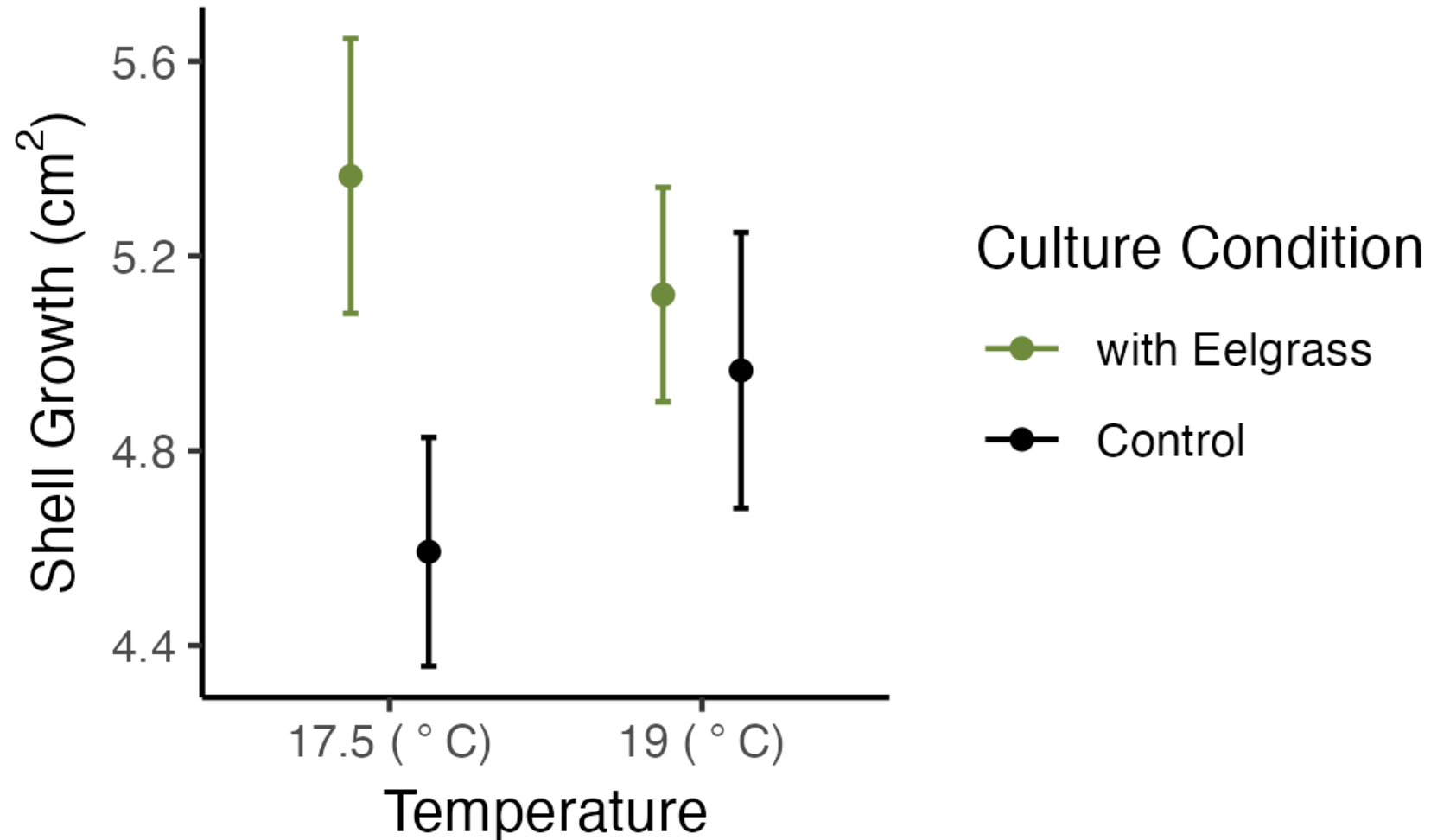
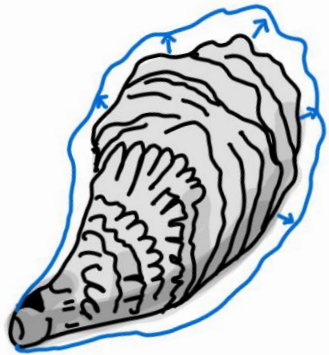
Does eelgrass presence alter oyster growth?



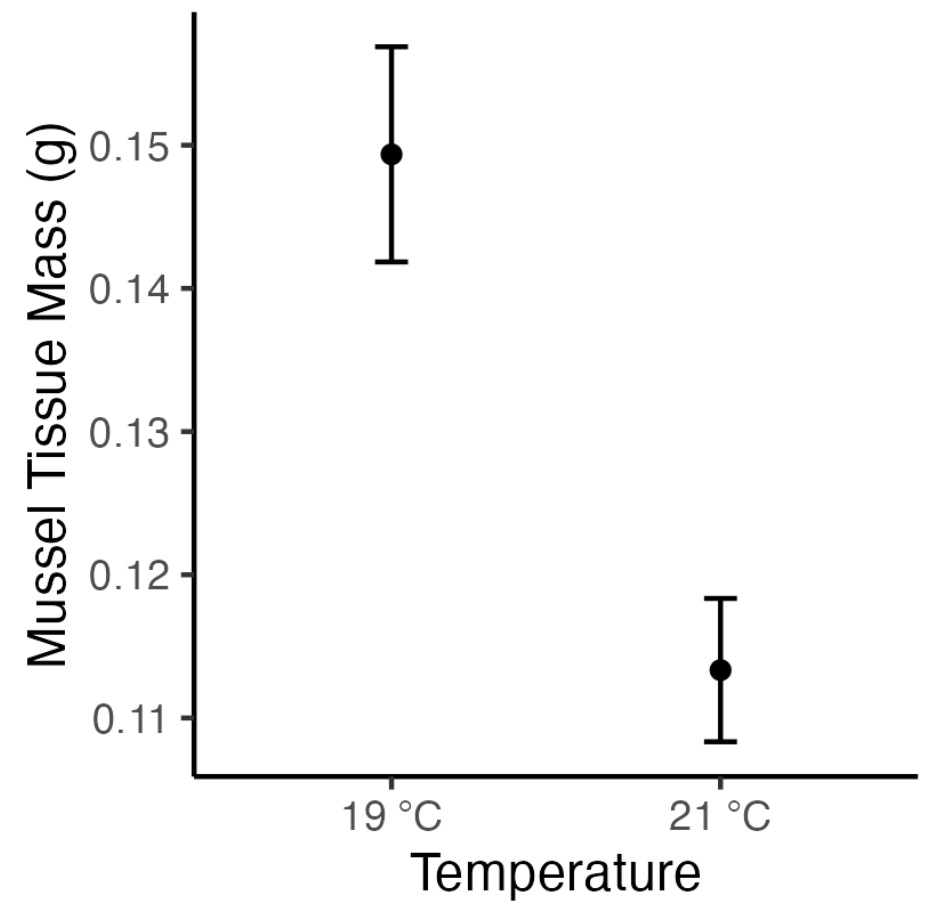
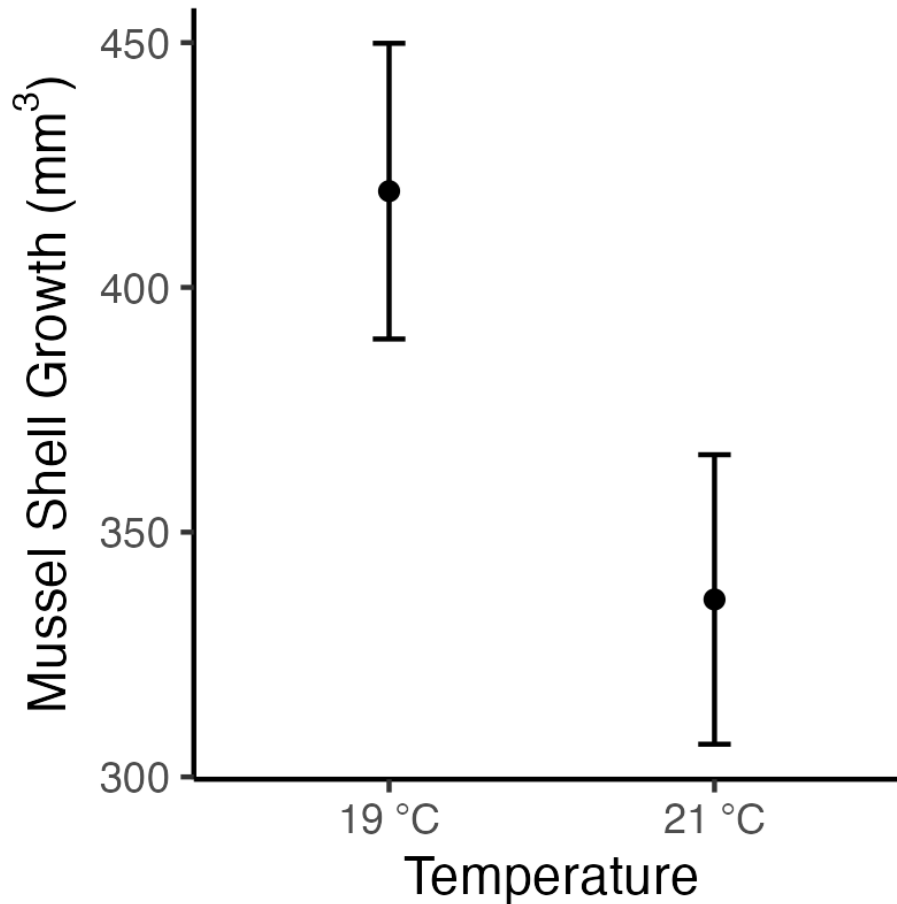
Eelgrass increases oyster growth by 17% at cooler temperatures



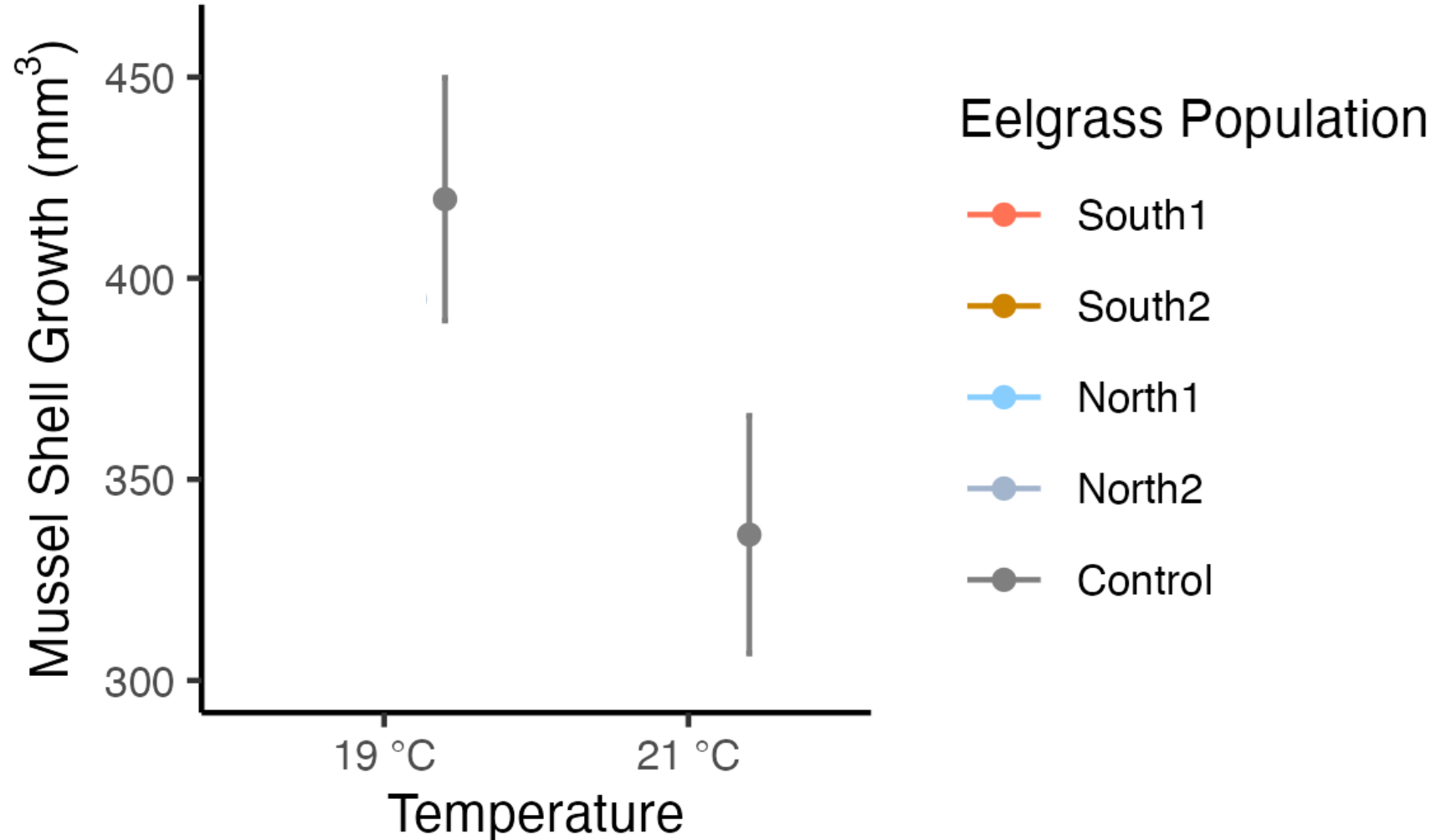
Eelgrass has no affect on oyster growth at warmer temperatures



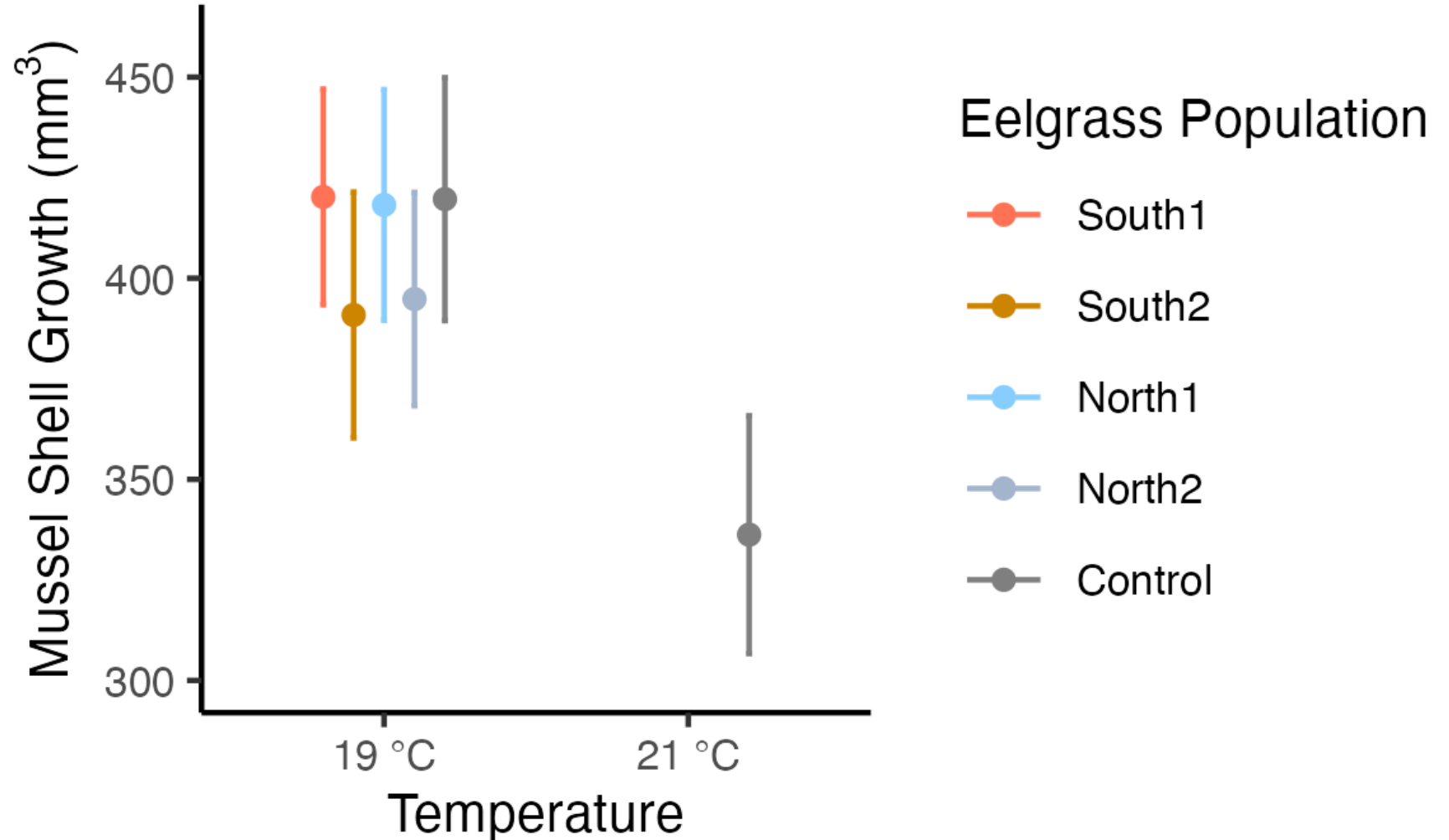
Warming reduces blue mussel growth by ~20%



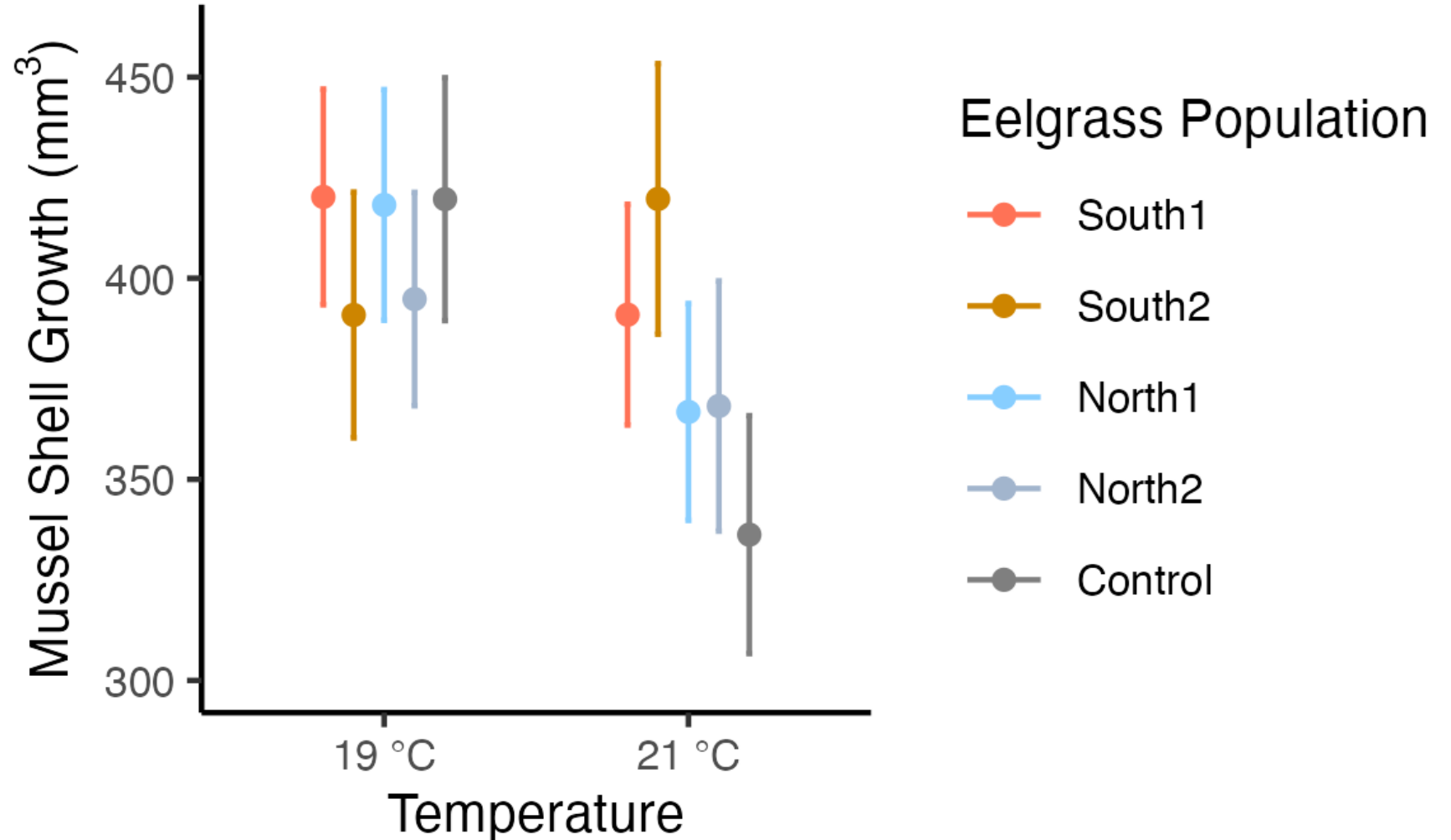
Can negative effect of warming be reversed by eelgrass?



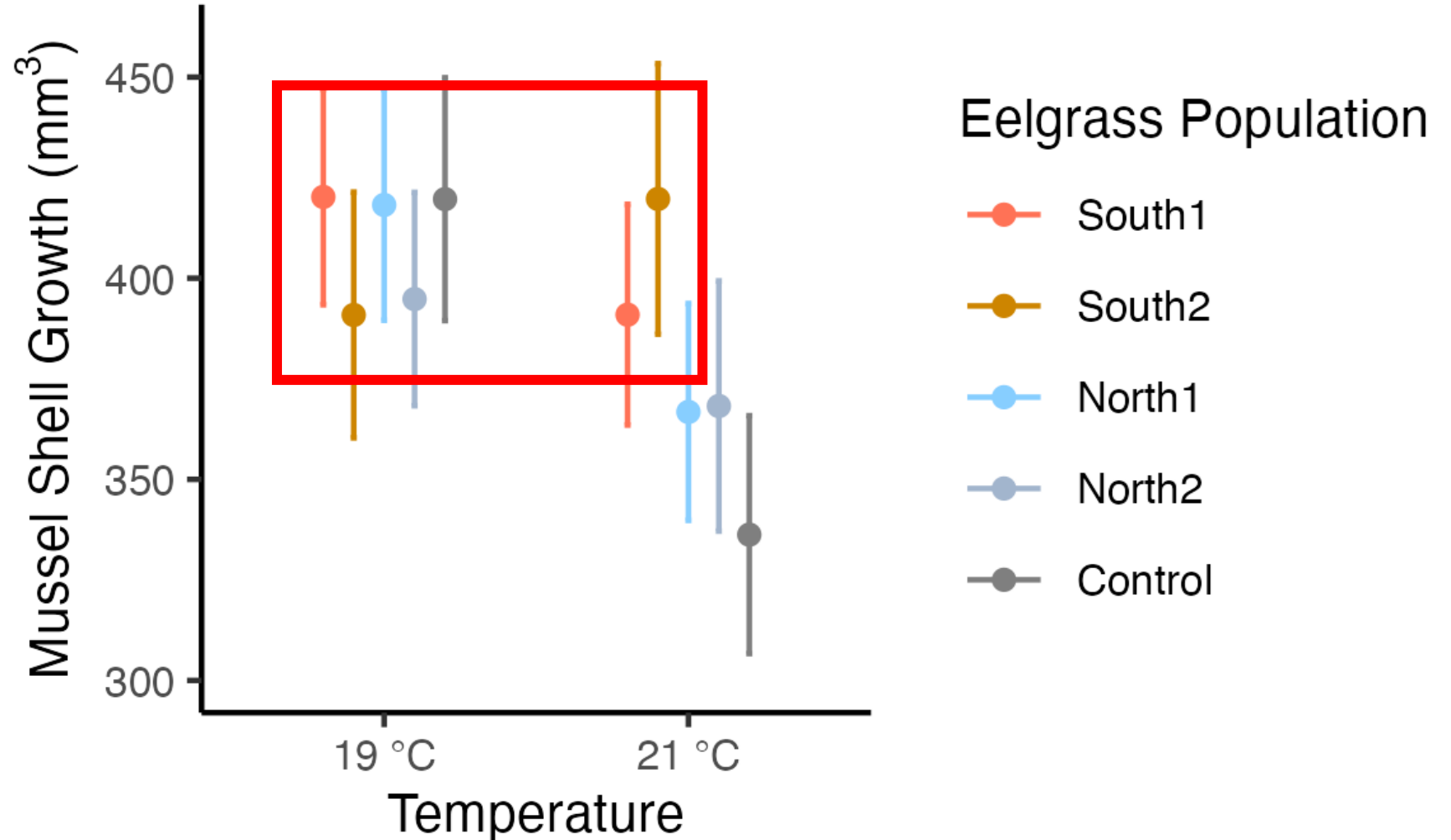
Eelgrass does not alter blue mussel shell growth at cooler temperatures



Depending on eelgrass population, eelgrass can reverse negative effects of warming on blue mussels



Depending on eelgrass population, eelgrass can reverse negative effects of warming on blue mussels



Eelgrass Soft Shell Clam Results

Size Change (Final - Initial mm)

15

10

5

0



Unvegetated Mudflat

Eelgrass Bed

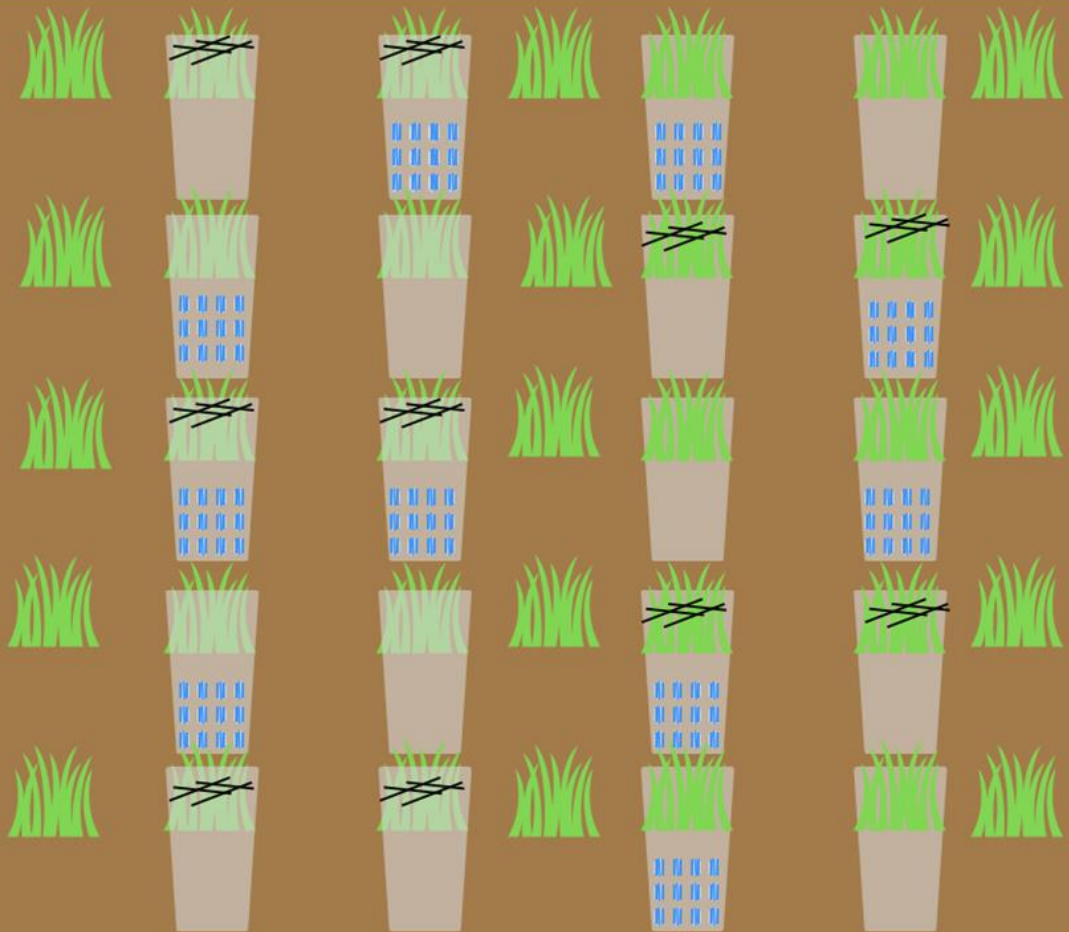
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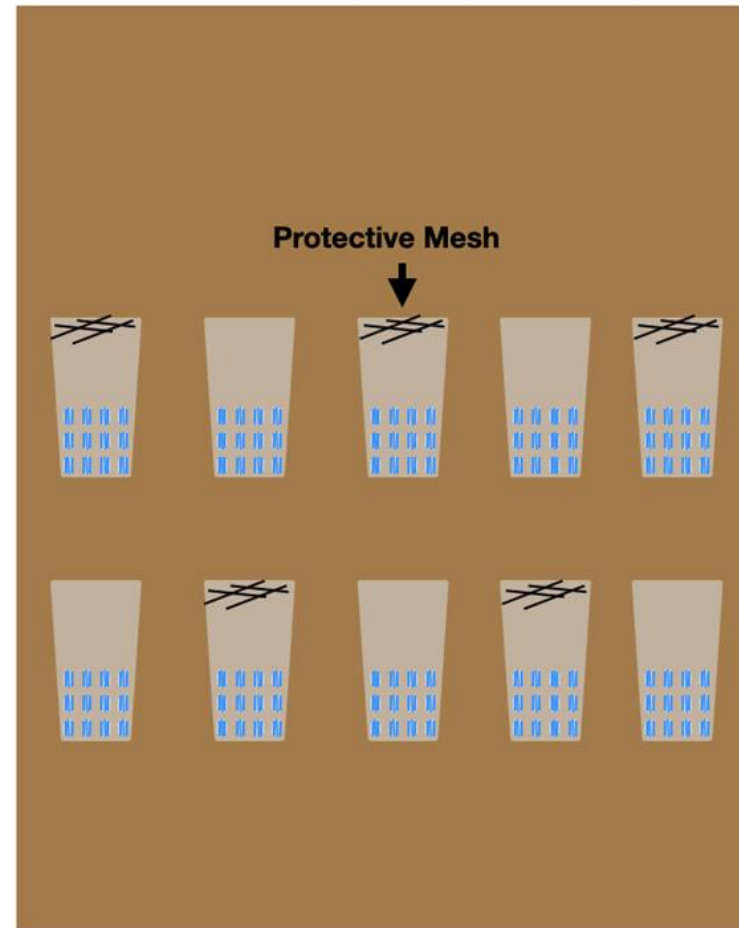
*Data from Brian Beal 2007

Ongoing Eelgrass – Clam Field Experiment

Eelgrass Meadow



Adjacent Mud Flat



In Summary:

- Eelgrass presence alters bivalve growth across all three bivalve species, but this effect is context dependent



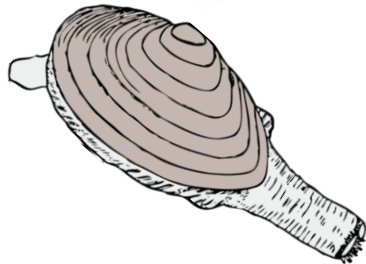
Oysters: Eelgrass can enhance oyster growth rate at ambient temps



Blue Mussels: Eelgrass populations that are resilient to warming can enhance blue mussel growth during periods of heat stress



Soft Shell Clams: Eelgrass meadows reduce soft shell clam growth rate compared to adjacent unvegetated areas



Questions?

