

An ongoing quest: Understanding the effects of competition between juvenile *Nereocystis luetkeana* and *Sargassum muticum*

KA Dobkowski^{1,2}, MS Turner^{2,4}, J Calhoon^{1,2}, MC Dittrich^{2,3}, KH Johnson^{1,2}, and MN Dethier^{2,4}

1- Bates College, 2 – Friday Harbor Labs, 3- University of Alaska SE, 4 – University of Washington

Introduction and Background

Nereocystis luetkeana (bull kelp) beds start over every year

- Annual species (in a "field" of perennials)
- Each year's recruits must survive juvenile stage (which has high mortality)
- Dominant primary producer and 3D habitat forming species



- Beds exhibit annual variability and declining trends in some parts of the Salish Sea

- *Sargassum muticum* (wireweed) is a widespread non-native that may compete with *N. luetkeana* in the shallow subtidal

KEY QUESTION: Does the presence of established *S. muticum* influence the growth of juvenile *N. luetkeana*?

H_0 = No difference in growth between *N. luetkeana* alone or in the presence of *S. muticum*

Results

-In the first experiment, few *S. muticum* and no *N. luetkeana* survived to be measured

- Some *N. luetkeana* stipes remained attached to the blocks
- Transplant method has potential?

-In suspended experiments, SCUBA surveys indicated that juvenile kelp could survive for ~1 week

Conclusions

-Something is damaging transplants before we can assess differences in growth



-Herbivores?

-Other seaweeds on the FHL dock show evidence of kelp crab (*Pugettia*) damage

-Water motion?

-Suspended blocks move with currents/boat wakes

-Low flow in FHL basin



-Transplantation stress?

Acknowledgements and Funding

Thanks to Brittany Cummings, Eliza Heery, and Olivia Graham for field help. Funding sources: KA Dobkowski, Bates College faculty development fund; J Calhoon, Bates Environmental Internship and Bates Student Research Fund; M. Dittrich, FHL REU Program; K Johnson, Bates Hoffman Fellowship

Methods



Initial experimental setup: shallow subtidal (~3 m deep) at Friday Harbor Labs (FHL), deployed via wading on a low tide

-used Gorilla Glue to attach juvenile *N. luetkeana* and *S. muticum* (collected subtidally) to half-size concrete blocks

-factorial design: effects of inter- and intraspecific competition

-n=5 per treatment

- One *N. luetkeana* ----->
- One *S. muticum*
- Two *N. luetkeana*
- Two *S. muticum*
- One *N. luetkeana* and one *S. muticum*



-measured stipe length (*N. luetkeana* only) and total length of transplanted seaweeds

-remained in the field for three weeks

- allow for growth

-enable pickup at same tidal height

Second and third attempts: suspended half-size concrete blocks using polypropylene line at 3 m depth from FHL floating dock

-same transplant method and seaweed measurements

-n=5 per treatment; focus on interspecific only

- One *N. luetkeana*
- One *S. muticum*
- One *N. luetkeana* and one *S. muticum*



-Third experimental setup included clear plastic plates as "crab shields", attached to rope 1 meter above the block



-Monitored by SCUBA after ~1 week and pulled up for data collection after two weeks of growth

Feedback greatly appreciated!!

How might we refine our methods???

What alternative explanations might exist for our results (or lack thereof)???