Tipping the balance: the impact of eelgrass wasting disease in a changing ocean

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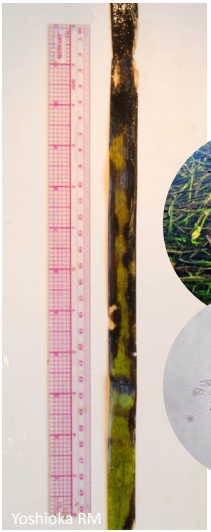
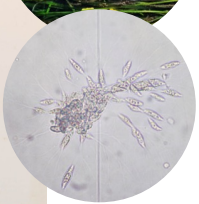
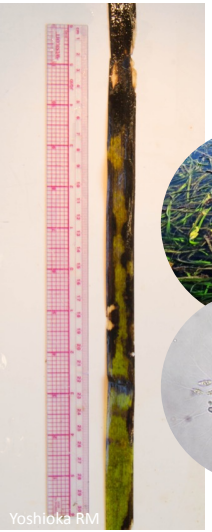




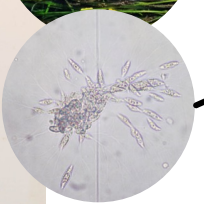
Eelgrass Wasting Disease

- Widespread, common disease
- Does not necessarily kill host*
- Affects a vital temperate foundation species
- Incredibly tractable marine disease system

Eelgrass Wasting Disease: The Players



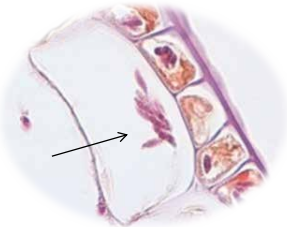
Host: **Eelgrass**
Zostera marina



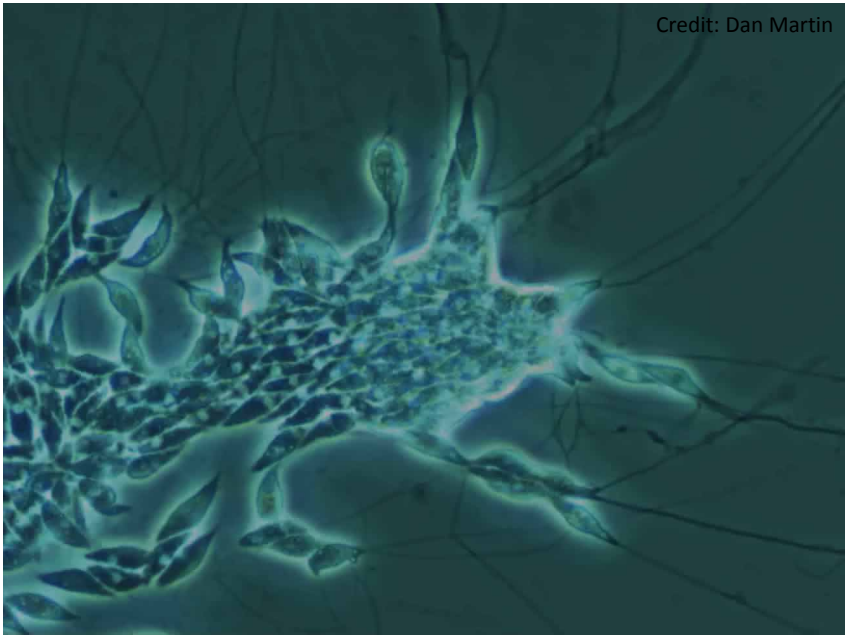
Pathogen: ***Lz***
Labyrinthula zosterae
Porter & Muehlstein

of

Zostera marina



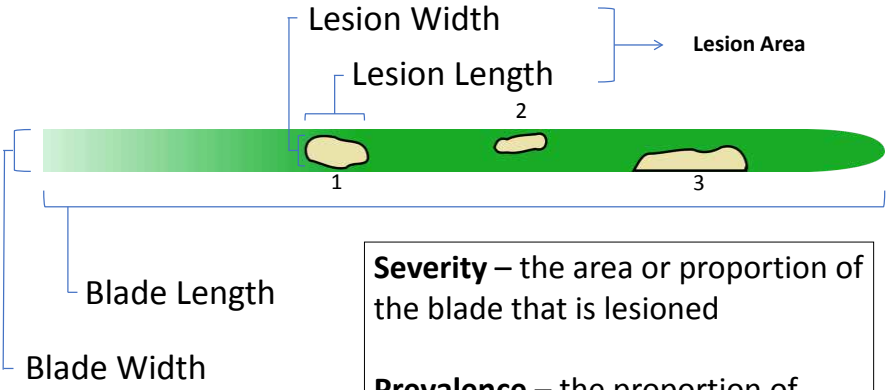
Labyrinthula zosterae



Research Questions

- What is the prevalence and severity of eelgrass wasting disease in the Pacific Northwest?
- What biotic and abiotic factor drive *Labyrinthula zosterae* virulence*?*
- How does eelgrass wasting disease impact *Z. marina* health*?*

Scoring Eelgrass for Disease…

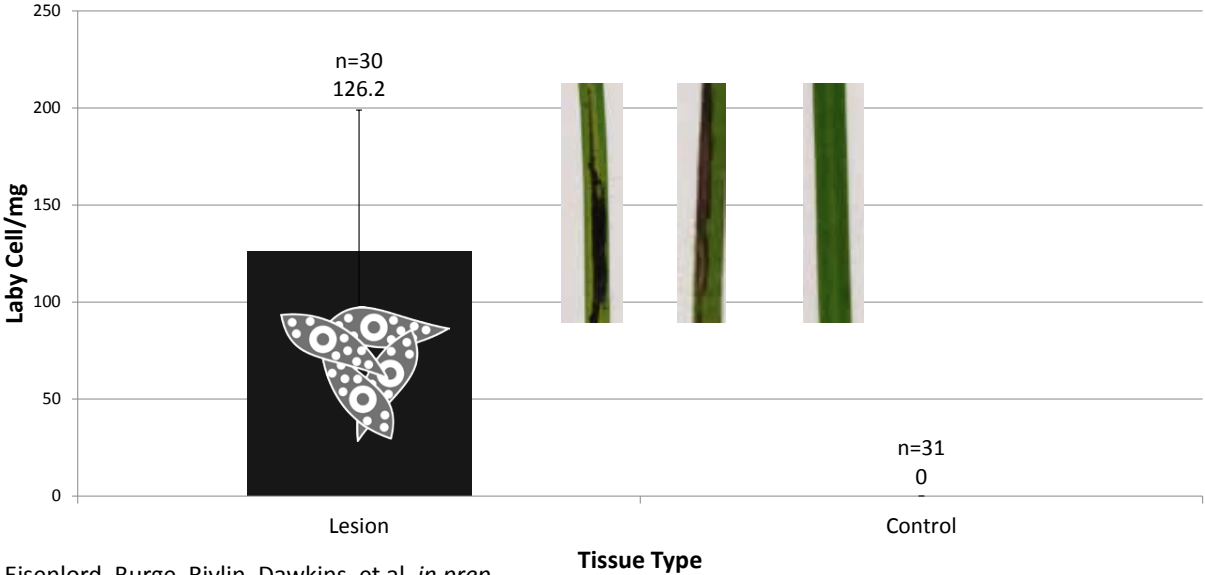


Severity – the area or proportion of the blade that is lesioned

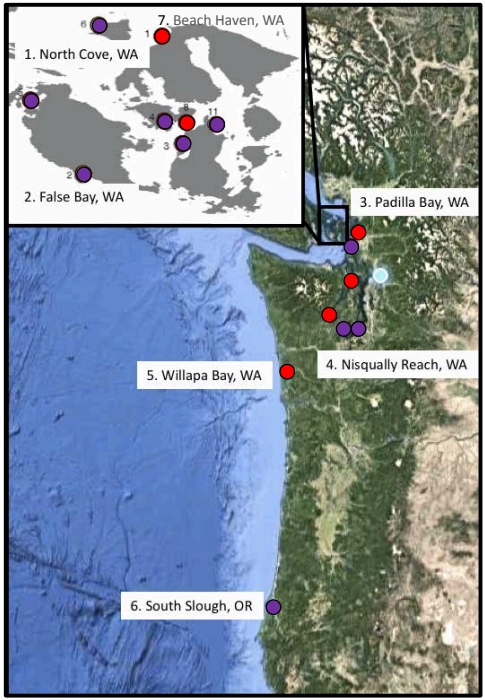
Prevalence – the proportion of blades that have a lesion

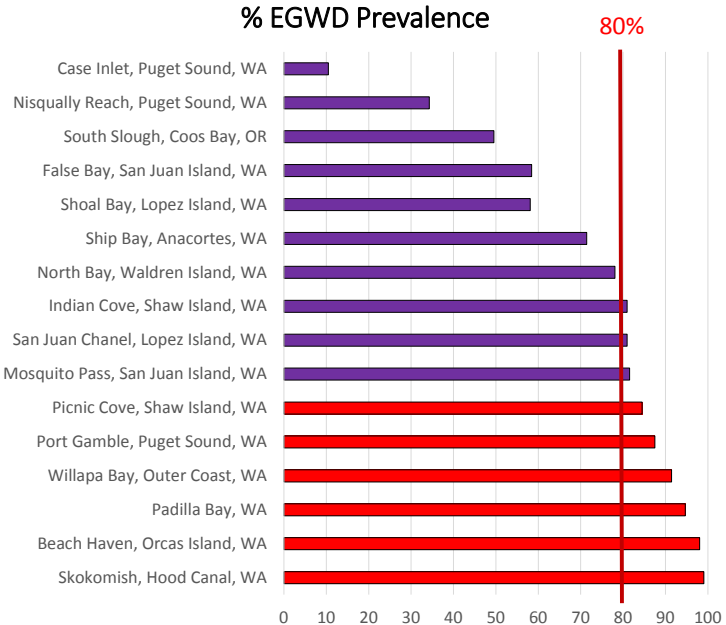
Figure: Reyn Yoshioka

Quantitative PCR of *Labyrinthula zosterae:* pathogen cells/mg

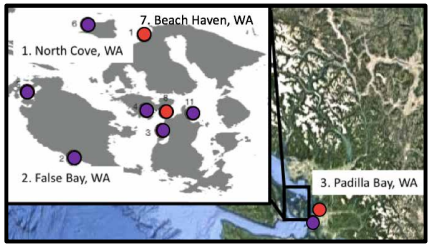


Eisenlord, Burge, Rivlin, Dawkins, et al. *in prep*

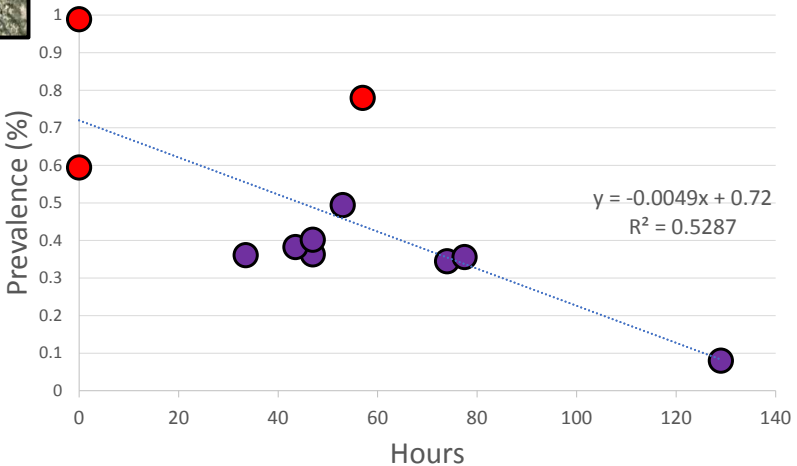




Eisenlord, Yoshioka, et al. *in prep*

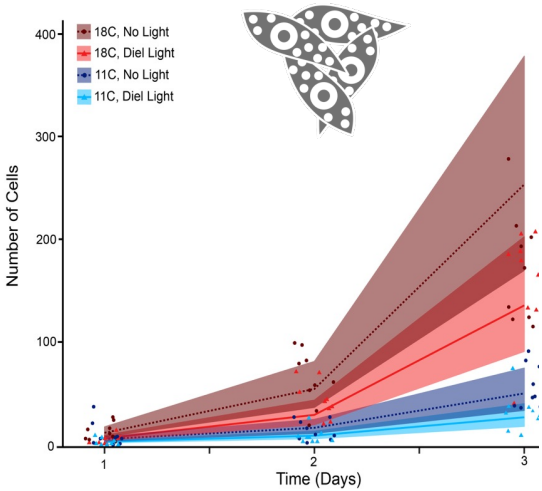


Hours spent under 11C during June and July decreased EGWD disease prevalence and severity in the wild

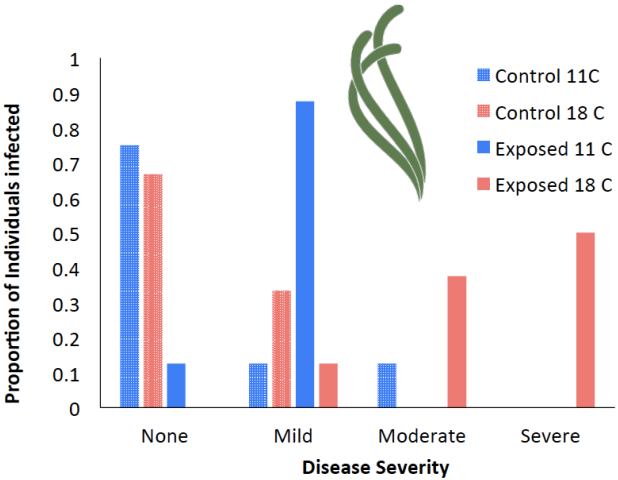


Eisenlord, Yoshioka et al., *in prep*

In lab studies, Labyrinthula zosterae cell growth and virulence is moderated at 11C



Dawkins, Eisenlord, Winningham et al. *in revision*



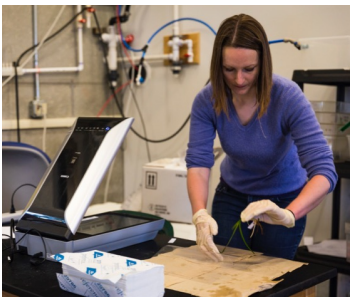
Groner, Eisenlord, Burge, et al. *in prep*

Impact of LZ infection on *Z. marina* growth and phenol production

- Mesocosm experiment conducted in experimental units in the University of Washington Friday Harbor Lab's ocean acidification lab

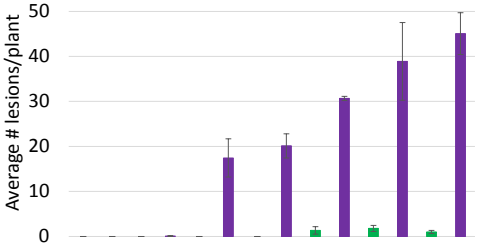
- Wild-collected *Z. marina* kept in 11° C flow through, filtered sea water for 20 days. Half individuals exposed to $1*10^4$ cells/ ml *L. zosterae* for 24 hours (N=144)

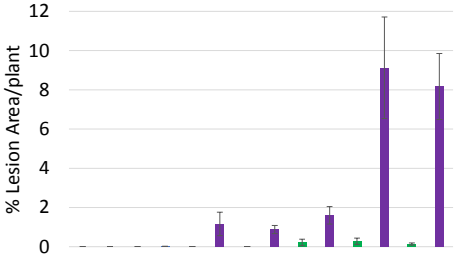
- Shoots sampled at 7 time points after initial exposure: 4 hours, 24 hours, 48 hours, 3 days, 6 days, 12 days, 20 days



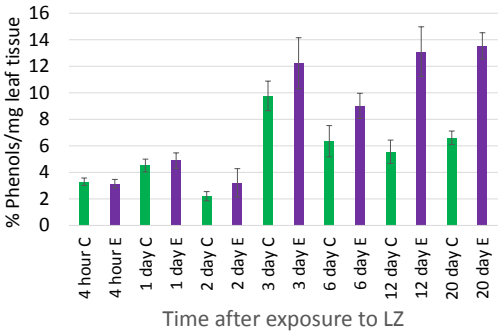
Exposed

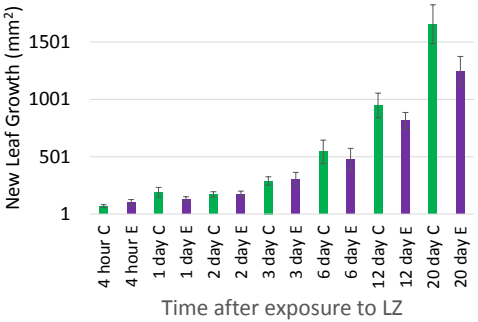
Control

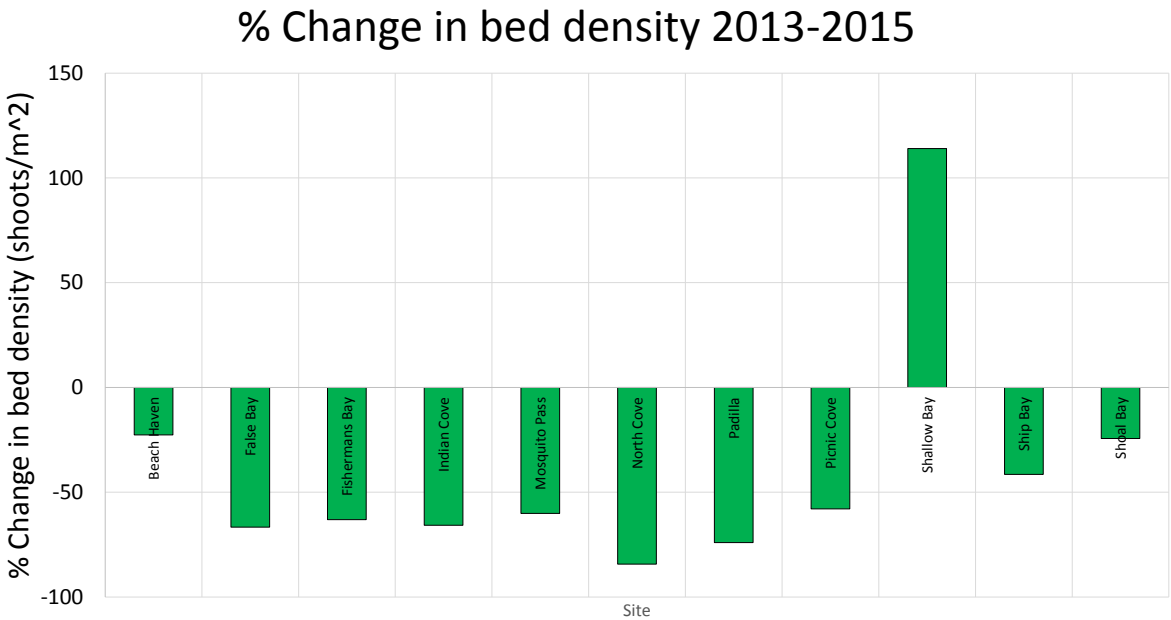




Eisenlord et al. *in prep*






% Change in bed density 2013-2015
% Change in bed density (shoots/m^2)
150
100
50
0
-50
-100
Beach Haven
False Bay
Fishermans Bay
Indian Cove
Mosquito Pass
North Cove
Padilla
Picnic Cove
Shallow Bay
Ship Bay
Shdal Bay
Site

Conclusions to date…

- Eelgrass wasting disease is widespread in pacific northwest eelgrass beds - found at every site surveyed

- High variation in eelgrass wasting disease impact between sites – but ~3rd of surveyed sites had >80% prevalence

- Evidence of a low temperature threshold moderating infectivity and virulence

- Lab experiment shows infection reduces shoot growth and increases phenols

Thank you!

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Colleen Burge

Natalie Rivlin

Allison Tracy

Miranda Winningham, Olivia Graham, Francesca Giammona, Evan Fiorenza, Morgan Eisenlord, Bella Bledsoe, Maya Groner, Phoebe Dawkins, Reyn Yoshioka, Clio Jensen

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