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Salish Sea Ecosystem Conference

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Apr 5th, 2:15 PM - 2:30 PM

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

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Eisenlord, Morgan; Burge, Colleen Amy; Dawkins, Phoebe D.; Yoshioka, Reyn; Tran, Tyler; Rivlin, Natalie; Winningham, Miranda; Jensen, Clio; Van Alstyne, Kathy; and Harvell, Drew, "Tipping the balance: the impact of eelgrass wasting disease in a changing ocean" (2018). *Salish Sea Ecosystem Conference*. 349. <https://cedar.wwu.edu/ssec/2018ssec/allsessions/349>

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Speaker

Morgan Eisenlord, Colleen Amy Burge, Phoebe D. Dawkins, Reyn Yoshioka, Tyler Tran, Natalie Rivlin, Miranda Winningham, Clio Jensen, Kathy Van Alstyne, and Drew Harvell

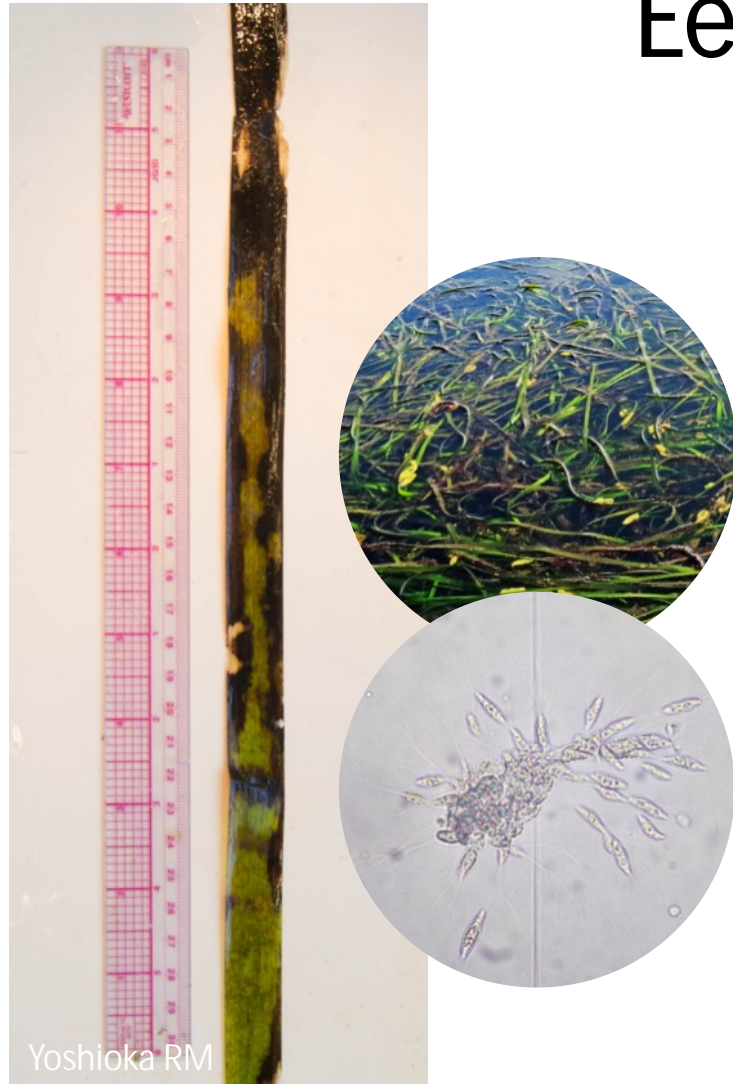
Tipping the balance: the impact of eelgrass wasting disease in a changing ocean

Salish Sea Ecosystem Conference
April 5, 2018

Morgan Eisenlord^{1,2}, Colleen Burge³, Phoebe Dawkins¹, Reyn Yoshioka⁴, Tyler Tran⁵, Natalie Rivlin³, Miranda Winningham¹, Clio Jensen^{2,6}, Kathy Van Alstyne⁵, Drew Harvell¹

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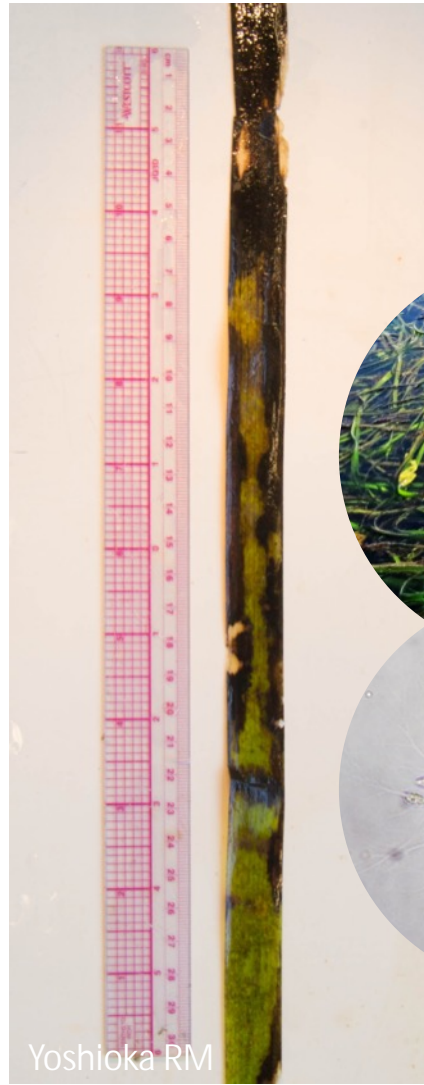
Eelgrass Wasting Disease



Yoshioka RM

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

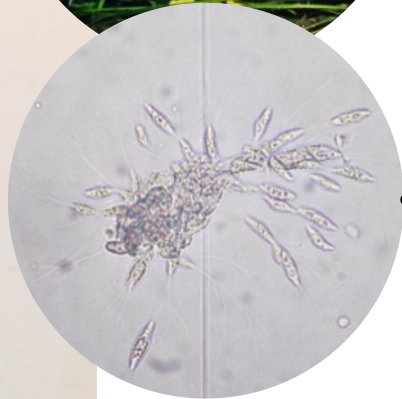
Eelgrass Wasting Disease: The Players



Yoshioka RM



Host: Eelgrass
Zostera marina

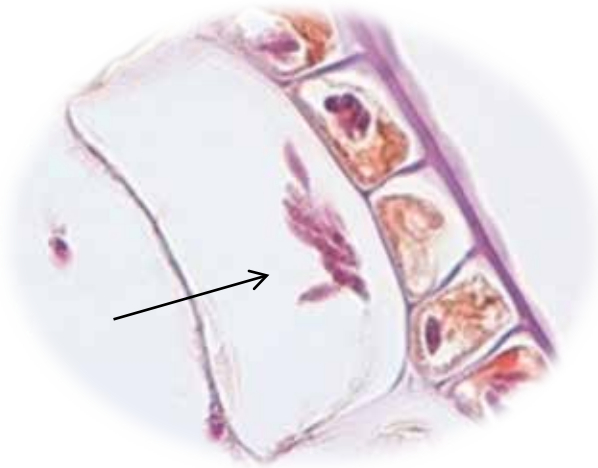


Pathogen: *LZ*
Labyrinthula zosterae
Porter & Muehlstein

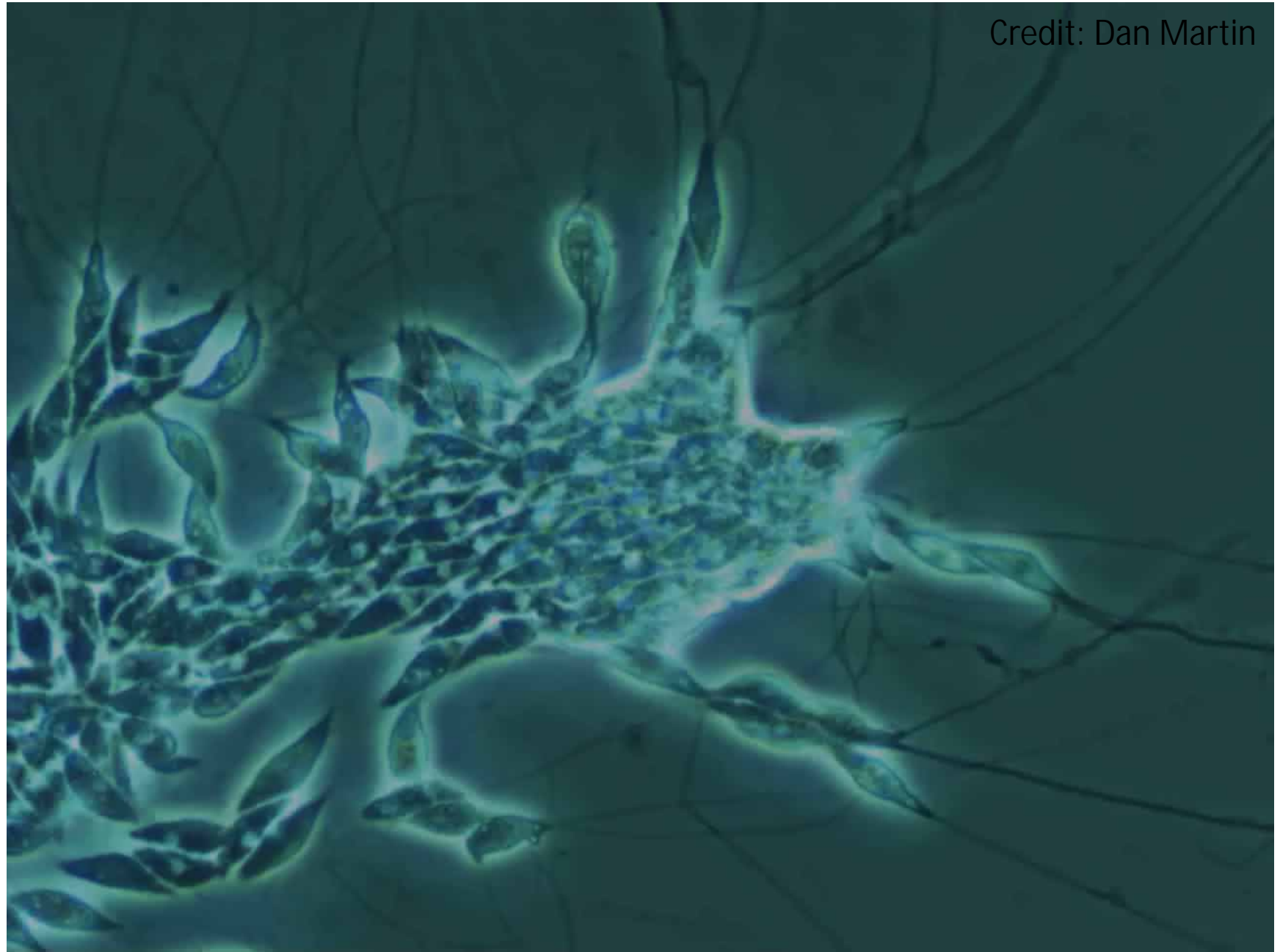




Zostera marina



Labyrinthula zosterae



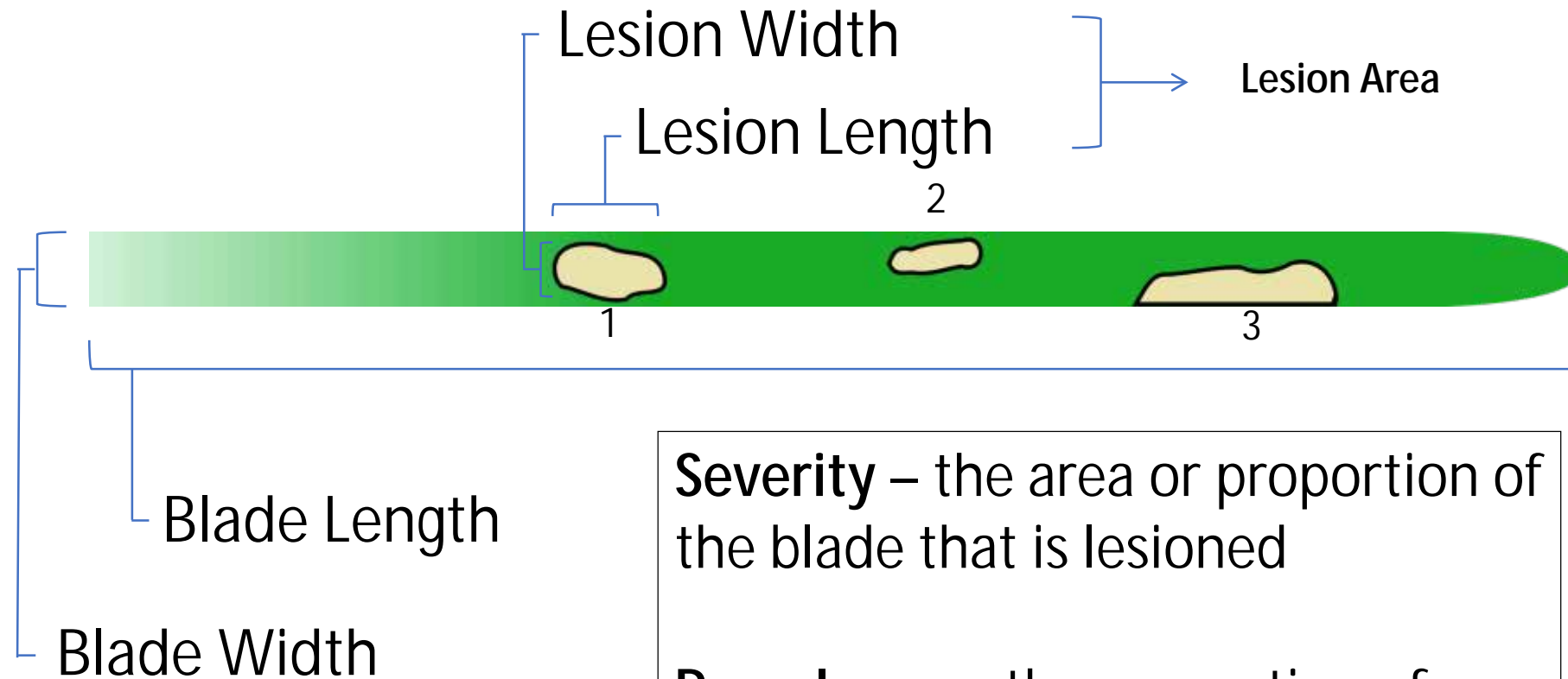
Credit: Dan Martin

Research Questions

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



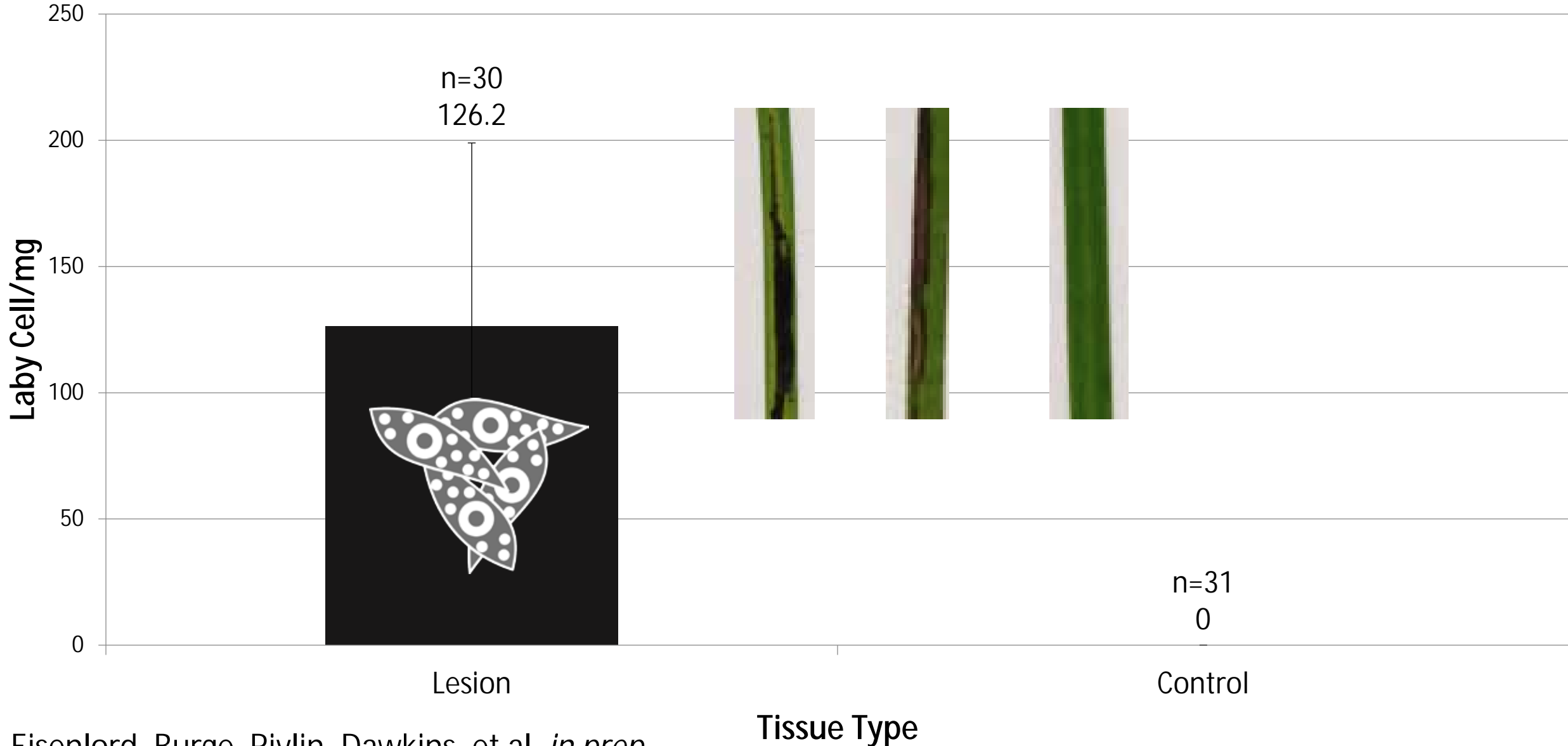
Scoring Eelgrass for Disease...

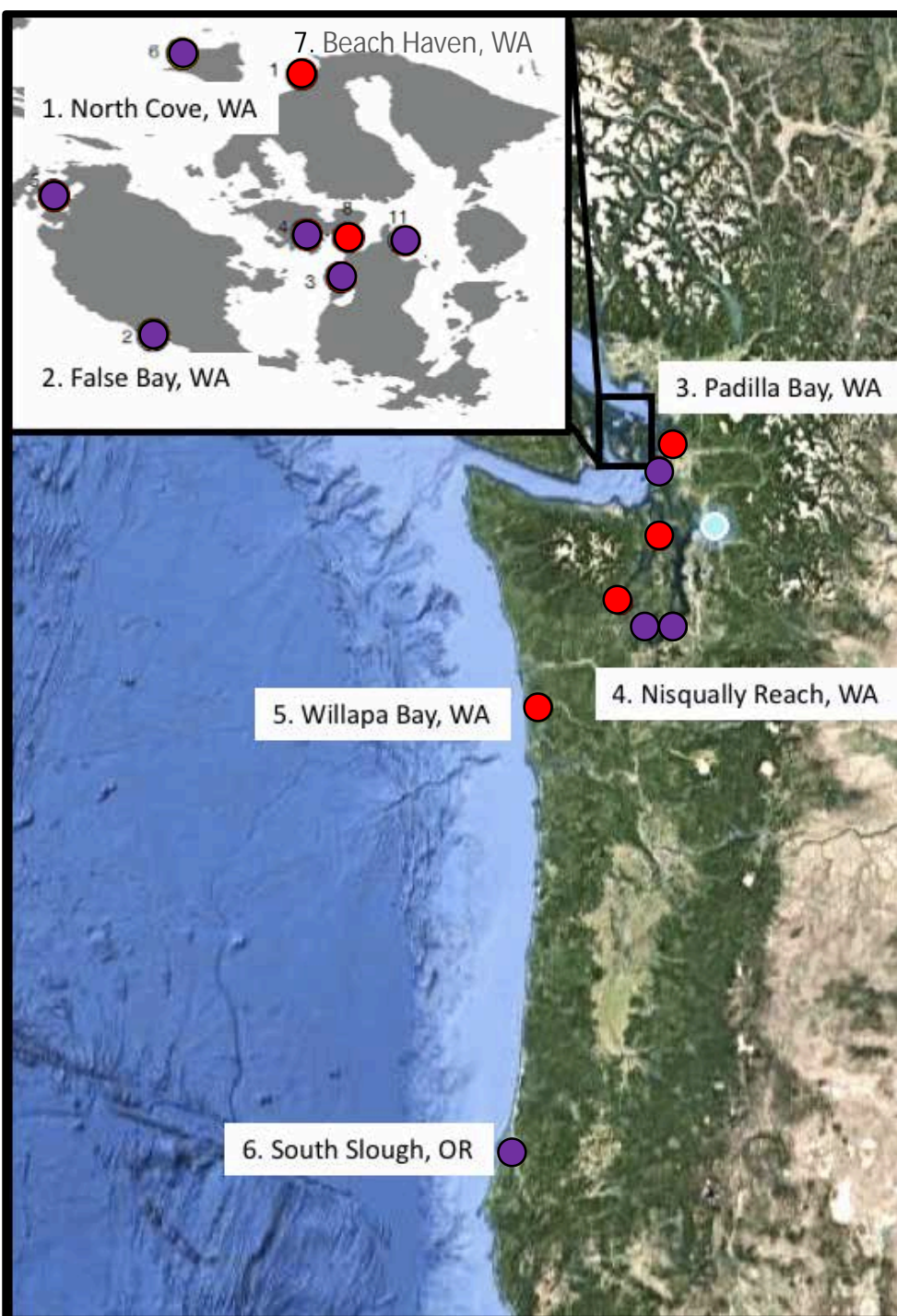


Severity – the area or proportion of the blade that is lesioned

Prevalence – the proportion of blades that have a lesion

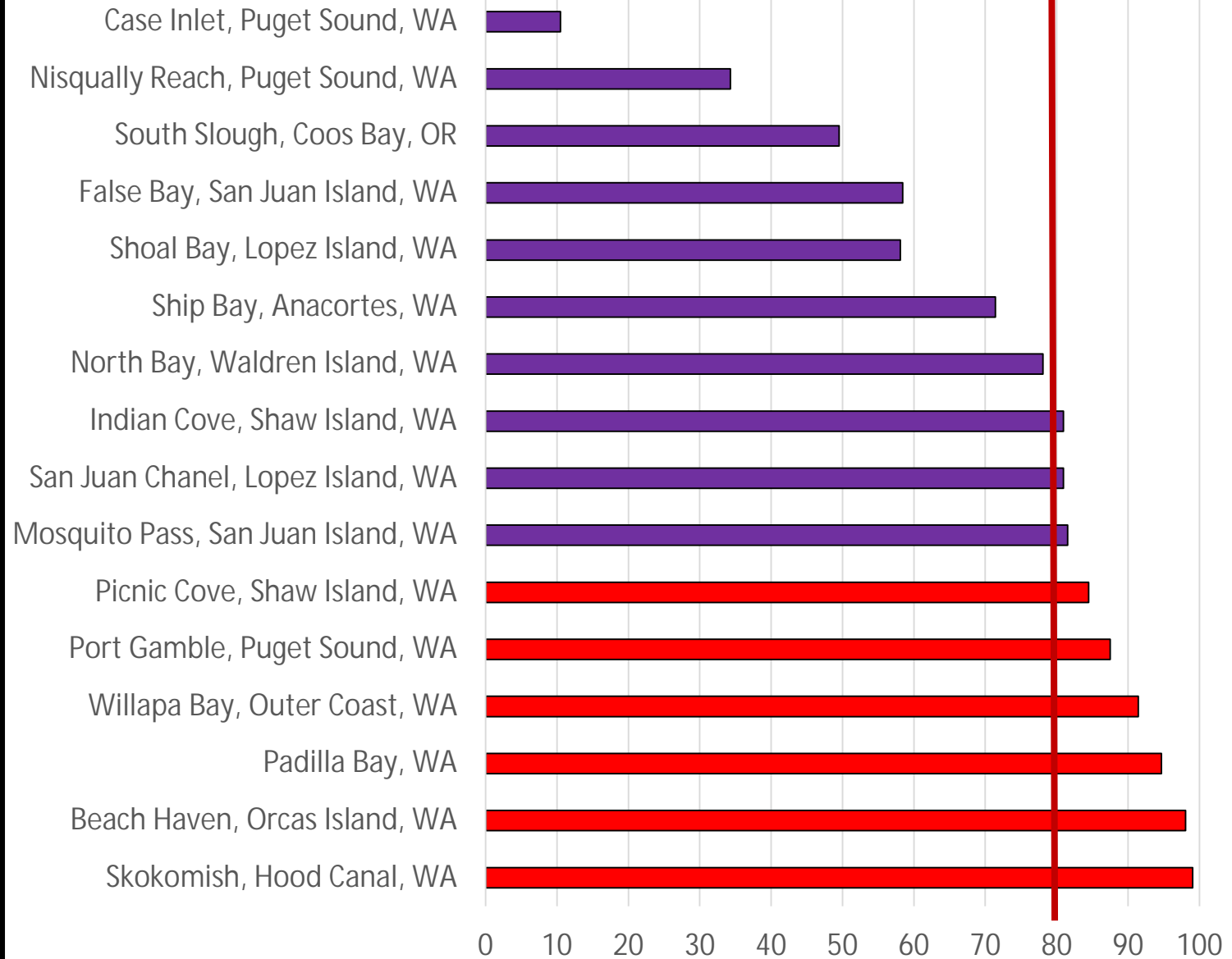
Quantitative PCR of *Labyrinthula zosterae*: pathogen cells/mg



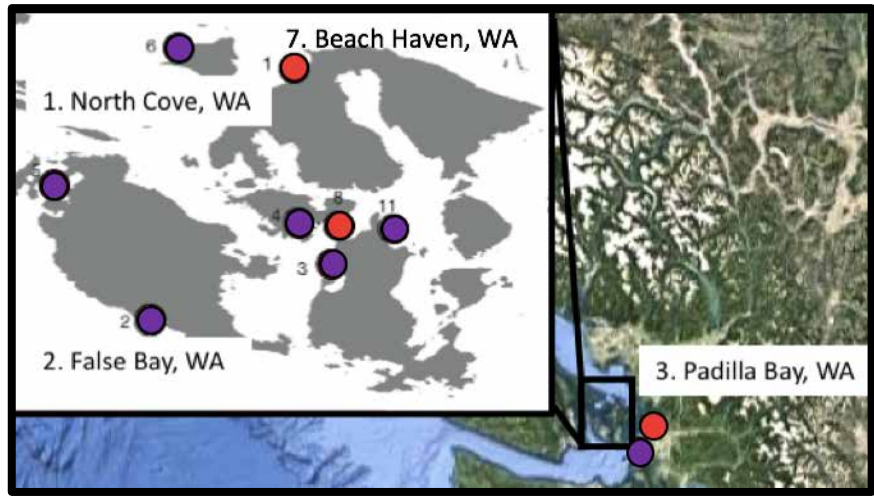


% EGWD Prevalence

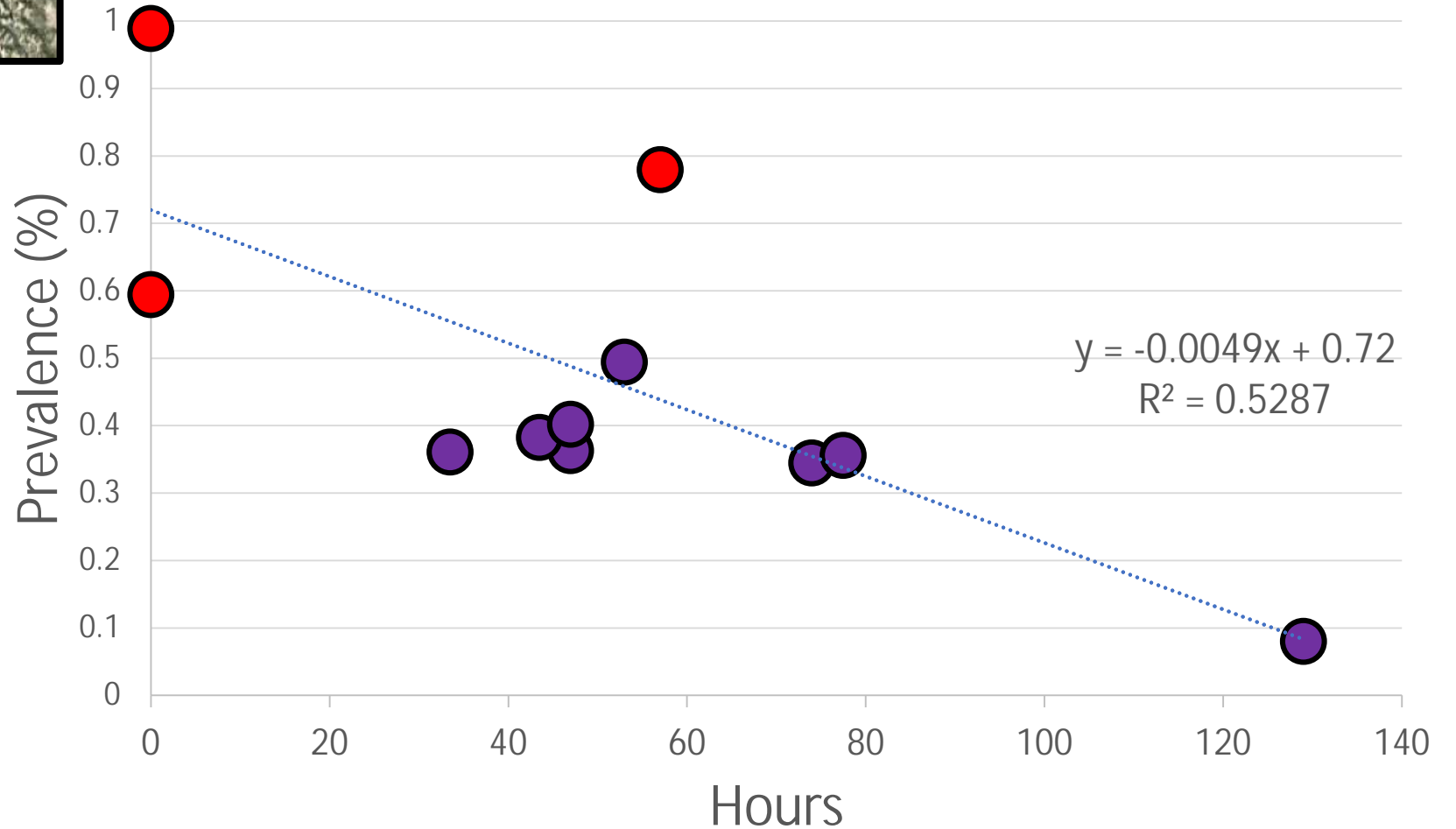
80%



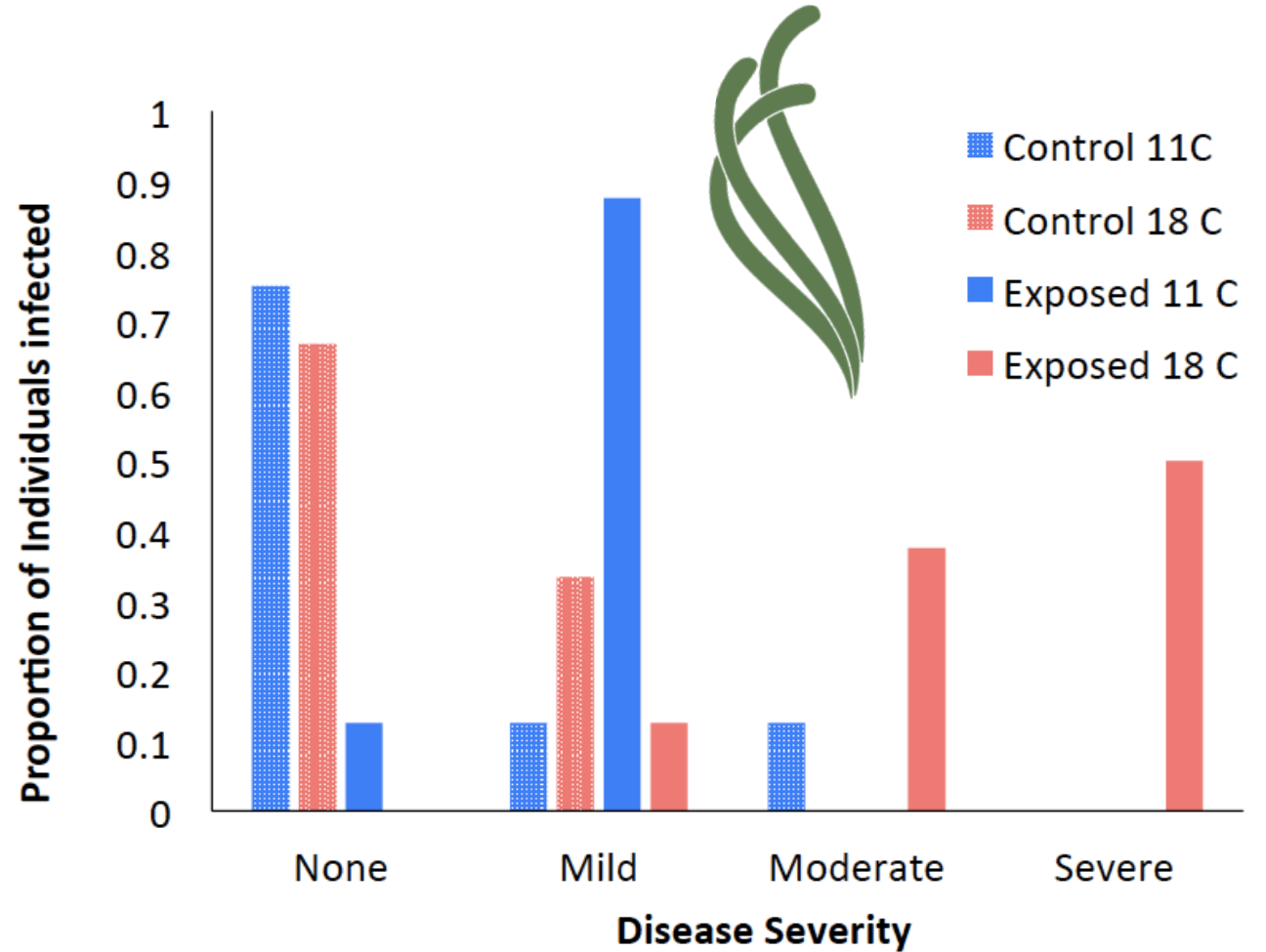
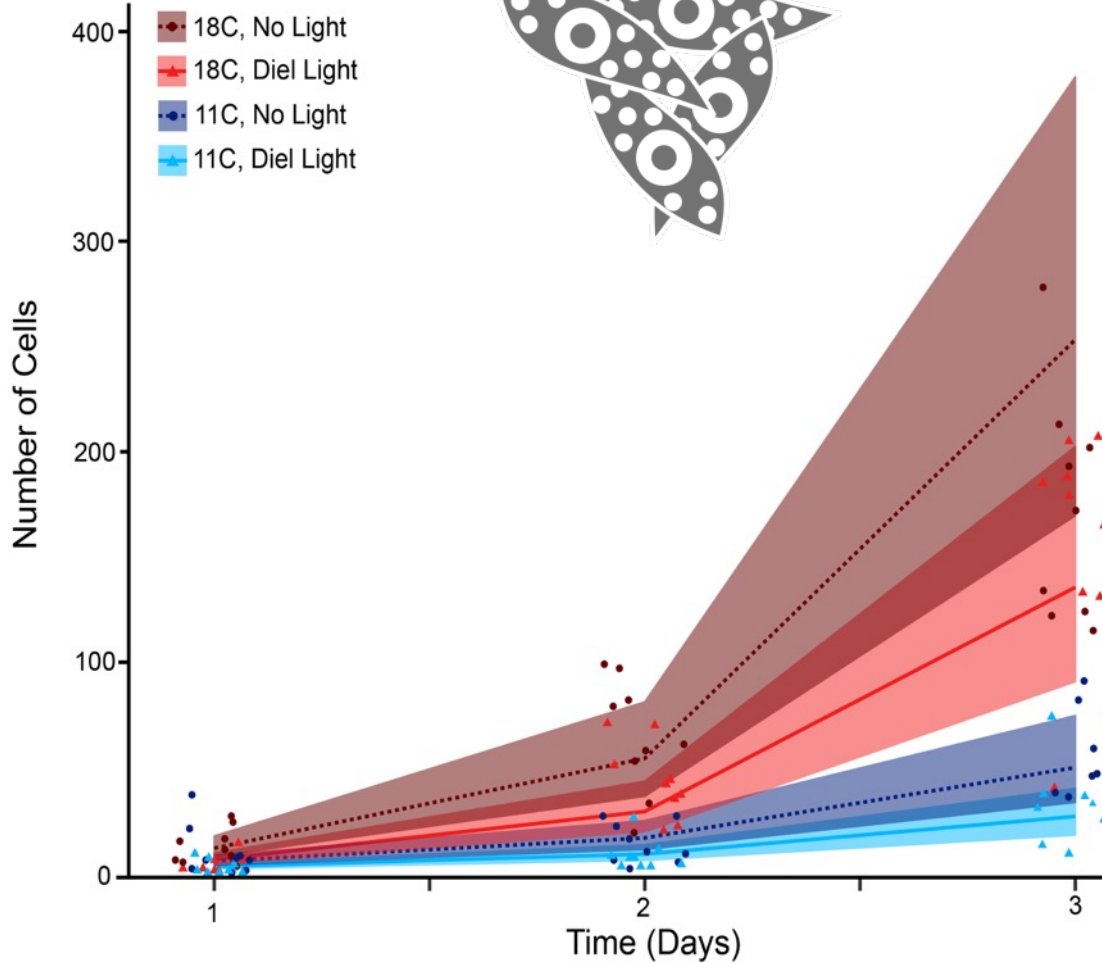
Eisenlord, Yoshioka, et al. *in prep*



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



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

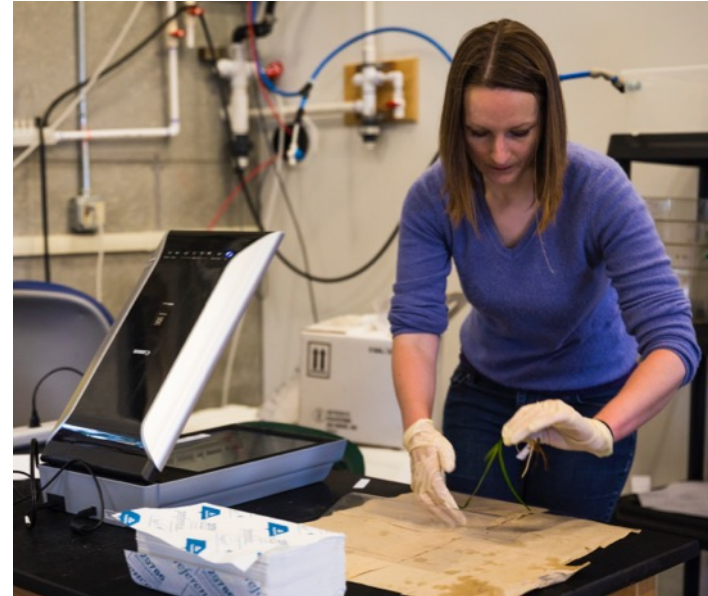


Dawkins, Eisenlord, Winningham et al. *in revision*

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

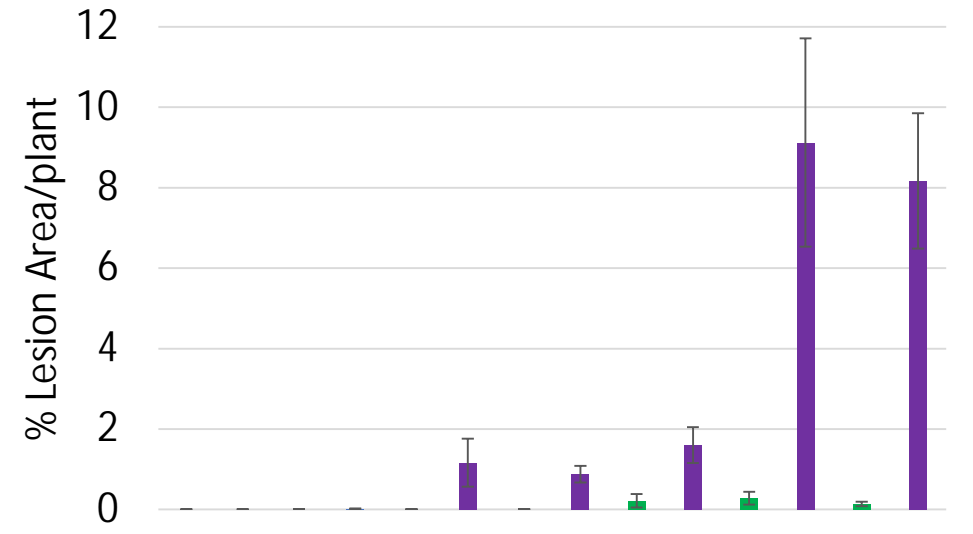
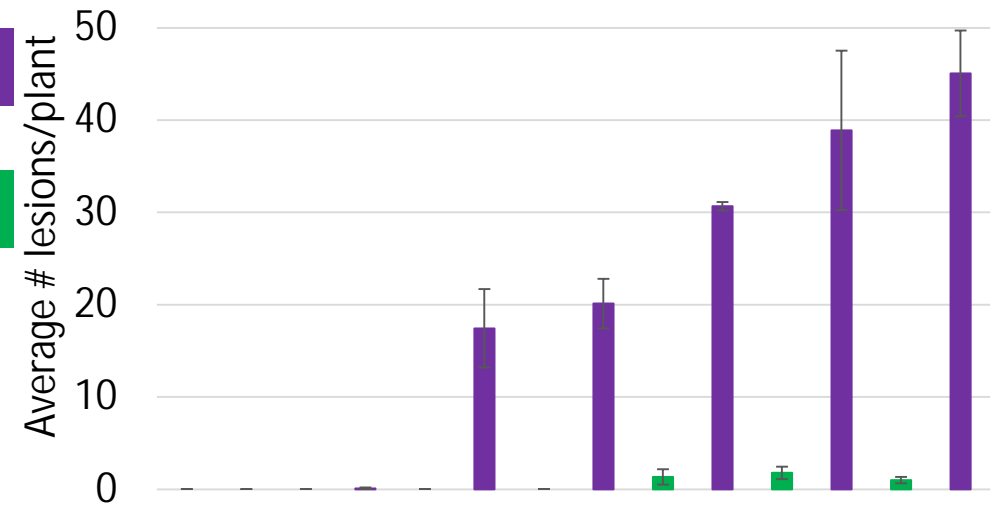
Impact of LZ infection on *Z. marina* growth and phenol production

- 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

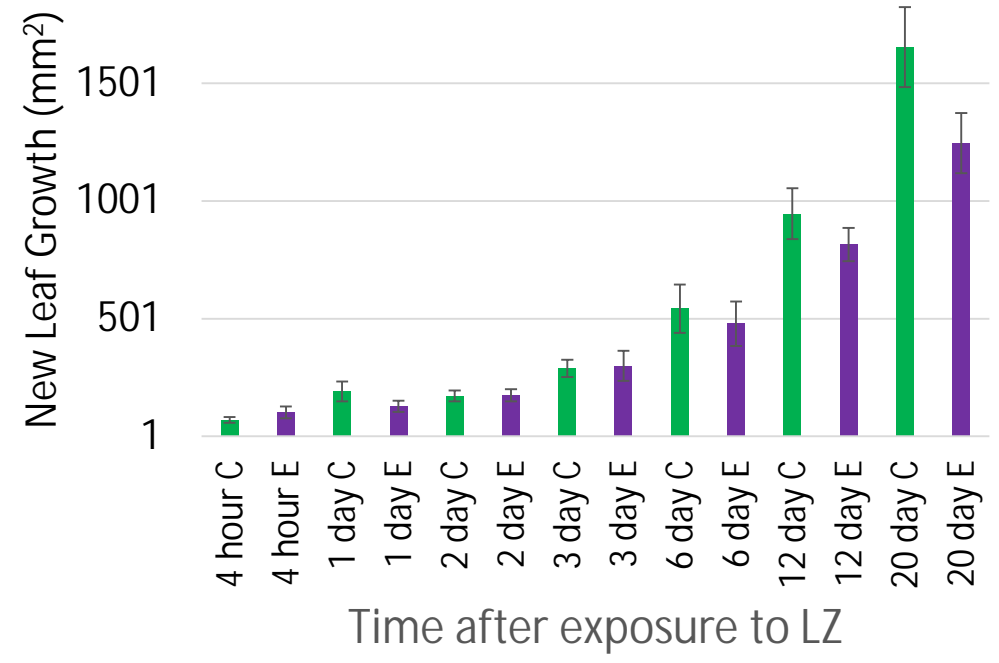
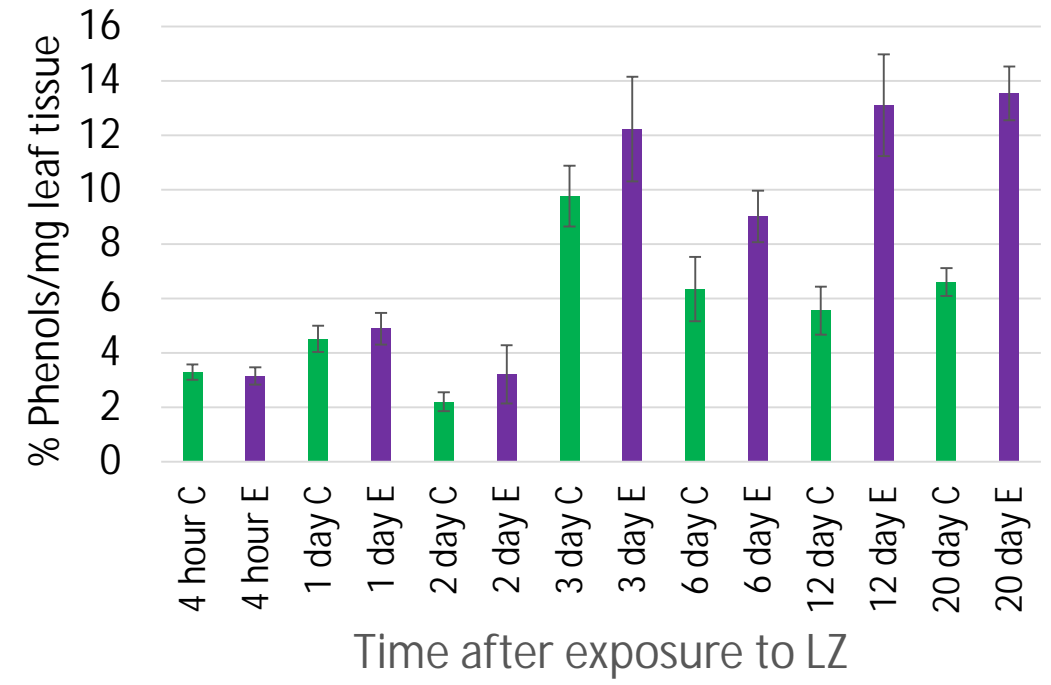




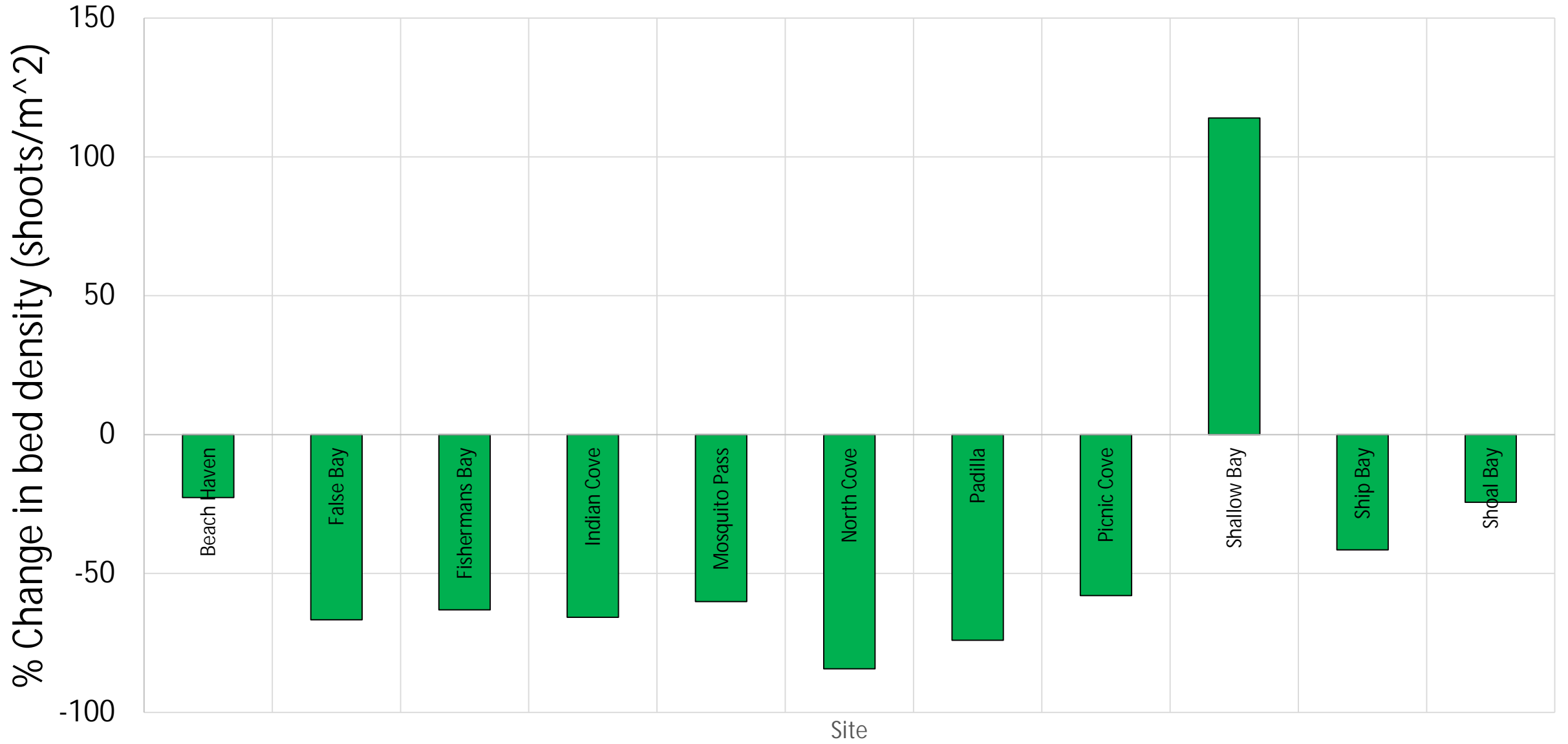
Exposed
Control



Eisenlord et al. *in prep*



% Change in bed density 2013-2015



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!



Drew Harvell



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



**David R. Atkinson Center
for a Sustainable Future**

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