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

Morgan Eisenlord  
Cornell Univ., United States, me367@cornell.edu

Colleen Burge  
Univ. of Maryland, Baltimore County, United States, colleenb@umbc.edu

Phoebe D. Dawkins  
Cornell Univ., United States, pd298@cornell.edu

Reyn Yoshioka  
Univ. of Oregon, United States, rmy@uoregon.edu

Tyler Tran  
Western Washington Univ., United States, tyler.tran@wwu.edu

See next page for additional authors

Follow this and additional works at: https://cedar.wwu.edu/ssec

Part of the Fresh Water Studies Commons, Marine Biology Commons, Natural Resources and Conservation Commons, and the Terrestrial and Aquatic Ecology Commons

Eisenlord, Morgan; Burge, Colleen; 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

This Event is brought to you for free and open access by the Conferences and Events at Western CEDAR. It has been accepted for inclusion in Salish Sea Ecosystem Conference by an authorized administrator of Western CEDAR. For more information, please contact westerncedar@wwu.edu.
**Speaker**
Morgan Eisenlord, Colleen Burge, Phoebe D. Dawkins, Reyn Yoshioka, Tyler Tran, Natalie Rivlin, Miranda Winningham, Clio Jensen, Kathy Van Alstyne, and Drew Harvell

This event is available at Western CEDAR: https://cedar.wwu.edu/ssec/2018ssec/allsessions/349
Tipping the balance: the impact of eelgrass wasting disease in a changing ocean

Salish Sea Ecosystem Conference
April 5, 2018

Morgan Eisenlord\textsuperscript{1,2}, Colleen Burge\textsuperscript{3}, Phoebe Dawkins\textsuperscript{1}, Reyn Yoshioka\textsuperscript{4}, Tyler Tran\textsuperscript{5}, Natalie Rivlin\textsuperscript{3}, Miranda Winningham\textsuperscript{1}, Clio Jensen\textsuperscript{2,6}, Kathy Van Alstyne\textsuperscript{5}, Drew Harvell\textsuperscript{1}

\textsuperscript{1}Cornell University; \textsuperscript{2}Friday Harbor Lab, UW; \textsuperscript{3}Institute of Marine Environmental Technology, UMBC; \textsuperscript{4}Oregon Institute of Marine Biology, UO; \textsuperscript{5}Shannon Point Marine Center, WWU; \textsuperscript{6}Bryn Mawr College
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
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 11°C

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 $1 \times 10^4$ 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
Eisenlord et al. in prep
% Change in bed density 2013-2015

- Beach Haven
- False Bay
- Fishermans Bay
- Indian Cove
- Mosquito Pass
- North Cove
- Padilla
- Picnic Cove
- Shallow Bay
- Ship Bay
- Shoal Bay

-% Change in bed density (shoots/m^2)
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
Special thanks to:
- Billie Swalla, Megan Dethier, Carolyn Friedman, Sunny Powers, Michael Milgroom, Sandy Wyllie-Echeverria, Ann Jarrell, and Joleah Lamb for their support, mentorship, and encouragement
- Bella Bledsoe, Olivia Graham, Mo Turner, and the students of the 2015, 2016, & 2017 Cornell Ocean Research Apprenticeship for Lynch Scholars for many hours assistance in the field and lab

Funding:
- University of Washington Friday Harbor Laboratories Graduate Fellowship
- Atkinson Center for a Sustainable Future
- Cornell Research Apprenticeship for Lynch Scholars
- National Science Foundation Graduate Research Fellowship Program