Latitudinal variation in seagrass wasting disease from Puget Sound to Alaska

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Graham, Olivia; Klohmann, Corinne; Adamczyk, Emily; Hessing-Lewis, Margot; Olson, Angeleen; Tolimieri, Nick; Stephens, Tiff; Burge, Colleen Amy; and Harvell, Drew, "Latitudinal variation in seagrass wasting disease from Puget Sound to Alaska" (2018). *Salish Sea Ecosystem Conference*. 125. https://cedar.wwu.edu/ssec/2018ssec/allsessions/125

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Speaker
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Salish Sea Ecosystem Conference
April 5, 2018
Eelgrass (Zostera marina)

• Cover less than 0.2% all oceans (Duarte et al. 2005)
• But a triple win for marine sustainability
  • Mitigate effects of global climate change
  • Create essential marine habitat
  • Offset coastal pollution
Seagrass Wasting Disease (SWD)

• Caused by marine protist
  • *L. zosterae*

• Caused historic eelgrass die-offs (Muehlstein 1989)

• Threatens eelgrass

• Facilitated by:
  • Temperature (Bull *et al.* 2010, Dawkins *et al.*, *in prep*)
  • Salinity (McKone and Tanner 2009)
Subtidal: Disease Refuge?

• Little known about *subtidal* disease
• Subtidal beds in Sweden
  • Had reduced disease at depth and low salinity (Jakobsson-Thor *et al.* 2018)
• Subtidal beds in San Juans, 2016
  • Had lower SWD in subtidal beds
Exploring Large-Scale Disease Patterns

• Research questions
  • How does SWD vary across large latitudinal gradient?
  • How do environmental factors (temperature, salinity) influence SWD?

• Hypotheses
  • **Lower** SWD at **higher** latitudes with **cooler** temperatures
  • **Higher** SWD at **lower** latitudes with **warmer** temps
Field Methods—Summer 2017

• Subtidal* and intertidal SWD surveys
  • 60 subtidal blades/site
  • 120 intertidal blades/site
• Measure site-specific data
  • Temperature
  • Salinity
  • Density, canopy height
• Collected eelgrass

Photo: flickr.com
Lab Methods

- Scan eelgrass
- Measure distinctive lesions
- qPCR
  - Eisenlord: “Tipping the balance: the impact of eelgrass wasting disease in a changing ocean”
Disease Survey Sites:

• Alaska
• Calvert Island, BC
• San Juan Islands, WA
• Puget Sound, WA

4 regions
19 sites
1136 subtidal blades
The graph shows the relationship between disease prevalence (%) and subtidal water temperature (F) for different regions: Puget Sound, Alaska, San Juans, and British Columbia. The coefficient of determination, $R^2$, is 0.3298.
1. Temperature seems to be an important driver of subtidal disease.
2. Found considerable local variation in disease.
3. Subtidal may serve as a refuge against SWD.
Looking Ahead

• Analyze 2017 intertidal eelgrass scans
• Continue to monitor subtidal and intertidal disease
  • Repeat regional surveys in 2018
Broader Impacts

• Has relevance to regional and global eelgrass
  • Provides key snapshots of eelgrass health

• Can directly inform PNW eelgrass conservation and management efforts
  • Which need protection? Are declining? At risk?

• Provides greater understanding of the processes that drive and shape marine environments
Acknowledgements

Harvell Lab
- Drew Harvell, Joleah Lamb, Allison Tracy, Morgan Eisenlord, Corinne Klohmann, Phoebe Dawkins, Miranda Winningham

Collaborators
- Mary O’Connor & Emily Adamczyk (UBC)
- Margot Hessing-Lewis & Angeleen Olsen (Hakai)
- Nick Tolimieri (NOAA)
- Tiff Stephens (U.Alaska)

Dive support
- Tanya Prinzing, John Cristiani, Chris Wells, Alex Lowe, Julia Kobelt, NOAA Team (Nick, Greg, Ole)

Financial support
- Atkinson Center Sustainable Biodiversity Fund
- Women Diver’s Hall of Fame
- FHL Student Scholarship
- Mellon Grant
Questions?

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Next Steps

• Analyze images for severity
• Developing lesion ID application, EELISA (Gomes & Rappazzo)
  • More consistent, efficient way to measure lesions
  • Potential for increased scope of surveys
Introduction