Latitudinal variation in seagrass wasting disease from Puget Sound to Alaska

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Speaker
Olivia Graham, Corinne Klohmman, Emily Adamczyk, Margot Hessing-Lewis, Angeleen Olson, Nick Tolimieri, Tiff Stephens, Colleen Amy Burge, and Drew Harvell

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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
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
$R^2 = 0.3298$

![Graph showing the relationship between disease prevalence (%) and subtidal water temperature (F) for different locations: Puget Sound, Alaska, San Juans, and British Columbia. The graph includes data points and a linear trend line.](image)
Summary

1. Temperature seems to be 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
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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