Evaluating the interaction of water quality and eelgrass in Coos Bay, Oregon using a complete, validated biophysical model

Caitlin Magel
University of Washington Tacoma
Puget Sound Institute

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UNIVERSITY of WASHINGTON

Tarang Khangaonkar
Adi Nugraha

UNIVERSITY OF OREGON

Dave Sutherland

SOUTH SLOUGH NATIONAL ESTUARINE RESEARCH RESERVE
EST. 1974

Ali Helms
Jaime Belanger

Janet Niessner

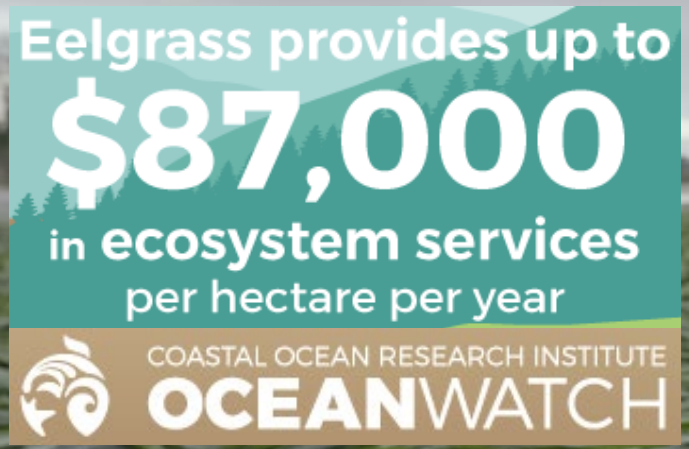
CONFEDERATED TRIBES OF COOS · LOWER UMPQUA · SIUSLAW

Funding

OREGON OCEAN SCIENCE TRUST

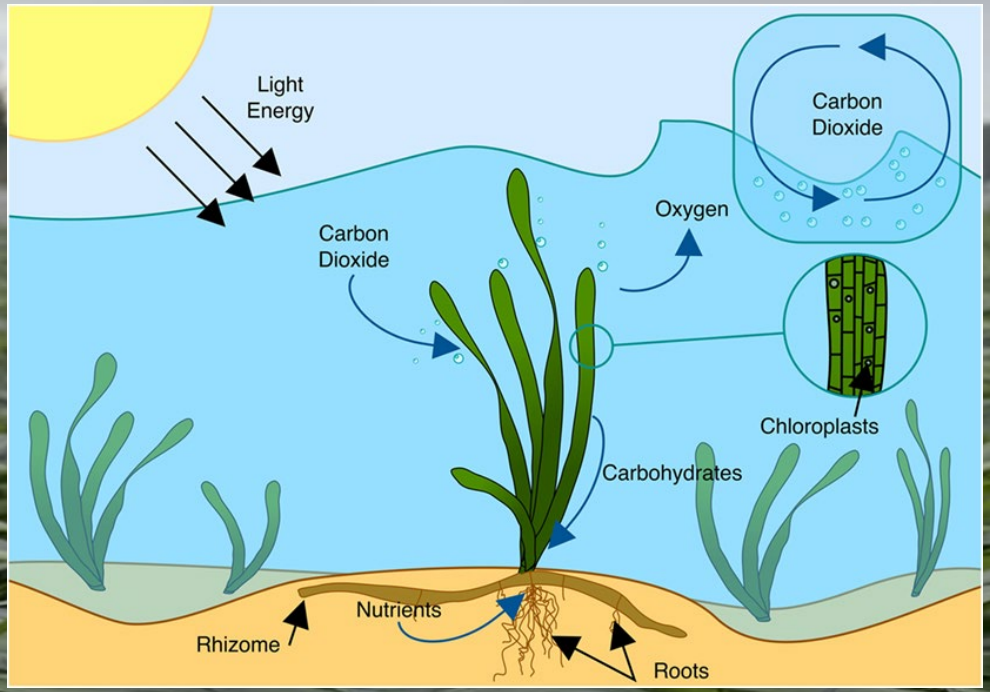
Oregon Coordinating Council on Ocean Acidification & Hypoxia

Importance of eelgrass



- Protects coastlines
- Provides habitat for fish and birds
- Improves water quality and clarity
- Enhances ecosystem resilience
- Strengthens the coastal economy
- Mitigates climate change (OAH)?

Importance of eelgrass



Cullen-Unsworth et al. 2018

➢ **Mitigates climate change (OAH)?**

Coos Estuary

Hauser
Shorewood
Glasgow
North Bend
Cooston
Coos Bay
Bunker Hill
Barview
Charleston
Crown Point
Millington

Project Overview

Leverage existing:

- Water quality and eelgrass monitoring data
- Hydrodynamic circulation model
- Biogeochemical model framework

To produce a biophysical model of Coos Bay with water quality, plankton, and eelgrass, including interactions with the water column and sediment.

Research Objective

Understand the dynamics of pH, DO, and eelgrass in Coos Bay – in the context of ecosystem services.

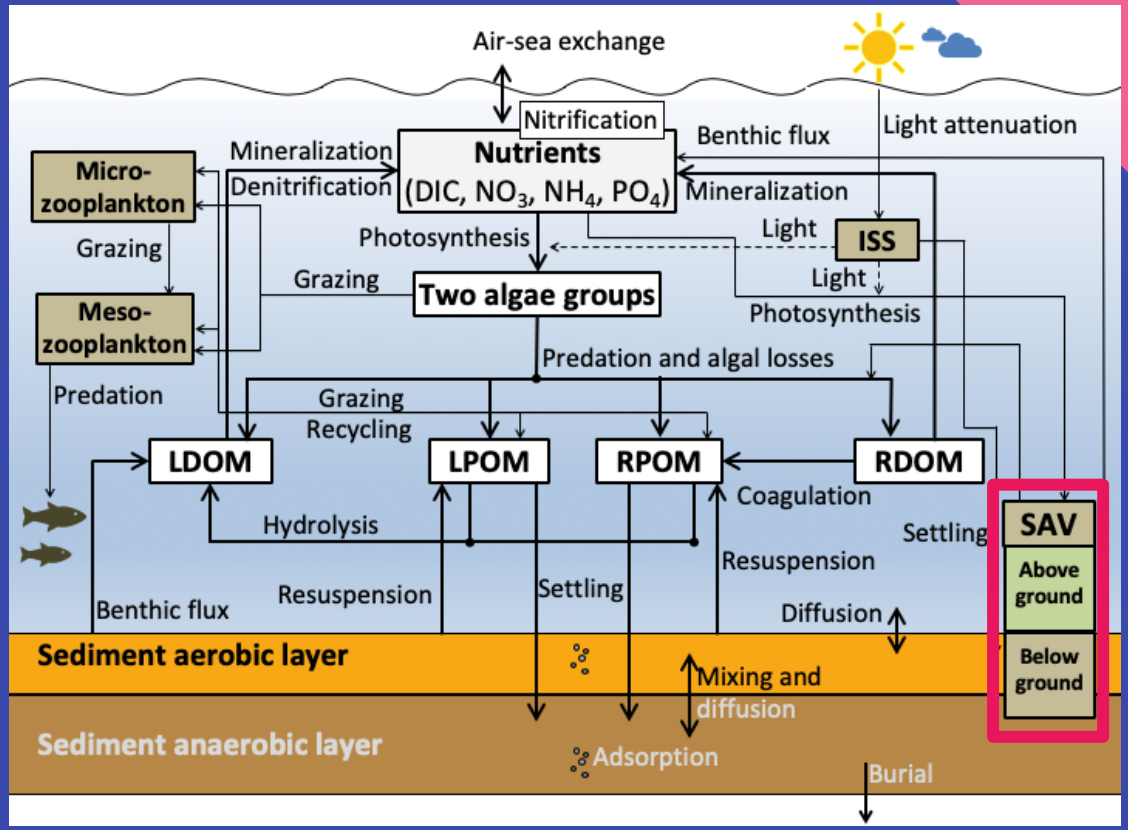
1. What conditions confer vulnerability to OAH?
2. How would changes in eelgrass abundance alter pH and DO conditions and variability?

Model Background

Run
Hydrodynamics
U, V, T, S, WSL

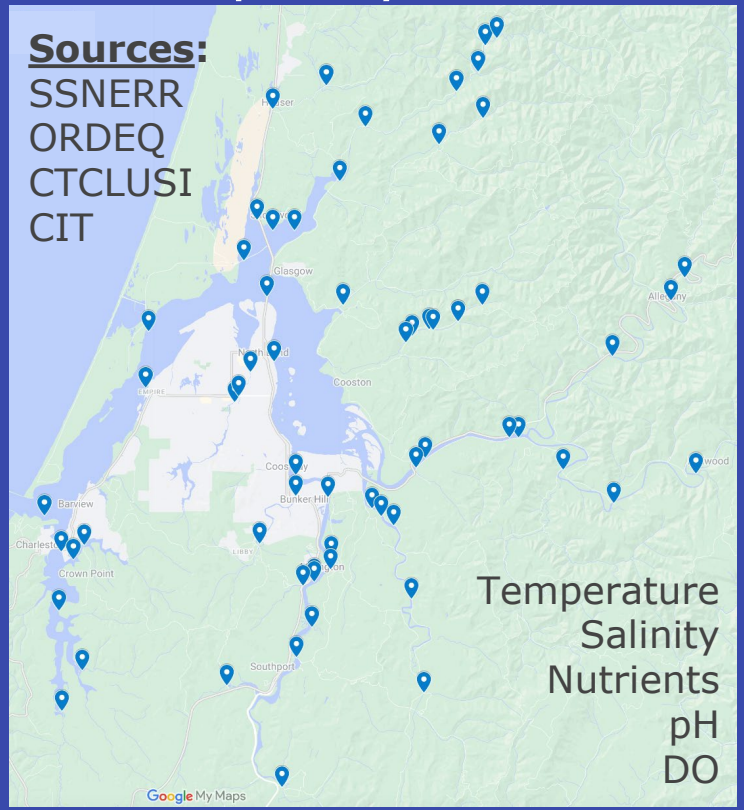
Calculate Transport of Water Quality Variables
(Nutrients, Phytoplankton, Zooplankton, Carbon
DO, pH)

Source / Sink terms
Eutrophication
Kinetics

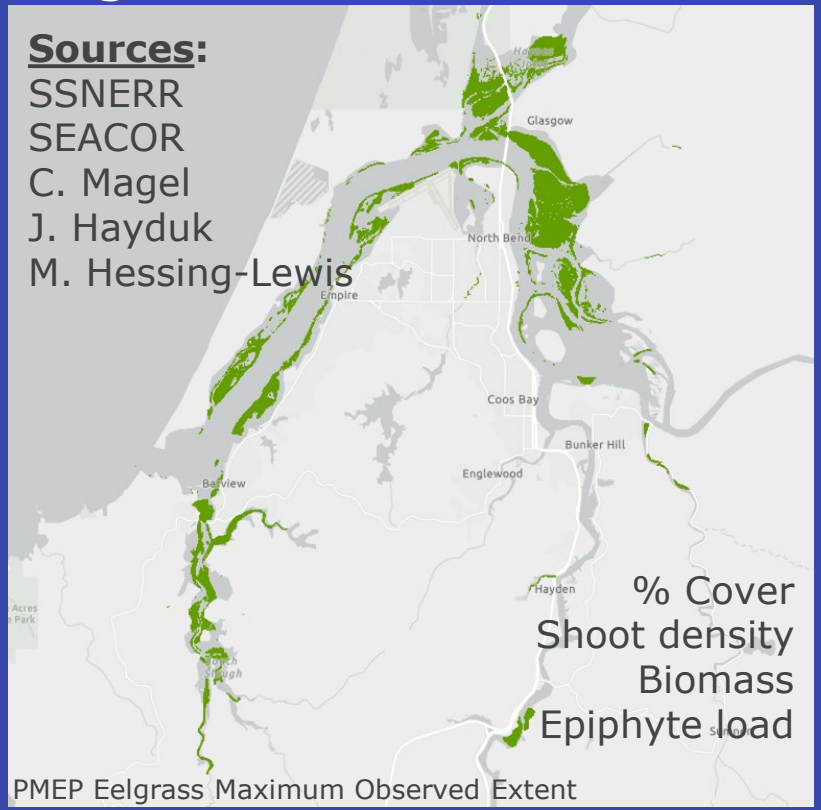


Data collection

Water quality



Eelgrass

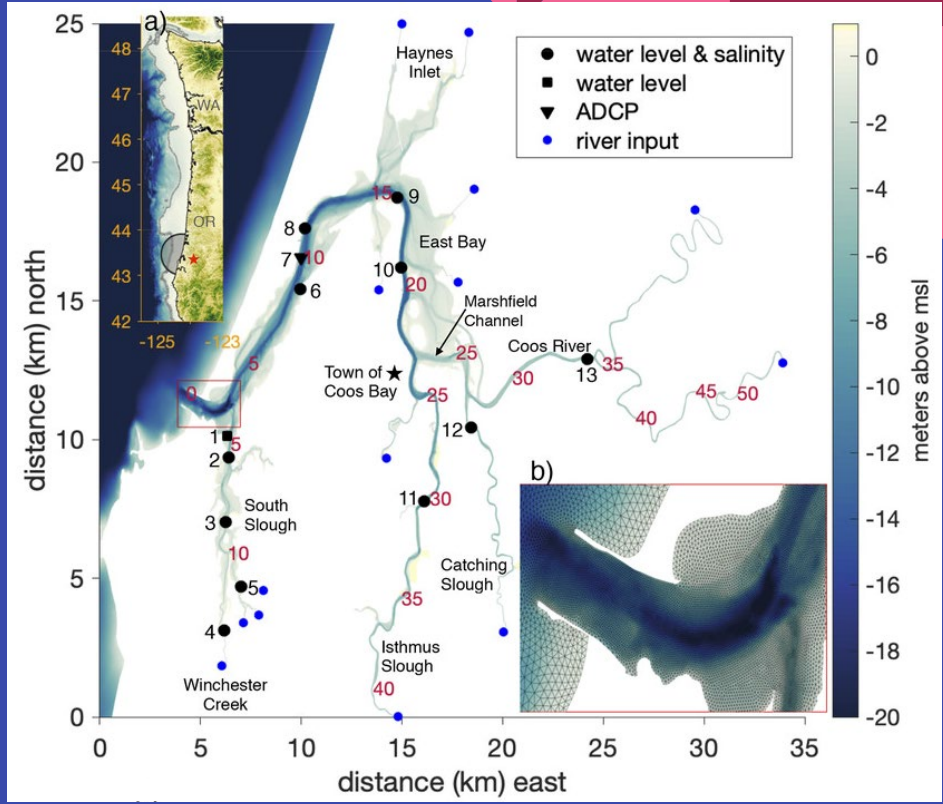


Model development

- Prepared grid
  - Grid size & bathymetry
- Established hydrodynamics
  - River inflows (14)
  - Ocean boundary: tides, T & S
- Calibrated hydrodynamics

In progress:

- Setup & calibrate biogeochemistry
- Establish eelgrass initial condition

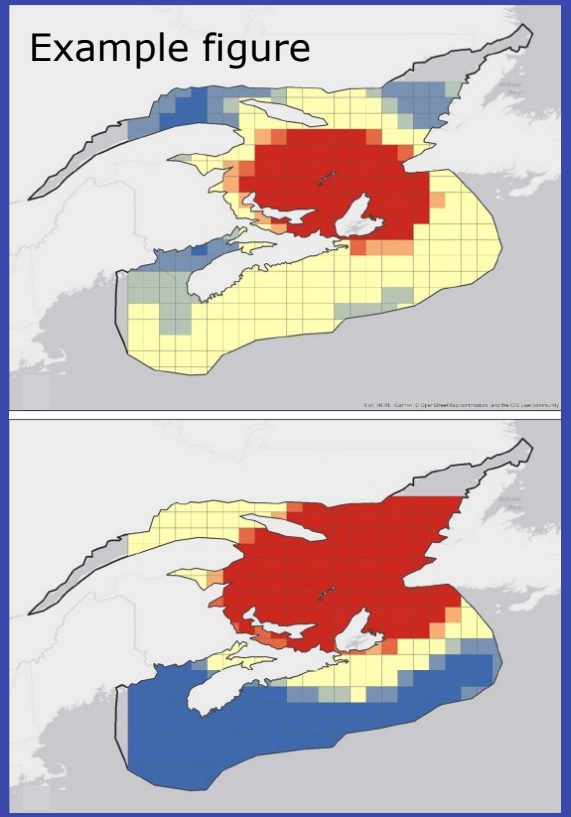


Conroy et al. 2020

What conditions confer vulnerability to OAH?

Products:

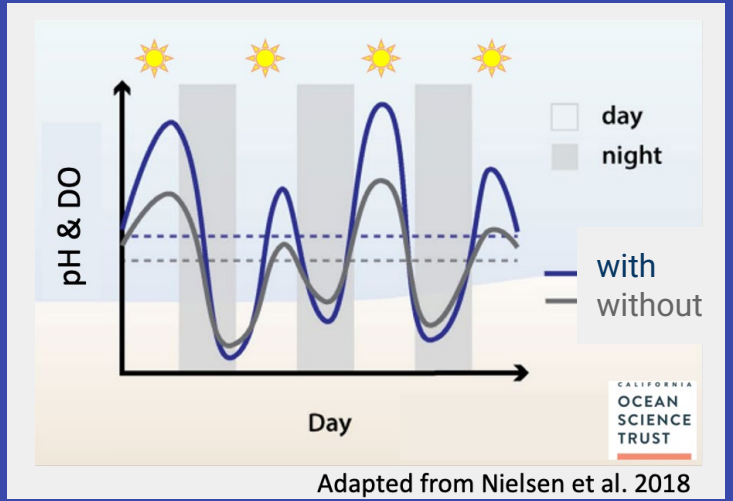
- Spatio-temporal model of water quality and eelgrass
- Maps identifying OAH “hotspots”
- Analysis of the ecohydrological processes that confer resilience or vulnerability to OAH



How would changes in eelgrass abundance alter pH and DO conditions and variability?

Products:

- Modeled scenarios comparing conditions with/without eelgrass
- Contour maps showing the influence of eelgrass on water quality



Adapted from Nielsen et al. 2018

Outreach and Dissemination

Public outreach

- South Slough Visitor's Center
- Teachers On The Estuary (TOTE) program
- Charleston Marine Life Center

End users of data and products

- SSNERR: eelgrass restoration and conservation
- ODSL: update Remove-Fill Guide
- PMEP: essential fish habitat
- Coos Bay Estuary Management Plan
- Shellfish growers/harvesters

Thank you!

Caitlin Magel

magelcai@uw.edu