Apr 4th, 1:30 PM - 1:45 PM

Assessing harmful algal bloom risk in Puget Sound: a coupled modeling-data analysis approach

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Speaker
Dana Woodruff, Taiping Wang, Stephanie Moore, Zhaoqing Yang, Ning Sun, Jerry Borchert, Audrey Coyne, Guillaume Mauger, and Valerie Cullinan

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Assessing harmful algal bloom risk in Puget Sound – a coupled modeling-data analysis approach

Dana Woodruff, Taiping Wang, Zhaoqing Yang, Val Cullinan, Ning Sun, Rebecka Bence
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Guillaume Mauger
(Univ. of Wash. Climate Impacts Group)

Jerry Borchert, Audrey Coyne
(WA Dept. of Health)

Salish Sea Ecosystem Conference April 4th, 2018
Projected increase of HAB threats to shellfish harvest and associated economic impact to coastal communities

Need for better forecasting tools for HAB occurrence and biotoxin risk

Monitoring resources limited, strategic resource allocations necessary

**GOAL:**

*Better understand HAB risk to support improved management of shellfish monitoring now and in the future*
Why Paralytic Shellfish Poisoning (PSP)?

- *Alexandrium* bloom in Washington’s marine waters every year
- PSP is a serious illness caused by eating contaminated shellfish
- Over 3,300 shellfish samples are tested annually for PSP
- Biotoxin monitoring is a coordinated effort between DOH, DFW, DNR, Local Health Departments, Tribes, Industry and Citizen Volunteers
- Variability in the timing and location of PSP blooms presents planning challenges to managers
Development of PSP Risk Probabilities for Puget Sound

Wash. DOH Biotoxin Data
- Location, Date
- Closure Status
- Concentration

UW Regional Climate Model
- Meteorology
- Stream Flow

Recent & Future Climate Conditions

PNNL High-resolution Salish Sea Model
- Temperature
- Salinity

NOAA Alexandrium Growth Function

Statistical Functions

Prediction of HAB Risk

Modeling

DECISION SUPPORT
- Stakeholder Planning
- Allocation of Resources
- Improved Monitoring
High-resolution Salish Sea Hydrodynamic Model

- **Inputs to model:**
  - Hydrology and climate forcing from UW DHSVM and WRF

- **Outputs from model:**
  - Temperature/salinity
  - Light availability
  - Residence time
  - Vertical stratification

- **Simulation periods:**
  - Recent: 2000-2006
  - Future: mid-century
Mussel sentinel sites sampled year round

27 biotoxin closure zones located in 12 coastal counties

# of closure days
- Each site/zone
- Weekly/biweekly
- 2000-2006
Regional scale

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<th>Temp (°C)</th>
<th>Prob. of Closure</th>
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</table>

Region

Model Temperature

Observed Probability of Closure
Closure zone example – Bellingham Bay

![Graph showing observed and modeled probability of closure over months]

- **Observed**
- **Modeled**

Month probabilities range from 0.00 to 1.00, with peaks in August and November.
Closure zone example – Bellingham Bay

![Graph showing probability of closure over years from 2000 to 2006. The graph compares observed and modeled data with peaks in probability occurring in specific years.](image-url)
Model Skill Assessment

Probability of closure

N = 338
R² = .86

Observed vs. Modeled
Next steps

- Assess probability of shellfish closure for future time period
  - Does the pattern of PSP risk change in the future?
  - How will this affect monitoring effort?
Conclusions

- Application of modeling approach to the scale of management units (biotoxin closure zones) is unique in Puget Sound

- Predicts seasonality of shellfish closure probabilities reasonably well

- Interannual variability of closures not well captured at all sites, hence…

- Not necessarily a good tool for next year predictions, but potentially a good tool for assessing longer-term (decadal scale) changes to the PSP bloom season
Questions?

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