Regulatory Models and Salish Sea Model Status

Ben Cope
Office of Environmental Review and Assessment
EPA Region
Topics

• Models in the regulatory process
• Salish Sea Model
  • Agency partnership
  • Building and testing
  • Model review and acceptance process
Models are Used in Decisions

• Why?

  • We need a scientific basis for decisions and investments
  • We need to link discharges/releases to resulting water quality changes
  • We need to focus on the most important pollution sources
  • We need to estimate the outcome of different alternatives
  • We need to anticipate future changes (e.g., pop growth)
Characteristics of a good regulatory model

• Model framework includes the important processes and capabilities
• Processes/equations of the model framework are well documented
• Incorporates all available input data that might affect predictions
• Thorough documentation of model development
• Transparency about limitations and uncertainty
• Peer review
• Public review
Salish Sea Model...Typical or Atypical?

• Answer: Both

• Typical
  • Model linking nutrients and DO/pH
  • Model building process
  • Model used in Clean Water Act-based decisions

• Atypical
  • Large scale and complexity of Salish Sea (akin to Chesapeake Bay model)
    • More project team experience and skill
    • More time and funding
    • Limitations in resolving small scale impacts
Salish Sea Model

Tarang Khangaonkar, Wenwei Xu, Adi Nugraha, Laki Premathilake

Pacific Northwest National Laboratory (PNNL)

Greg Pelletier, Teizeen Mohamedali, Anise Ahmed, Cristiana Figueroa-Kaminsky, Sheelagh McCarthy, and John Gala

Washington State Department of Ecology
Scientific Tool

FVCOM + CEQUAL-ICM
(Hydro) (WQ)

Source: PNNL
Matching patterns is a test of:

- Freshwater input volume
- Vertical mixing
- Interbasin mixing

Source: PNNL
Surface Currents

Fraser River Eddy

Juan De Fuca Eddy

Source: PNNL
Saratoga Passage, Year 2006, Surface Layer

- Patterns are test of:
  - Nutrient supply
  - Nutrient/Biomass/DO linkage
  - Seasonal variation

Source: PNNL
Is it good enough to use in decisions?

• No fixed numeric guidelines for “acceptable uncertainty”
• Judgment call...by the water quality agency
Getting to Acceptance

Uncertainty

Time

Before 1\textsuperscript{st} review

After 1\textsuperscript{st} review

After 2\textsuperscript{nd} review

Diminishing Returns
Salish Sea Model

Documentation and Peer Review

• 17 Project Plans (QAPP), Reports, and Journal Papers

...and counting

• Model aspects include:
  • Boundary data approaches
  • Circulation
  • Sediment diagenesis
  • Carbon and pH
  • Primary Focus: Nutrients and Dissolved Oxygen
Scenarios

• What ifs
• Multiple model runs with adjusted inputs
• Pre-specified
• Isolating sources and testing changes to source loadings
• Tend to get more elaborate over time
Models and Policy are refined together

• Build the best model you can
• Ask scientists and stakeholders for ideas/info to improve it
• Start using model results/insights
• Model and Policy are refined until final decision
Questions?