

Regulatory Models and Salish Sea Model Status

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EPA Region

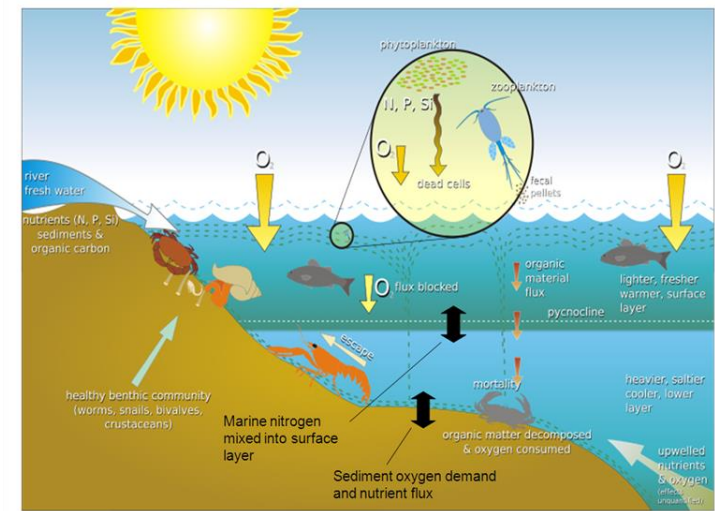
Topics

- 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)

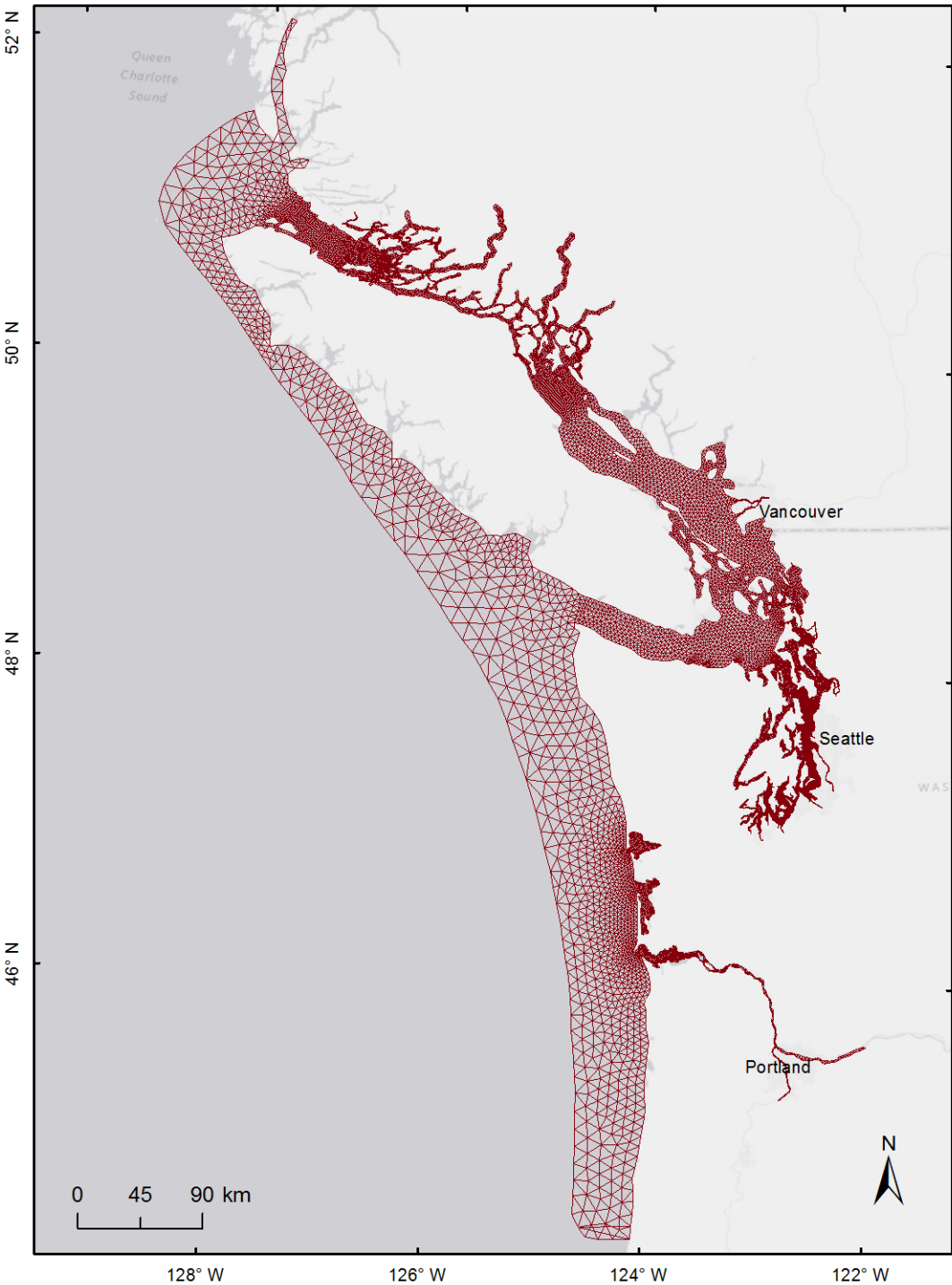
**Greg Pelletier, Teizeen Mohamedali, Anise Ahmed, Cristiana Figueroa-Kaminsky,
Sheelagh McCarthy, and John Gala**

Washington State Department of Ecology



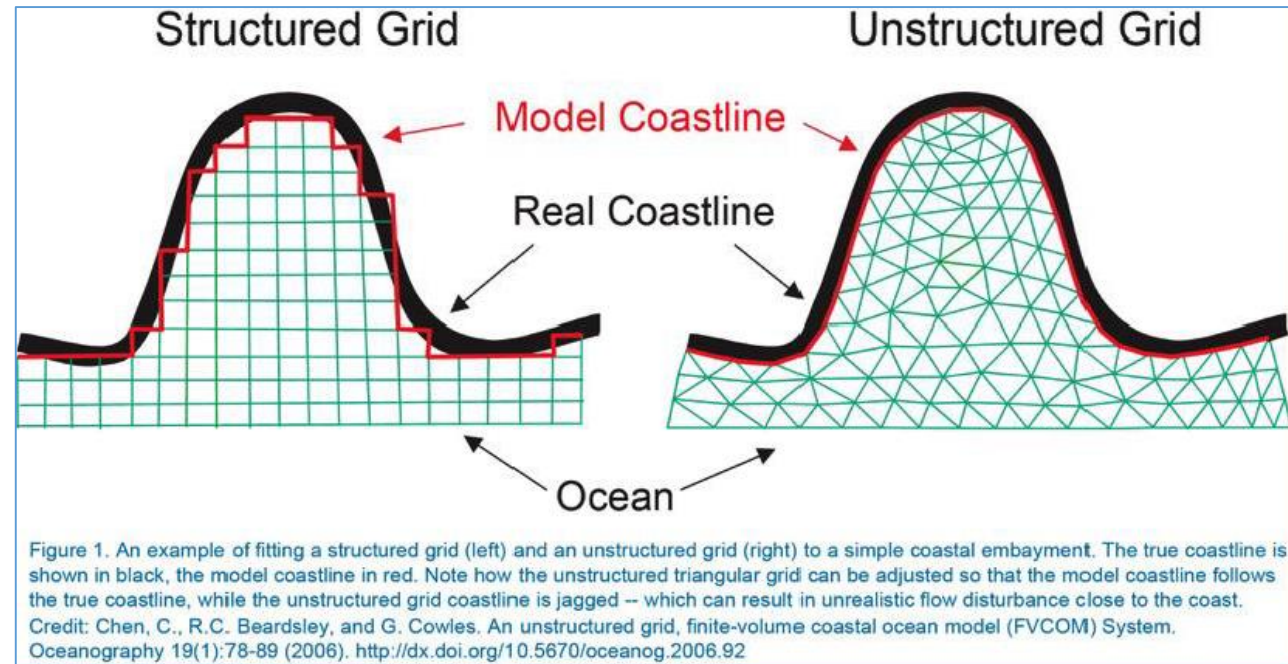
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Scientific Tool

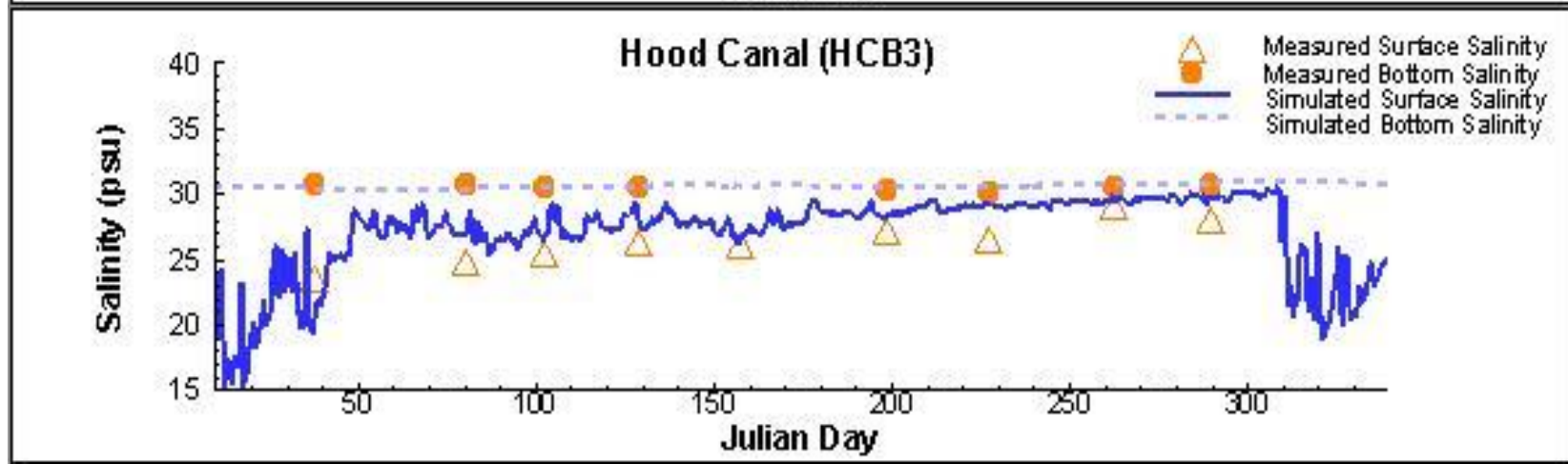
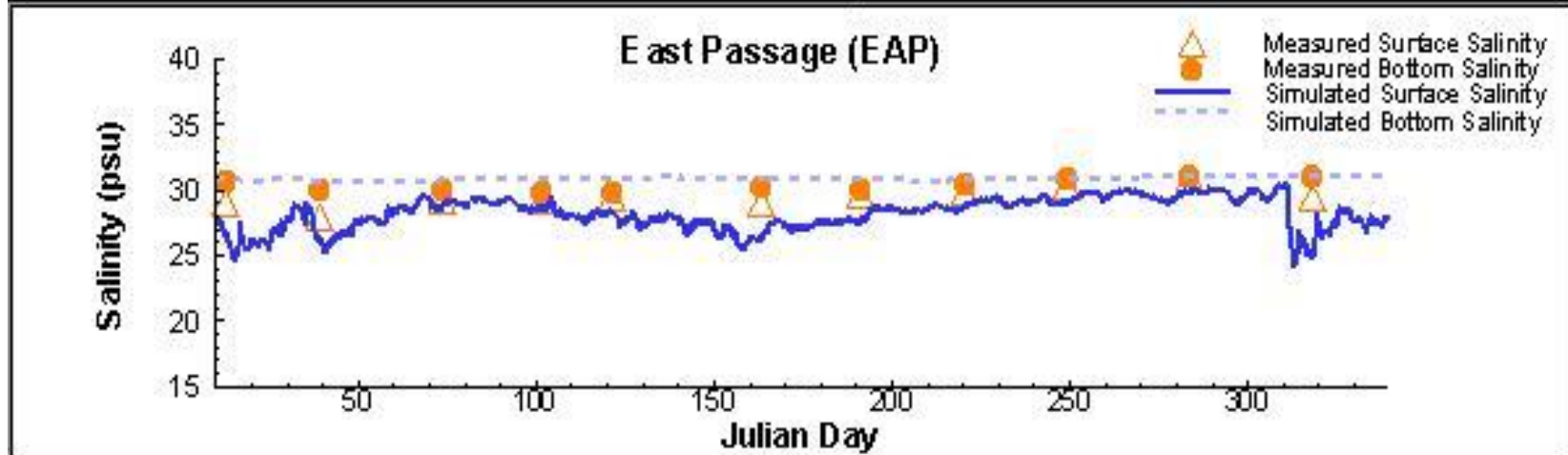
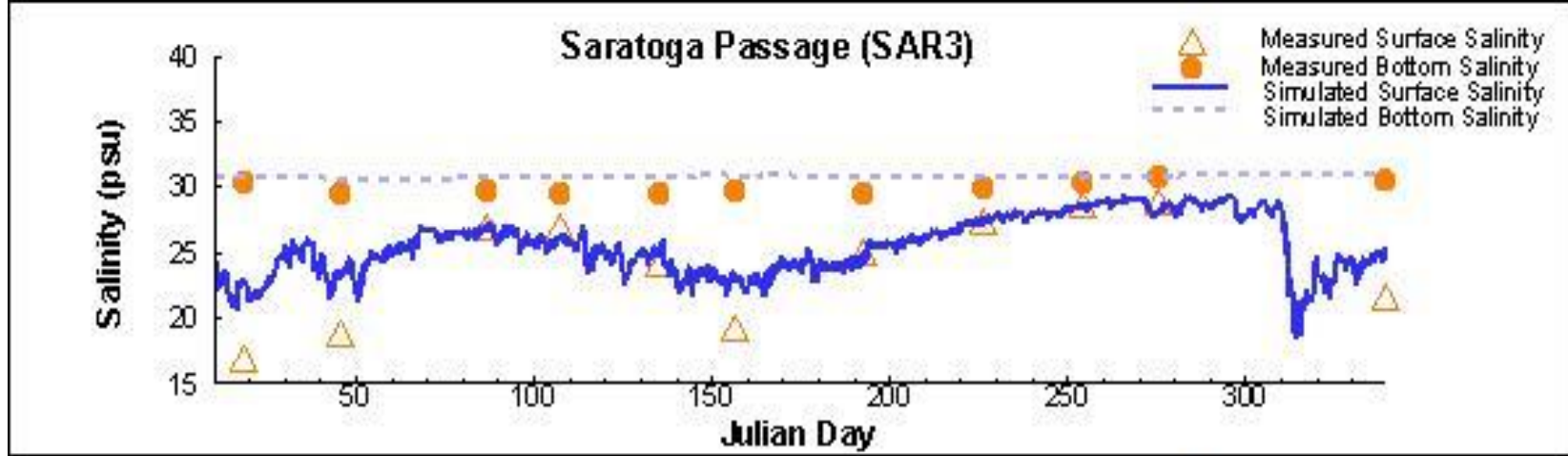
FVCOM + CEQUAL-ICM
(Hydro) (WQ)



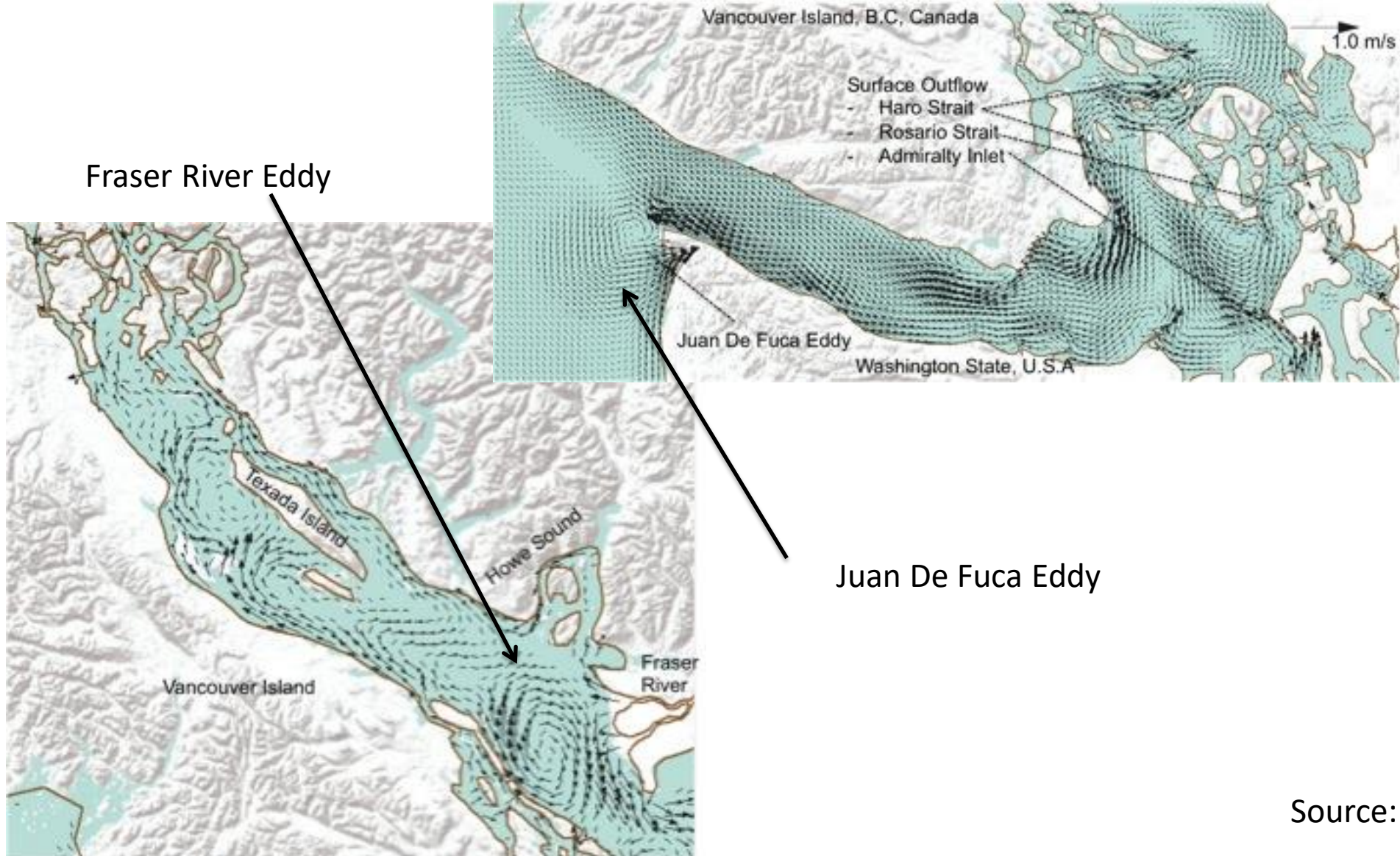
Source: PNNL

Matching patterns is a test of:

- Freshwater input volume
- Vertical mixing
- Interbasin mixing

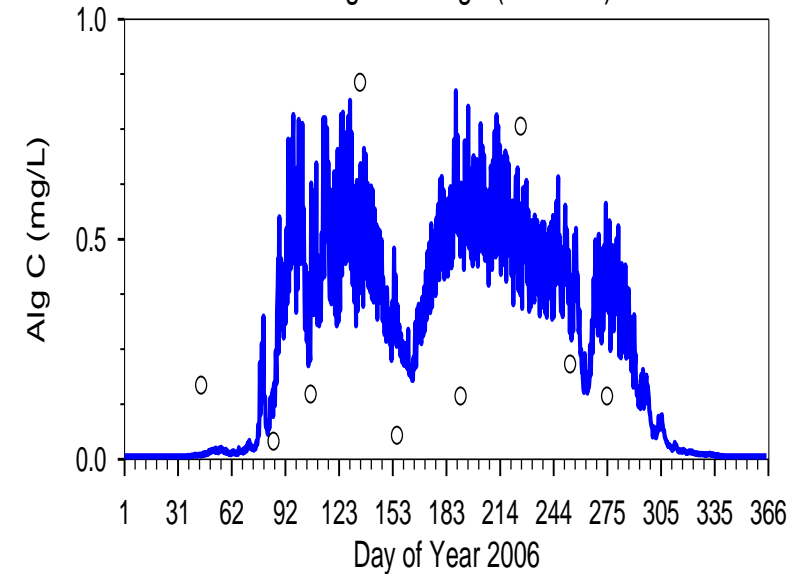


Surface Currents

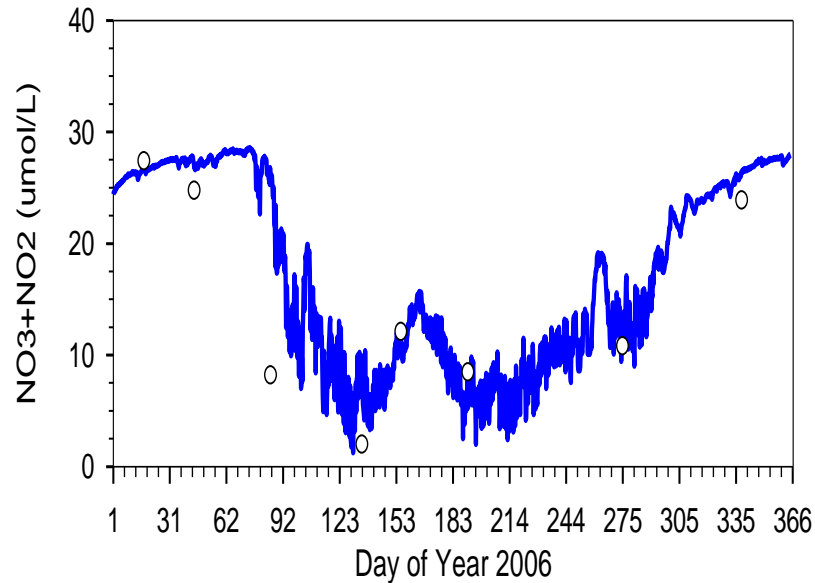


Saratoga Passage, Year 2006, Surface Layer

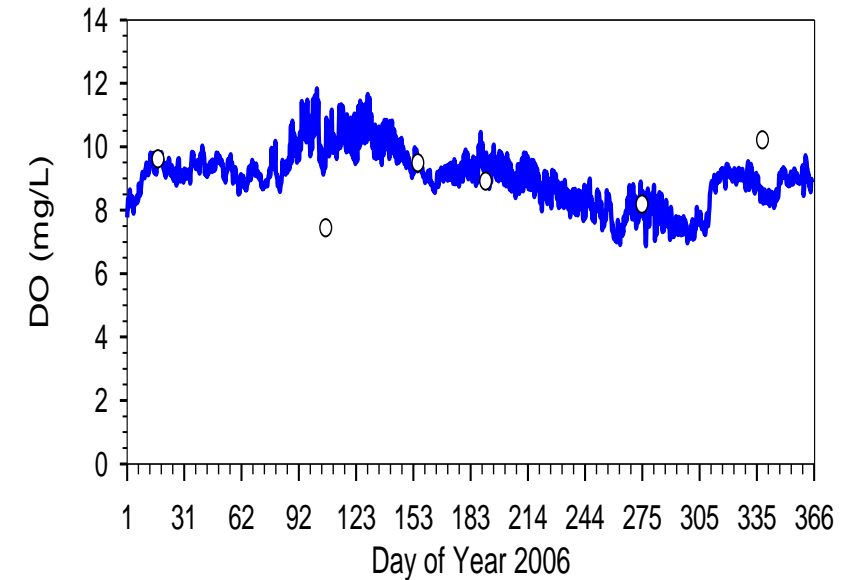
Algae



Nitrate/Nitrite



Dissolved Oxygen



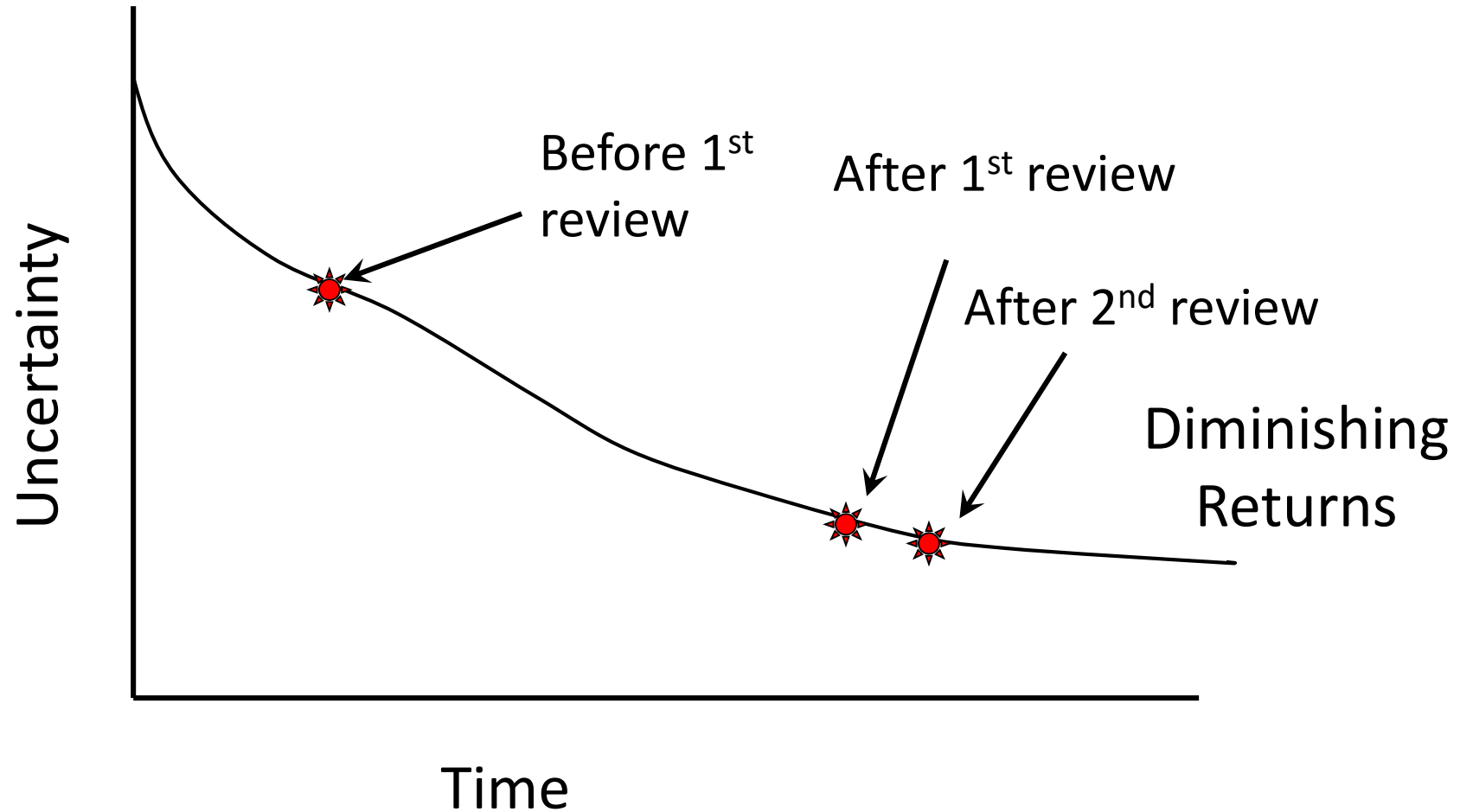
- Patterns are test of:
 - Nutrient supply
 - Nutrient/Biomass/DO linkage
 - Seasonal variation

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



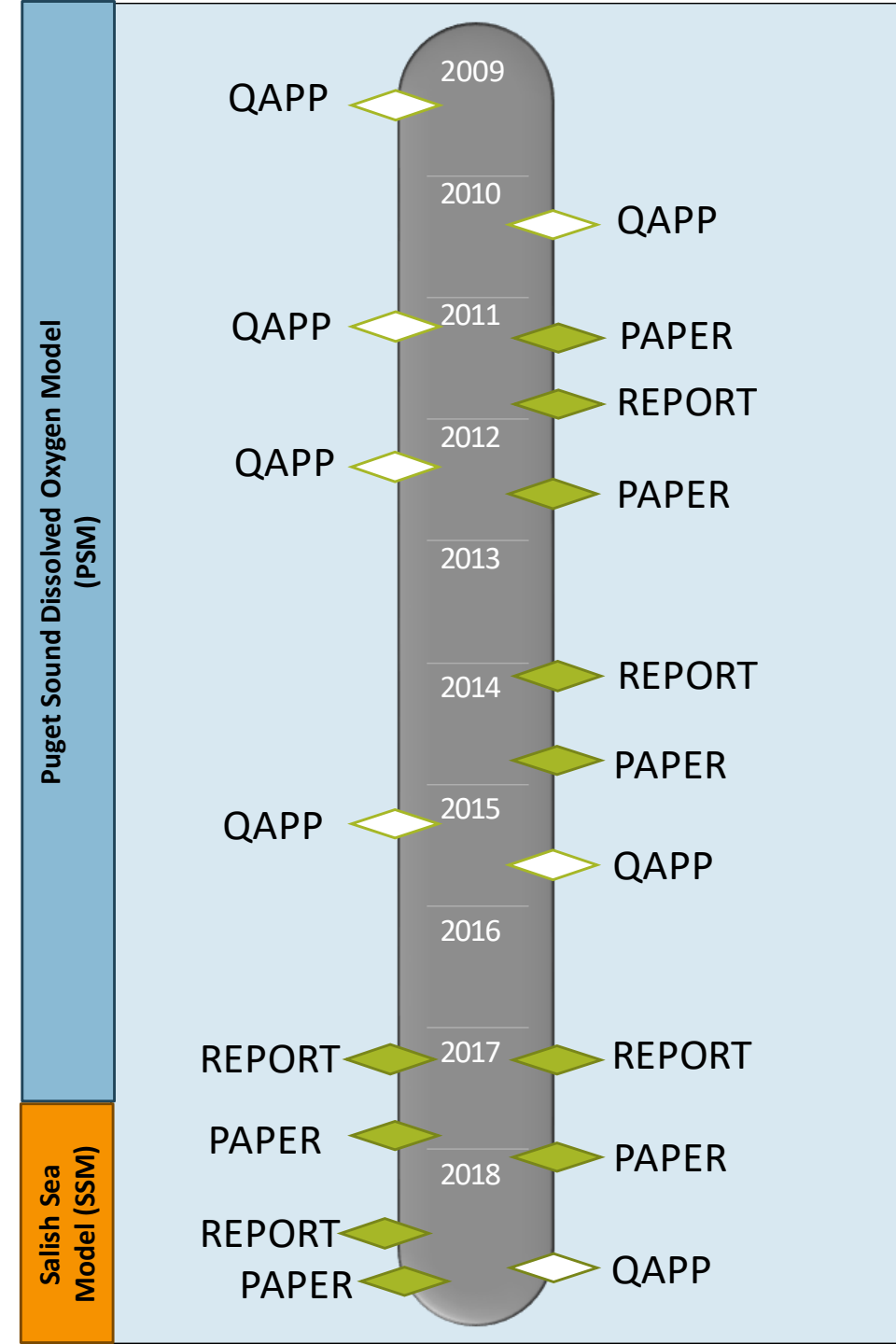
Salish Sea Model

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

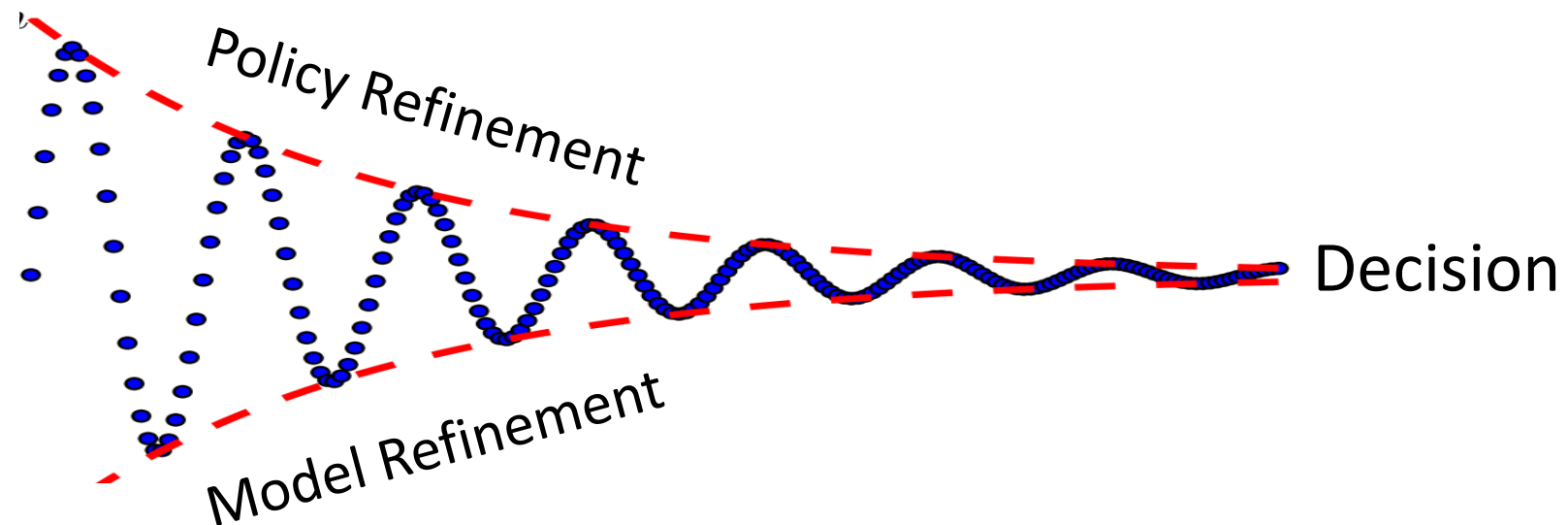


Scenarios

- 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?

