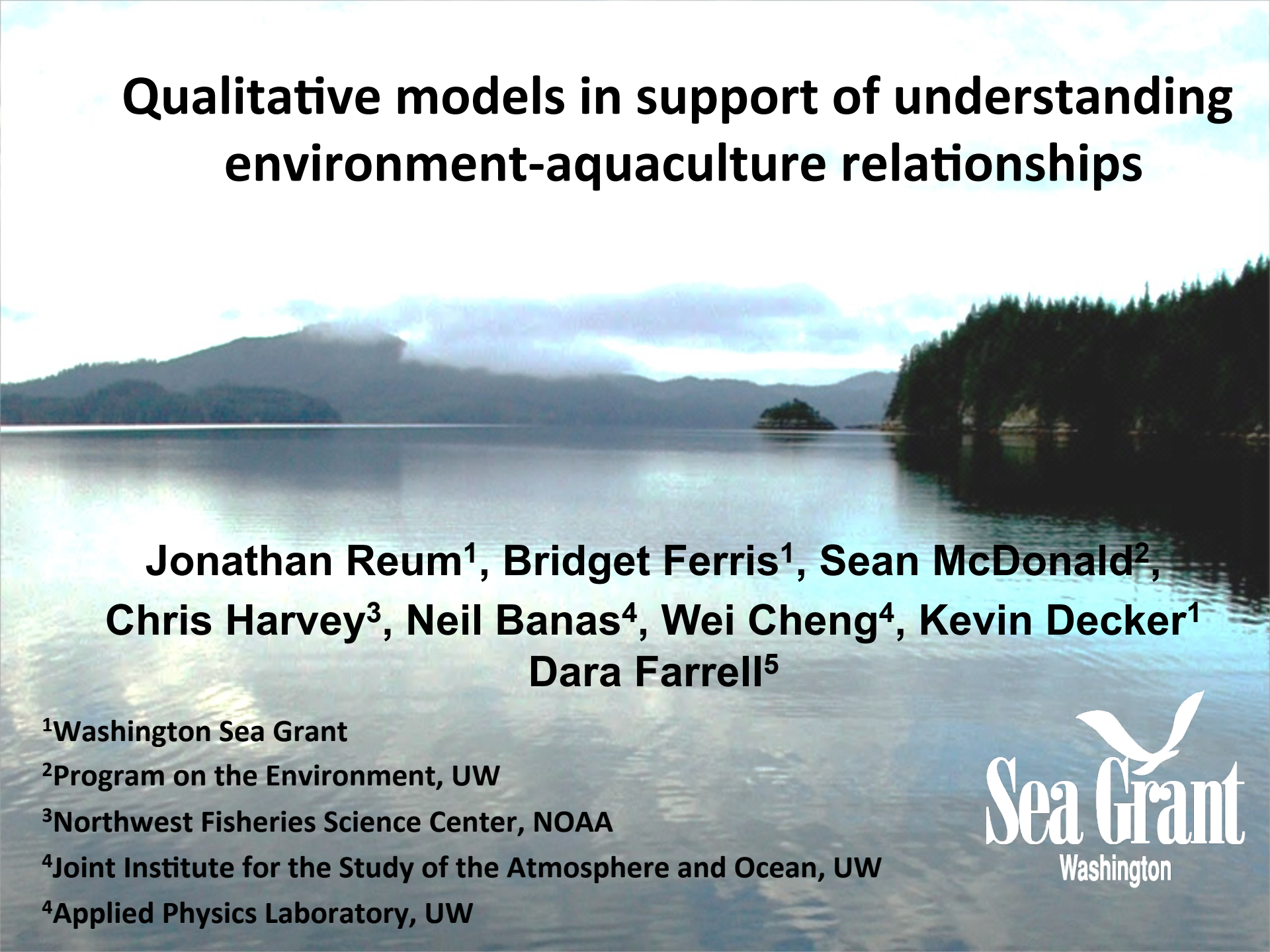
Qualitative models in support of understanding environment-aquaculture relationships



Jonathan Reum[1], Bridget Ferris[1], Sean McDonald[2], Chris Harvey[3], Neil Banas[4], Wei Cheng[4], Kevin Decker[1] Dara Farrell[5]

[1]Washington Sea Grant

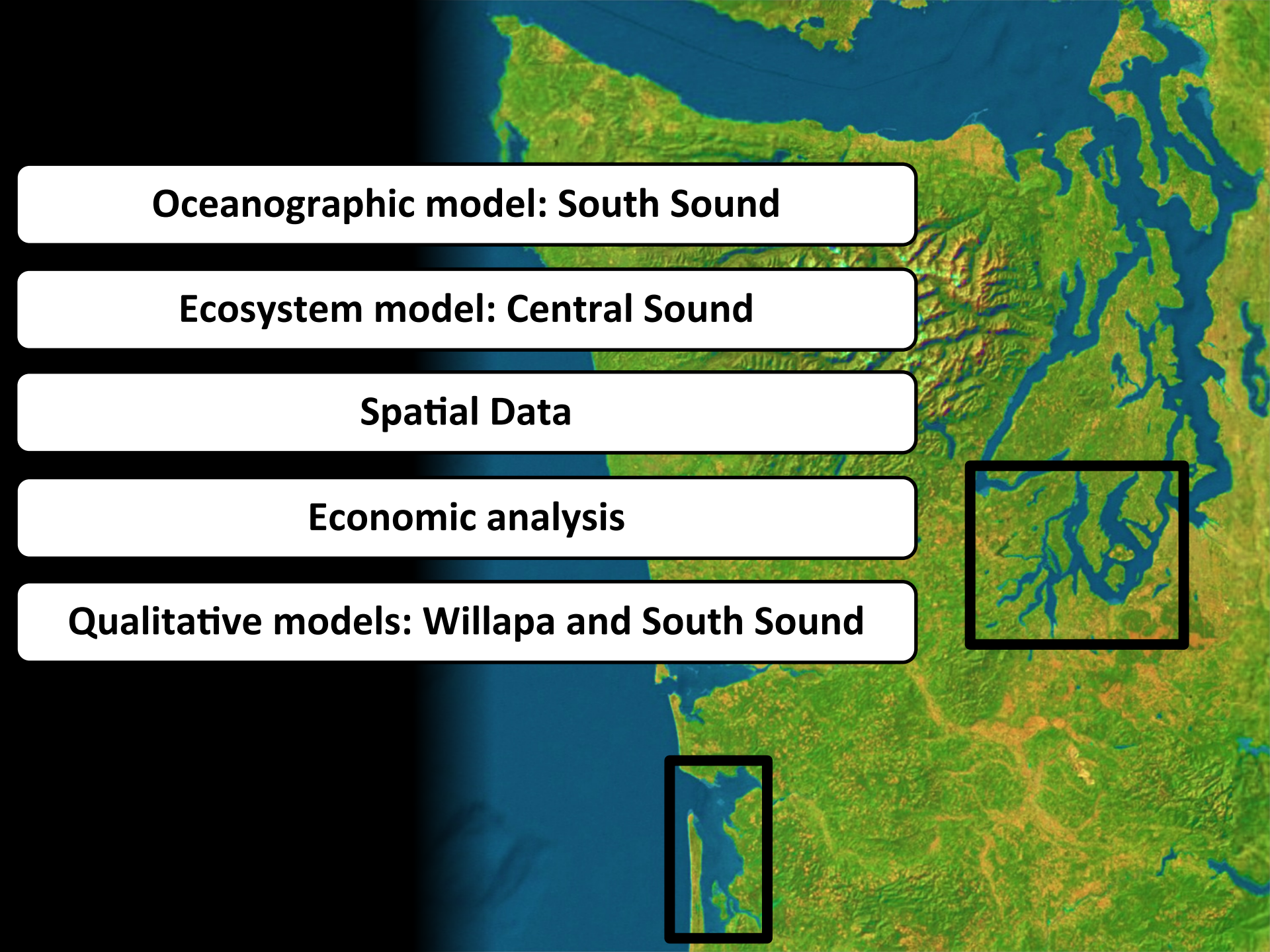
[2]Program on the Environment, UW

[3]Northwest Fisheries Science Center, NOAA

[4]Joint Institute for the Study of the Atmosphere and Ocean, UW

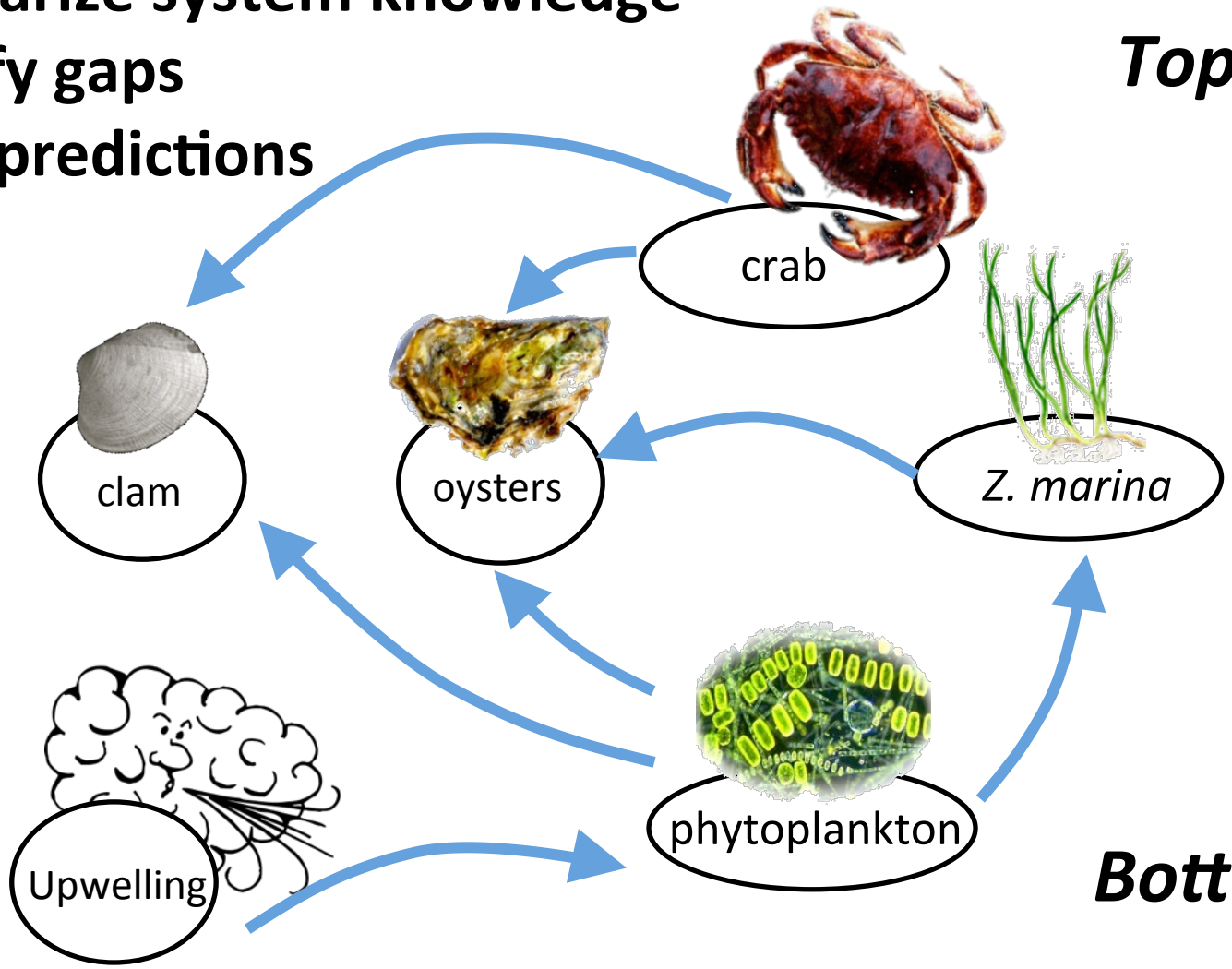
[4]Applied Physics Laboratory, UW

Sea Grant Washington

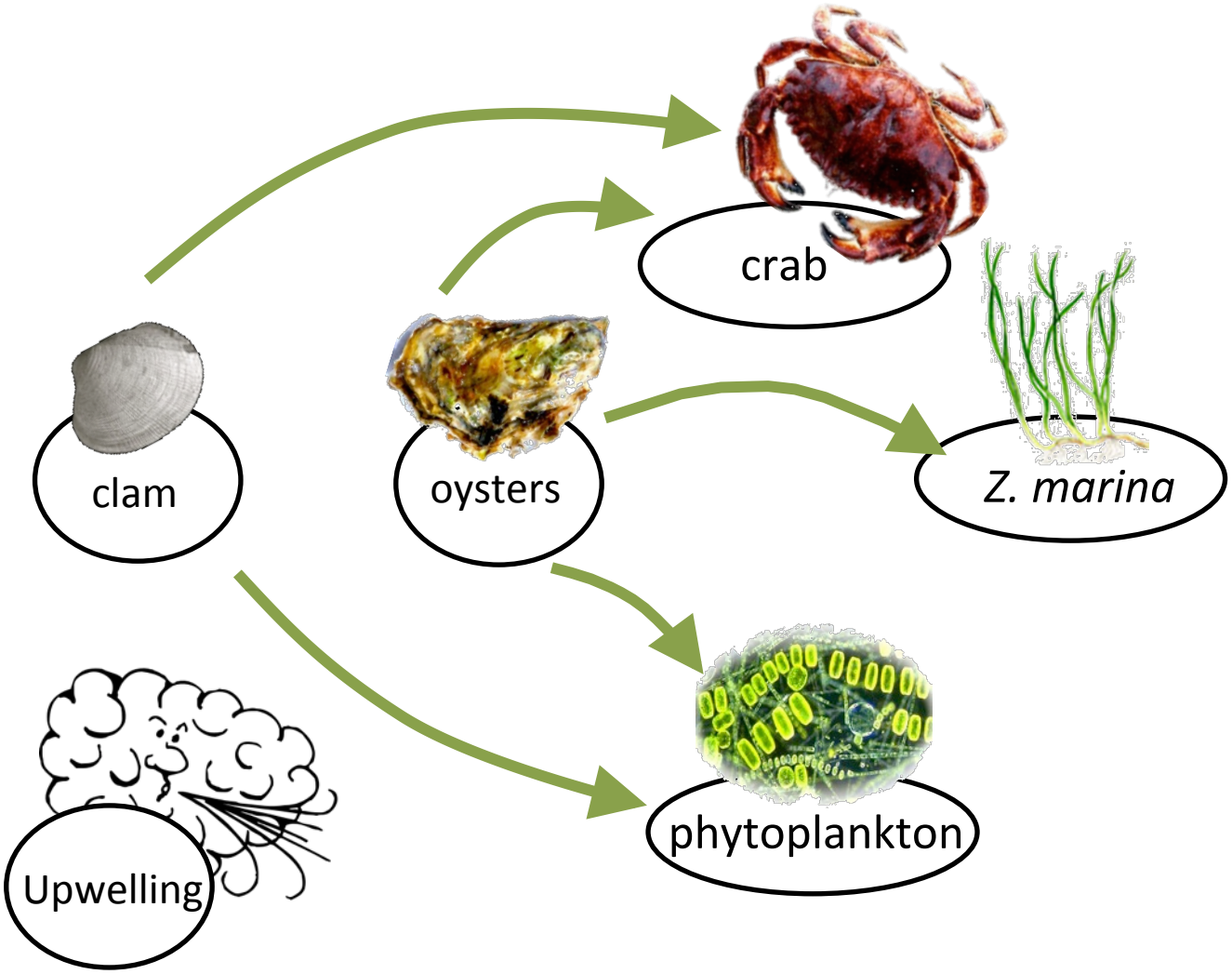

Oceanographic model: South Sound
Ecosystem model: Central Sound
Spatial Data
Economic analysis
Qualitative models: Willapa and South Sound

Qualitative Models

-Summarize system knowledge
-Identify gaps
-Make predictions



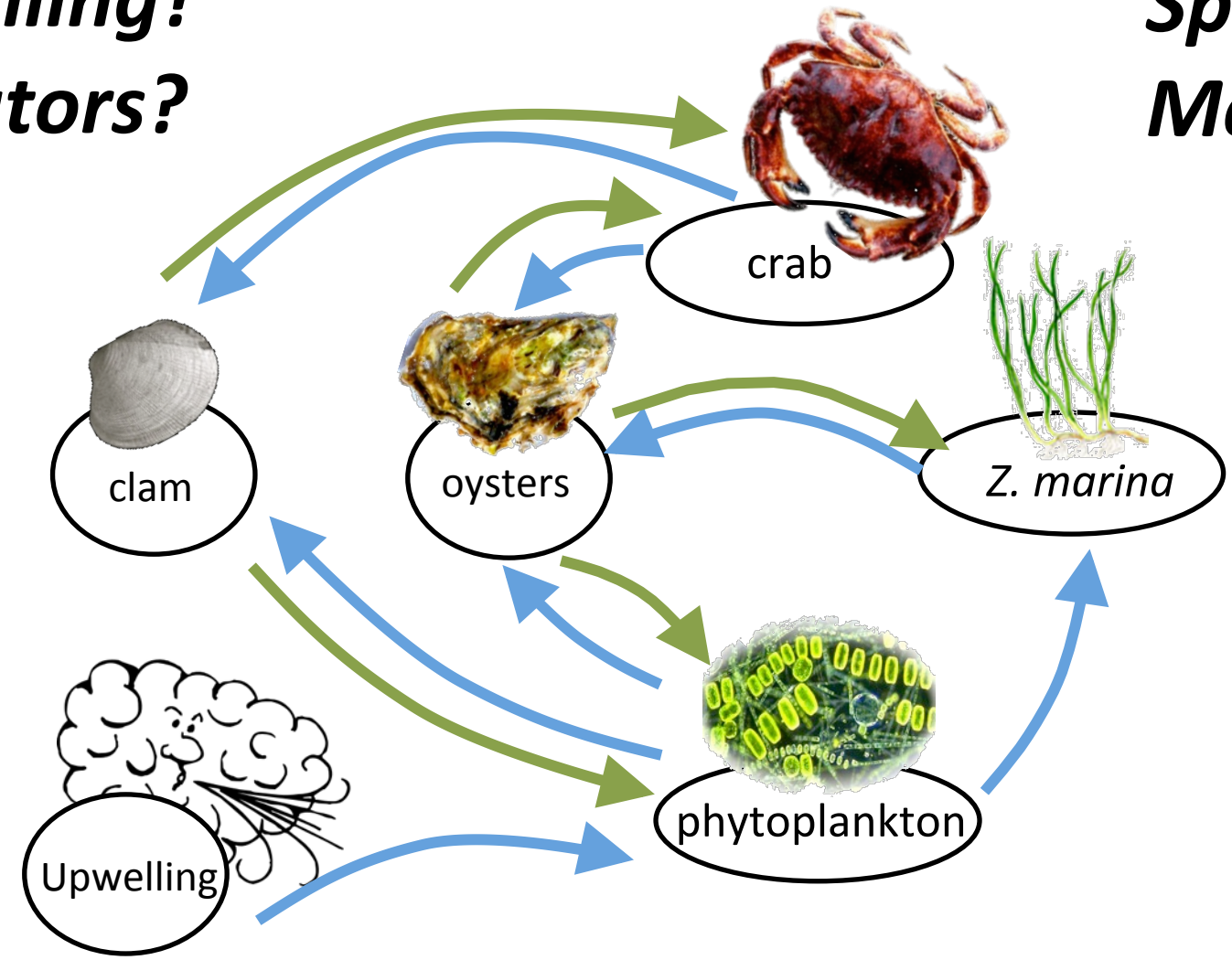
Cultured bivalves ➔ Environment



Cultured bivalves ⇄ Environment

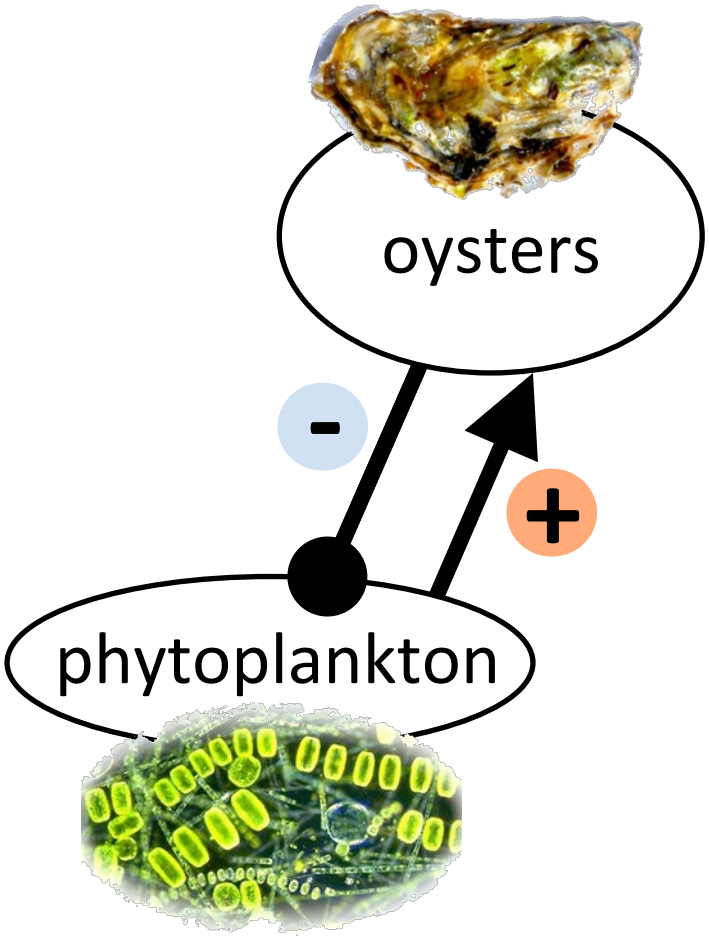
Upwelling?
Predators?

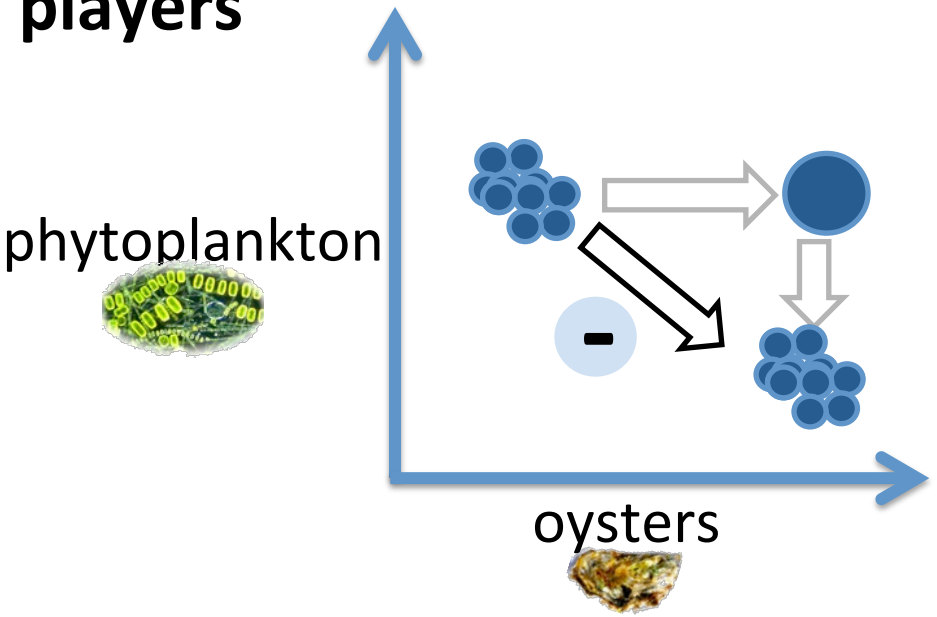
Species?
Method?

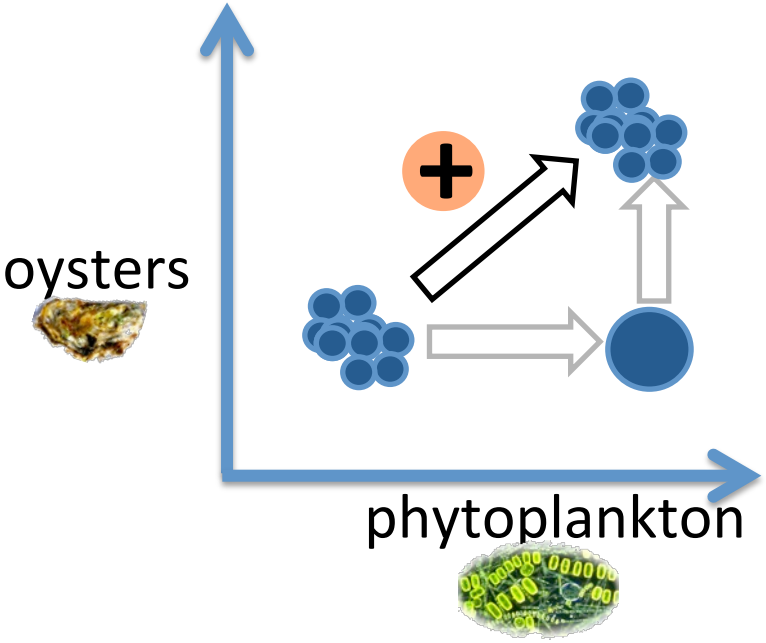


Building Qualitative Network Models:

Start with the important players

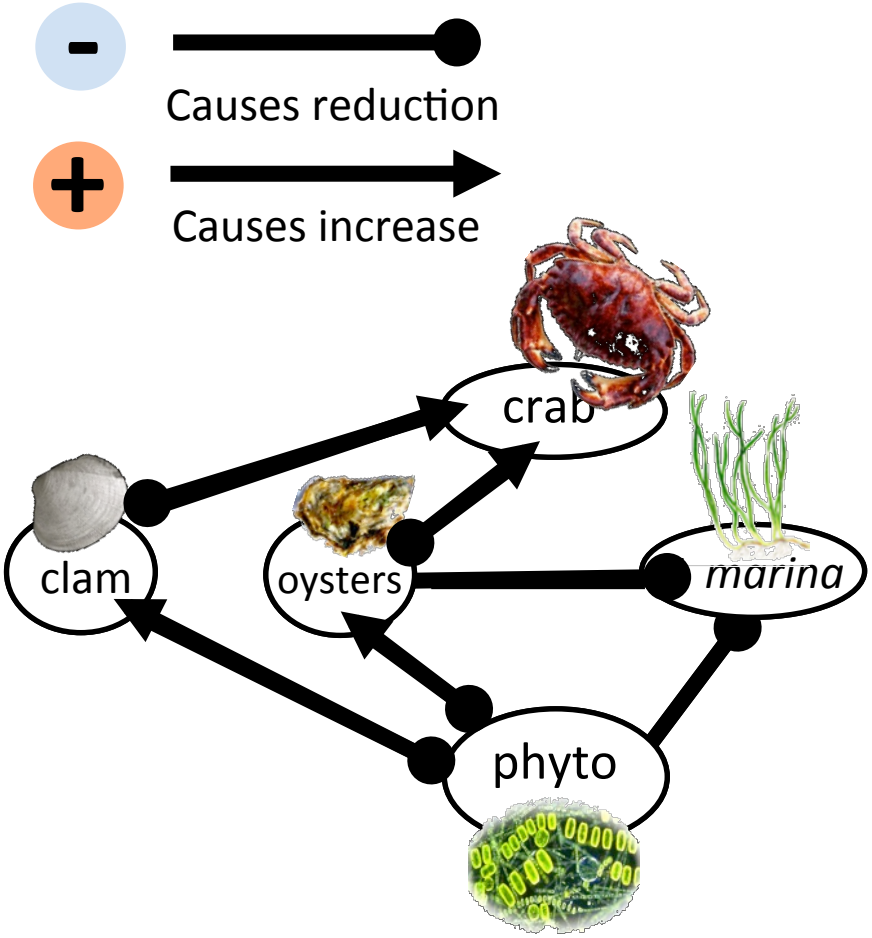


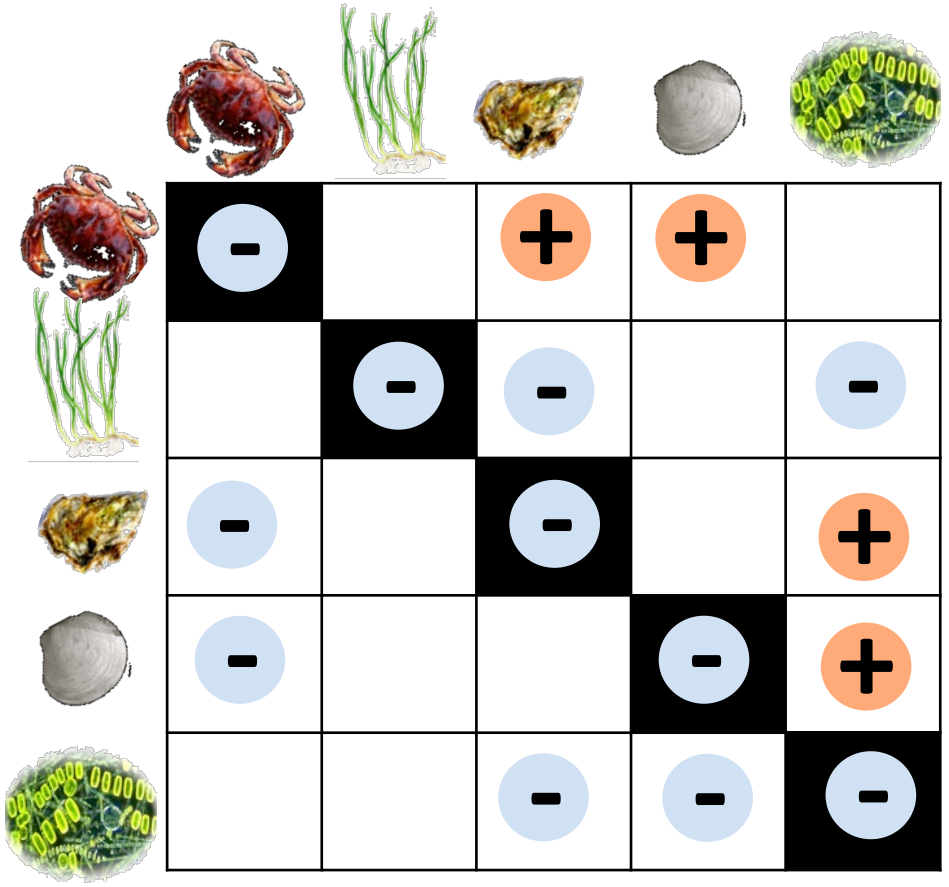




Building Qualitative Models:

Start with the important players

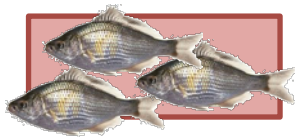




Qualitative model: Willapa Bay

Willapa Bay

Fish predators



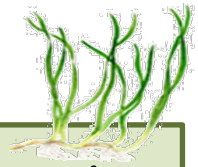
Drills

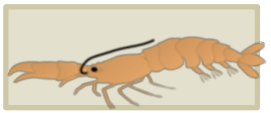
Inverts Structured

Inverts Unstructured

japonica

marina





Zooplankton

-Willapa study?

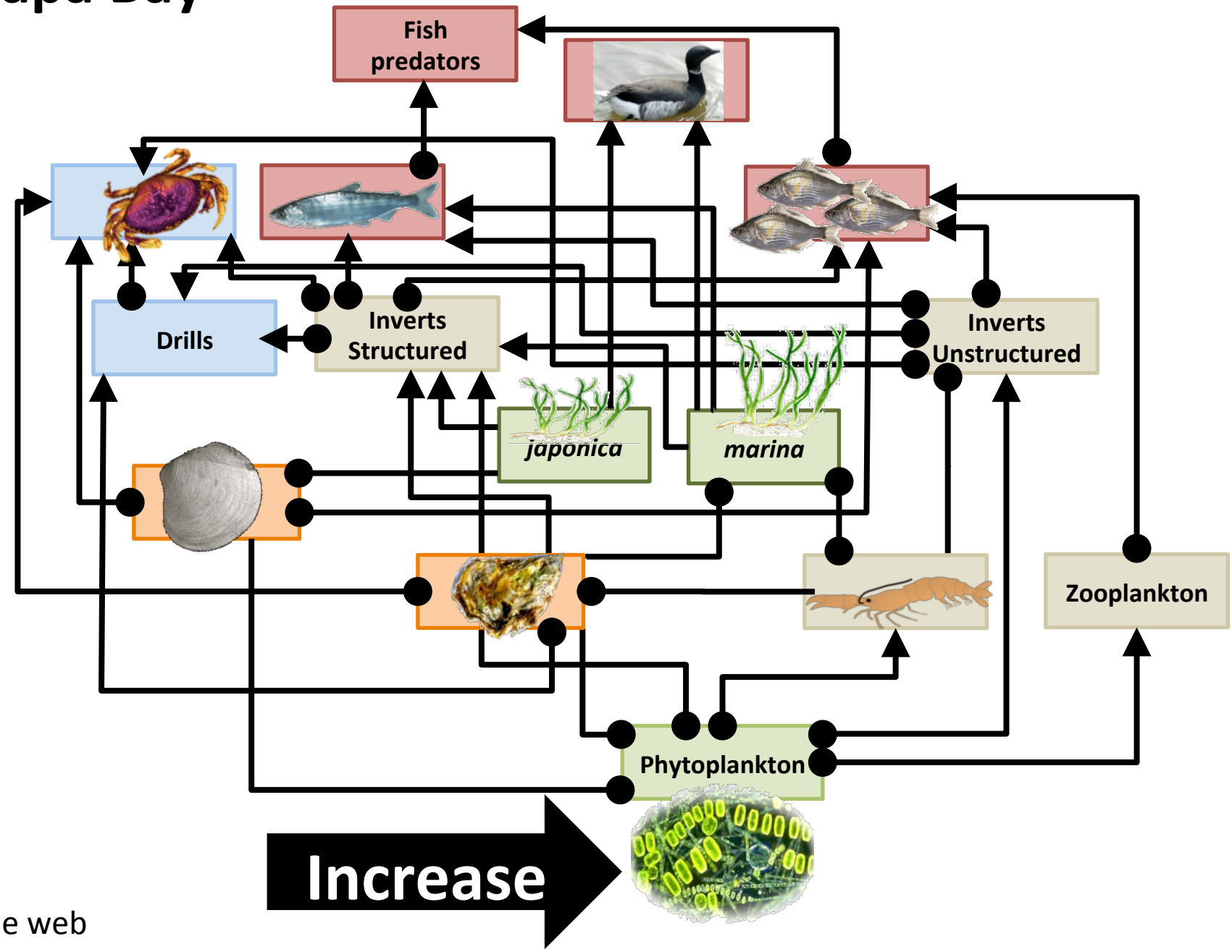
-PNW study?

-Expert knowledge?

-Ecological theory?

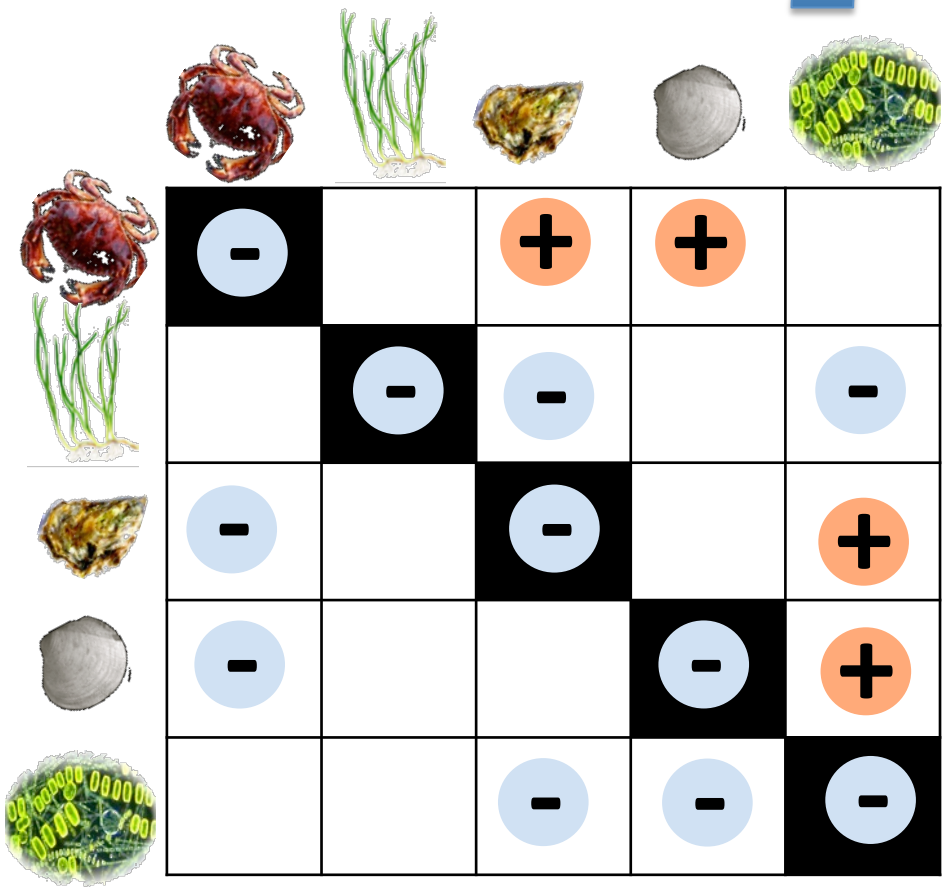
Phytoplankton

Willapa Bay



*Example web

1. Assign random interaction strengths



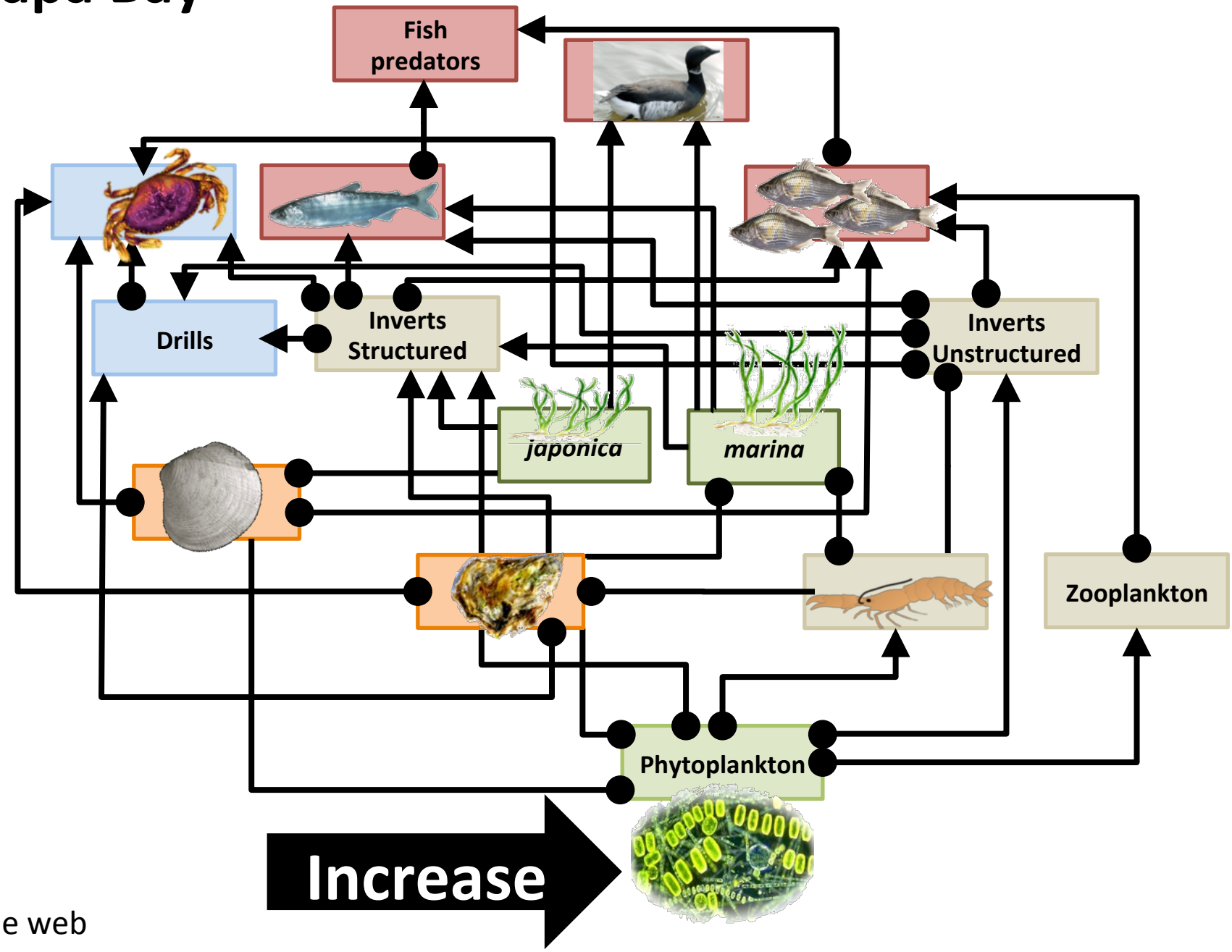
-0.20		.12	.65	
-0.30		.04	.15	
-0.97		.40	.61	
-0.30		.02	.15	
-0.20		.12	.41	
-0.90		.12	.05	
	-0.42			-.42
-.97		-0.21		.17
-.10			-.01	.07
		-.47	-.67	-.81

2. Stable?

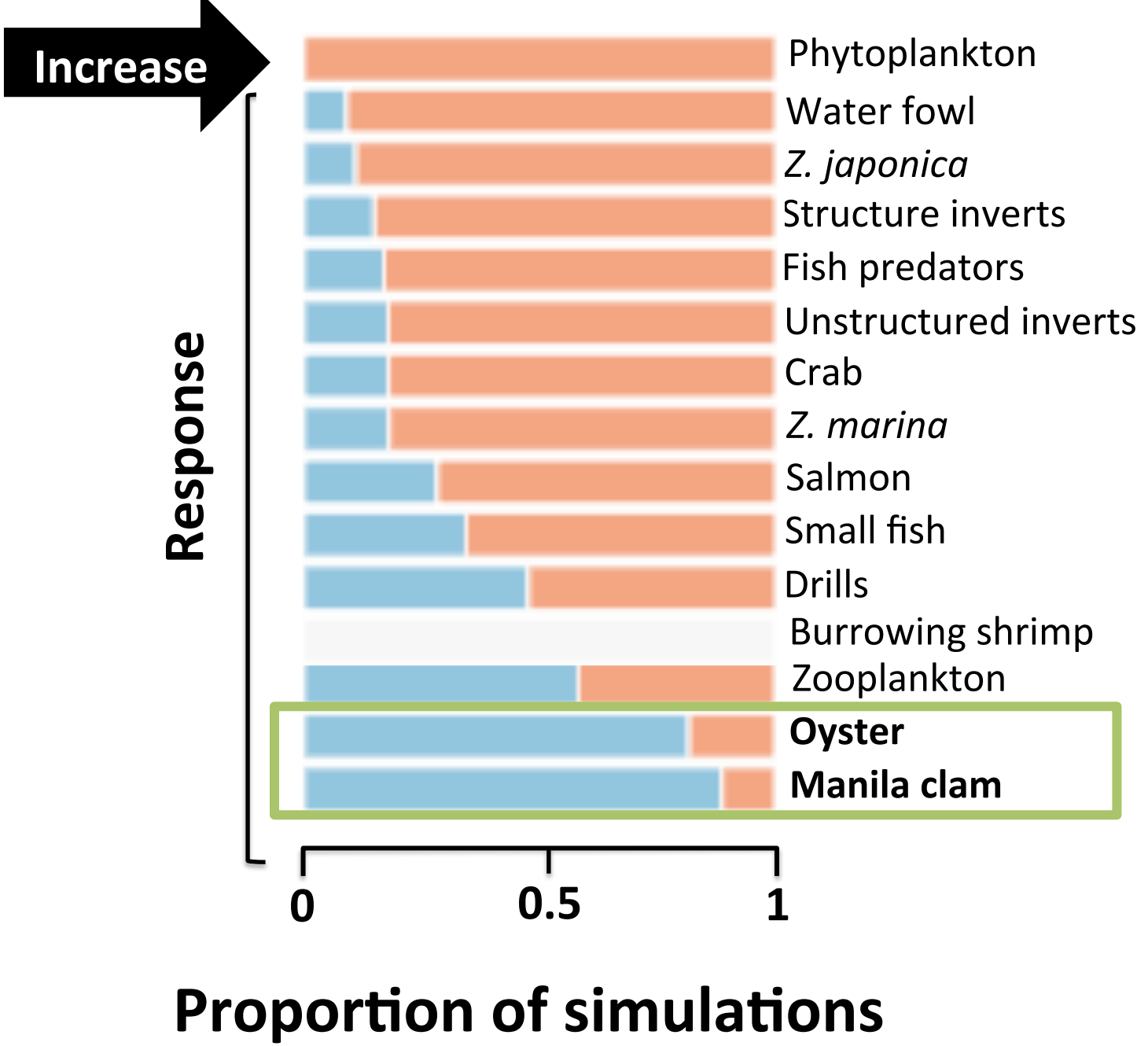
3. Calculate sign response of X to increase in Y

4. Repeat!

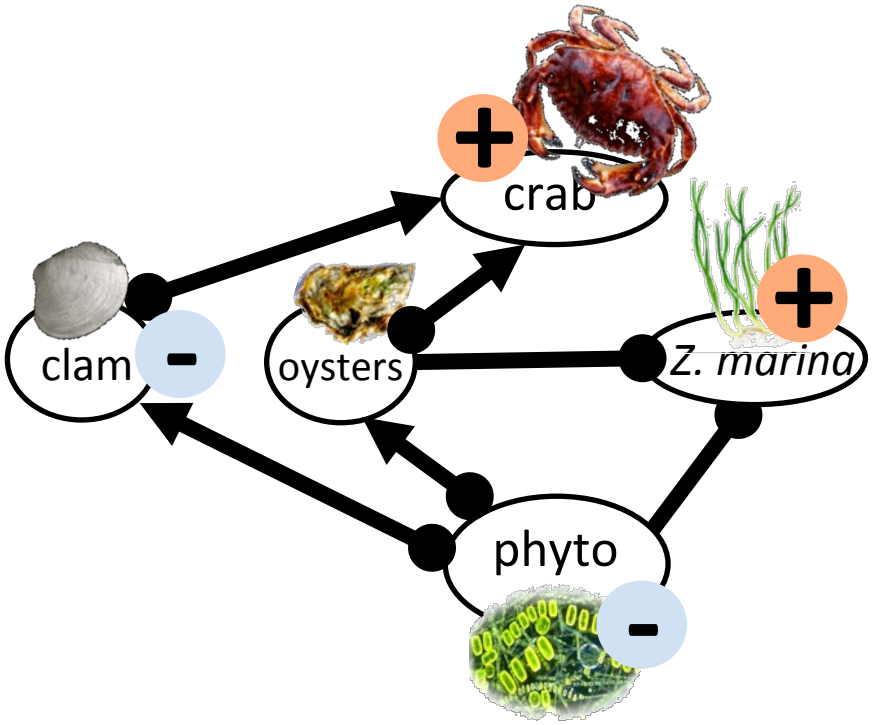
Willapa Bay



*Example web

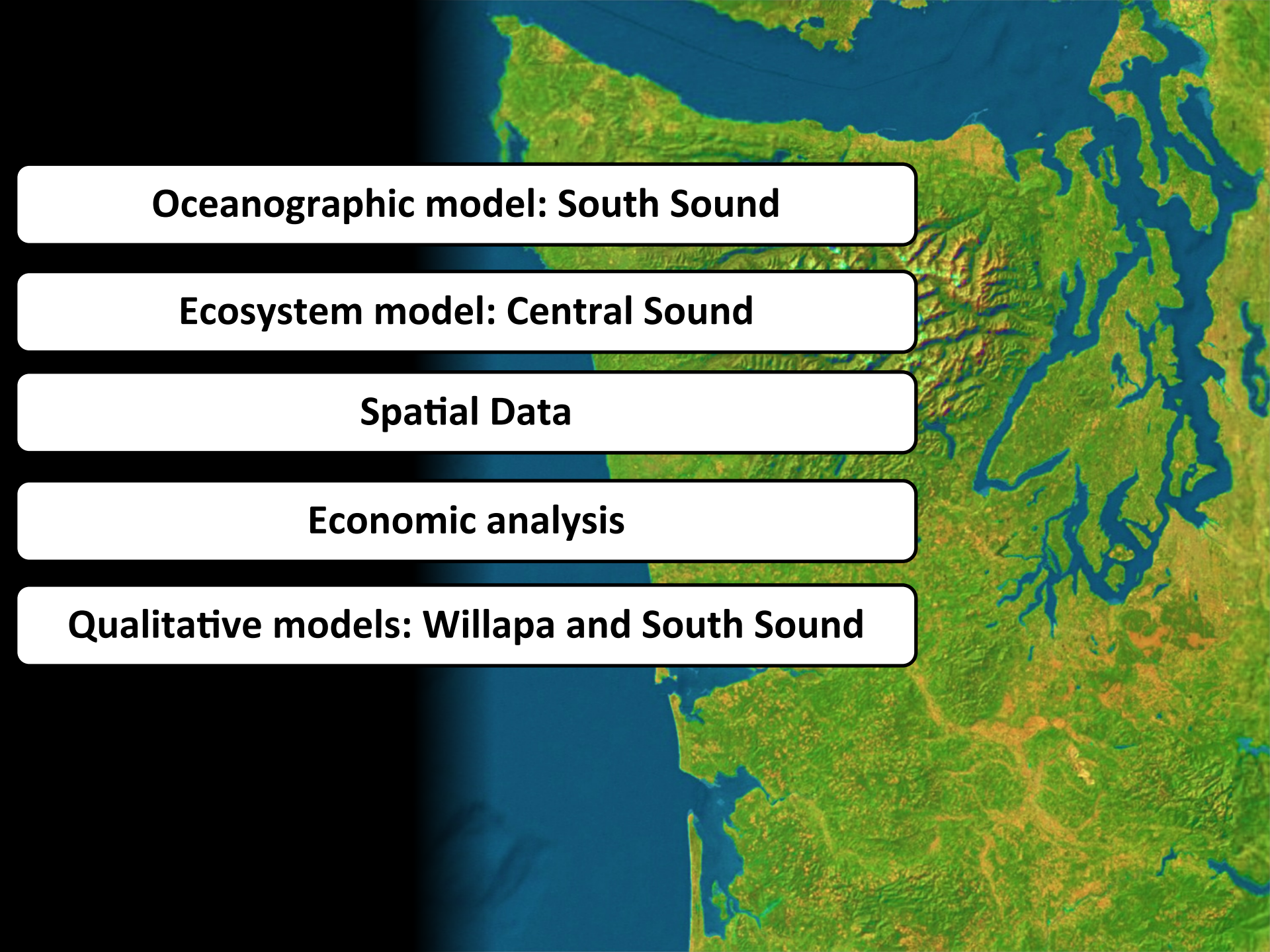


*Example predictions



- **Summarizes system knowledge**
- **Formalizes thinking**
- **Future research**
- **Ecological monitoring**
- **Qualitative predictions**

Next step… South Puget Sound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Acknowledgements

- August 28th workshop participants

- Jen Ruesink, Greg Williams, Brett Dumbauld, Tessa Francis, Phil Levin, Jessica Melbourne-Thomas, and many more.

Sea Grant
Washington