Development of socio-ecological conceptual models as the basis for an IEA framework in Southeast Alaska

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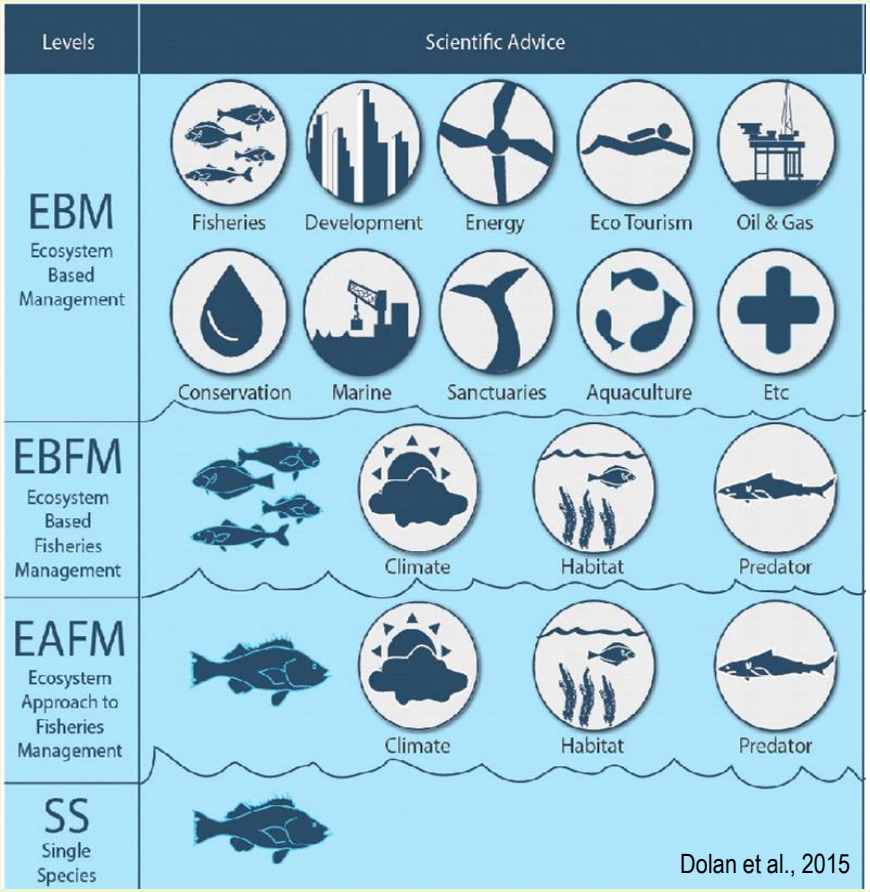
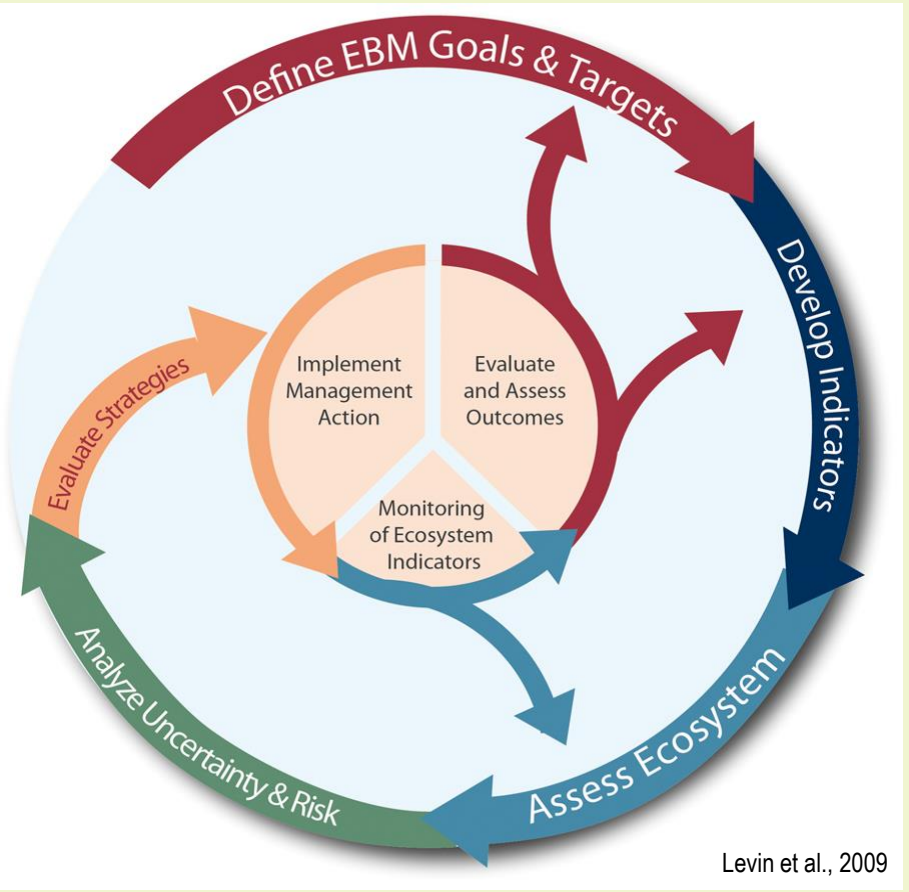
Introduction

What is an Integrated Ecosystem Assessment?

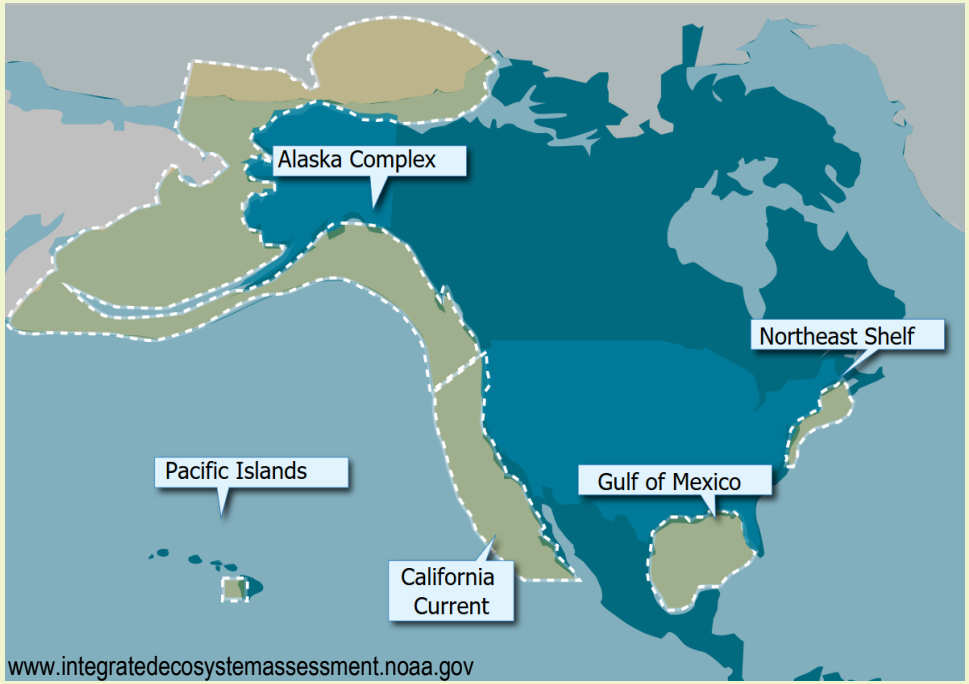


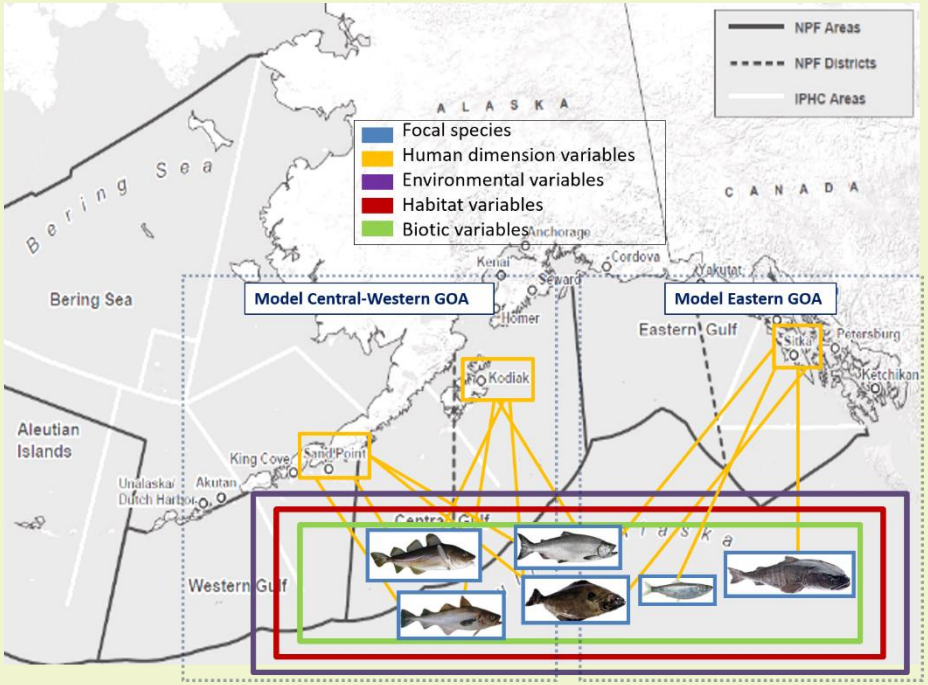
Dolan et al., 2015



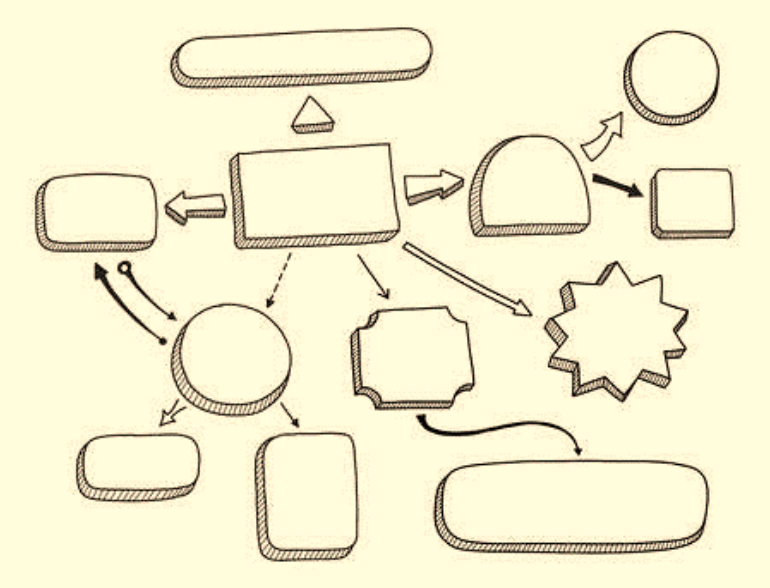
Levin et al., 2009

Regional and place-based IEAs





Conceptual models



- Essential part of the IEA loop
- Integration of social, environmental and biological components
- Identification of knowledge gaps and research needs
- Communication tool
- Incorporation of diverse types of knowledge (e.g., science and LEK)→ **Co-production of knowledge**

Objectives

- Co-production of knowledge between scientists and the community of Sitka in the development of conceptual models
  - Characterize main biological and environmental factors driving the abundance of Pacific halibut, Pacific herring, Chinook salmon and sablefish
  - Determine community well-being components associated with these fisheries

Methods

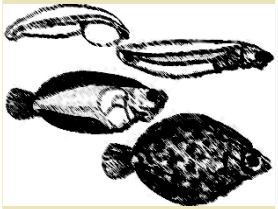
Study site and species selection

Building conceptual models

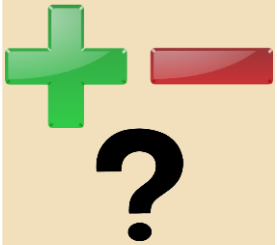
- Synthesizing available scientific information

Halibut

Fresh water input



Halibut larvae

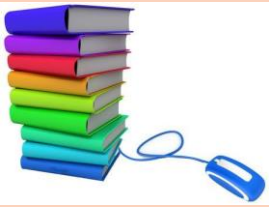


Positive

Alongshore transport enhanced

Micronutrients supplied from river discharge

High levels of chlorophyll-a



Stabeno et al., 2004

Etherington et al., 2007

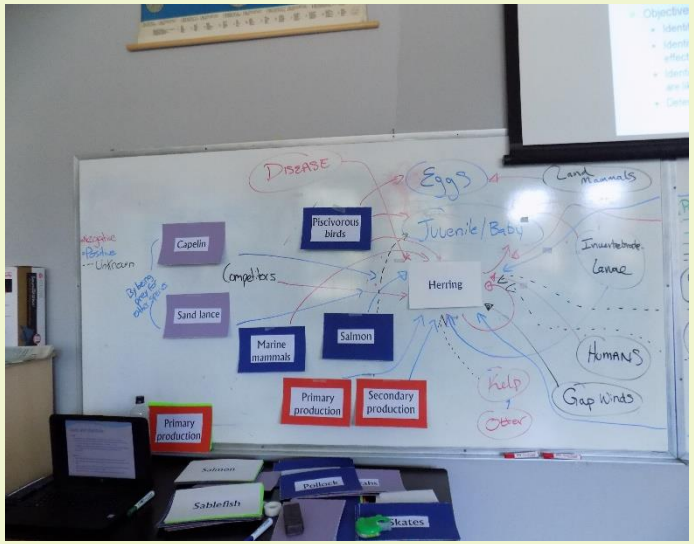
Bailey et al., 2008

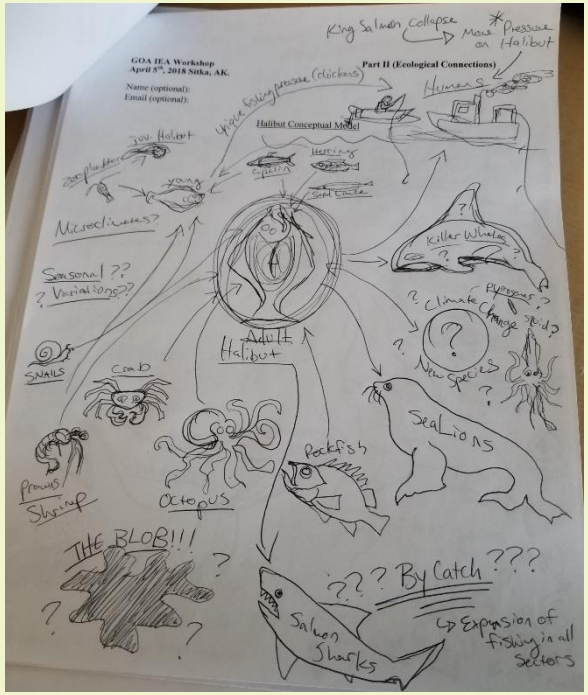
Doyle et al., 2009

Arimitsu et al., 2016

Building conceptual models

- Sitka focus groups





Ecological connections

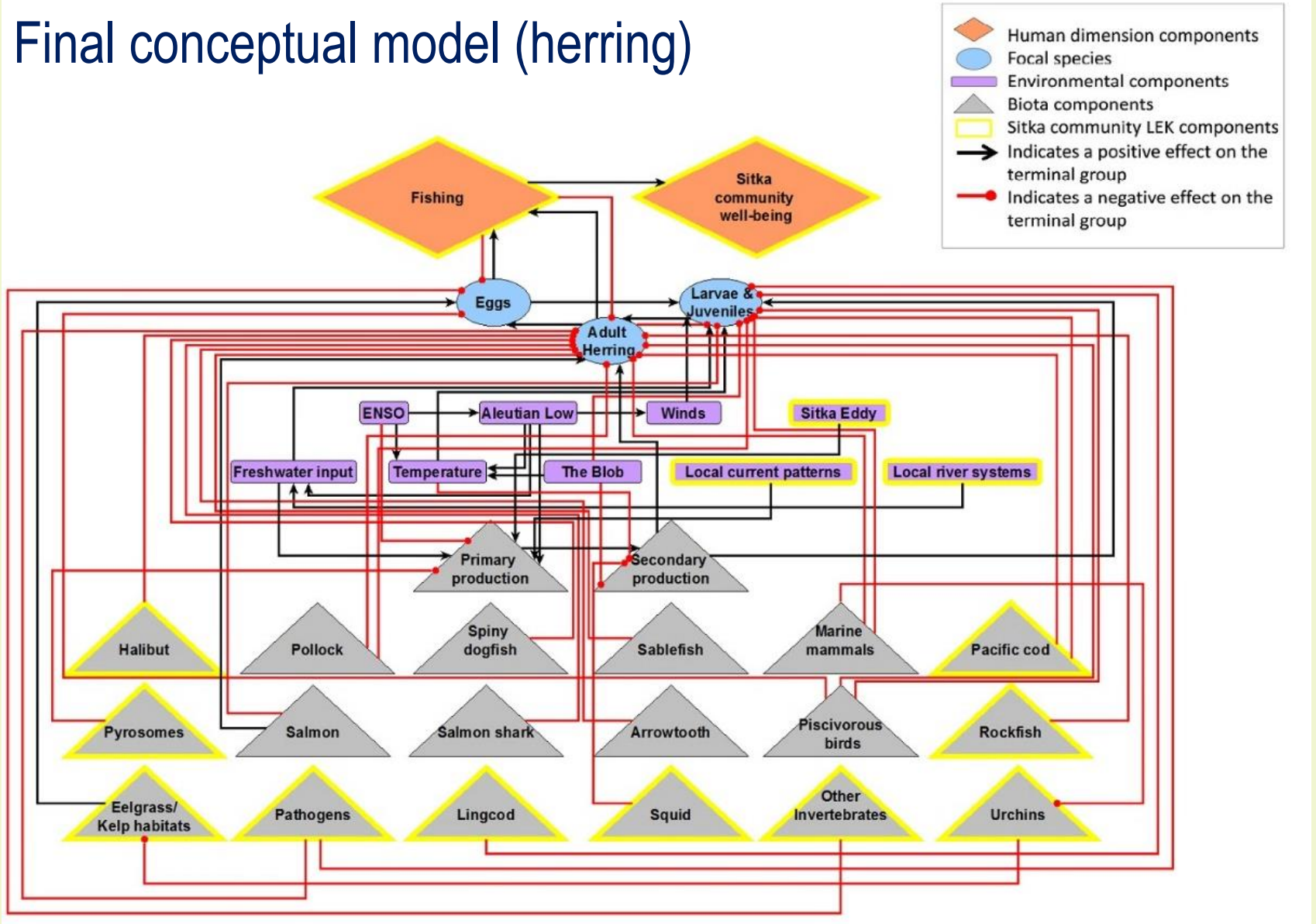
- Environmental variables
- Prey, predators and competitors

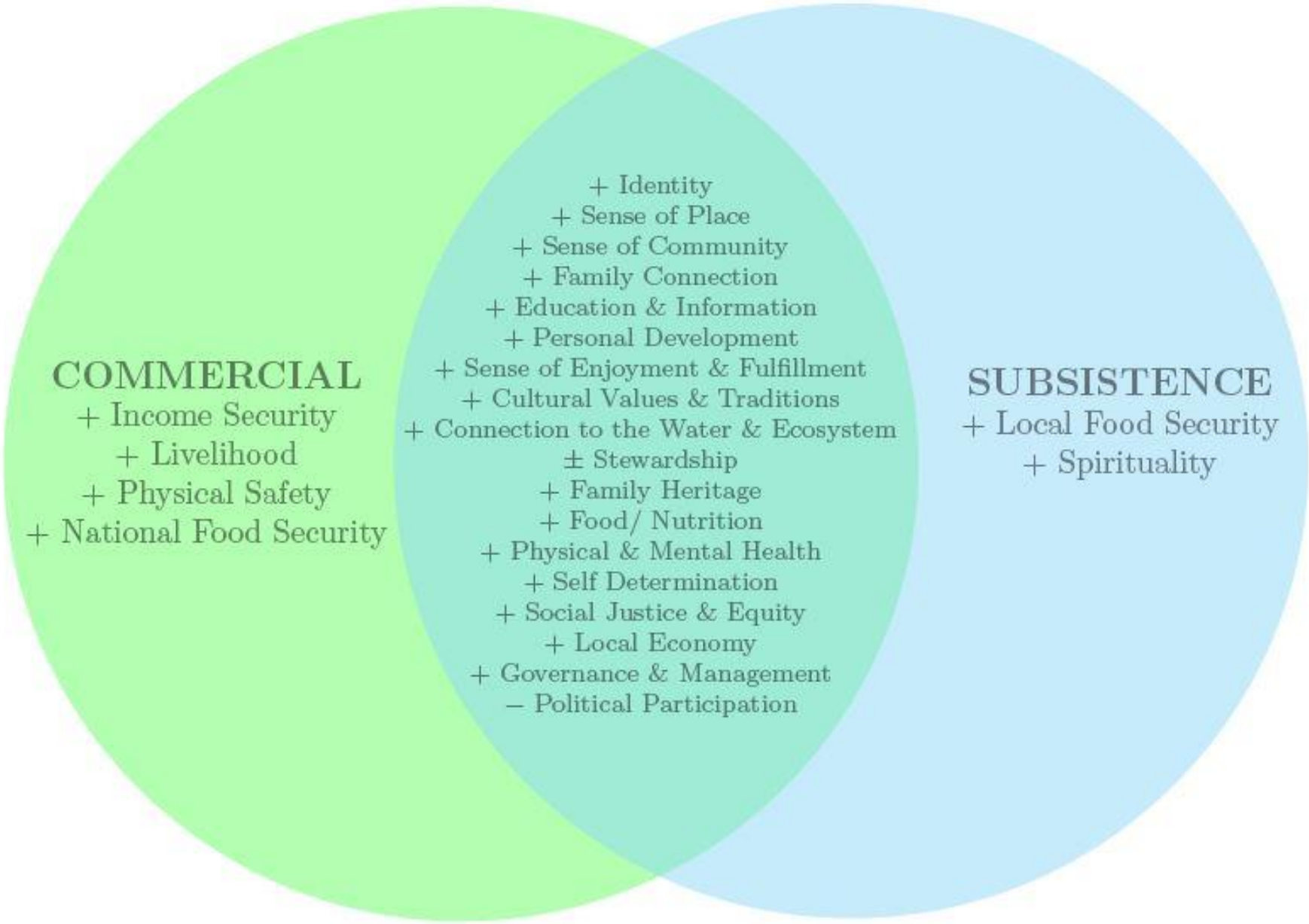
Human dimensions

- Resident's capacity to derive well-being from fisheries

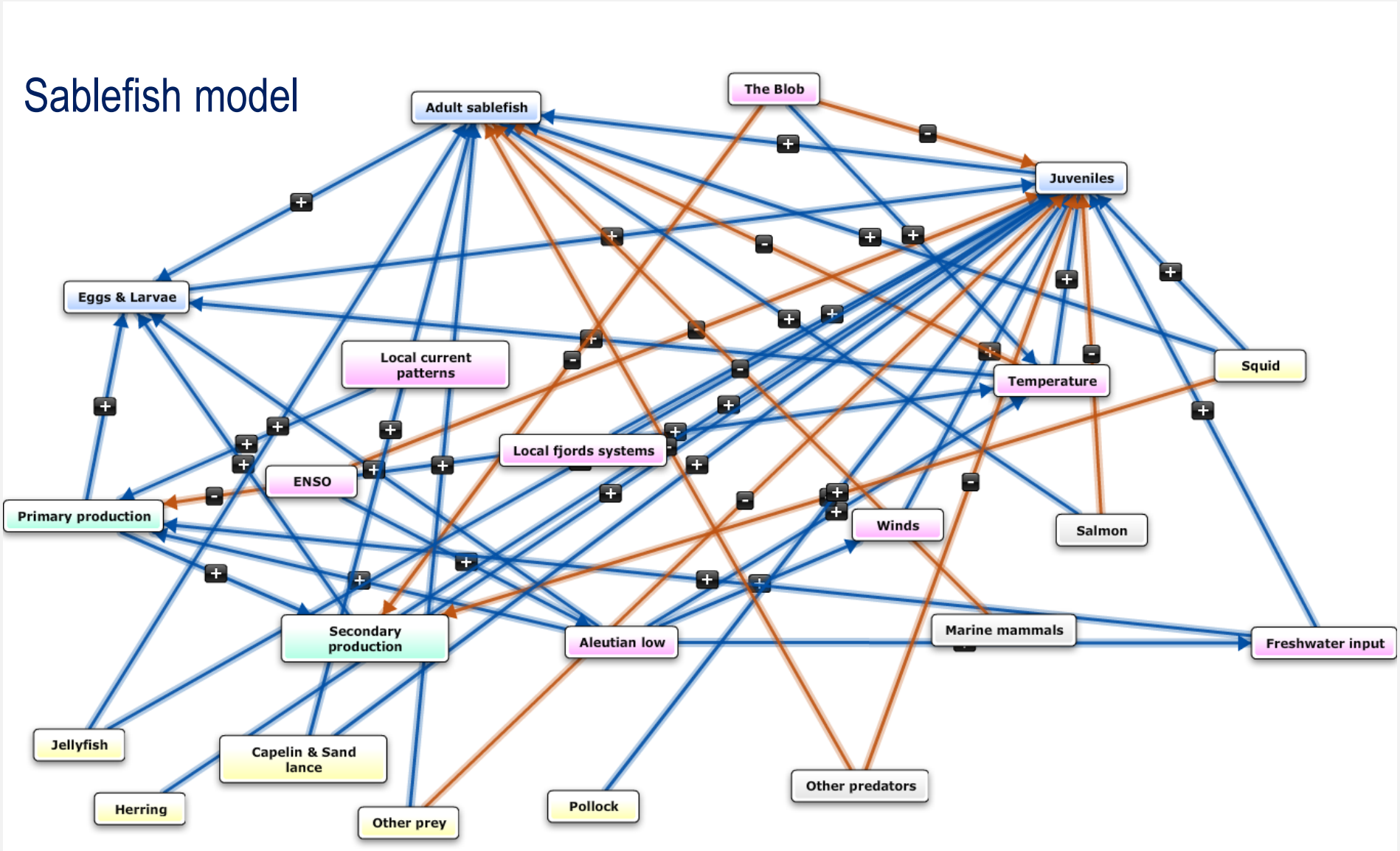
Results and Discussion

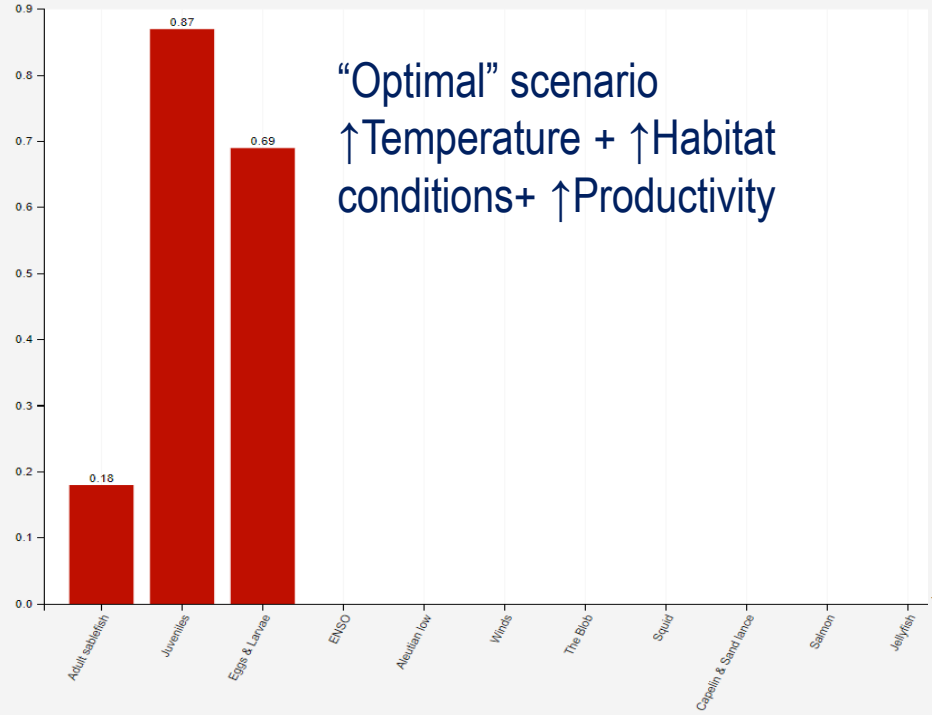
Final conceptual model (herring)



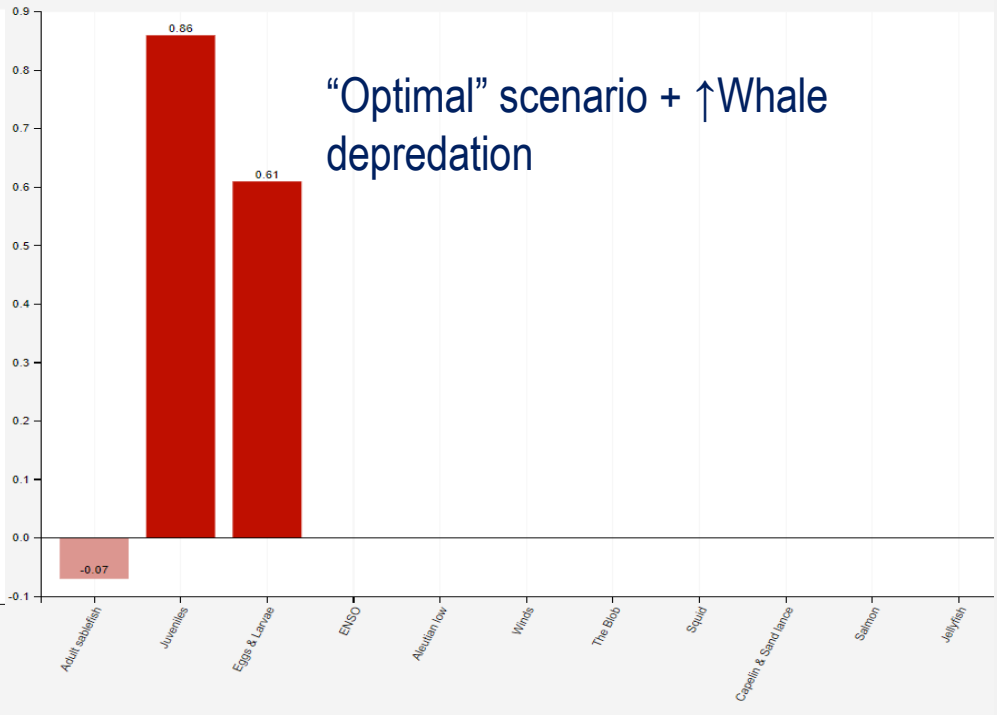

COMMERCIAL
+ Income Security
+ Livelihood
+ Physical Safety
+ National Food Security
+ Identity
+ Sense of Place
+ Sense of Community
+ Family Connection
+ Education & Information
+ Personal Development
+ Sense of Enjoyment & Fulfillment
+ Cultural Values & Traditions
+ Connection to the Water & Ecosystem
± Stewardship
+ Family Heritage
+ Food/ Nutrition
+ Physical & Mental Health
+ Self Determination
+ Social Justice & Equity
+ Local Economy
+ Governance & Management
− Political Participation
SUBSISTENCE
+ Local Food Security
+ Spirituality

Operationalizing conceptual models (Qualitative modeling)

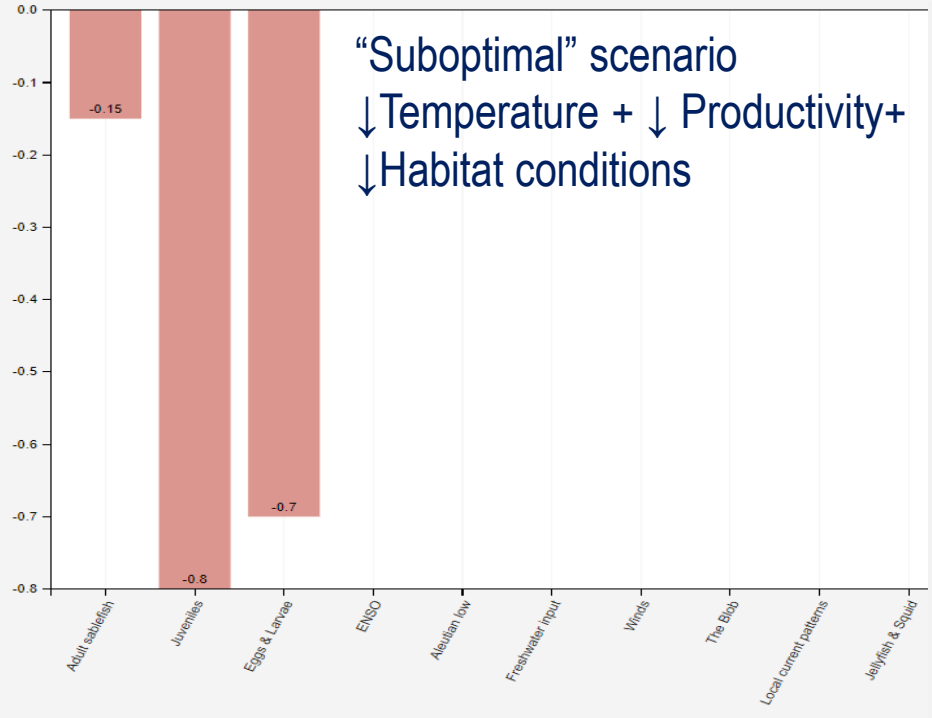




"Optimal" scenario
↑Temperature + ↑Habitat conditions+ ↑Productivity



"Optimal" scenario + ↑Whale depredation



"Suboptimal" scenario
↓Temperature + ↓ Productivity+ ↓Habitat conditions

Inference #1: Increased recruits under the optimal scenario. "Damped" positive effect on adult abundance

Inference #2: Whale depredation might drive the adult abundance down under an optimal scenario

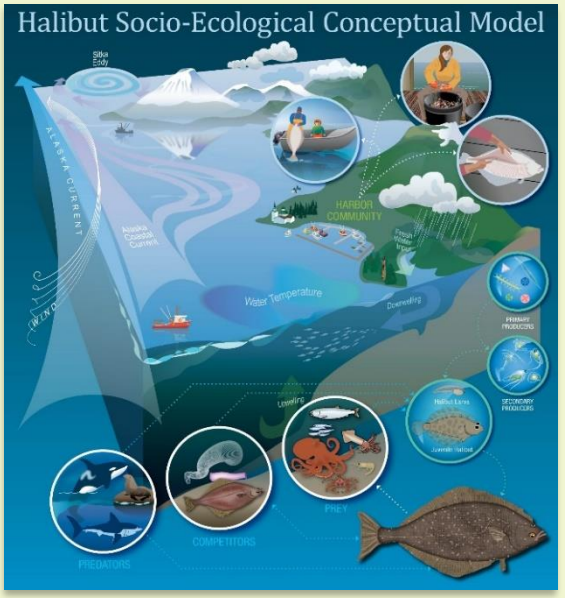
Inference #3: A suboptimal scenario results in declines for both juvenile and adult sablefish

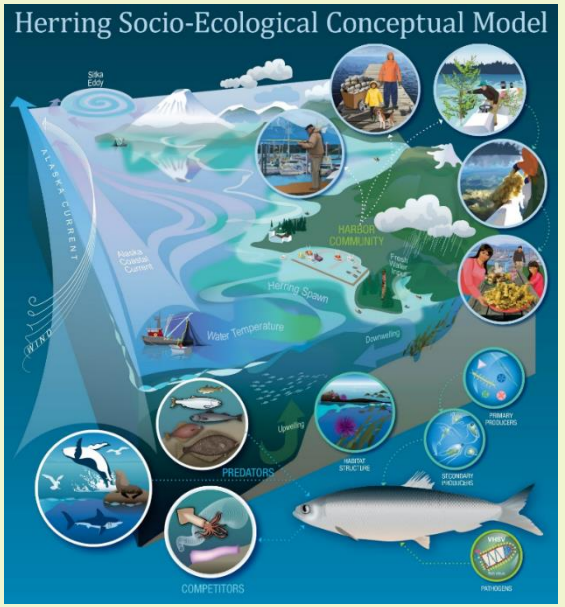
Other research questions to address:
How smaller size classes impact fishermen →
Avoidance behaviors
e.g., Targeting other species

Conclusion

"Placed-based participatory IEA"

- Sitka is a unique fishing community
- Sitka stakeholders have a deep understanding of their local ecosystem
- Conceptual models captured and integrated LEK
- Incorporation of LEK into science needed to achieve sustainable, effective, and equitable management of fisheries
- More informed and empowered community in relation to their local ecosystem and resources
- Operationalizing conceptual models allow an understanding of how different components of the model respond to a particular perturbation
- Long-term goal: Incorporate socio-ecological distinctive regions of GOA into one unifying IEA framework





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Tusen takk