# Identifying relevant spatial scales and priorities for ecosystem-based management in the Gulf of Mexico

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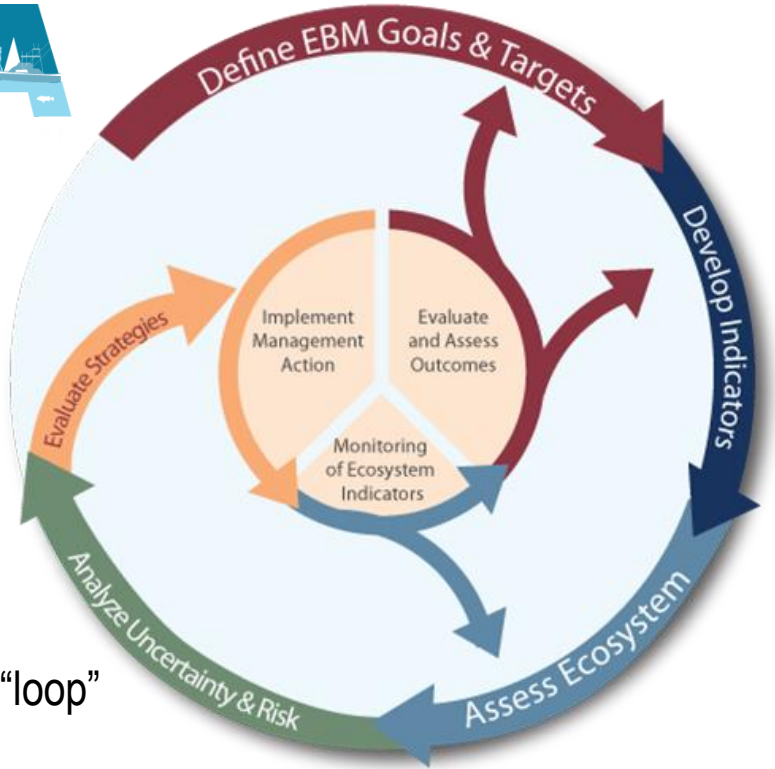
# Challenge #1: How do we effectively engage?




The IEA "loop"

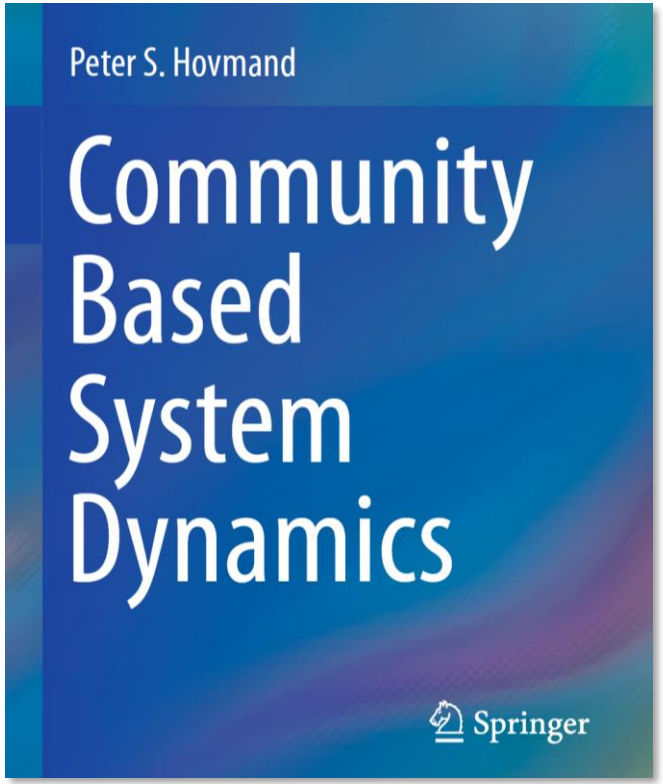
# Challenge #2: What *is* EBM and where do we start?

## Gulf of Mexico Integrated Ecosystem Assessment Program

### Mission:

Balancing the needs of nature and society through integrated science for current and future generations in the Gulf of Mexico

# Participatory system dynamics modeling



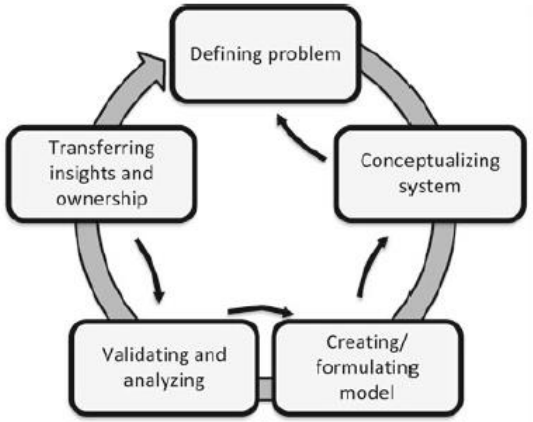




Fig. 1.5 Overview of the modeling process (Hovmand 2014)

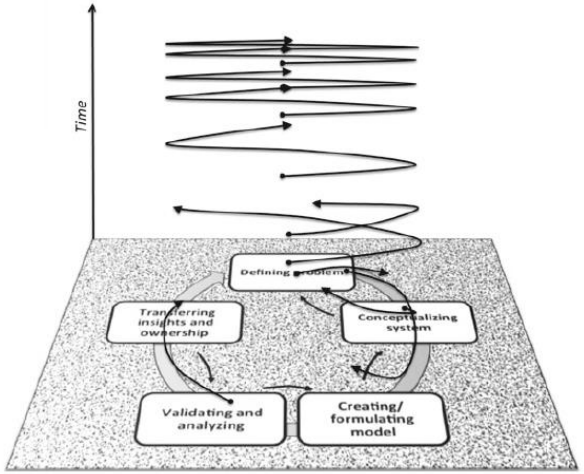
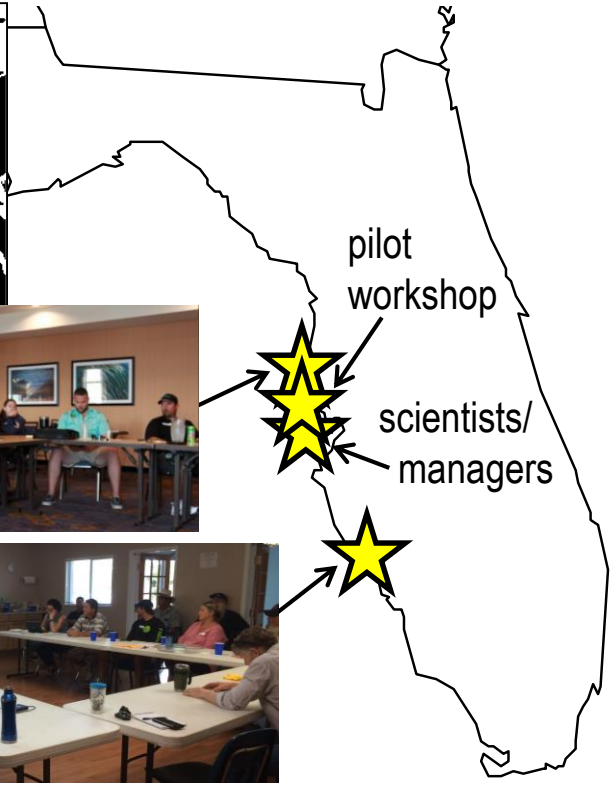


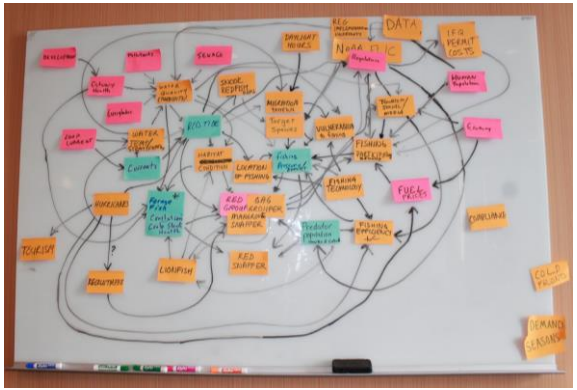

Fig. 1.6 Overview of multiple projects in a community in CBSD (Hovmand 2014)

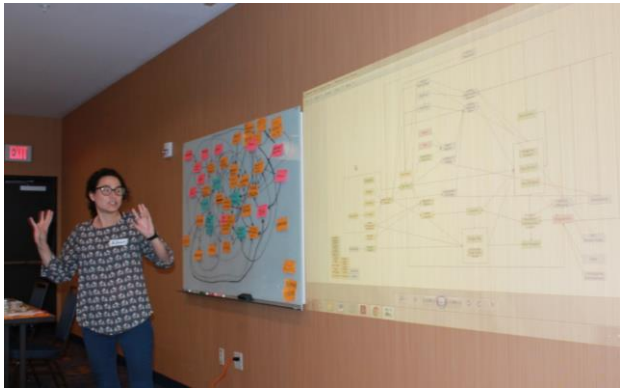
# Initial focus: West Florida snapper-grouper fishery

**Goal:** To increase information flow between scientists, managers, and stakeholders, in support of improved stock assessment and ecosystem assessment in the Gulf of Mexico.

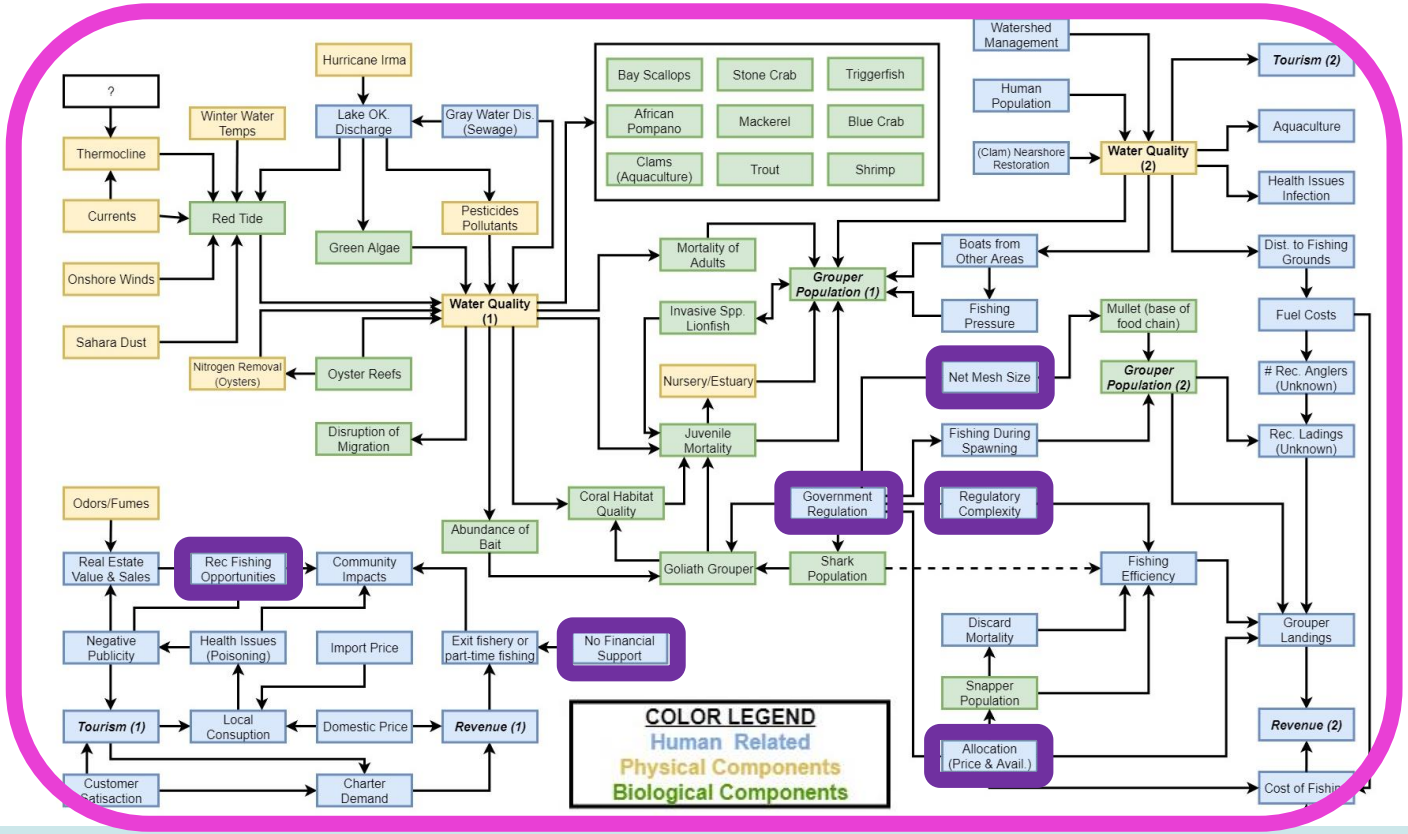


# Participatory fisheries system modeling process





# Participatory fisheries system model



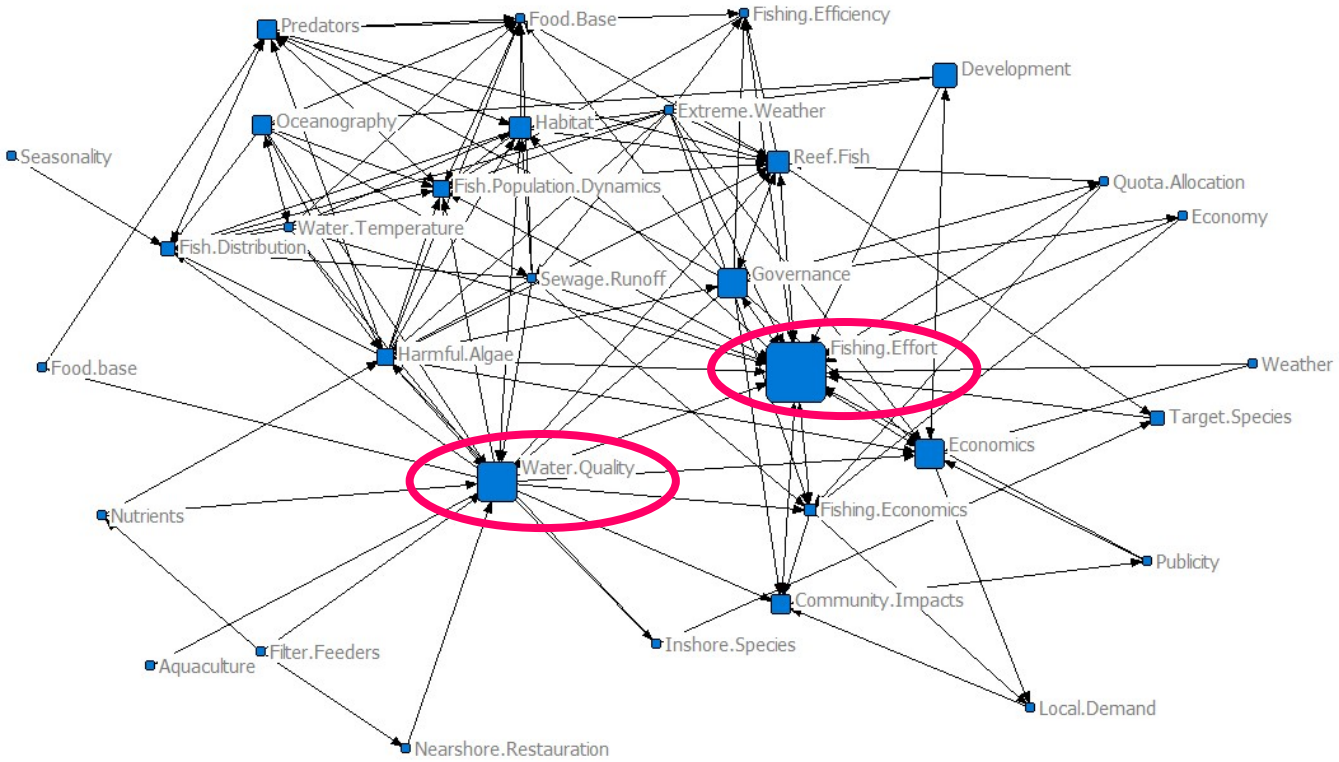

## Forces controlled by fishery management

## Forces that affect the fisheries

# Network analysis: which factors are influential?

Nodes sized by betweenness centrality

- have considerable influence within a network, high number of pass-through linkages



# Water quality / red tide most influential node

Red tide perceived to negatively affect:

- Prey base
- Habitat
- Tourism
- Aquaculture
- Demand for the recreational sector
- Demand for local seafood
- Restaurant industry
- Real estate
- Human health

## RESEARCH AND RESPONSE PLAN

**DOCUMENT IMPACTS**

- FISH & FISHING COMMUNITIES

**UNDERSTAND**

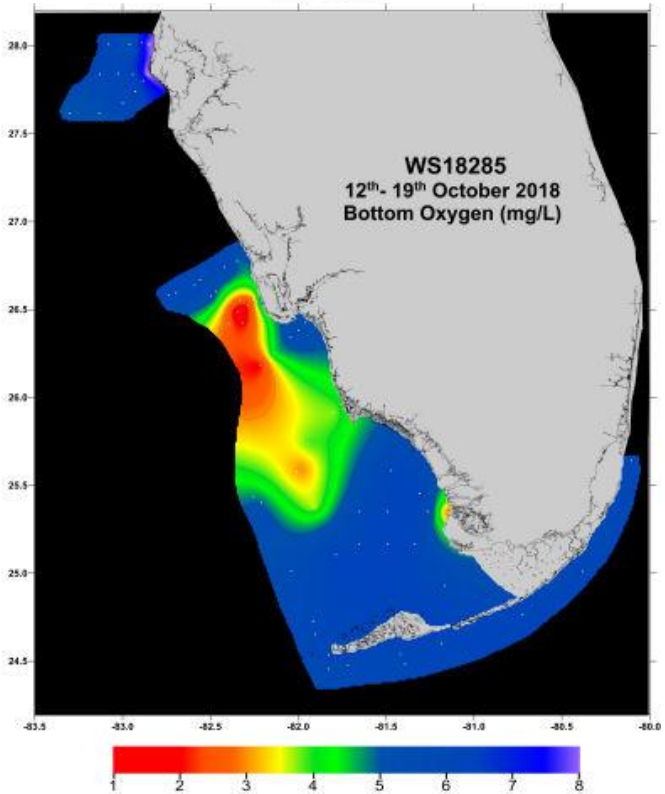
- BLOOM ECOLOGY

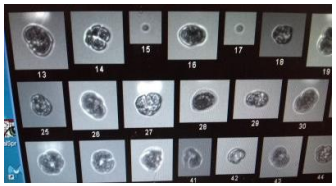
**LEARN & PREPARE**

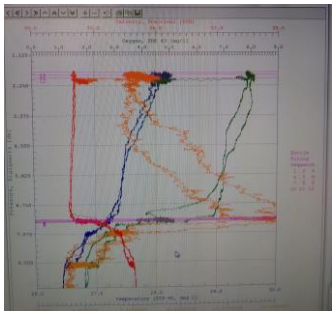
- FUTURE RED TIDE EVENTS

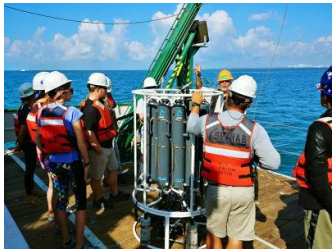
# Red tide response cruise – October 2018

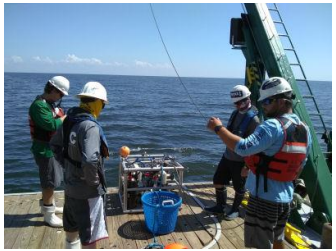
Leveraged collaborations with other federal and state agencies, universities, and private institutions to fill identified information gaps within conceptual model



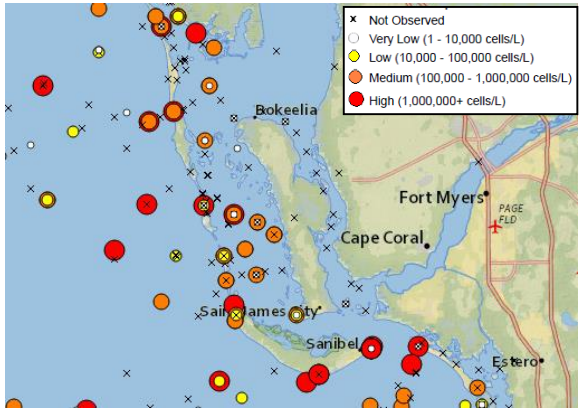


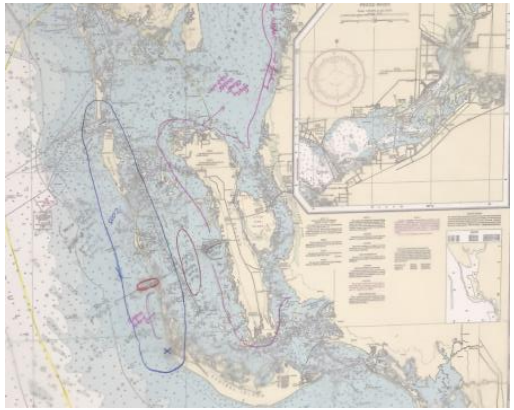




# Red tide local ecological knowledge initiative

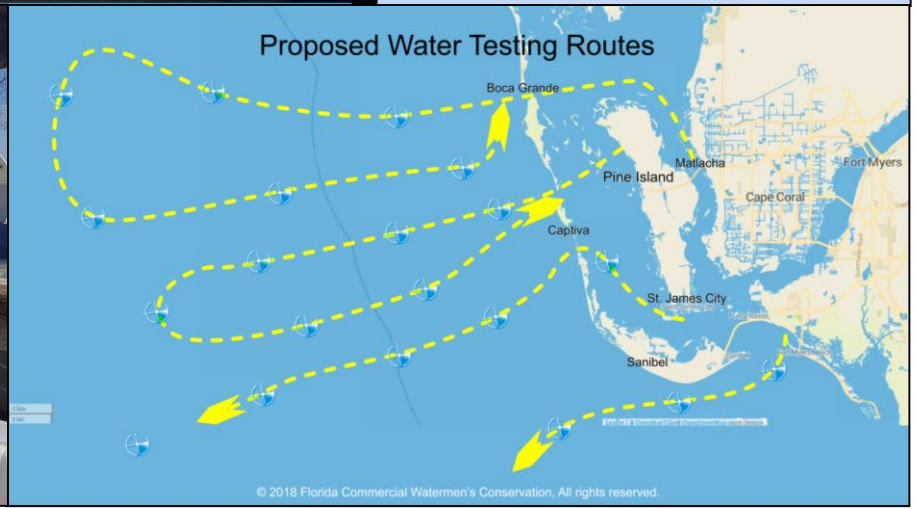
- Document red tide locations, frequency and severity over time and space
- Document impacts on ecosystem
- Identify stakeholder-driven hypotheses on bloom ecology
- Document adaptation strategies



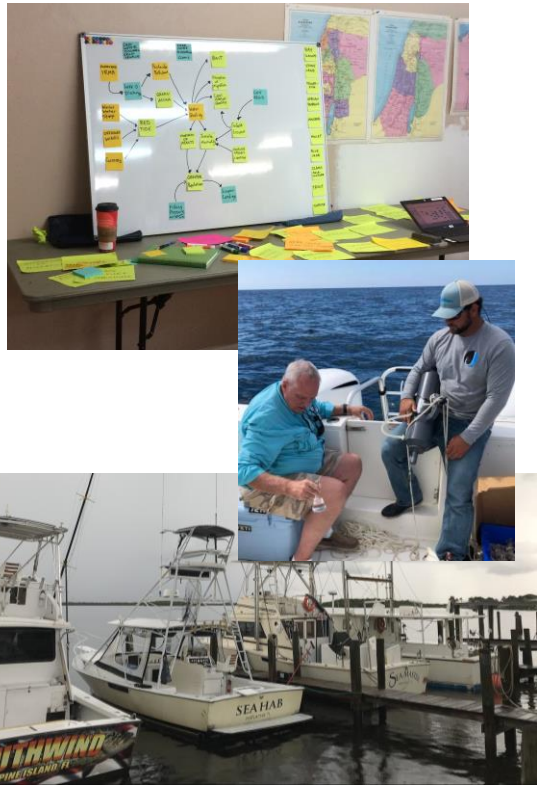
# Stakeholder involvement in science





# Conclusions: participatory fisheries system modeling

- Useful for defining discrete EBFM problems
- Effective for engaging both researchers and stakeholders
- Scientists inspired to redirect research towards user-inspired needs
- Stakeholders are engaged; by visualizing linkages are also motivated to help fill research gaps
- Beyond engagement and prioritization, other uses: indicator development, inform risk assessment and MSEs, quantitative tradeoff analysis



# Acknowledgments

The stakeholders and fishermen who have participated in this project

Many, many collaborating scientists