Developing Ecosystem Service Based Oyster Mgmt. for Florida

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Notes and Caveats

-Part of the FORS working group

-Ecosystem Service

-Still undergoing review

-Full report available online soon

-Summary will be submitted as an EDIS

- Lead contacts
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What we tried to do and why

- Purpose: Ecosystem Service Based Oyster Mgmt. (ESBOM)
- What/Why ESBOM? ES hard to quantify, oyster provide a lot of ES, oysters declining, declines may persist
- Current connection of oyster ES and mgmt.
- **Challenges to implementing ESBOM**
- Immediate changes recommended
- Longer-term needs
  - Policy
  - Science
- Conclusions

What is ESBOM

- Oysters subject to mgmt. decisions—harvest and restoration—N, lbs, $
- Oysters also provide lots of ES—some easy, others hard to measure
- Want mgmt. decisions to consider ES <u>explicitly and ideally quantitatively</u>

Why ESBOM for FL now?

1. Oysters <u>really</u> valuable for ES
2. Oysters are declining, esp. in FL
3. FL oyster mgmt. currently doesn't have an oyster mgmt. plan, much less one with ES in it
4. Decisions being made **now**. Need ESBOM to inform them.

Role of ESBOM guidance document

Targeted towards agencies & NGO's mainly

1. Help justify need for policy and research
2. Guide policy and research to support future ESBOM
3. Identify requirements for state/local mgmt. plans
4. Support change in how decisions are made

Ecosystem Service	Ecosystem function	Related Management Objectives	Objective metrics	Methods	Data Needs
Coastal Protection	Shoreline stabilization	• Minimize shoreline erosion/retreat • Sustain human property value • Sustain other habitats (marsh, mangrove, sea grass)	• Linear feet of reef needed to protect eroding shoreline • Shoreline protected with linear feet of oyster reef restored	• Calculate % of shoreline eroding	• Measurement of shoreline that is eroding • Measurement of shoreline suitable for oysters
Non-oyster fisheries and other recreation	Supports fish production and local economies	• Sustain or increase recreational and commercial fisheries	• Fish populations • Fish harvest and catch • Fisher utility/revenue • Local economic contribution	• Stock assessment • Fisheries independent monitoring • Fisher surveys	• Assess functional relationships between oysters and finfish recruitment
Water Quality	Filtration	• Reduce fish/wildlife/habitat mortality effects • Increase in seagrass area	• Number of oysters to filter volume of water using either area or density • Volume of water that will be filtered with oyster area or dentistry targets	• Calculate volume of water filtered based on density and area needed to achieve this density • Calculate filtration based on fixed area	• Filtration rate • Volume of water in estuary • Residence time • Temperature • Oyster area • Oyster density
Nitrogen Removal	Nitrogen Assimilation	• Decrease in nitrogen load • Meet total maximum daily load targets	• Mass of nitrogen removed from the estuary based on density and area targets	• Calculate nitrogen content in shell and tissues based on number oyster targets	• Concentrations of nitrogen in shell • Concentration of nitrogen in soft tissue • Oyster density • Oyster area
	Denitrification	• Decrease in nitrogen load • Meet total maximum daily load targets	• Mass of nitrogen removed from the estuary using target reef area • % of anthropogenically derived nitrogen removed	• Calculate denitrification change using difference in denitrification between oyster and reference habitat and planned area of oyster reef restoration.	• Nitrogen load to the estuary • Oyster reef area • Site-specific oyster denitrification values • Site-specific baseline denitrification values
Oyster Fishery	Supports oyster production and local economies	• Sustain or increase recreational and commercial fisheries	• Oyster harvest • Oyster fisher revenue • Local economic contribution	• Stock assessment • Fisheries independent monitoring • Fisher surveys	• Assess oyster recruitment relationships (i.e. as function of reef structure/height and as mediated by other env. variables

Overview of oyster ES connection to current mgmt

- **Ecosystem Function**: process, e.g., water quality
- **Related mgmt. objectives**: what's already there, like finfish populations
- **Objective metrics**: attributes, e.g., oyster abundance, that could help describe ES
- **Methods**: Approaches for measuring obj. metrics
- **Data Needs**: What we think we need

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- **Easy to see how oysters -> ES**
- **Current oyster mgmt. not directly, explicitly connected to ES (except harvest)**
- **We argue this is what we need: Develop explicit ES metrics, targets, thresholds that connect to mgmt. decisions about oysters (harvest, restoration, etc.)**

Challenges with ESBOM

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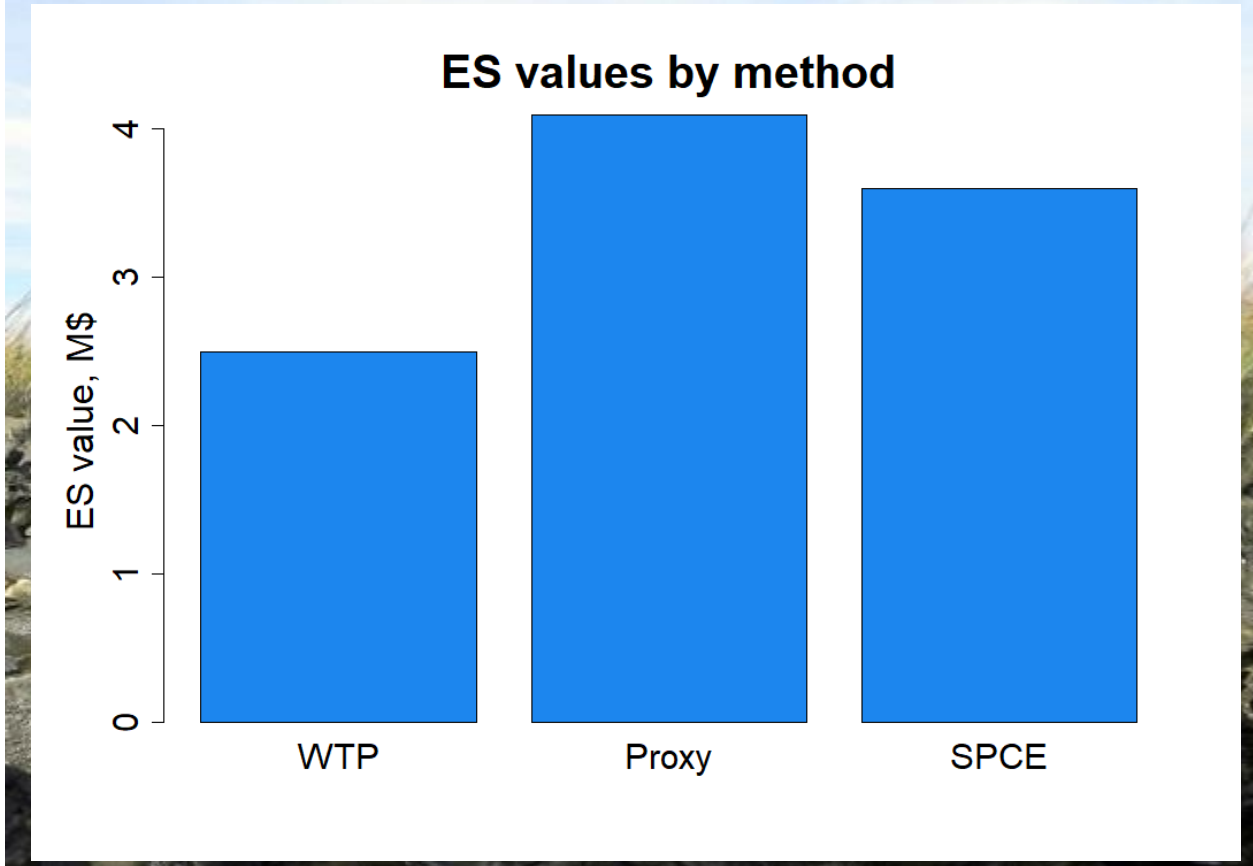
A hypothetical example:
Imagine an ESBOM goal is stated to be no more than 15% decrease in shoreline stabilization value of an area like Cedar Key

Challenges with ESBOM

1. **Different methods for quant. ES**, will give different values that may be context dependent (proxy!). ES value of shoreline stabilization must be defined and accepted



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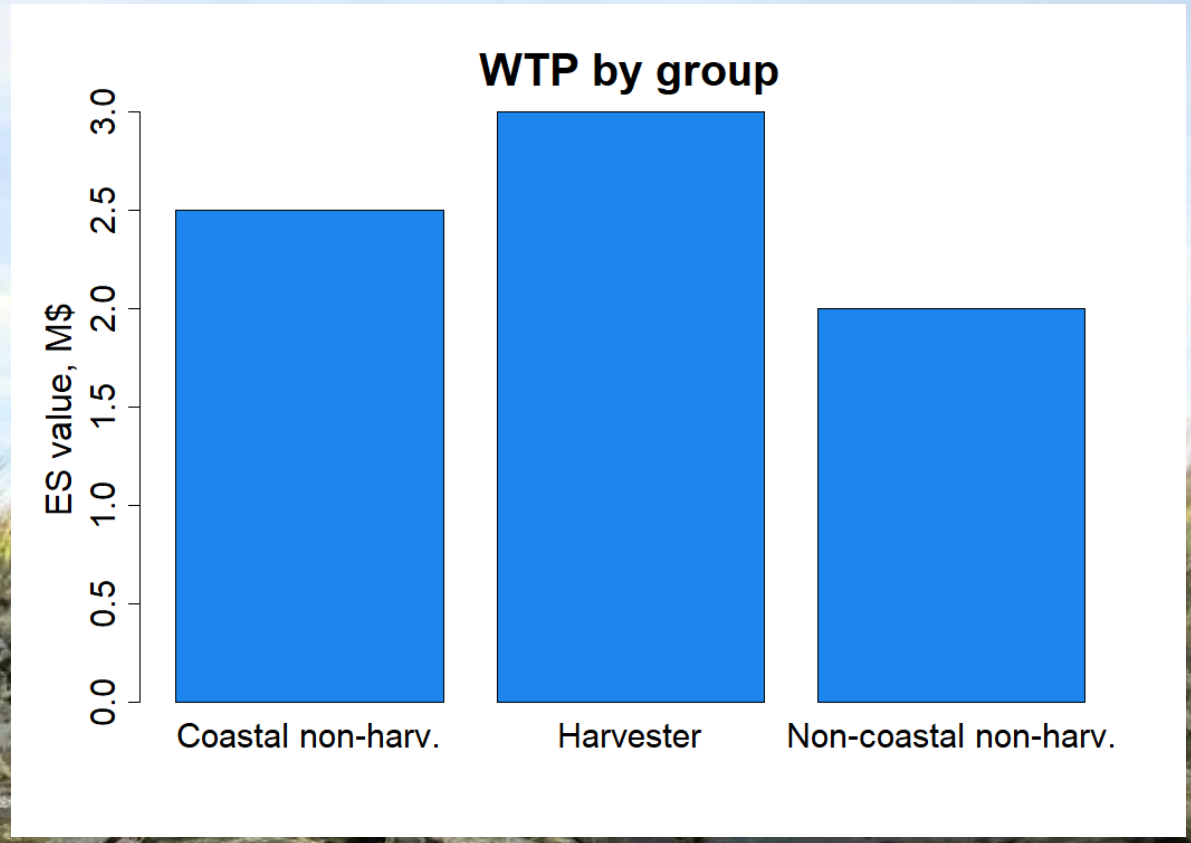

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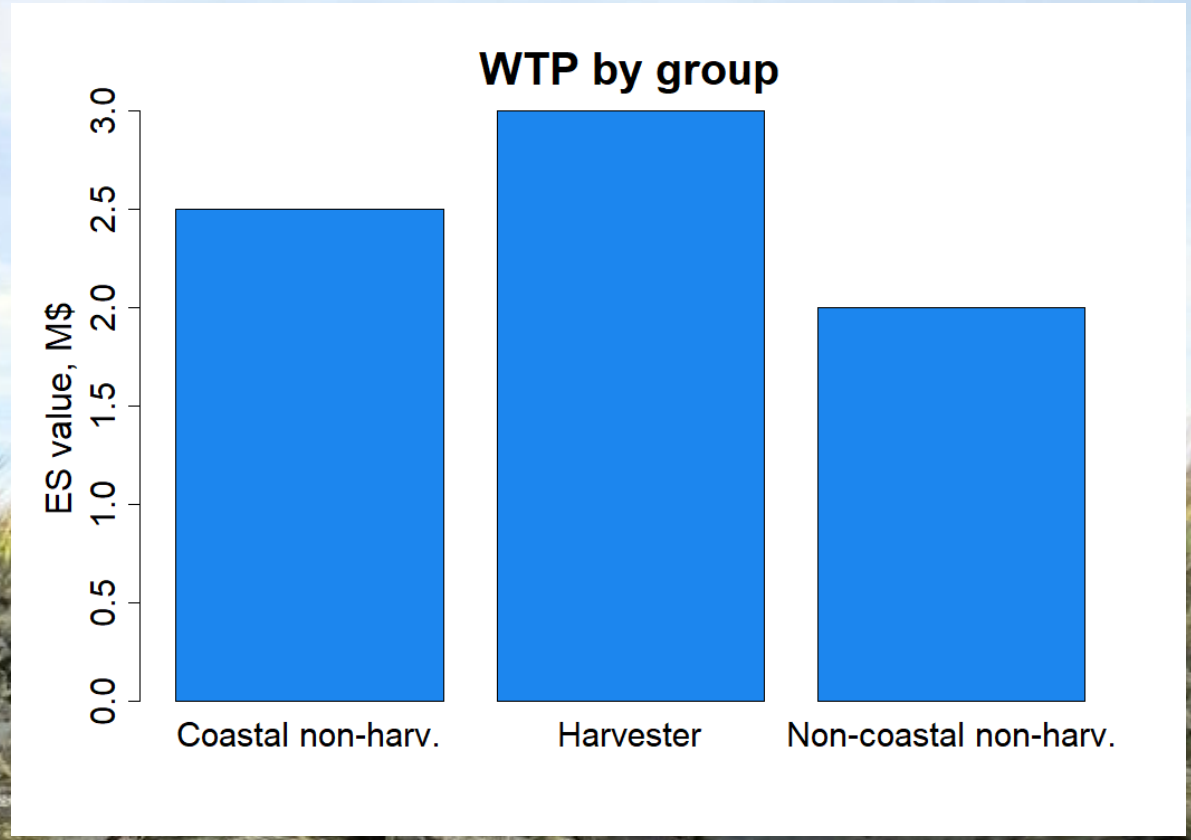

Proxy: What happens if proxy-base tech, and price change?

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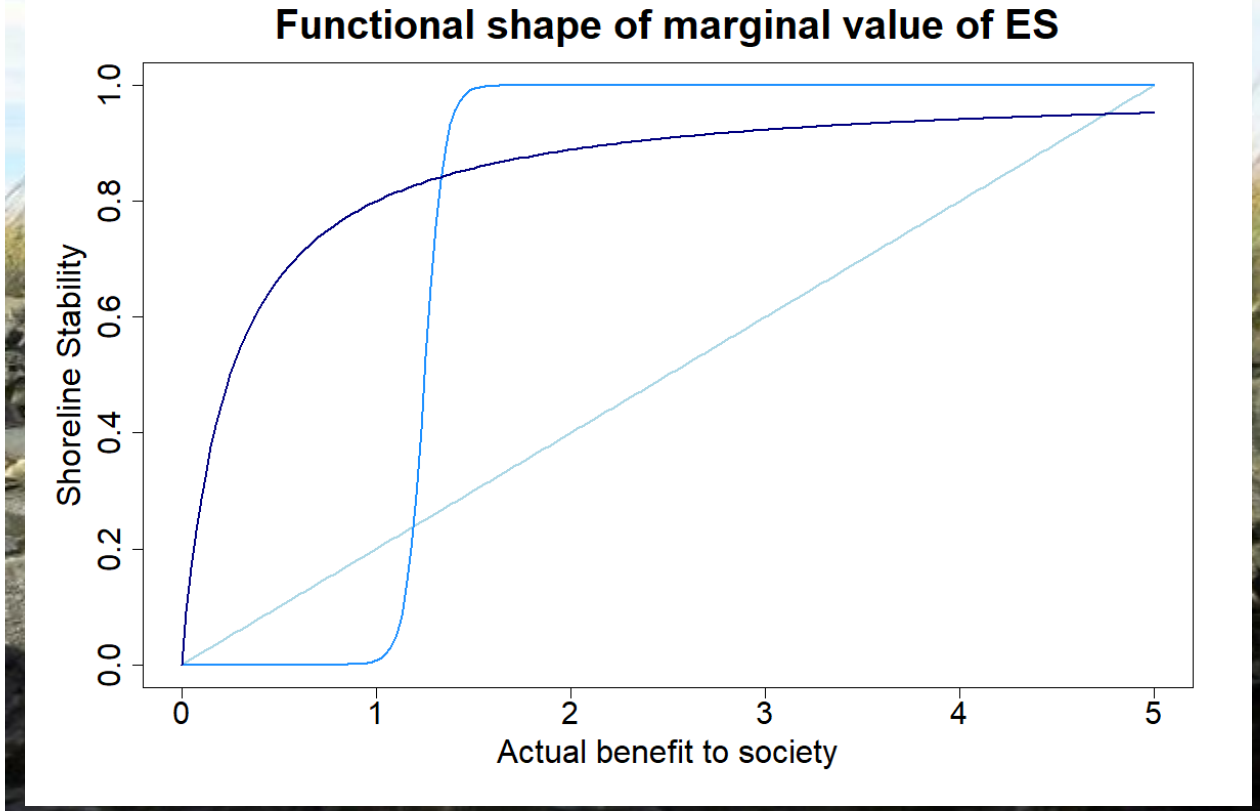

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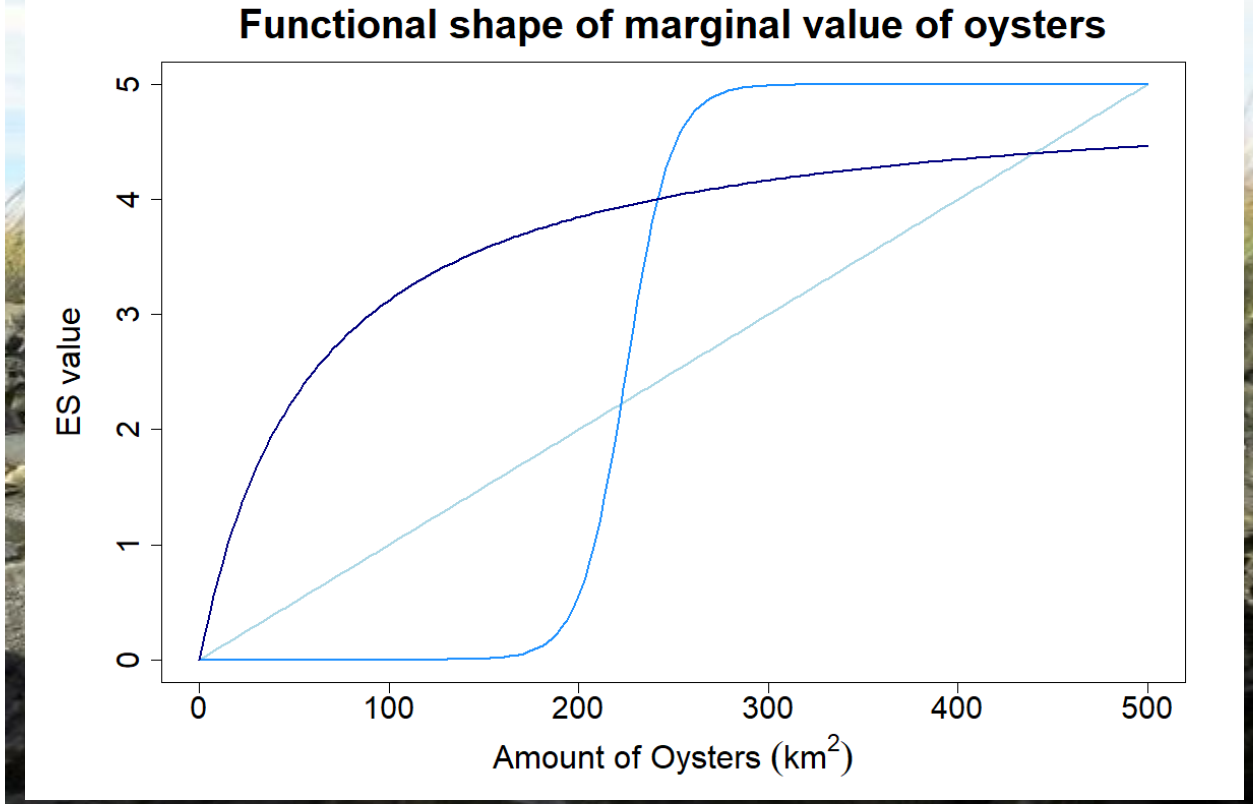

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5. **Trade-offs among ES**. How do we determine importance shoreline stability vs. livelihood from commercial harvest? There are not always win-wins.

Challenges with ESBOM

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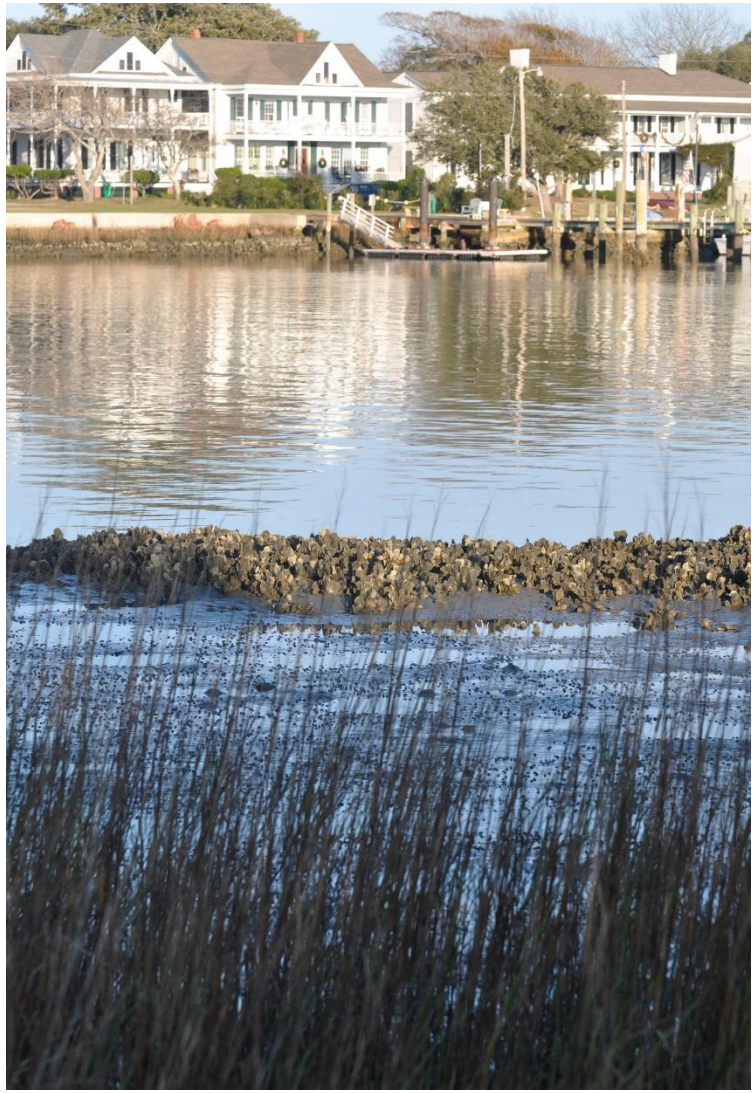
There are good reasons why these direct ES-mgmt. targets for oysters are going to be hard to make

Action and policy steps for ESBOM*

- **Use existing, imperfect tools to quantify oyster ES**
  - InVest, others
  - Oyster ES calculators paired with oyster shell/pop/fishery dynamics
- **Use existing decision-making approaches with at least qualitative ES**
  - SDM, MCDA
  - Participatory Cooperative-Mgmt
  - Place-based approaches
- **Update state-required criteria for oyster mgmt. decision-making**
  - Codify using best available science
  - Require quant. or qual. consideration of ES for mgmt. decisions
  - Prioritize funding to systems with oyster ecosystem services mgmt. plans



Long-term actions for ESBOM

- **Chase down scientific uncertainties (challenges)**
  - Measurement and perception variance
  - Oysters ~ oysters
  - ES ~ oysters
  - Value to society ~ ES
  - Trade-offs

- **Enhance monitoring**
  - Expand oyster monitoring to ES (remote sensing)
  - Standardize methods for sampling AND analyses

- **Revise/Update mgmt. process**
  - More explicit about oyster decision-making criteria and needs
  - More local, stakeholder involved

Conclusions

- Need explicit ESBOM
- Some big challenges
- Some good options exist now, but they aren't easy (SDM, MCDA, etc.)
- Long-term we need more science on oysters and ES for ESBOM to stand up