

# APALACHICOLA BAY SYSTEM INITIATIVE COMMUNITY ADVISORY BOARD

## MEETING IV – 27 JULY 2022

### MEETING OBJECTIVES

#### UPDATED WORKPLAN AND SCHEDULE

#### CAB PROCESS AND ROLE

#### MANAGEMENT AND RESTORATION STRATEGIES AND ASSUMPTIONS FOR MODELING SCENARIOS



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# **CAB MEETING OBJECTIVES 27 JULY 2022**

## **AGENDA ITEM #5**

- **APPROVAL OF PROCEDURAL ITEMS (AGENDA & SUMMARY REPORT)**
- **REVIEW OF UPDATED WORKPLAN AND MEETING SCHEDULE**
- ~~**SCIENCE AND DATA COLLECTION UPDATE**~~  
**TONGING DATA PRESENTATION**
- **CAB SUCCESSOR GROUP, RFWG, COMMUNITY OUTREACH UPDATES**
- **FWC NFWF RESTORATION PLAN UPDATE**
- **PROTECTION AND ENFORCEMENT OF RESTORATION AND RESTORATION EXPERIMENT SITES APPROACH DISCUSSION**

# **CAB MEETING OBJECTIVES 27 JULY 2022**

- **SETTING EXPECTATIONS: OVERARCHING CONSIDERATIONS FOR MODEL SIMULATION RESULTS BRIEFING**
- **APALACHICOLA BAY OYSTER ABUNDANCE INDEX DATA PRESENTATIONS:**
  - FISHERY-DEPENDENT DATA, ED CAMP, UF**
  - FISHERY-INDEPENDENT DATA, ED CAMP, UF**
  - RESTORATION DATA, BILL PINE, UF**
  - TONGING DATA, SANDRA BROOKE, FSUCML**
- **FISHERIES MODEL INITIAL SIMULATION RESULTS DISCUSSION**
- **AGREEMENT ON NEXT SUITE OF SCENARIOS FOR FISHERIES MODEL SIMULATIONS**
- **PUBLIC COMMENT**
- **NEXT STEPS: ACTION & AGENDA ITEMS FOR 28 SEPT 2022 MEETING**

# ABSI COMMUNITY ADVISORY BOARD TO DATE

- **PHASE I (2019). Standing up and Organization of the ABSI CAB —** *May 2019 – Dec. 2019 (Assessment, Questionnaire, and 2 CAB Meetings)* ***Complete***
- **PHASE II (2020). Scoping of Issues, Identification of Performance Measures & Strategies —** *Jan. 2020 – Dec. 2020 (7 CAB Meeting and 1 Oystermen's Workshop)* ***Complete***
- **PHASE III (2021). Building Consensus on CAB Recommendations for the ABS Ecosystem-Based Adaptive Management and Restoration Plan**  
— Adoption of Final Draft Management and Restoration Plan Framework for Phase IV Evaluation — *Jan. 2021 – Nov. 2021 (7 CAB Meeting and 2 Oystermen's Workshops)* ***Complete***

# ABSI CAB PHASE IV OVERVIEW

- **PHASE IV (2022).** Evaluation of the Draft Adaptive Management and Restoration Plan Framework's Prioritized Restoration and Management Strategies, Restoration Projects Selection and Implementation, and Funding Planning — *Dec. 2021 – Dec. 2022 - (6 CAB Meetings, Public Workshops – TBD)* *Initiated*
- **COMMUNITY ADVISORY BOARD (CAB).** CAB initiates Phase IV and works on evaluating the best combination of strategies predicted to achieve management and restoration objectives for the Bay using decision support tools coupled with available and emerging data and research. The CAB vets recommendations with management and restoration agencies. The CAB evaluates the priority and efficacy of strategies and actions and identifies specific recommended restoration projects and management approaches.

# ABSI CAB PHASE IV OVERVIEW

- **PUBLIC ENGAGEMENT IN 2022.** The CAB working through the Community Outreach Subcommittee initiated a community feedback initiative by providing information and seeking community input on the Plan Framework. The CAB will vet the results of their prioritized strategies with the larger ABS community through multiple forums including questionnaires administered through a variety of methods including Facebook, online via the ABSI website, and direct mailings. In addition, public workshops will be conducted in various locations to provide the Community with information on ABSI and solicit community feedback. *Initiated*
- **RESTORATION FUNDING WORKING GROUP (RFWG).** Initiated in late 2021 the Restoration Funding Working Group's role is to seek resources and political, governmental, and organizational support for the CAB's priority recommendations. *Initiated*
- **CAB SUCCESSOR GROUP.** The CAB Successor Group will be ready to convene when the CAB completes their work on the Apalachicola Bay System Ecosystem-Based Adaptive Management and Restoration Plan. The Successor Group's role will be to organize a group of key stakeholders committed to working collaboratively for the long-term, and once the CAB process is complete (~June 2024), to ensure that the Plan is implemented, monitored, and adaptively managed over time and has the support of the Community. *Pending*

# ABSI CAB PHASE IV SCHEDULE

## PREVIOUS PHASE IV MEETINGS – 2022

- **MEETING I – JANUARY 26, 2022 (VIRTUAL)**  
Overview of scope and goals for Phase IV. Briefing on collaborative modeling and CAB process for Phase IV. Briefing on ABSI predicative models (Ecological/Oyster, Hydrologic, Hydrodynamic, and Riverine). Public comment.
- **MEETING II – MARCH 30, 2022 (ANERR)**  
Science and data update. Committee reports. Community Outreach Plan discussion. Guidance on Fisheries Model development. Discussion with FWC on management strategies. Public comment.
- **MEETING III - MAY 25, 2022 (ANERR)**  
Science and data update. Committee reports. Community engagement initiative update. Chesapeake Bay Oyster Management and Habitat Restoration Modeling presentation. Alabama Management and Restoration Approach presentation. Discussion with FWC/DEP/ANERR on restoration strategies. Public comment.

# ABSI CAB PHASE IV SCHEDULE

## CURRENT MEETING

### MEETING IV – JULY 27, 2022 (ANERR)

- Committee reports
- Community engagement initiative update
- Update on FWC NFWF funded restoration project
- Discussion on protection and enforcement of restoration and restoration experiment sites
- Briefing on Overarching Considerations for simulation results
- Apalachicola Bay oyster abundance index data presentations
- Fisheries Model simulation results & scenarios refinements
- Agreement on next suite of scenarios for model simulations
- Public comment



# ABSI CAB PHASE IV SCHEDULE

## REMAINING PHASE IV MEETINGS – 2022

- **MEETING V – SEPTEMBER 28, 2022 (ANERR)**

Science and data update. Committee reports. Community engagement initiative update. Fisheries Model simulation results & scenarios refinements. Agreement on next suite of scenarios for model simulations. Public comment.

- **MEETING VI – NOVEMBER 30, 2022 (ANERR)**

Science and data update. Committee reports. Community engagement initiative update. Fisheries Model simulation results & scenarios refinements. Agreement on next suite of scenarios for model simulations. Public comment.

## 2023 PHASE IV MEETINGS PLANNED

- Six CAB Meetings Planned
- Additional Public Workshops Planned
- February (Meeting VII), April (Meeting VIII), June (Meeting IX)
- August (Meeting X), October (Meeting XI), December (Meeting XII)

# ABSI CAB CONSENSUS BUILDING PROCESS

**UNANIMOUSLY ADOPTED 30 OCTOBER 2019**

- **Goal.** The overarching goal of the Apalachicola Bay System Initiative (ABSI) Community Advisory Board (CAB) is to develop a package of consensus recommendations informed by the best available science, data, and stakeholders' experiences for the management and restoration of the Apalachicola Bay System (ABS), and to ensure there is a reliable mechanism and process for the monitoring, funding, and implementation of the Apalachicola Bay System Ecosystem-Based Management and Restoration Plan.
- **Process.** The Apalachicola Bay System Initiative (ABSI) Community Advisory Board (CAB) will seek consensus on its recommendations for options to be evaluated using the best available science and decision-support tools for management and restoration of the Apalachicola Bay System (ABS).
- **Consensus Threshold.** In instances where, after vigorously exploring possible ways to enhance the members' support for the final package of recommendations, and the CAB finds that 100% acceptance or support is not achievable, final consensus recommendations will require at least 75% favorable vote of all members present and voting.

# **ABSI CAB CONSENSUS BUILDING PROCESS**

**UNANIMOUSLY ADOPTED 30 OCTOBER 2019**

## **CAB Guiding Principles**

- 1) Community Advisory Board (CAB) members will strive to work together collaboratively, and seek to understand and respect differing perspectives.
- 2) The CAB will strive to achieve consensus on the evaluation and development of their recommendations.
- 3) The Community Advisory Board will operate under policies and procedures that are clear, concise, and consistently and equitably applied.
- 4) CAB members will serve as accessible liaisons between the stakeholder groups they have been appointed to represent and the ABSI CAB, and should strive to both inform and seek input on issues before the CAB from those they represent.

## **Four Personal Guiding Principles**

- 1) Be impeccable with your word.
- 2) Don't take things personally.
- 3) Don't make assumptions.
- 4) Always participate fully.

# ABSI CAB CONSENSUS BUILDING PROCESS

UNANIMOUSLY ADOPTED 30 OCTOBER 2019

## CAB Members' Role

- The Community Advisory Board process is an opportunity to explore possibilities.
- Offering or exploring an idea does not necessarily imply support for it.
- Listen to understand. Seek a shared understanding even if you don't agree.
- Be focused and concise—balance participation & minimize repetition. Share the airtime.
- Look to the Facilitator to be recognized. Please raise your name tent or hand to speak.
- Speak one person at a time. Please don't interrupt each other.
- Focus on issues, not personalities. *“Using insult instead of argument is the sign of a small mind.”*
- Avoid stereotyping or personal attacks. *“Mud thrown is ground lost.”*
- Actively contribute to the creation of a shared vision, and management and restoration strategies for a healthy and sustainable Oyster Fishery and Ecosystem.
- To the extent possible, offer options to address other's concerns, as well as your own.
- Participate fully in discussions, and complete meeting assignments as requested.
- **Work actively toward and be willing to reach consensus.**

# QUESTIONS OR COMMENTS ON WORKPLAN, SCHEDULE, AND PROCESS

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**APALACHICOLA BAY SYSTEM INITIATIVE  
COMMUNITY ADVISORY BOARD**

**MEETING IV – 27 JULY 2022**

**MANAGEMENT SCENARIOS AND  
ASSUMPTIONS FOR MODELING**

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# ILLEGAL HARVEST DISCUSSION – AGENDA ITEM #9

## ILLEGAL HARVEST **1** OF WILD OYSTERS IN APALACHICOLA BAY

Discuss the best approach to communicate with FWC Law Enforcement and the ABS Community regarding the critical importance for strict enforcement of the Apalachicola Bay Closure **2** and the protection from illegal harvest (poaching) from oyster habitat restoration sites and restoration experimental sites for the long-term future and sustainability of the oyster fishery specifically, and the health of the Apalachicola Bay System generally.

**1** *Key Uncertainty.* *Illegal Harvest is a Key Uncertainty for restoration success and science-based management recommendations.*

**2** *Bay Closure.* *On December 16, 2020, the FWC approved the final rules to temporarily suspend all wild oyster harvest and to prohibit on-the-water possession of wild oyster harvesting equipment (tongs) from Apalachicola Bay through December 31, 2025.*

# OVERARCHING CONSIDERATIONS FOR MODEL RESULTS

## AGENDA ITEM #10

- The CAB is exploring proposed strategies and scenarios (combinations of strategies or options) acknowledging that all options require investments, commitments, and trade-offs and must be implemented collectively for the package of recommendations to succeed. As the CAB moves forward evaluating and selecting scenarios for the package of consensus recommendations, the entire package must be implemented and work together synergistically and accomplish the desired outcome.
- It should be further understood that the results of modeling simulations must be evaluated in relation to the confidence the modeler and stakeholders have in the data and the assumptions used. The level of confidence is directly proportional to the level of uncertainty for the results and must be considered when interpreting the simulation results for the various scenarios evaluated.
- The ABSI Project Team's commitment is to be transparent and realistically manage expectations, and to clarify where appropriate what the implications, requirements, and trade-offs are for any given package of recommendations.



# OVERARCHING CONSIDERATIONS FOR MODEL RESULTS

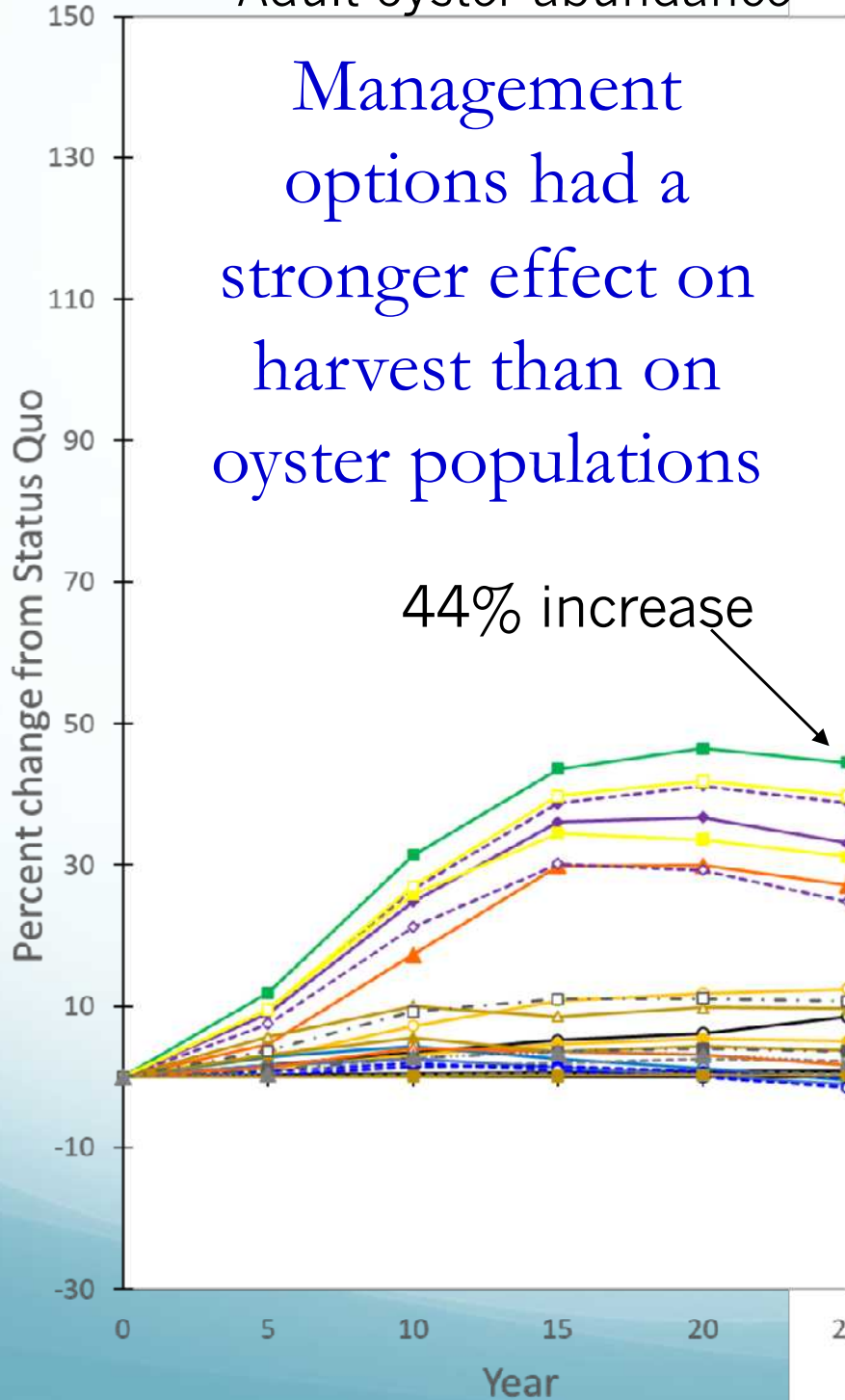
- As the CAB moves forward with the process of evaluating scenarios that will ultimately evolve into the CAB's package of consensus recommendations predicted to achieve the desired outcomes for the ABS, the scenarios (strategies) must be implemented as a package and work together synergistically, and strategies should not be seen as stand-alone alternatives.
- For the CAB's consensus recommendations to be successful and have the best chance for funding and implementation, the recommendations should balance predicted outcomes socially, politically, culturally, and economically based on an analysis of sustainable harvest potential (jobs) and ecosystem services, including but not limited to creating habitat and the resultant food source for hundreds of species including commercially valuable fish, water quality, shore protection, and storm protection, as well as other benefits including but not limited to recreational activities and tourism.

# CONSENSUS STRATEGIES

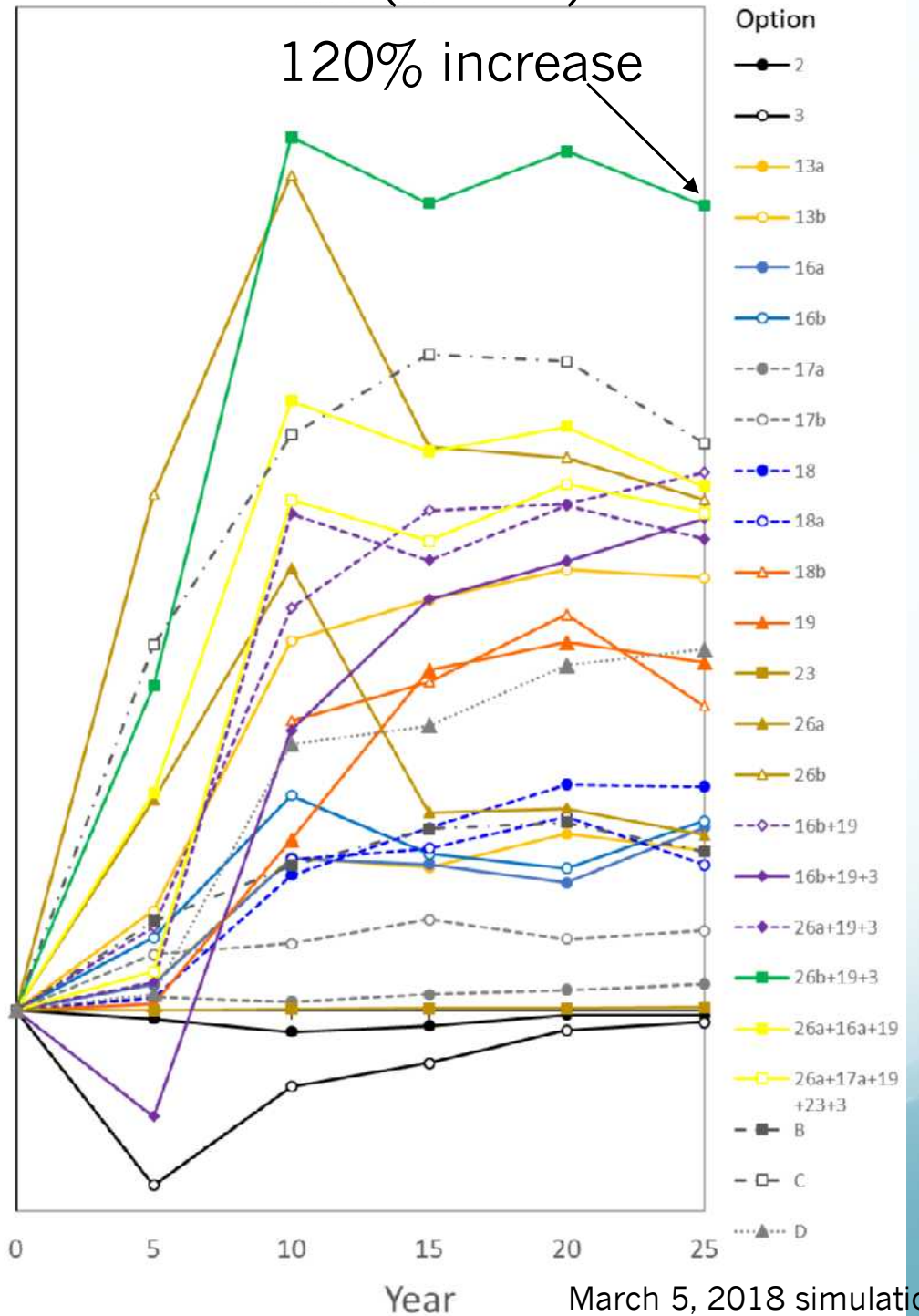
## LESSONS LEARNED FROM THE OYSTERFUTURES PROJECT

- The following six slides demonstrate lessons learned from the strategies evaluated and ultimately selected as part of the consensus package of recommendations for the OysterFutures project (2015 – 2018).

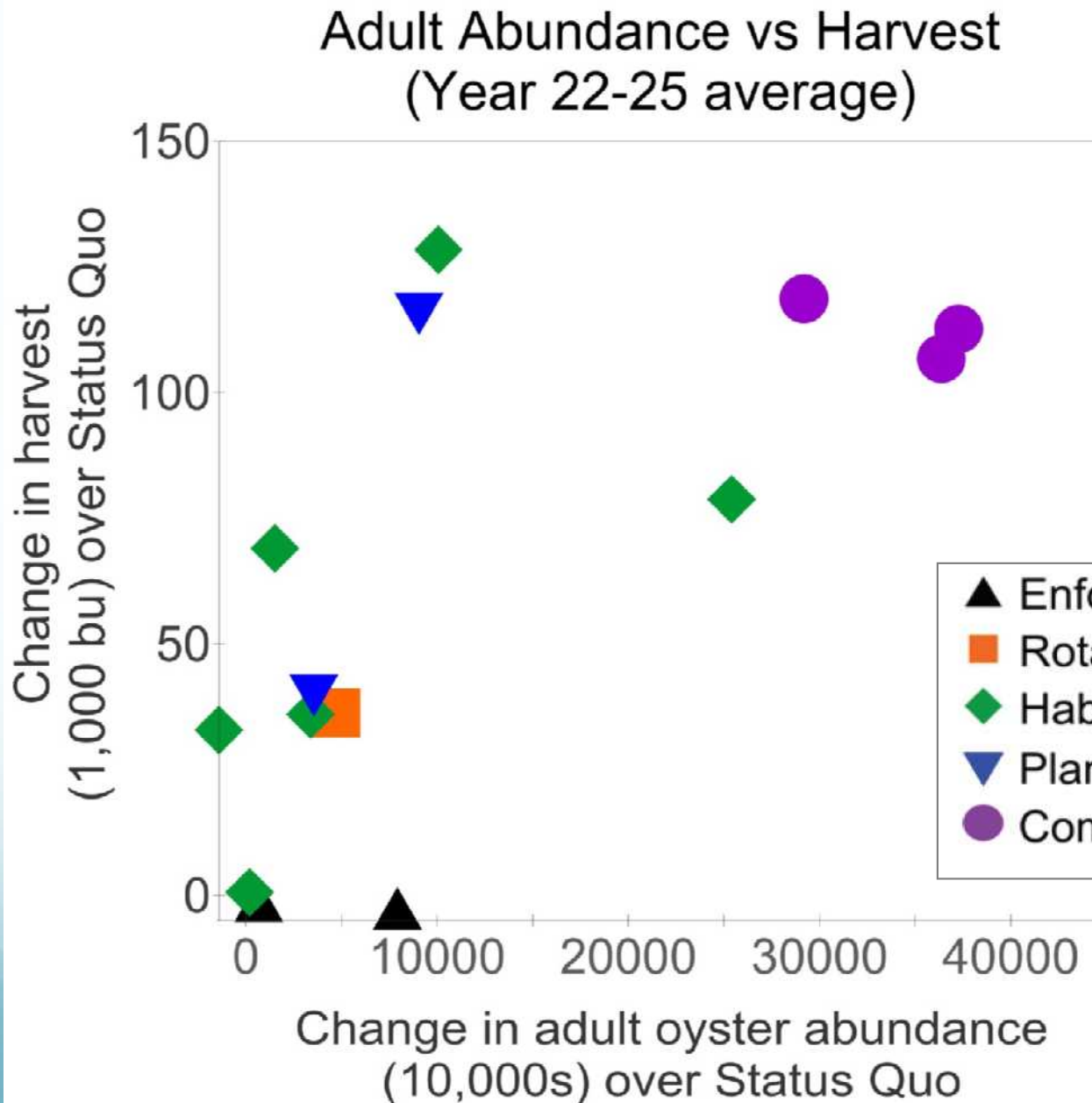
Adult oyster abundance



Harvest (bushels)



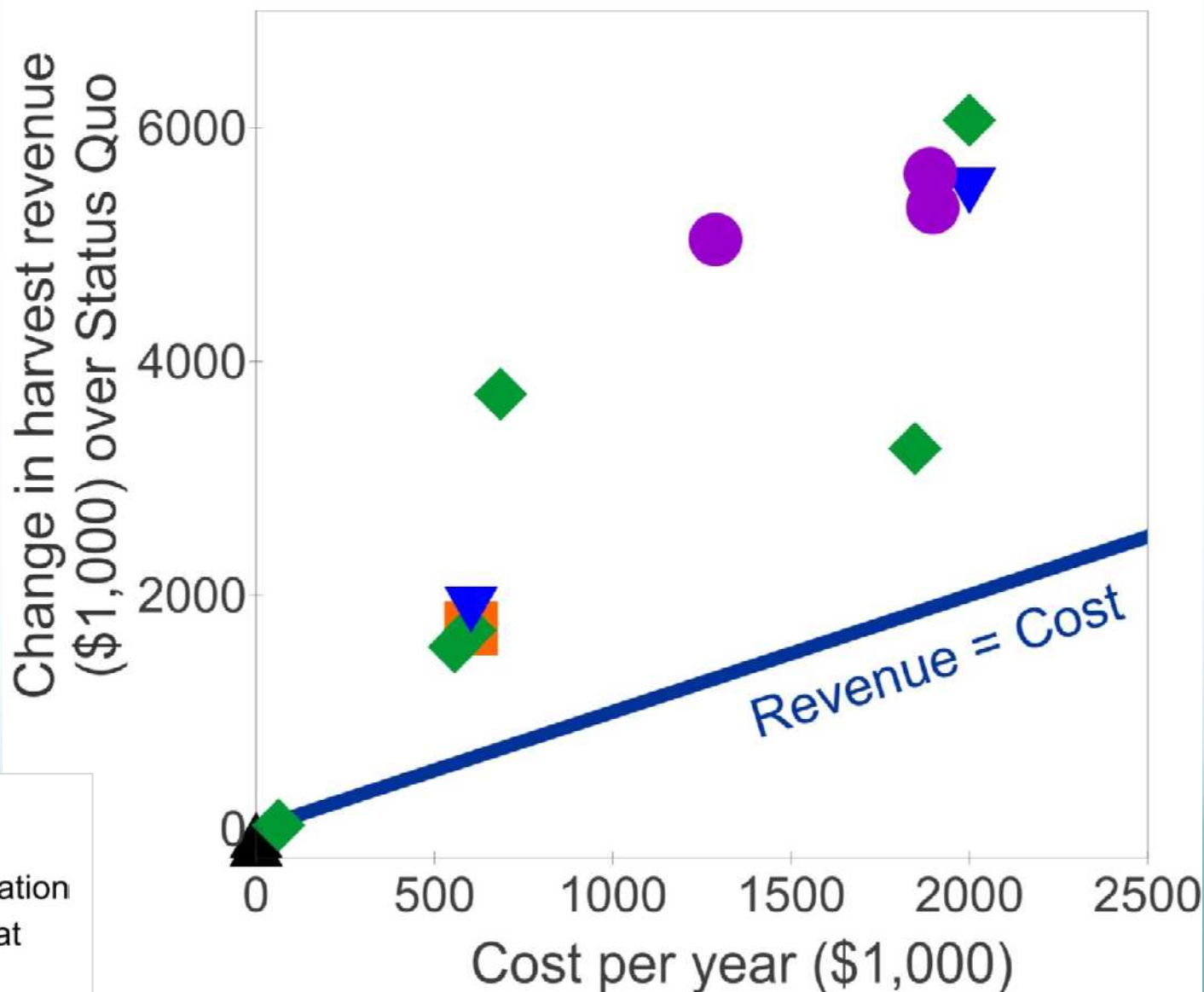
# Win – win options exist: high abundances and high harvest



**Important note:**  
For most options, these strong positive benefits did not start to be realized until around 10 years after implementation.

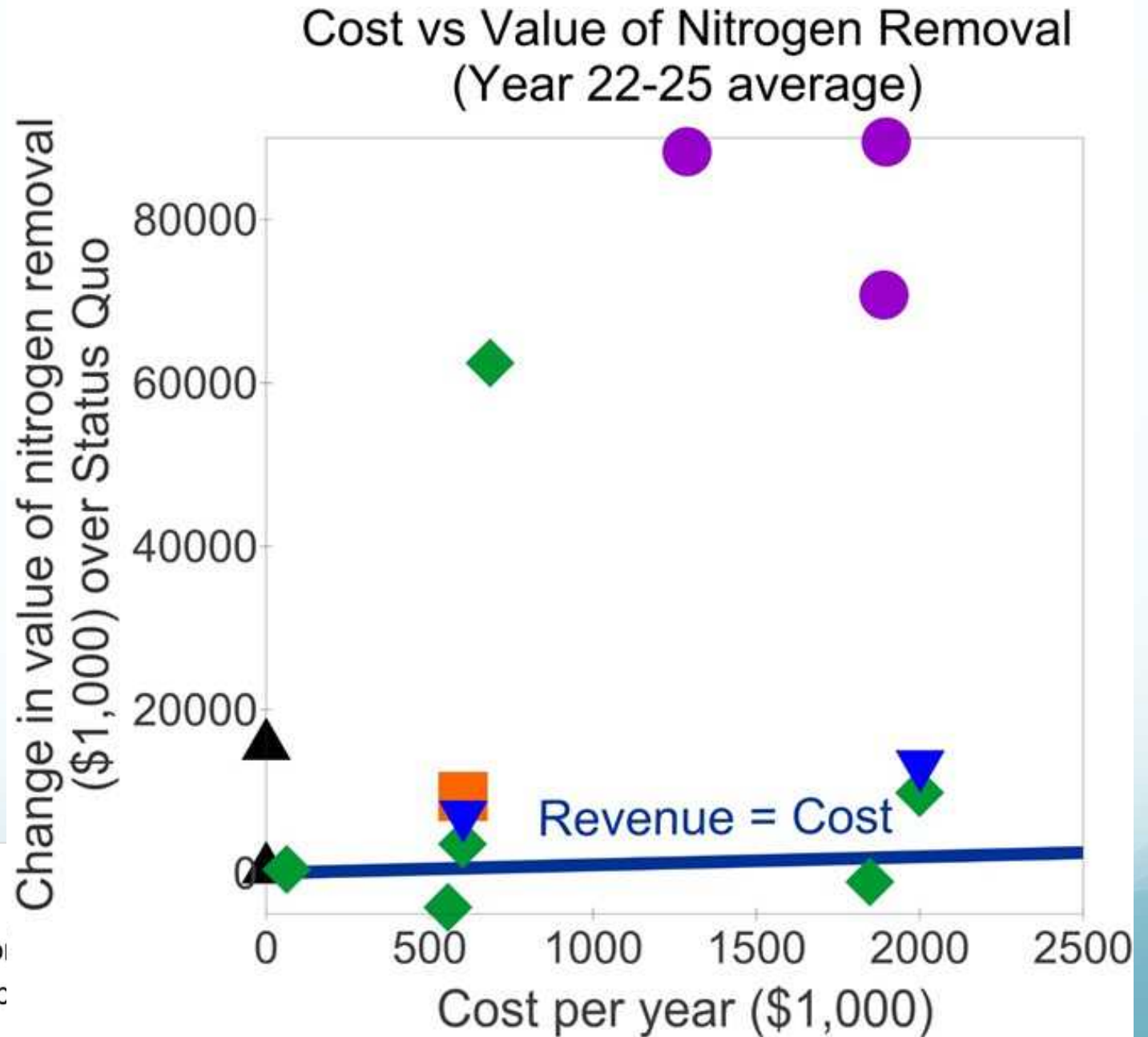
All but two scenarios showed increased revenues to watermen

Cost vs Harvest Revenue  
(Year 22-25 average)



- ▲ Enforcement
- Rotational Harvest
- ◆ Habitat Modification & Restoration
- ▼ Planting Hatchery-Reared Spat
- Combined Options

All but two scenarios resulted in higher value of nitrogen removal compared to cost



# WHAT OPTIONS THE STAKEHOLDERS CHOOSE

- They chose options (strategies/scenarios) that increased oyster abundance and harvest.
- They chose options (strategies/scenarios) that increased revenue to fisherman and were cost effective.
- They chose options (strategies/scenarios) that increased nitrogen reduction and were cost effective.



## TAKE HOME POINTS FROM MODEL FORECASTS

- Win-win-win options exist
- Strong positive benefits were not realized for 10 years
- Combining options led to best overall performance
- After 20 years, harvest revenue could be twice that of annual public investments
- After 20 years, there could be more than an 8-fold return on public investment for pollution reduction
- Choice of options had a stronger control on harvest than on oysters



# INITIAL SCENARIOS & ASSUMPTIONS FOR MODELING

## AGENDA ITEM #11

### Scenarios

**Scenario A:** Limited entry commercial oyster fishery.

**Scenario B:** Active management of the oyster resource using an oyster abundance minimum density threshold.

**Scenario C:** A combination of limited entry (Scenario A) and active management (Scenario B).

#### Modeled Simulations Include:

- Closed seasons
- Bag limits
- Potential for bioeconomic entry (i.e., based on assumptions about profitability and variable costs, so not capped at number of trips/participants), as is most recent status quo.
- Fixed effort remains an option, as does, allowing for an effort cap with bioeconomic operations below that.
- Discard mortality applied to oysters captured but not harvested.
- Potential for density dependent catchability which there is some evidence may occur.

*\* The models still include shell budget information.*

# INITIAL SCENARIOS & ASSUMPTIONS FOR MODELING

## ASSUMPTIONS

1. Oystermen will harvest oysters (fish) whenever the weather and regulations permit.
2. \$80,000 is the initial annual gross income level that oyster harvesters identified as requisite for earning a “good” living solely from oysters harvesting, and which would guarantee economic self-sufficiency.
3. A likely bag limit of 5 – 6 bags/day, and a selling price of \$100/bushel of oysters.
4. Oyster harvest allowed 7-days/week during open times.
5. Oyster harvest allowed all months during open times and areas. Note: this is an initial assumption that can be altered or relaxed for future scenarios.
6. Use a range of 5% low to 30% high to account for illegal harvest, potentially related to changes in enforcement.

# INITIAL SCENARIOS & ASSUMPTIONS FOR MODELING

## ASSUMPTIONS

7. 200 bushels/acre metric as threshold for sustainable harvest/habitat.
8. The spatially implicit scenarios implies assuming the pre-closure amount of closed and thus open areas. However, there was some stakeholder support for considering an even more spatially limited fishery, at least initially.
9. Calculate the maximum number of participants the resource can sustain under different assumptions of income and bag limits. Initial scenario results will use income of \$80,000 annual gross and 5 bag/person/day limit, but of course changing these variables will affect maximum number of participants (less income, lower bag limits will generally allow more participants).

# INITIAL SCENARIOS & ASSUMPTIONS FOR MODELING

## ASSUMPTIONS

10. Run the initial simulations of the scenarios two ways with the overarching assumption that: 1) oyster habitat restoration works and improves the oyster population abundance specifically and the Bay generally to a threshold sufficient to support some level of sustainable commercial oyster harvesting; and 2) restoration of the Bay and oyster reef habitat does not work as predicated and the health of the Bay is not sufficiently improved to support a sustainable oyster reef habitat together with commercial oyster harvesting.
11. Additional assumptions not explicitly addressed include:
  - Assuming constant pathology that is subsumed by past estimates of natural mortality of oysters. That is, we're not modeling changes in oyster disease right now.
  - Assuming natural mortality has not been dramatically altered by some unknown predator or environmental variable.
  - Latent effort (demand to harvest oysters) exists.

# NEW MANAGEMENT SCENARIO – 27 JULY 2022

## AGENDA ITEM #13

- 1) Assess the effectiveness of a put-and-take fishery for maintaining a sustainable wild oyster harvest in Apalachicola Bay. Specific areas would receive regular cultching and/or deployment of hatchery spat-on-shell and would be subject to the same fishery management regulations as non-supplemented areas.)
  - **Action I-A.)** Conduct field study of survival of planted spat-on-shell to harvestable size and time required to attain market size.
  - **Action I-B.)** Use fishery models to estimate the amount and frequency of cultch and/or spat-on-shell required to maintain the minimum threshold for sustainable harvest (i.e., 400 bags/acre).
  - **Action I-C.)** Conduct cost-benefit analysis of deploying cultch and/or spat-on-shell in support of wild oyster harvest in Apalachicola Bay. This includes cost of cultch and spat-on-shell production, cost of deployment, survival of hatchery spat and value of harvest and associated industry.
  - **Action I-D.)** Monitor the stability of oyster populations using the put-and-take approach to wild fishery harvest, to determine whether deploying cultch or spat-on-shell helps reduce natural fluctuations in oyster populations.

# QUESTIONS OR COMMENTS ON SCENARIOS AND ASSUMPTIONS

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**APALACHICOLA BAY SYSTEM INITIATIVE  
COMMUNITY ADVISORY BOARD  
RESTORATION AND MANAGEMENT  
STRATEGIES OVERVIEW**

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# 8 RESTORATION STRATEGIES AND 19 ACTIONS

## PRIORITY 1 RESTORATION STRATEGIES (5)

- 1) Restore and create reef structures suitable for sustained oyster settlement that enhance ecosystem services in designated restoration areas. (#1 – 9.6)
- 2) Use experimental evidence and habitat suitability analyses to determine the most suitable substrate (e.g., limestone, granite, spat-on-shell, artificial structures) for restoring, enhancing, and/or developing new reef structures that will increase productivity in the Apalachicola Bay oyster ecosystem. (#2 - 8.7)
- 3) Determine area (acres or km<sup>2</sup>) of oyster reefs that currently support live oysters as well as the area needed to ensure sufficient spat production that will support sustainability of oyster reefs and sustainability of a wild oyster fishery throughout the ABS. (#3 - 8.6)
- 4)<sup>^</sup> Develop criteria for restoring specific reefs or reef systems damaged by environmental conditions or natural disasters. (#4 – 8.2)
- 5)<sup>^</sup> Identify monitoring needs for assessing the health of oyster populations (including disease), and detecting changes in environmental conditions and habitat quality (for oysters and other reef-associated species) over time. (#4 – 8.2)

*<sup>^</sup>Priority #4 and #5 above received the same ranking*



## **PRIORITY 2 RESTORATION STRATEGIES (2)**

- 6.) Develop ecosystem models that forecast future environmental conditions and oyster population status. (#6 – 7.2)
- 7.) Assess existing ecosystem services metrics used for other oyster studies and develop a list of ABSI specific metrics to assess change over time. (#7 – 6.7)

## **PRIORITY 3 RESTORATION STRATEGIES (1)**

- 8) Seagrass and other SAV, and wetland and riparian habitat should be restored concurrently on appropriate substrate/bottom to work synergistically with oyster habitat restoration to enhance restoration of the ABS. (#8 – 4.73)

# 12 MANAGEMENT STRATEGIES AND 44 ACTIONS

## PRIORITY 1 MANAGEMENT STRATEGIES (7)

- 1) Evaluate a suite of management approaches that in combination achieve the goal of maintaining a sustainable wild oyster fishery as measured in relation to relevant performance metrics for determining success. (#1 – 9.3)
- 2) Recommend specific criteria and/or conditions, with related performance measures for the reopening of Apalachicola Bay to limited wild oyster harvesting. (#2 – 9.0)
- 3) Conduct an oyster stock assessment for the ABS with periodic updates. (#3 – 8.8)
- 4) Manage the commercial oyster industry and recreational oyster fishing to provide for sustainable spat production and the recovery of oyster populations. (#4 – 8.75)
- 5) Work with FWC Law Enforcement to develop enforcement strategies and appropriate penalties sufficient to deter harvest or sale of undersized oysters as well as violations that harm wild or leased oyster reefs and other natural resources, and that will support restoration efforts in the ABS. (#5 – 8.6)
- 6) Evaluate the development of a policy that would require setting sustainable harvest goals and placing limitations on or a complete closure to harvesting based on the results of data (e.g., stock assessment) collected and evaluated under a comprehensive monitoring program designed to sustainably manage the resource. (#6 – 8.5)
- 7) Restore and create reef structures suitable in size, location, and substrate type for healthy and sustainable oyster settlement and production, and harvesting. (#7 – 8.3)

## PRIORITY 2 MANAGEMENT STRATEGIES (5)

- 8) Recommend policies and actions that retain and recycle shell for habitat replenishment in the ABS. (#8 – 7.7)
- 9) Use decision-support tools to develop a system of potential closed areas that are well defined in terms of size, location, and longevity and include rotational and seasonal harvest areas, as well as long-term closed areas in strategic locations to provide habitat for year-round protection for brood stock and enhanced spawning opportunities. (#9 – 7.6)
- 10) Use ecological quantitative modeling and other decision support tools to evaluate strategies and actions, and define performance criteria for an oyster population that can sustain a pre-determined level of wild oyster harvest, with a stipulated number of harvesters (limited entry), and protocols to ensure sustainability. (#10 – 7.5)
- 11) Work with FDACS to ensure that oyster aquaculture practices and locations in the Bay are compatible with the goals and strategies for restoration and management of the ecosystem and are compatible with a wild fisheries and the important cultural role of a working waterfront and seafood industry. (#11 – 6.8)
- 12) Investigate oyster shell and oyster relay programs to move both cultch and live oysters to more favorable habitat (relay programs are recommended to only be used for restoration experiments). (#12 – 5.9)

# APALACHICOLA BAY SYSTEM INITIATIVE COMMUNITY ADVISORY BOARD

## DASHBOARD PERFORMANCE MEASURES

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# Performance Measures Evaluated in the Dashboard of the OysterFutures Model

1. **Abundance (10,000s) Adults:** Total number of adults (one year old and older oysters) on October 1 across all the bars in System including sanctuaries and fishery areas.
2. **Habitat (1000 bushels):** Total amount of substrate over all bars in the System including shell, stone, and other materials.
3. **Harvest (1000 bushels):** Total harvest in 1000 bushels across all regions in the System and all gears. The total also includes undersized oysters and any harvest that occurs in sanctuaries.
4. **Fraction of Oysters Harvested:** Fraction of market-sized ( $>3$  inch) oysters harvested. This fraction includes oysters that are in sanctuaries.
5. **Revenue (\$1000):** Total dockside value of harvest across all regions in the System. Revenue is calculated as the harvest in bushels times the price per bushel. It does not include any additional multipliers for effects on the rest of the economy.
6. **Number of Licenses:** The total number of licensed operators harvesting oysters in the System.

# Performance Measures Evaluated in the Dashboard of the OysterFutures Model

7. **Water Clarity:** Percent increase in light available to seagrass at 2 m depth.
8. **Reef: N Removed:** Total pounds of nitrogen removed by oyster reefs in all regions of the System. This performance measure includes nitrogen that is converted from other sources into nitrogen gas.
9. **Catch: N Removed:** The total amount of nitrogen removed in the oyster meats from harvest.
10. **Social Value: N (\$1000):** Value of nitrogen removed by reefs and harvest using a price of \$834\* per pound. *\*Note: this value will need to be calculated for the ABS working with the watermen.*
11. **Cost/Year (\$1000):** Total cost of substrate and spat additions.
12. **Fishery Revenue – Cost (per year):** Revenue from harvest minus the cost of substrate and spat additions.
13. **Social Value N Removed + Revenue (fishery harvest) – Cost (restoration and management):** The social value of nitrogen removed plus the revenue (dockside value) of the harvest minus the cost of shell and spat on shell.

**APALACHICOLA BAY SYSTEM INITIATIVE  
COMMUNITY ADVISORY BOARD  
COLLABORATIVE MODELING  
INGREDIENTS AND PROCESS**

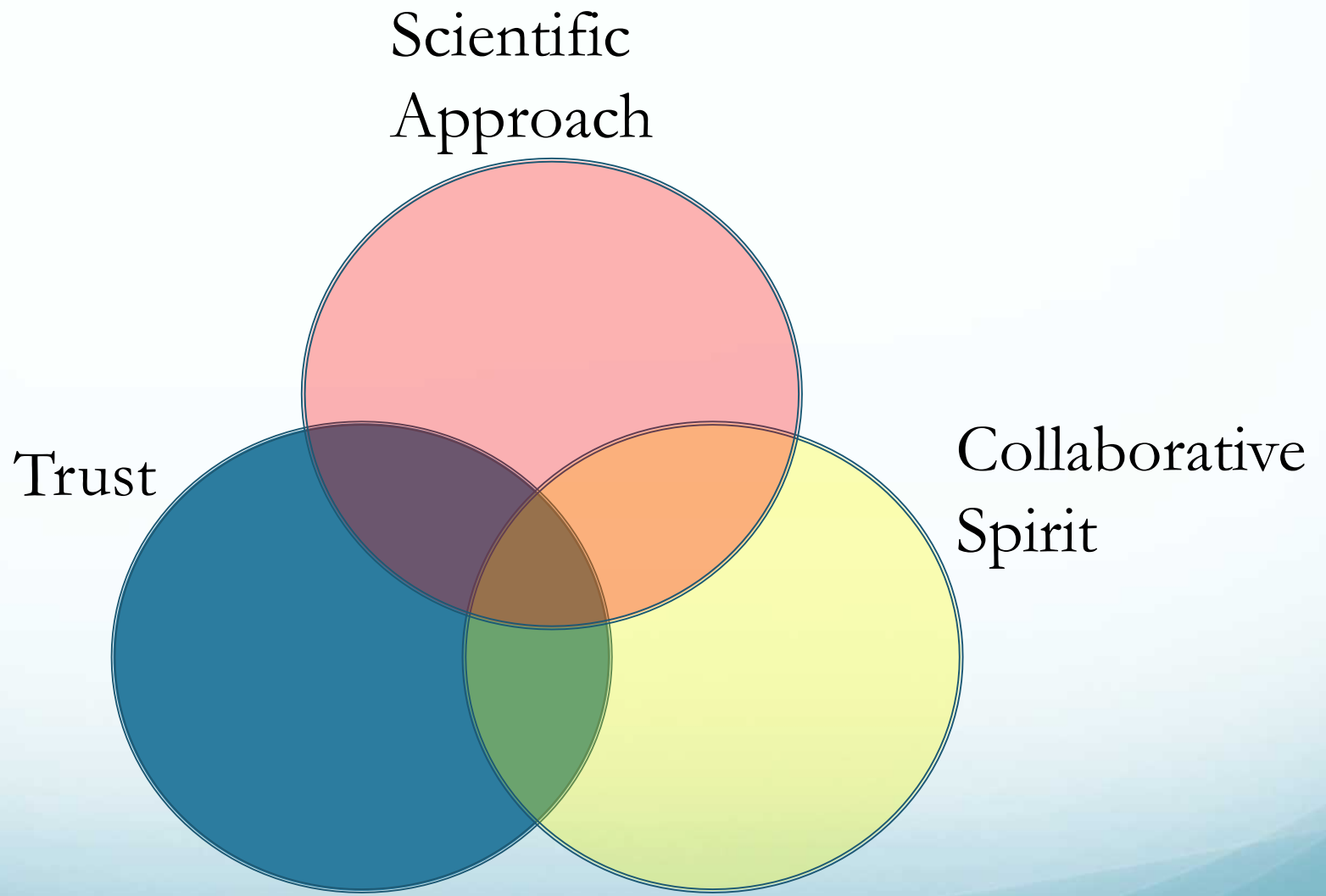
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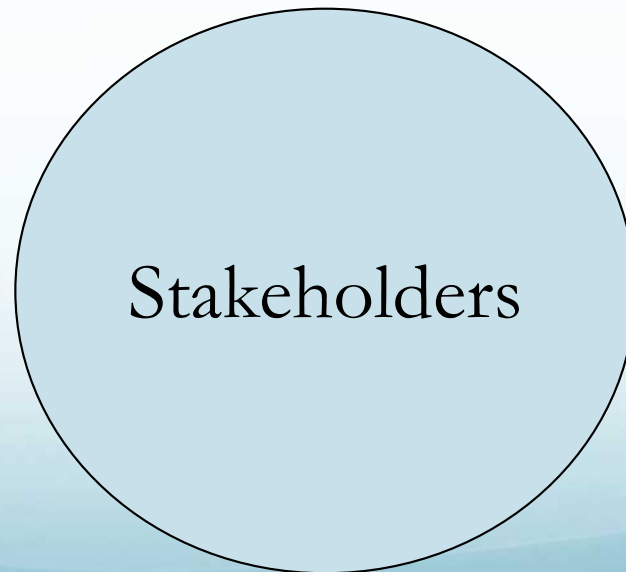
# THE INGREDIENTS FOR COLLABORATIVE MODELING





# STAKEHOLDER-CENTERED APPROACH TO COLLABORATIVE MODELING?

**Stakeholders propose**  
objectives, options/strategies,  
and performance measures

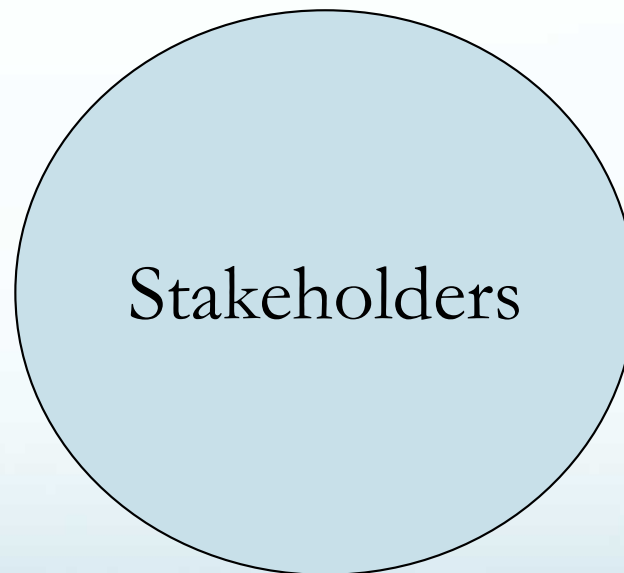


# STAKEHOLDER-CENTERED APPROACH

**Stakeholders propose**  
objectives, options/strategies,  
and performance measures



Model development  
and modification



**Scientists**

# STAKEHOLDER-CENTERED APPROACH

**Stakeholders revise**  
objectives, options/strategies,  
and performance measures

Model development  
and modification

Discuss options  
and performance  
measures

**Stakeholders**

Review  
model results

**Scientists**



# STAKEHOLDER-CENTERED APPROACH

**Stakeholders revise**  
objectives, options/strategies,  
and performance measures

