

Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan



Report and Recommendations
from the
Apalachicola Bay System Initiative
Community Advisory Board

Adopted Unanimously November 29, 2023

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ABBREVIATIONS

ABBREVIATION	DEFINITION
ABS	Apalachicola Bay System
ABSI	Apalachicola Bay System Initiative
ANERR	Apalachicola National Estuarine Research Reserve
CAB	Community Advisory Board (ABSI)
County	Franklin County
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FSU	Florida State University
FSUCML	Florida State University Coastal and Marine Laboratory
FWC	Florida Fish and Wildlife Conservation Commission
NGO	Non-Governmental Organization
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation Service
NFWFMD	Northwest Florida Water Management District
Plan	Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan
PRAB	Partnership for a Resilient Apalachicola Bay (CAB Successor Group)
RCSC	Riparian County Stakeholder Coalition
RPC	Regional Planning Council
SAB	Science Advisory Board (ABSI)
SAV	Submerged Aquatic Vegetation
TNC	The Nature Conservancy
TRIUMPH	Triumph Gulf Coast, Inc.
UF	University of Florida

EXECUTIVE SUMMARY

The Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan (hereafter the ‘Plan’) is a key deliverable of the Apalachicola Bay System Initiative (ABSI), a multidisciplinary effort led by the Florida State University Coastal & Marine Laboratory (FSUCML). ABSI has been supported primarily by a grant from Triumph Gulf Coast, Inc., with contributions from Florida State University [FSU] (\$1.5M cost-share) and The Pew Charitable Trusts. The Plan was developed over the course of nearly four years by a representative group of stakeholders formed into a Community Advisory Board (CAB). The 21 members of the CAB include local government officials as well as representatives from the seafood industry, other local businesses, recreational fishing industry, environmental groups, state agencies and institutions of higher learning.

Plan development by the CAB took place in collaboration with the ABSI scientific leadership team and a professional neutral facilitator (Jeff A. Blair, Facilitated Solutions, LLC) who provided process design and consensus building. The effort first focused on development of restoration and management vision themes, goals, outcomes, objectives and performance measures. A set of strategies for each goal was then developed with relevant performance measures followed by a prioritization exercise for each set of strategies. The themes, goals, outcomes, objectives, and strategies/actions were compiled into a draft restoration and management plan framework. Decision support tools were then used to test support for strategies linked to oyster management and fisheries. Finally, strategies in the plan framework were subjected to rounds of acceptability ranking exercises ultimately producing a Restoration and Management Plan approved by the CAB.

The **Plan** consists of structural elements built around the following five **Goals**:

- **Goal A:** The Apalachicola Bay System is a healthy and productive ecosystem that includes oyster reefs in locations and with oyster abundance as similar to historical conditions as possible and that also supports a vibrant and sustainable oyster fishery and other economically viable activities.
- **Goal B:** The Apalachicola Bay System is a productive, sustainably, and adaptively managed system that supports sustainable oyster resources and ecosystem services such as water quality and wildlife and fisheries habitat.
- **Goal C:** The Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan is supported by the Apalachicola Bay System stakeholders and is fully funded.
- **Goal D:** A productive and well-managed Apalachicola Bay System is supported by an actively engaged and informed stakeholder community and public.
- **Goal E:** The broader Apalachicola Bay Region is thriving economically as a result of a fully restored Apalachicola Bay System.

Each **Goal** has an accompanying **Vision Theme** and defined **Outcome**. Each **Goal** also has a series of **Objectives**. To achieve these **Objectives**, each **Goal** has a series of **Strategies** with associated **Actions** to implement these **Strategies**. **Performance Measures** have been selected to follow progress towards attainment of **Outcomes**.

Goal A focuses on restoration of the ABS ecosystem to promote enhanced ecological and ecosystem services including a sustainable oyster fishery. **Goal B** is more narrowly focused on the establishment through adaptive management of a sustainable oyster fishery in the Bay. It is anticipated that the major end-users of the recommended actions defined in **Goals A and B** would be state agencies charged with implementation of restoration and new management efforts including the Florida Fish and Wildlife Conservation Commission (FWC), Florida Department of Environmental Protection (FDEP) and Florida Department of Agriculture and Consumer Services (FDACS). It is also likely that federal agencies and non-governmental organizations (NGOs) may play a role in these activities. **Goals C, D and E** involve advisory recommendations for the implementation of the restoration and management Plan, outreach and interface with all stakeholders as well a broader economic development issues. It is anticipated that the *Partnership for a Resilient Apalachicola Bay* (CAB Successor Group) will be the primary end-user of these elements of the Plan.

The restoration and management Plan is intended to be adaptive. By this we mean that as chosen strategies and linked actions are implemented, monitoring and an assessment of results will shape the trajectory of future actions. The Plan contains a broad spectrum of suggested strategies, linked actions and performance measures as potential options to be used by stakeholder groups to achieve restoration and management goals.



Figure 1. **Left panel:** Oystermen deploying limerock and shell for ABSI’s 2021 oyster restoration experiment.

Right panel: ABSI technician deploying cages of hatchery oysters for survival and growth studies.

**APALACHICOLA BAY SYSTEM ECOSYSTEM-BASED ADAPTIVE
RESTORATION AND MANAGEMENT PLAN
REPORT AND RECOMMENDATIONS FROM THE APALACHICOLA BAY SYSTEM INITIATIVE
COMMUNITY ADVISORY BOARD**

Franklin County and its Oyster Fishery

Commercial fishing has been the most important economic activity in Franklin County throughout its history. The oyster industry of Apalachicola Bay has historically been a critical economic engine for the county and nearby portions of northern Florida, producing approximately 10% of the oysters harvested in the U.S. and 90% of the oysters harvested in Florida waters. Revenue from oyster harvest accounted for nearly half of Franklin County’s income prior to its decline but was always variable among years (Whitfield and Beaumariage, 1977). Commercially harvested oyster bars produced between 400 to 1,200 bushels/acre/year, depending on rainfall and river flows, hurricanes, red tides, and market demand. Dockside oyster landings ranged from less than 500,000 pounds to over six million pounds in the mid 1980’s (Ednoff, 1984; Edmiston, 2008). Unfortunately, the harvest collapsed (Fig. 2), despite increased fishing effort, and was declared a Federal Fisheries Disaster in 2013. Harvest continued until 2020, when the FWC implemented a 5-year fishery closure (FWC, 2020) to allow oyster populations to recover.

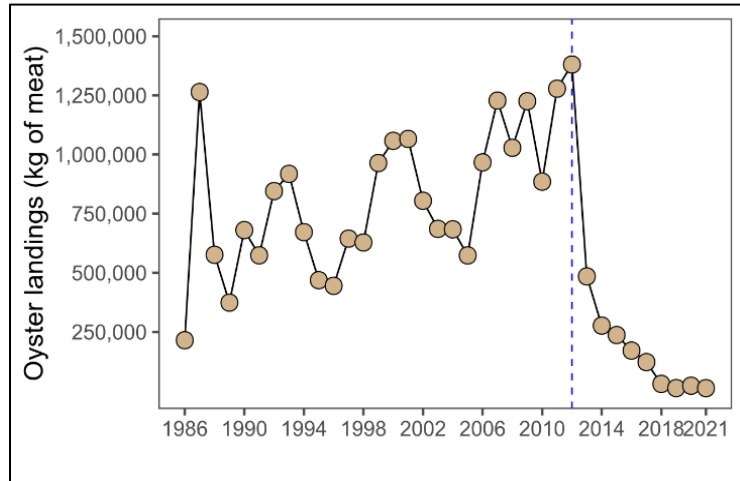


Figure 2. Apalachicola Bay Oyster Landings from 1996 to 2021. Data from the Commercial Fisheries Landings in Florida database compiled by the Florida Fish and Wildlife Conservation Commission¹ (FWC).

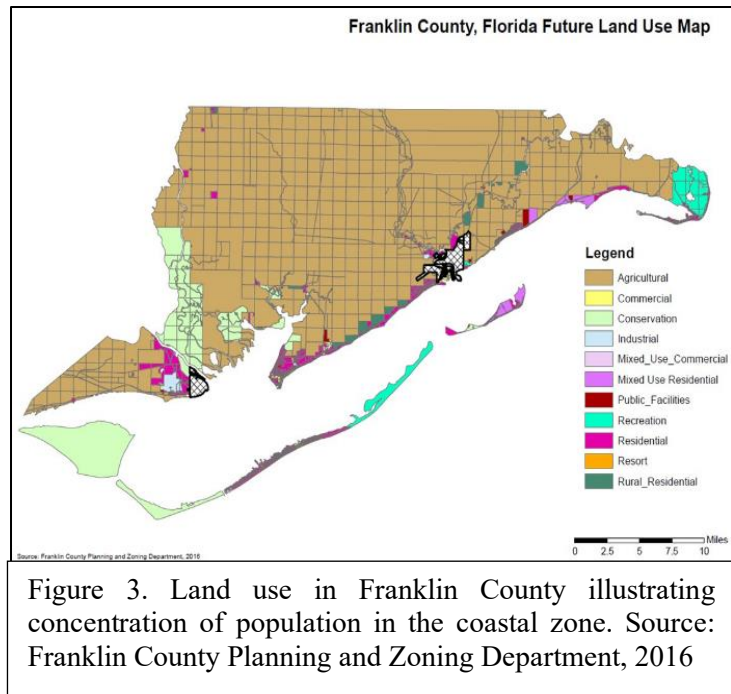
The commercial fishing industry in Apalachicola Bay is an important economic engine for Franklin County and the surrounding region. It is estimated to have been responsible for \$134 million in annual economic output before its decline and closure, with an additional \$71 million in value-added benefits (Edmiston, 2008). Of this, the oyster industry supplied as much as \$30 million of economic benefits annually. In 2006, Franklin County reported oyster catches totaling 2,127,044 pounds, finfish catches totaling 1,813,240 pounds, and shrimp landings totaling 1,272,660 pounds (Commercial Fisheries Landings in Florida).¹

The most recent annual estimate of economic contributions of marine commercial fishing in Franklin County from direct and indirect sources is more than \$18 million for 2019 (Camp et al. 2021a). It is estimated that between 60 and 85 percent of Franklin County residents made their living directly or indirectly from the fishing industry (Rockwood, 1977). The Bay supported a

¹ <https://myfwc.com/research/saltwater/fishstats/commercial-fisheries/landings-in-florida/>

diverse fishing industry beyond oyster production. While the oyster industry employs more people, the shrimp fishery generates more economic value (Cato, 1977). Shrimp landings typically average between two and five million pounds annually and include both bay and offshore harvests. On July 1, 1995, Florida implemented a constitutional amendment closing State waters to commercial fishing with entanglement nets (gill nets), limiting harvest of estuarine finfish to recreational fishers. Recreational saltwater fishing in Apalachicola Bay is an important economic driver for the region, annually contributing over \$150 million to the local economy and supporting an estimated 1,960 jobs (Edmiston, 2008). The most recent estimate of economic contributions of all marine recreational fishing trips from Franklin County in 2019 alone was greater than \$68.6 million (Camp et al 2021b). Apalachicola also supports a blue crab fishery, although historically smaller than oysters or shrimp, it is an important contributor to the local economy.

Franklin County, which surrounds most of Apalachicola Bay, is among the least populated counties in the state with 12,729 people in 2022 (BEBR, 2022). Per capita income in the County in 2021 was \$26,933, compared to \$35,216 for the state of Florida. Approximately 21% of the individuals earned below the poverty level, compared to 13.1% for Florida (US Census Bureau, 2023). Historically, over 65 percent of the Franklin County work force were employed by the commercial fishing industry (Edmiston, 2008). Franklin County is predominantly rural with 96 percent of the total county area zoned for agriculture (primarily forestry) or conservation lands (Fig. 3). Much of the agriculture and conservation lands are also wetlands. Approximately 80% of the county's lands are in public ownership. Most Franklin County residents live along the coast, leaving the northern and interior portion of the county sparsely populated. There were 309 total employer establishments identified by the US Census Bureau in 2021.



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Apalachicola Bay System Initiative

As the Apalachicola Bay oyster collapse unfolded, leaders at the Florida State University Coastal & Marine Laboratory (FSUCML) and FSU’s Office of the Vice President for Research concluded that the University could play a key role in addressing issues relating to the deterioration of the Bay ecosystem. Senior Research Faculty Dr. Sandra Brooke, FSUCML Director Dr. Felicia Coleman, Vice President for Research Dr. Gary Ostrander and Associate Vice President for Research Dr. W. Ross Ellington prepared and submitted a preproposal to Triumph Gulf Coast, Inc. in November of 2017 briefly outlining a program of research, restoration and management plan development, and outreach. The effort, called the Apalachicola Bay System Initiative (ABSI), was formalized in a major proposal submitted to Triumph Gulf Coast, Inc. in the late spring of 2018. A favorable review and subsequent negotiations led to the awarding of a grant on March 15, 2019. The period of support from Triumph Gulf Coast, Inc. extends to June 30, 2024. The report contained in this document constitutes one of the deliverables of the ABSI effort. We first will describe ABSI and the processes that led to the recommendations in this report.

The primary area of interest for this effort is the Apalachicola Bay System (ABS), which consists of six bays (Apalachicola Bay, East Bay, Saint Vincent Sound, East and West Saint George Sound and Alligator Harbor; Fig. 3) comprising a total of 155,374 acres (62,879 Ha). Oyster population decline and fishery collapse in this study area was linked to decades of contested water management challenges that



Figure 4. Map of the ABSI study area

led the American Rivers organization to designate the Apalachicola-Chattahoochee-Flint (ACF) River Basin as America's #1 most endangered river system in 2016 (https://americanrivers.org/wp-content/uploads/2016/02/MER2016_FullReport.pdf).

Tremendous focus has been placed on recovering historical freshwater input as a solution to ecosystem decline. While freshwater inflow to the estuary is important, it is only one of several forces influencing the success or failure of oysters in Apalachicola Bay: harvesting, climate, habitat, recruitment and survival all impact oyster populations. The ABSI has evaluated the influence of these and other factors on oyster reefs and their communities, and through the CAB, have generated a series of management tools, and identified alternatives for restoration and management of the ABS.

The ABSI project was built on a foundation of prior and on-going work conducted by several entities including FSU, FWC, Florida Fish and Wildlife Research Institute (FWRI), University of Florida (UF), University of South Florida (USF), Apalachicola National Estuarine Research Reserve (ANERR), the Florida DEP, the Florida DACS and The Nature Conservancy (TNC). Over the past four years the ABSI science team has produced an extensive body of research into various aspects of the biology, ecology and geochemistry of the ABS, including a series of experiments to evaluate restoration approaches. The ABSI project annual reports summarize the research and outreach accomplishments and can be found on the FSUCML ABSI website²

Apalachicola Bay System Initiative Mission Statement

ABSI seeks to gain insight into the root causes of decline of the Bay's ecosystem and the deterioration of oyster reefs and understand why they haven't recovered despite significant restoration efforts. Ultimately, the ABSI will develop a restoration and management Plan for the oyster reefs and the health of the Bay.

Project Statement

The overall ABSI effort aims to undertake a series of scientific approaches intended to aid in the development of an ecosystem-based oyster management and restoration plan (hereafter referred to as the Plan) for the Apalachicola Bay System. The Plan is informed by science while involving representative stakeholders and the public in its creation, development, and potential implementation by state and federal management agencies. Developing such a plan will help the state agencies responsible for marine resources improve the overall health and the rich biological diversity of the Bay, including ecologically and economically important species. Because oyster populations are declining in estuaries across the Florida panhandle, ABSI project leads have worked with scientific, non-profit, and governmental entities working on similar issues throughout this region to develop consistent oyster management recommendations.

The vitality of Apalachicola Bay is key to the socio-economic prosperity of Franklin County and the surrounding area. The decline of oyster habitat and loss of harvestable oysters has resulted in loss of employment in the seafood industry and reduced economic security for many Franklin County residents whose livelihoods are tied to the Bay.

² <https://marinelab.fsu.edu/absi/about-absi/>

ABSI's Overarching Goals

- Understand why the Apalachicola Bay oyster populations declined, why they have not recovered, and identify restoration approaches that will inform larger efforts.
- Determine whether loss of oyster populations is causing a decline in overall ecosystem health.
- Work with local stakeholders to develop an ecosystem-based adaptive restoration and management plan (the Plan) for Apalachicola Bay.

Purpose of the Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan

The purpose of the Plan is to provide the roadmap for restoration of the Bay ecosystem and its services as well as the re-establishment and management of a sustainable wild oyster fishery. The Plan is a suite of options intended for use by state and federal agencies and NGOs implementing restoration and subsequent resource management. A critical component of the Plan is the role of a local stakeholder group that will replace the existing CAB and will monitor progress in implementation of adaptive management for the ABS and serve as a conduit for bidirectional information flow for all stakeholders.

Plan Development Leadership, Partners, and Participant Groups

ABSI Leadership

- Principal Investigator: Dr. Sandra Brooke, Senior Research Faculty, FSUCML, FSU
- Co-Principal Investigator: Dr. Felicia Coleman (2019-2020) Director of FSUCML; Dr. Joel Trexler (2021-present), Director of FSUCML and Professor of Biological Science, FSU
- Collaborator, Dr. W. Ross Ellington, Professor Emeritus of Biological Science, FSU

Facilitated Solutions, LLC

Jeff Blair, with Facilitated Solutions, LLC, provides independent third-party neutral facilitation for the ABSI Community Advisory Board. Jeff designed the Consensus Solutions Process (see below) used by the CAB and led the Assessment Process that included interviewing stakeholders and providing recommendations for CAB membership and representation.

Plan Technical Partner

- Dr. Ed Camp, Assistant Professor of Fisheries and Aquaculture Governance, School of Forest Resources and Conservation, University of Florida. Dr. Camp has played a critical role in the development of decision support tools used in evaluating the suite of potential management strategies and actions.

Community Advisory Board

A key component of the ABSI project is to involve stakeholders in a meaningful consensus building process for development of an ecosystem-based restoration and management plan. This is accomplished through the CAB, assembled by ABSI, and tasked with providing input into that initiative. The 21 members of the CAB include local government officials as well as representatives from the seafood industry, commercial and recreational fishing industry and environmental groups.

- List of past and current members is found in Appendix A.
- List of CAB meetings is found in Table 1 with links to meeting reports.
- Assisting the CAB are three subcommittees: Outreach Subcommittee (Appendix B), CAB Successor Group Subcommittee (Appendix C) and Restoration Funding Working Group (Appendix D).

The Role of the Community Advisory Board in Plan Development

The overarching goal of the ABSI-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 ABS, and to ensure there is a reliable mechanism and process for the monitoring, funding, and implementation of the Plan.

A critical component of the Plan is oyster reef restoration with full consideration of factors affecting the biology, ecology, and sustainable management of the resource. Restoration related actions, as indicated above, should be informed by the best available science and shared stakeholder values, that in turn, result in an economically viable, healthy, and sustainable ABS.

The process is designed so that members can explore and evaluate oyster fishery practices and management options, and restoration policies in the ABS. The CAB's consensus recommendations, in the form of the Plan, will be delivered to the ABSI Project Team and directed to natural resource managers and environmental regulators, and other agencies/entities as appropriate.

Overall Scope of Effort of the CAB in Development of the Plan

The CAB met 28 times over the course of nearly four years (Table 1 shows the chronology of these meetings). A consensus process was used to achieve objectives at each meeting (next section will describe in detail the **Process**). The effort first focused on development of management and restoration vision themes, goals, outcomes, objectives, and performance measures. A set of strategies for each goal was then developed with relevant performance measures followed by a prioritization exercise for each set of strategies. The themes, goals, outcomes, objectives, and strategies/actions were assembled into a draft restoration and management plan framework. Decision support tools were then used to test support for strategies linked to oyster management and fisheries. Finally, strategies in the plan framework were subjected to rounds of acceptability ranking exercises ultimately producing an approved draft Restoration and Management Plan.

Table 1: Chronology of CAB development of the Apalachicola Bay Ecosystem-Based Adaptive Restoration and Management Plan by Meeting [Summary reports for each meeting can be found on this link <https://marinelab.fsu.edu/absi/cab/documents/>]

DATE	ACTIVITY
PHASE I (2019)	
Oct. 20, 2019	Organizational and Procedural.
Dec. 18, 2019	Development of vision themes, goals, outcomes, objectives, and performance measures.
PHASE II (2020)	
Jan. 8, 2020	Development of vision themes, goals, outcomes, objectives, and performance measures.
March 11, 2020	Development of vision themes, goals, outcomes, objectives, and performance measures.
May 22, 2020	Development of strategies/actions to achieve goals and relevant performance measures.
July 16, 2020	Development of strategies/actions to achieve goals and relevant performance measures.
Sept. 9, 2020	Development of strategies/actions to achieve goals and relevant performance measures.
October 15, 2020	Development of strategies/actions to achieve goals and relevant performance measures.
Nov. 12, 2020	Development of strategies/actions to achieve goals and relevant performance measures.
PHASE III (2021)	
Jan. 13, 2021	Prioritization of strategies to achieve goals.
Feb. 24, 2021	Prioritization of strategies to achieve goals.
April 21, 2021	Review and approve revisions to draft restoration and management plan framework.
June 16, 2021	Review and approve revisions to draft restoration and management plan framework.
August 14, 2021	Review and approve revisions to draft restoration and management plan framework.
October 19, 2021	Review and approve revisions to draft restoration and management plan framework.
Nov. 16, 2021	Review and approve revisions to draft restoration and management plan framework.
PHASE IV (2022)	
Jan. 26, 2022	Plan development using plan framework- process
March 30, 2022	Plan development using plan framework- fisheries and management modeling scenarios as decision support tools.
May 25, 2022	Plan development using plan framework- fisheries and management modeling scenarios as decision support tools.
July 27, 2022	Plan development using plan framework- fisheries and management modeling scenarios as decision support tools.

October 18, 2022	Plan development using plan framework- fisheries and management modeling scenarios as decision support tools.
Nov. 30, 2022	Plan development using plan framework- fisheries and management modeling scenarios as decision support tools.
PHASE V (2023)	
Feb. 1, 2023	Plan development using plan framework- fisheries and management modeling scenarios as decision support tools.
April 12, 2023	Acceptability ranking of strategies.
May 31, 2023	Acceptability ranking of strategies.
August 9, 2023	Acceptability ranking of strategies and final approval of draft Apalachicola Bay Ecosystem-Based Adaptive Restoration and Management Plan.
Sept. 27, 2023	Approval of the CAB Report format and <i>Draft Report and Recommendations for the Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan.</i>
Nov. 29, 2023	Adoption of the Final Draft CAB Report and Recommendations <i>for the Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan.</i>

Consensus Development Process

The ABSI-CAB sought consensus on its recommendations for options to be evaluated using the best available science and decision-support tools for management and restoration of the ABS. The Process and procedure for consensus development were adopted by the Board on October 30, 2019.

General consensus is a participatory process whereby, on matters of substance, the members strive for agreements which all of the members can accept, support, live with or agree not to oppose (Fig 5) . 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. This super majority decision rule underscores the importance of actively developing consensus throughout the process on substantive issues with the participation of all members and which all can live with.

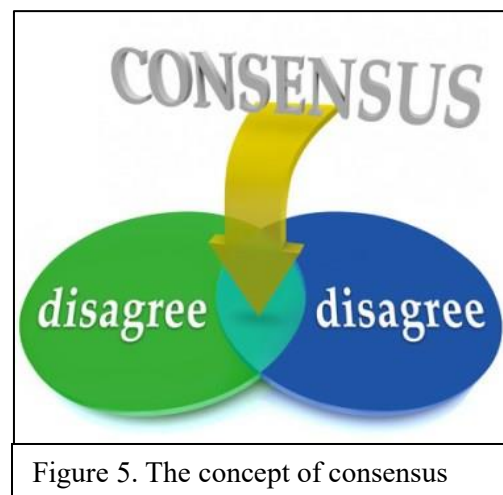


Figure 5. The concept of consensus

The CAB developed its recommendations using consensus-building techniques with the assistance of the facilitator. Techniques such as brainstorming, ranking, and prioritizing approaches were utilized. The CAB’s consensus process was conducted as a neutrally facilitated consensus-building process. CAB members, project staff, and the facilitator were the only participants seated at the table. Only CAB members participated in discussions and voted on proposals and recommendations. Since a majority of the recommendations within the Plan will be provided to

FWC, FWC personnel seated on the CAB abstained from all voting procedures. Throughout the process, the Project Leadership Team and CAB members were provided opportunities to request specific clarification from members of the public in order to assist the CAB in understanding an issue. Observers/members of the public were welcome to speak during the public comment periods provided at each meeting, and all comments submitted in writing were included in the next meeting's facilitator's summary report.

Acceptability Ranking Process

The final series of CAB meetings involved acceptability ranking of the adopted Plan strategies using the evaluation worksheet. A portion of the evaluation worksheet for the August 9, 2023 CAB meeting can be found in Appendix E. During the meetings, CAB members were asked to develop and rank strategies (options/scenarios) using a 4-Point acceptability ranking scale. This process was consistent with the Consensus Building Procedures unanimously adopted by the CAB October 30, 2019. Once ranked for acceptability, strategies with a ≥ 3.0 average ranking (75%) were considered preliminary consensus recommendations for inclusion in the package of recommendations for the Plan.

This was an iterative process, and strategies were reevaluated and re-ranked multiple times at the request of any CAB member. The status of a ranked strategy was not final until the final CAB meeting, when a vote was taken on the entire package of consensus ranked recommendations to the FSUCML. The CAB finalized their recommendations for the Plan at the November 29, 2023 meeting.

CAB members were requested to be prepared to state their minor and major reservations when asked, and to offer proposed refinements to the strategy to address their concerns. If a CAB member was not able to offer refinements to make the strategy acceptable (4) or acceptable with minor reservations (3) they were advised to rank the strategy with a 1 (not acceptable).

The following scale was utilized for the ranking exercises:

ACCEPTABILITY RANKING SCALE	<i>4 = Acceptable, I agree</i>	<i>3 = Acceptable, I agree with minor reservations</i>	<i>2 = Not Acceptable, I don't agree unless major reservations addressed</i>	<i>1 = Not Acceptable</i>
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CRITERIA TO CONSIDER FOR PROPOSING AND EVALUATING STRATEGIES AND RECOMMENDATIONS	
CRITERIA	EXPLANATION
IMPORTANCE	Is this proposed strategy and associated actions critically important to achieving the goals of the Adaptive Restoration and Management Plan?
TIMELY	Will things get worse if the proposed strategy and associated actions are not implemented?
FEASIBLE/ PRACTICAL	Is it likely that the proposed strategy and associated actions will be successful in achieving the relevant goals of the Adaptive Restoration and Management Plan?
RESOURCES	Are there resources available, or likely to become available for implementing the proposed strategy and associated actions? Is implementation cost effective?
COMMITMENT	Is there commitment from the stakeholders and regulators regarding implementation of the proposed strategy and associated actions?

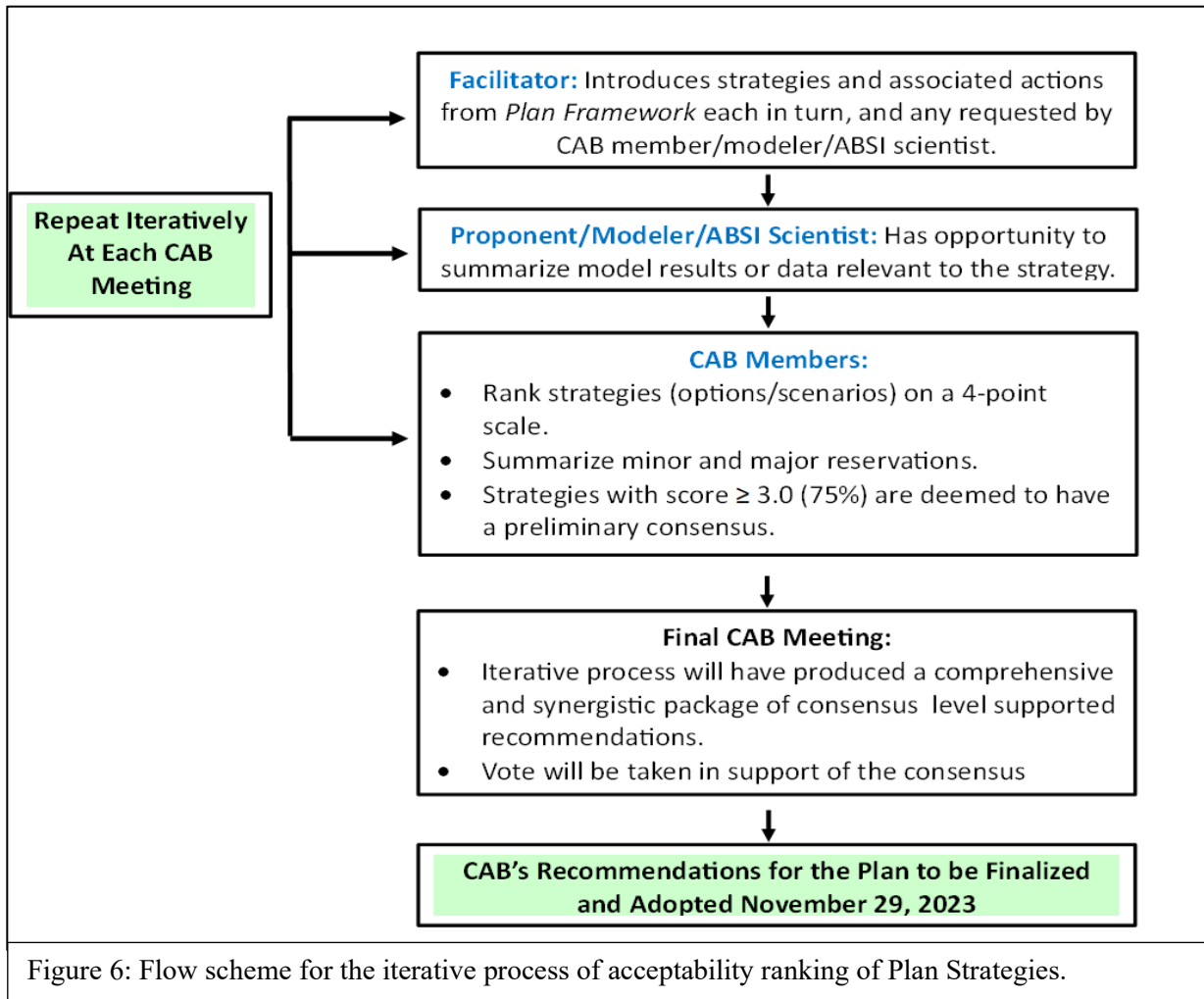
Process Design and Facilitation

The *Strategies Acceptability Ranking Exercise Process* and the *Consensus Solutions Process* (Fig. 6) was designed by Jeff A. Blair of Facilitated Solutions, LLC. In addition, CAB meetings and community workshops were facilitated and reported on by Jeff A. Blair (Facilitated Solutions³).

An overview of the Consensus Solutions Process follows:

- Facilitator introduced each strategy and associated actions from the *Plan Framework* in turn.
- Proponent, Modeler, and/or ABSI Scientists as appropriate were offered an opportunity to provide a summary of the results of modeling or experimental data results relevant to the strategy as appropriate.
- CAB members were offered an opportunity to ask clarifying questions.
- The strategies and associated actions were ranked, each in turn using the 4-Point Acceptability Ranking Scale.
- CAB members were provided the opportunity to briefly summarize their minor and major reservations.
- Strategies and associated actions that achieved a ranking score of ≥ 3.0 (75%) were deemed to have a preliminary consensus level of support and would be further evaluated as appropriate.
- Strategies and associated actions could be refined to enhance support across stakeholder interests.
- This process was repeated iteratively during each CAB meeting until a comprehensive and synergistic package of recommendations achieved a consensus level of support.
- The only vote was taken at the end of the last meeting in support of the consensus package of recommendations. A 75% or greater level of support was required for consensus.
- All ranking results were preliminary until the vote was taken at the conclusion of the final meeting.

³ <http://facilitatedsolutions.org>



Input From Other Stakeholder Groups in Plan Development

Input and feedback from various stakeholder groups was critical in development of the Plan. Four workshops were held with oystermen from the local region (see Appendix F for list of workshops and links to workshop summary reports). Three community workshops were held (see Appendix G for list of workshops and links to workshop summary reports). In addition, a broad spectrum of outreach vehicles was employed including meetings with elected government bodies, op-ed pieces, TV and radio interviews, presence at local events and one-on-one meetings with stakeholders (see Appendices H and I for representative listings).

Structure of the Adaptive Restoration and Management Plan

The **Plan** consists of structural elements built around the following five **Goals**:

- **Goal A:** The Apalachicola Bay System is a healthy and productive ecosystem that includes oyster reefs in locations and with oyster abundance as similar to historical conditions as possible and that supports a vibrant and sustainable oyster fishery and other economically viable activities.

- **Goal B:** The Apalachicola Bay System is a productive, sustainably, and adaptively managed system that supports sustainable oyster resources and ecosystem services such as water quality and wildlife and fisheries habitat.
- **Goal C:** The Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan is supported by the Apalachicola Bay System stakeholders and is fully funded.
- **Goal D:** A productive and well-managed Apalachicola Bay System is supported by an actively engaged and informed stakeholder community and public.
- **Goal E:** The broader Apalachicola Bay Region is thriving economically as a result of a fully restored Apalachicola Bay System.

Each **Goal** has an accompanying **Vision Theme** and defined **Outcome**. Each **Goal** also has a series of **Objectives**. To achieve these **Objectives**, each **Goal** has a series of **Strategies** with associated **Actions** to implement these **Strategies**. **Performance Measures** to follow progress towards attainment of **Outcomes** are described after the Goals A-E narrative.

Prospective End-Users of the Plan

Goal A focuses on restoration of the ABS ecosystem to promote enhanced ecological and ecosystem services including a sustainable oyster fishery. **Goal B** is more narrowly focused on the establishment through adaptive management of a sustainable oyster fisheries in the Bay. It is anticipated that the major end-users of the elements and recommended actions defined in **Goals A and B** would be State of Florida agencies charged with implementation of restoration and management efforts including the FWC, FDEP and FDACS. It is also likely that federal agencies and NGOs may play a role in these activities. **Goals C, D and E** involve advisory recommendations for the implementation of the restoration and management Plan, outreach and interface with all stakeholders as well a broader economic development issues. It is anticipated that the *Partnership for a Resilient Apalachicola Bay* will be the primary end-user of these elements of the Plan.

Goal A: A Healthy and Productive Bay Ecosystem

Vision Theme A: The Apalachicola Bay System, including its oyster reef resources, is sustainably managed. Water resources and affected habitats are afforded adequate protection to ensure that essential ecosystem functions are maintained, and a full suite of economic opportunities are realized.

Goal A: The Apalachicola Bay System is a healthy and productive ecosystem that includes oyster reefs in locations and with oyster abundance as similar to historical conditions as possible and that supports a vibrant and sustainable oyster fishery and other economically viable activities.

Outcome: By 2030, the Apalachicola Bay System is a healthy, productive, and sustainably managed ecosystem that supports a viable oyster fishery while providing a broad suite of ecosystem services that, in turn, afford additional opportunities for sustainable economic development.

Goal A Objectives

A1) To define measurable ecosystem health metrics (e.g., oyster population demographics, condition indices, reef associated community, water quality, nutrient levels, submerged aquatic vegetation, fish and wildlife populations) that can be used to quantify ecosystem services and determine the effects of change on ecosystem functions (e.g., oyster fishery harvest, habitat for other fishery species, filtration capacity) and societal benefit derived from ABS management and restoration efforts, with target and threshold levels identified.

A2) To help establish a comprehensive monitoring plan to evaluate the health of the oysters and the ABS ecosystem and its measurable ecological functions and ecosystem services with clearly defined performance measures and strong coordination among the various entities conducting research, scientific monitoring, and restoration in the region.

A3) To use observations, monitoring, experiments, and modeling to create decision support tools that can inform how a range of natural and human influenced factors will affect the ABS ecosystem.

A4) To use decision support tools to identify viable strategies for restoration and management of the ABS oyster communities and the function of the ABS ecosystem.

Table 2: Goal A — Ecosystem Restoration Prioritized Strategies

STRATEGIES (7)	ACTIONS (33)
<p>A1) Establish bay-wide metrics of ecosystem health to monitor the status of the ABS, including oyster habitat, and establish targets and thresholds that can be used to sustainably restore and manage oyster habitat and the ABS ecosystem.</p>	<p>Action 1-A) Restore and create reef structures suitable in size, location, height, and substrate type that can support a healthy and sustainable oyster ecosystem.</p> <p>Action 1-B) Obtain data at a Bay-wide scale to develop system-wide ecosystem-based metrics</p>

	<p>and models that will inform restoration and adaptive management decisions.</p> <p>Action 1-C) Design and implement projects to achieve multiple ecological and ecosystem service targets (e.g., provision of habitat for reef-associated species, water filtration, shoreline protection).</p> <p>Action 1-D) Implement oyster population enhancement studies to complement cultching for restoration.</p> <p>Action 1-E) Establish performance measures and ecosystem service targets that can be used to guide restoration planning, implementation, and monitoring of restoration progress.</p> <p>Action 1-F) Use habitat suitability analyses and results from oyster larval dispersal models to select optimal locations for restoring, enhancing, and/or developing new reef structures.</p> <p>Action 1-G) Continue conducting restoration experiments to test efficacy of different reef structural designs (e.g., reef dimensions, orientation, shape and/or rugosity.)</p> <p>Action 1-H) Continue using knowledge gained from experiments to recommend best practices for broad scale restoration in the ABS.</p>
<p>A2) Incorporate stakeholder knowledge and experience to help identify suitable substrate(s) (e.g., limestone, concrete, spat-on-shell, artificial structures) and the best locations for restoring, enhancing, and/or developing new reef structures.</p>	<p>Action 2-A) Include oystermen in discussions to evaluate cultching techniques and materials for growing oysters (e.g., historical non-traditional, trees), adding spat on shell or other substrates.</p> <p>Action 2-B) Include oystermen in discussions on spatial configuration of reefs (e.g., height, width, contours) locations (existing reefs and hard bottom), use of larger rock to create stability and protect restored reefs from siltation and sedimentation from prevailing currents and storms.</p> <p>Action 2-C) Include oystermen on material deployment projects for reef restoration to ensure material is deployed correctly and in appropriate locations.</p>
<p>A3) Determine area (acres or km²) of oyster reefs that currently support live oysters as well as the area needed to ensure sufficient spat</p>	<p>Action 3-A) Continue to update maps of existing oyster habitat using multibeam sonar and backscatter, and ground-truth for accuracy, on a timeframe determined by speed of</p>

<p>production that will support development of sustainable oyster populations.</p>	<p>environmental change (e.g., update mapping of the Bay every five years if data indicate detectable changes are occurring on this scale). Action 3-B) Continue to collect data to support estimates of oyster reef areas that support live oysters. Action 3-C) Use ecological modeling that incorporates reproductive output, recruitment (includes reef carrying capacity), natural mortality rates and fishery harvest to assess oyster population dynamics. Action 3-D) Study and incorporate into planning efforts the connectivity of shoreline (intertidal) oyster habitat with subtidal oyster reefs (e.g., larval transport modeling) when and where applicable.</p>
<p>A4) Identify monitoring needs for assessing the health of oyster populations and detecting changes in environmental conditions and habitat quality (for oysters and other reef-associated species) over time.</p>	<p>Action 4-A) Monitor intertidal and subtidal reef/habitat using protocols and frequencies consistent with existing monitoring. Adjust and add to monitoring program as needed to sufficiently assess oyster habitat and populations. After checking data accuracy, post updated monitoring data on a regular basis on an accessible public website. Action 4-B) Conduct rapid ‘spot-checks’ (e.g., using tong surveys) at a sufficient number of different locations in the Bay to supplement the site-level monitoring. Sufficient number of sites to be determined by statistical analysis of existing data. Document volume of material (rock/shell/oysters), abundance and size of live and box oysters (dead oyster with valves and hinge intact), abundance and type of predator and environmental data. Action 4-C) Continue and expand sites for collecting long-term in situ environmental data (e.g., conductivity, pH, and temperature) and integrate ANERR environmental and nutrient data (e.g., Total Carbon, Nitrogen, and Phosphorus) as correlated with oyster metrics. Action 4-D) Generate habitat condition indicators using monitoring data, and other ecological factors (e.g., oyster-associated communities and structural complexity). Action 4-E) Evaluate the impacts of anthropogenic (human) nutrient loading and</p>

	<p>pollutants to oyster resources and the Bay ecosystem.</p> <p>Action 4-F) Use data to evaluate status of oyster populations, oyster ecosystem health and quality of ecosystem services.</p> <p>Action 4-G) Integrate ecosystem services metrics into a monitoring and adaptive management program to assess ecosystem recovery progress.</p>
<p>A5) Use and update recently developed ecosystem models that forecast future environmental conditions and oyster population status for restoration and management strategies and decisions.</p>	<p>Action 5-A) Ensure data collected for use in ecosystem modeling are entered, receive data quality checks, and are made available to the public in an accessible online format.</p> <p>Action 5-B) Incorporate existing data to forecast acceptable future environmental scenarios (or forecasts) and analyze potential effects on oyster populations and ecosystem-level services and habitat metrics (targets).</p> <p>Action 5-C) Coordinate with appropriate state and federal agencies, out-of-state user groups, and other initiatives working on both geographically constrained and basin-wide water-flow alterations and management strategies that affect the health of the ABS.</p> <p>Action 5-D) Use models to identify potential oyster restoration areas that could be used as protected spawning reefs to enhance recruitment and productivity of other reefs in the ABS.</p>
<p>A6) Conserve and/or restore Bay (landscape) habitat (i.e., Submerged aquatic vegetation (SAV) including seagrass, and wetland and riparian habitat) to work synergistically with oyster habitat restoration to enhance restoration of the ABS.</p>	<p>Action 6-A) Develop restoration projects in the Bay that work toward meeting the ecosystem-level metrics for the Bay.</p> <p>Action 6-B) Monitor and model changes to foundational habitat (e.g., SAV, mangroves, salt marsh grasses) for identifying restoration and management priorities.</p>
<p>A7) Develop criteria for restoring specific reefs or reef systems that are resilient to adverse environmental conditions or natural disasters and incorporate adaptive management actions into the Plan, as appropriate.</p>	<p>Action 7-A) Restore and manage oyster habitat and reefs that are resilient to adverse environmental conditions, episodic events, or natural disasters and incorporate adaptive management actions into the Plan, as appropriate.</p> <p>Action 7-B) Develop and incorporate metrics established elsewhere in the Plan for monitoring and evaluating the degree of damage and potential for recovery.</p>

	<p>Action 7-C) Develop an approach for mitigating damage (e.g., physical repair, spat supplements, or some combination of both).</p> <p>Action 7-D) Determine periodicity of hatchery-produced spat addition (e.g., annually, or longer) with a specific timeline for continuing the approach. This approach is not intended to create a put-and-take fishery.</p> <p>Action 7-E) Apply projected climate scenarios to larval dispersal and habitat suitability models to identify target areas for restoration that will persist under future conditions (i.e., increased temperature, extreme weather, sea level rise).</p>
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Goal B: Sustainable Management of Oyster Resources

Vision Theme B: A restored Apalachicola Bay System has resulted in a sustainably managed and adequately enforced wild harvest oyster fishery while also providing opportunities for other economically viable and complementary industries, including tourism and aquaculture. This is accomplished by working collaboratively with stakeholders to create, monitor and fund a plan that ensures that the protection of the habitat and the fishery it supports is informed by science, stakeholder input, and industry experience, and is implemented in a manner that provides both fair and equitable access to and protection of the resource.

Goal B: The Apalachicola Bay System is a productive, sustainably, and adaptively managed system that supports sustainable oyster resources and ecosystem services such as water quality and wildlife and fisheries habitat.

Outcome: By 2030, an engaged and collaborative group of stakeholders will have contributed to and helped spearhead a fully funded science-driven plan to sustainably manage oyster resources in the Apalachicola Bay System.

Goal B Objectives

B1) Using strategies and actions identified in this document (the Plan), develop a separate science-based oyster recovery and adaptive management plan through a transparent and inclusive process involving both commercial and recreational industries and includes: broad stakeholder and community support; a long-term, comprehensive monitoring plan that will be provided to, with the goal of implementation by, state agencies and their contractors; a regulatory framework that allows for rapid modifications when needed to address changing environmental conditions; and enforceable regulations that contain penalties sufficient to deter violations and harm to the resource. This Plan must be constructed with the direct involvement of entities within the State of Florida (e.g., FWC, FDACS, State Legislature) in cooperation with other relevant agencies to enhance the likelihood of consideration for implementation.

B2) To evaluate oyster aquaculture best-management practices that allow for the unimpeded recovery of oyster’s reefs, the oyster fishery, and the ecological and societal health of the ABS ecosystem while providing economic opportunities to the aquaculture industry.

Table 3: Goal B — Prioritized Strategies for Sustainable Management of Oyster Resources

STRATEGIES (9)	ACTIONS (40)
B1) Evaluate a suite of management approaches that in combination achieve the goal of maintaining a sustainable wild oyster fishery as measured in relation to performance metrics for determining success identified in Goal A of the Plan.	Action 1-A) Evaluate the potential for a limited-entry oyster fishery that would be managed adaptively based on an adopted sustainable harvest level through a transparent representative stakeholder driven consensus-building process that includes vetting the plan

	<p>with local oystermen and FWC law enforcement.</p> <p>Action 1-B) Consider implementation of a Bay-wide summer (June – August) wild-harvest fishery closure.</p> <p>Action 1-C) Consider daily harvest limits in conjunction with a Monday – Friday five-day harvest week.</p> <p>Action 1-D) Consider a recreational wild oyster harvest limit (e.g., the hand-harvesting of only one 5-gallon bucket of oysters) and allow recreational hand-harvesting during the same season the fishery is open to commercial harvest.</p> <p>Action 1-E) Evaluate managing harvest areas to prevent the concentration of effort in locations by allowing all the legal and approved (by FDACS) harvest areas of the Bay to be open during the harvest season and harvesting hours (Action 1-B and 1-C above).</p> <p>Action 1-F) Evaluate existing allowable and minimally destructive alternative gear type options and harvest methods, including the use of experimental gear for wild oyster harvesting.</p>
<p>B2) Develop specific criteria and/or conditions, with related performance measures from Goal A for the reopening and closing of Apalachicola Bay to limited wild oyster harvesting.</p>	<p>Action 2-A) Use the best available science and decision-support tools to develop criteria for opening and closing wild oyster harvest and for determining sustainable harvest before the harvest season and during the harvest season in conjunction with the annual stock assessments and frequent monitoring.</p> <p>Action 2-B) Select a reasonable but conservative starting target for reopening the fishery and adjust (through adaptive management) the allowable harvest based on monitoring and oyster population analysis (e.g., stock assessments).</p> <p>Action 2-C) Ensure that definitions of oyster population health are based on metrics/criteria specific to the resource in addition to the fishery.</p> <p>Action 2-D) Evaluate harvest-level or oyster population-based metrics used to manage oyster reef harvest at sustainable target levels and above threshold levels. Consider</p>

	<p>graduated metrics that serve as targets, or indicators when harvest should be limited or closed. This should be applied by area or reef data allows.</p> <p>Action 2-E) Consider temporary wild harvest closures based on the results of oyster population monitoring relative to the established metrics.</p> <p>Action 2-F) Add a spatial component to the ecological and fishery modeling to approximate historical and existing reefs and reassess management strategies based on the evaluation of modeling scenarios.</p>
<p>B3) Conduct an oyster stock assessment for the Apalachicola Bay System with periodic updates.</p>	<p>Action 3-A) Conduct annual or biannual stock assessments using fisheries dependent and independent data, with data collection methods and site selection done in collaboration with oystermen, for determining a sustainable level of wild oyster harvest for each season.</p> <p>Action 3-B) Conduct monitoring (i.e., spot-checks) of oyster abundance during the fishing season to facilitate adaptive management of harvest limits.</p>
<p>B4) Recommend FWC Law Enforcement review enforcement strategies and penalties to assure sufficient deterrence of harvest or sale of undersized oysters, violations that harm wild or leased oyster reefs and other natural resources, and other matter that hinder restoration efforts in the ABS.</p>	<p>Action 4-A) Develop strategies to increase enforcement presence and number of checkpoints to provide a deterrent to illegal activities.</p> <p>Action 4-B) Ensure law enforcement presence during peak harvesting periods, and on the water during harvest season hours.</p> <p>Action 4-C) Develop strategies to ensure consistent practices are used for enforcement of regulations regarding the harvestable and marketable size of oysters. (See Actions 5-F and 5-G)</p> <p>Action 4-D) Statutes and/or rules should be revised as needed to require FWC to check harvested oysters for size-limit enforcement* before they are washed and processed. Once processed, enforcement of oyster size-limits should be limited to oysters under 2.75” because processing changes shell height.</p> <p>* Sampling and other data collection activities shall not be impacted by this recommendation.</p> <p>Action 4-E) Evaluate and enhance, as needed, the regulations and enforcement practices to</p>

	<p>ensure dealers accurately identify the source of oysters after processing and packaging.</p> <p>Action 4-F) Evaluate and revise, as needed, the statutory and/or regulatory requirements to ensure that FWC has authority to enforce oyster regulations at the dealers’ location.</p> <p>Action 4-G) Work with oystermen to evaluate current rules and regulations to ensure they are enforced consistently and fairly.</p> <p>Action 4-H) FWC should evaluate and seek authority to implement a tiered system of penalties for willful violators (i.e., increased fines and license suspensions ranging from increased length of suspension to the permanent loss of license) to keep willful violators out of the industry.</p> <p>Action 4-I) Encourage community and industry support for consistent judicial imposition of penalties within the existing penalties framework for oyster harvest violations, including imposing stricter penalties for habitual and willful violators.</p> <p>Action 4-J) Prior to the opening of each harvest season, conduct a joint workshop between law enforcement and the oystermen to review the current rules and regulations, identify any changes, discuss enforcement approaches relative to harvest practices and constraints on the water, and to provide mutual two-way education, and enhance communication and collaboration between law enforcement and oystermen.</p> <p>Action 4-K) Work together and with other stakeholders to seek funds to support the recommended increased law enforcement presence in the Bay.</p> <p>Action 4-L) Establish the 5% allowable undersize oyster limit for both harvesters and dealers.</p> <p>Action 4-M) Clarify that it is an allowable practice for oystermen to weigh oyster bags while on the water to ensure the bags meet the weight limit regulations.</p>
<p>B5) Establish co-management advisory committees to provide advice and oversight to state managing agencies on oyster habitat and</p>	<p>Action 5-A) Convene a co-management advisory committee comprised of state and federal agencies, and other appropriate</p>

<p>wild harvest. Evaluate the development of a policy that would require setting sustainable harvest goals and placing limitations on or a complete closure to harvesting in certain areas (e.g., important spawning reefs) based on the results of data (e.g., stock assessment, larvae transport modeling) collected and evaluated under a comprehensive monitoring program designed to sustainably manage the resource.</p>	<p>experts, to assess and make recommendations on oyster habitat needs in conjunction with harvest management strategies. Action 5-B) Convene an Oyster Fishery Advisory Board within FWC to review and make recommendations on management and enforcement of the oyster fishery statewide.</p>
<p>B6) Recommend policies and actions that retain and recycle shell or other suitable material for habitat replenishment in the Apalachicola Bay System.</p>	<p>Action 6-A) Develop agency rules and policies that require shell retention and/or obtain shell or other suitable material for habitat replenishment (through a fee or incentive program). Action 6-B) Obtain legislative support for statutes that support or require shell recycling and oyster habitat replenishment. (e.g., Texas House Bill 51 (2017); North Carolina General Statute §130A-309.10 (2010); Maryland House Bill 184; Chapter 157, F.S. (McClellan 1881). Action 6-C) Establish and/or expand partnerships with local organizations, stakeholder groups, industry, and universities in shell recycling programs.</p>
<p>B7) Use decision-support tools to evaluate and develop a system of potential closed areas (e.g., spawning reefs) 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.</p>	<p>Action 7-A) Engage local stakeholders in determining total coverage (how much to protect), placement (where to protect), and size (how large) of all types of potential closed areas using gridded maps as well as distributions of selected fishery and ecologically important species. Action 7-B) Use ecological quantitative modeling outputs to identify: the oyster population abundance that can support sustainable harvest; percentage of the total reef area that is sufficiently productive to support sustainable harvest; annual recruitment required to support sustainable harvest; and to determine the amount and frequency of habitat replacement to maintain productive oyster reefs.</p>
<p>B8) Work with FDACS and oyster aquaculture industry stakeholders to ensure that oyster aquaculture practices and locations in the Bay are compatible with the goals and strategies for</p>	<p>Action 8-A) Develop maps using FDACS data showing all proposed and existing aquaculture activities in the ABS, superimposed on existing maps of essential fish habitat, fishing</p>

<p>restoration and management of the ecosystem and are compatible with wild fisheries and the important cultural role of a working waterfront and seafood industry</p>	<p>activities, seagrass beds, and natural existing hard bottom (reefs/bars) to identify potential conflicts. Maps should be updated as frequently as is feasible to assure their usefulness.</p> <p>Action 8-B) Evaluate and consider programs and policies that use farmed oysters for restoration on wild oyster reefs and to retain oysters and/or shells from aquaculture industry to be recycled on wild reefs.</p>
<p>B9) Assess the effectiveness of an oyster replenishment program 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.</p>	<p>Action 9-A) Conduct field studies of survival of planted spat-on-shell to harvestable size and time required to attain market size.</p> <p>Action 9-B) Develop and 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).</p> <p>Action 9-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 to ensure the economic viability of replenishing activities.</p> <p>Action 9-D) Monitor the stability of oyster populations using the oyster replenishment program approach to wild fishery harvest, to determine whether deploying cultch or spat-on-shell helps reduce natural fluctuations in oyster populations.</p>

Goal C: A Fully Funded Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan Supported by Apalachicola Bay System Stakeholders Strategies to Ensure the Implementation, Monitoring, and Adaptability of The Plan

Vision Theme C: The Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan is science-based, developed with engagement and support from the Apalachicola Bay System stakeholders, and is fully funded.

Goal C: The Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan is supported by the Apalachicola Bay System stakeholders and is fully funded.

Outcome: By 2030, the Apalachicola Bay System is a productive and sustainably managed ecosystem. A fully funded and well-executed science-based Ecosystem-Based Adaptive Management and Restoration Plan that incorporates the monitoring necessary for evaluation and adaptation that is developed and broadly supported by Apalachicola Bay System stakeholders with guidance from a permanent stakeholder advisory group.

Goal C Objectives

C1) To establish a fully funded permanent, representative stakeholder process to monitor the long-term implementation of the Plan.

C2) To identify funding sources and define mechanisms for full implementation of the Plan.

Table 4: Goal C — Prioritized Strategies for Implementation of the Plan

STRATEGIES (2)	ACTIONS (12)
<p>C1) <i>Partnership for a Resilient Apalachicola Bay</i>, which is the successor group to the CAB, will have an open and transparent process for the implementation of the Plan with many opportunities for stakeholder engagement and input in a variety of forms (e.g., workshops, online, public/ government meetings) for generating awareness and support while incorporating any changes the <i>Partnership for a Resilient Apalachicola Bay (PRAB)</i> deems appropriate and necessary to fulfill the Plan’s goals and objectives.</p>	<p>Action 1-A) The PRAB actively engages with state programs to encourage their adoption of long-term monitoring guidelines and metrics (see Goal A) for assessing water quality, oyster abundance, and demographics and to regularly review and update these guidelines and metrics to maintain a healthy and sustainable oyster harvest and Bay ecosystem.</p> <p>Action 1-B) The PRAB will monitor the Plan’s implementation and make recommendations for revisions required to adaptively respond to changing conditions.</p> <p>Action 1-C) The PRAB will encourage agencies to prioritize the Plan’s recommendations for investing more funding in the management and restoration of oyster resources.</p> <p>Action 1-D) The PRAB will support state legislators and state agencies in the</p>

	<p>development of funding strategies, and incentives for involving local oystermen, seafood dealers, restaurants, aquaculture operations, and private citizens in oyster reef restoration efforts that will increase the viability of oyster resources.</p> <p>Action 1-E) The PRAB facilitates bidirectional information flow between agencies implementing the restoration and management plans and the public, other government entities and NGOs.</p>
<p>C2) Create a comprehensive funding approach for the Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan implementation including a comprehensive analysis for future grant funding for strategies that support sustainable monitoring deriving from the Plan. [Status: Initiated and Ongoing]</p>	<p>Action 2-A) Evaluate and seek funding sources for implementation of management and restoration strategies included in the Plan (e.g., state agencies, region-wide Gulf trustee implementation group for oil spill settlement funding, federal agencies).</p> <p>Action 2-B) Evaluate and seek funding for the engineering design, permitting and implementation of habitat restoration efforts based on oyster habitat suitability mapping and modeling and restoration and management targets in consultation with stakeholders.</p> <p>Action 2-C) Evaluate and seek funding sources to generate awareness, education, and support for a healthy oyster and ABS ecosystem.</p> <p>Action 2-D) Evaluate and seek long-term funding for a comprehensive monitoring program that is used across programs and projects with a dashboard on metrics and indicators to leverage resources, standardize the metrics and indicators measured, and to share data.</p> <p>Action 2-E) Develop and seek a funding source to provide cultch for habitat restoration on an ongoing basis.</p> <p>Action 2-F) Work across estuary programs to fund and leverage large scale monitoring for the Perdido to Suwanee region.</p> <p>Action 2-G) The PRAB should evaluate whether to initiate the development of an Apalachicola Bay Estuary Program (ABEP) to coordinate and lead in the implementation and monitoring of the Plan. The PRAB should explore whether it's a better model to be a part of the Environmental Protection Agency's</p>

	(EPA) National Estuary Program or to model an ABEP after the EPA program and assess alternative funding models such as those used by the other Florida Panhandle estuary programs.
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Goal D: An Engaged Stakeholder Community and Informed Public Strategies to Support Education, Outreach, and Community Support for The Plan

Vision Theme D: Stakeholders of the Apalachicola Bay System are committed to working together to disseminate relevant information and advocate for a sustainably managed oyster habitat and a healthy Bay ecosystem. In so doing, the group will facilitate innovative research, development and implementation of best management practices and serve as a hub for information exchange that supports innovation, education and communication opportunities.

Goal D: A productive and well-managed Apalachicola Bay System is supported by an actively engaged and informed stakeholder community and public.

Outcome: By 2030, stakeholders, private and nonprofit civic leaders, and the public are informed of the importance of sustaining the health of the Apalachicola Bay System and are engaged and working actively together along with elected and appointed leaders and managers to invest in and implement the Plan.

Goal D Objectives

D1) To coordinate community engagement efforts to increase public awareness of and support for a healthy and well-managed ABS ecosystem, and to ensure that businesses, industries, non-profits, community groups, individuals, and local governments are supportive and included in these efforts.

D2) To measure public and stakeholder understanding of the issues important to the health and restoration of the Bay and socio-economic indicators.

Table 5: Goal D — Prioritized Strategies for An Engaged Stakeholder Community and Informed Public

STRATEGIES (2)	ACTIONS (7)
<p>D1) Build, with the help of the PRAB, community support and stewardship by educating stakeholders on the importance of maintaining a healthy ABS ecosystem and oyster reefs and by engaging them in the Bay restoration through a variety of hands-on programs.</p>	<p>Action 1-A) The PRAB shall support development of a community outreach strategy intended to inform and educate stakeholders and the public about the research, the Plan, and focusing on a healthy ABS ecosystem. The audience will include local city, county, and state government officials, businesses and organizations, citizens of every age, and other interested stakeholder groups.</p> <p>Action 1-B) Work with local groups, agencies, businesses, and other stakeholders to develop a successful shell-recycling program.</p> <p>Action 1-C) Work with local groups, agencies, businesses, and other stakeholders to identify sources of shell, or other restoration material.</p>

	<p>Action 1-D) Develop a “Bay Stewards” program to honor, reward, and provide incentives for businesses and individuals that demonstrate their stewardship of the resource.</p>
<p>D2) Support and participate in providing educational opportunities for students at all levels (primary & secondary school through college) to understand the value of their coastal ecosystems, importance of stewardship and the role oysters play in ecosystem health and fisheries.</p>	<p>Action 2-A) Work with existing entities (e.g., WeatherStem, Scientist in Every Florida School program of the Florida Museum) to expose more K-12 students to the research being conducted to support ABS restoration and management.</p> <p>Action 2-B) Provide training and financial support for new workforce entrants in the Franklin County community through an aquaculture internship program.</p> <p>Action 2-C) Provide research opportunities for undergraduate and graduate students in science that supports the Plan’s goals.</p>

Goal E: A Thriving Economy Connected to a Restored Apalachicola Bay System Strategies to Monitor, Assess, and Report on the Economic Viability of The Plan

Vision Theme E: A restored Apalachicola Bay System sustains a vibrant commercial oyster fishery, a thriving aquaculture industry and recreational and tourism-related activities and development opportunities that underpin a strong local economy and resilient coastal community.

Goal E: The broader Apalachicola Bay Region is thriving economically as a result of a fully restored Apalachicola Bay System.

Outcome: By 2030, the broader Apalachicola Bay Region is thriving economically because of a restored Apalachicola Bay System that reflects a unique coastal cultural heritage, based on a vibrant oyster fishery, while simultaneously providing new opportunities for sustainable and responsible development, business, recreation and tourism.

Goal E Objectives

E1) To ensure that economic indicators of the commercial oyster fishery and associated industries in the ABS demonstrate increasing viability and growth.

E2) To ensure that industries and businesses within the ABS are compatible with a healthy and well-managed ABS ecosystem.

E3) To develop growth management policies, plans and regulations affecting the ABS that are compatible with a healthy and well-managed ABS ecosystem while maintaining a thriving economy and supporting cultural heritage.

E4) To develop an oyster aquaculture industry that provides economic opportunities and is complementary to the wild harvest fishery.

Table 6: Goal E — Economic Strategies Outside ABSI Scope Prioritized Strategies

STRATEGIES (2)	ACTIONS (10)
<p>E1) Engage all stakeholders to support the regional economy linked to a restored and functionally robust ABS.</p>	<p>Action 1-A) Engage commercial fishermen in the restoration of the Bay and encourage future participation in restoration such as monitoring, cultching, and shell recycling.</p> <p>Action 1-B) Coordinate with the local business community and governing bodies (i.e., city and county commissions) to ensure that growth management plans, land use and development regulations meet strong standards that are compatible with and minimize the environmental impact of industry and business activities within the ABS and are conducive to a healthy ecosystem.</p>

	<p>Action 1-C) Coordinate with and encourage recreational businesses and activities that recognize the importance of and support a sustainable commercial oyster fishery and the importance of the seafood industry to the Region’s cultural heritage.</p> <p>Action 1-D) Work with existing partners (e.g., the Chamber of Commerce, Apalachee Regional Planning Council, and city and county staff) and initiatives such as the Regional Recreation Economy Alliance to leverage resources to support the local economy and monitor and report on the economic benefits of a restored Apalachicola Bay System (ABS). Include key economic indicators relevant to the commercial oyster fishery and associated industries in the region. Develop a dashboard that includes key economic indicators over time based on restoration efforts in the ABS.</p>
<p>E2) Develop economic information and tools necessary to support efforts connecting ABS restoration and management with local and regional economies.</p>	<p>Action 2-A) Recommend economic monitoring and enforcement programs to assure quality of data necessary for metrics that measure economic output from and regional impact of harvest on oyster reefs.</p> <p>Action 2-B) Support development of planning strategies tied to economic indicators that consider future conditions (e.g., climate, sea level rise (SLR), altered river flow) and their effects on the ABS.</p> <p>Action 2-C) Review land development regulations to provide flexibility while supporting and enhancing efforts to maintain and revitalize working waterfronts in Apalachicola and Eastpoint to ensure preservation of Franklin County’s cultural heritage and a viable seafood industry.</p> <p>Action 2-D) Work with oystermen and other community stakeholders to promote markets for post-recovery Apalachicola oyster products.</p> <p>Action 2-E) Develop complementary industries in wild oyster harvest and oyster aquaculture that provide new economic opportunities by building a network of experts that can help Franklin County citizens build</p>

	<p>successful programs through business training, identifying sources of funding for equipment, and developing products that will enhance and diversify local industries.</p> <p>Action 2-F) Develop new markets for selling oysters to areas within and outside of Florida in part by investing in location (Apalachicola Bay) branding.</p>
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Performance Measures

The regular measurement of outcomes and results, which generates reliable data on the effectiveness, efficiency, and sustainability of programs and plans. The decision support tools will be used when available to forecast results that will help weigh the potential outcomes of different strategies.

Table 7: Performance Measures for Goals A-E

GOAL A—A HEALTHY AND PRODUCTIVE BAY ECOSYSTEM	
OBJECTIVES	RECOMMENDED METRICS
<p>A1) To define measurable ecosystem health metrics (e.g., oyster population demographics, condition indices, reef associated community, water quality, nutrient levels, SAV, fish and wildlife populations) that can be used to quantify ecosystem services and determine the effects of change on ecosystem functions (e.g., oyster fishery harvest, habitat for other fishery species, filtration capacity) and societal benefit derived from ABS management and restoration efforts, with target and threshold levels identified.</p> <p>Goal for Objective A1) User-friendly informative decision support tools available to ABS resource managers.</p>	<ul style="list-style-type: none"> • Oyster population dynamics (recruitment, growth, mortality, shell budgets). • River flows under climate and management scenarios (river flow model). • Current speed and direction and particle trajectories (proxy for larval dispersal), under different river flow, tidal and wind-forced scenarios (hydrodynamic model). • Temperature, salinity, oxygen, pH, nutrients and organic carbon dynamics under different climate and management scenarios (combined river flow and hydrodynamic models). • Reef area and height (total area of patches of living and nonliving oyster shell or substrate with and without live oysters). • Area and distribution of suitable oyster habitat (from predictive habitat models) for current and future conditions.
<p>A2) To help establish a comprehensive monitoring plan to evaluate the health of the oysters and the ABS ecosystem and its measurable ecological functions and ecosystem services with clearly defined performance measures and strong coordination among the</p>	<ul style="list-style-type: none"> • Regularly updated maps of intertidal and subtidal reefs • Oyster recruitment rates • Density (#/m²) of live and dead oyster juveniles (<25mm), sub-adults (26-75 mm) and market size (> 76 mm) adults.

<p>various entities conducting research, scientific monitoring, and restoration in the region.</p> <p>Goal for Objective A2) A monitoring plan approved by stakeholders and resource management.</p>	<ul style="list-style-type: none"> • Oyster size-frequency distribution (using shell height) (mm) • Reproductive status • Condition index • Pest and predator prevalence • Disease prevalence • Environmental variables (temperature, salinity, oxygen, turbidity, pH, nutrients)
<p>A3) To use observations, monitoring, experiments, and modeling to create decision support tools that can inform how a range of natural and human influenced factors will affect the ABS ecosystem.</p> <p>Goal for Objective A3) Management and restoration plan that increases ecological function of oyster reefs in the ABS.</p>	<ul style="list-style-type: none"> • Understanding of optimal restored reef, placement, dimensions, and materials. • Identification of optimal locations for broodstock reefs (areas closed to harvest). • Increase density of legal oyster populations on both restored and non-restored reefs (#/m²).to at least 100 m³ (levels observed in 2000). • Statistically significant increase (over current conditions) in diversity and abundance of ecologically- and economically-important species (resident and transient). • Maintenance of sufficient live oysters and dead shell to sustain a healthy oyster reef ecosystem.
<p>A4) To use decision support tools to identify viable strategies for restoration and management of the ABS oyster communities and the function of the ABS ecosystem.</p> <p>Goal for Objective A4) Improved oyster reef ecosystem services for the ABS.</p>	<ul style="list-style-type: none"> • Change in the amount of shoreline habitat that is protected (Goal: increase in shoreline extent, elevation, marsh cover). • Change in the amount of sustainable wild oyster harvest that is supported by restored oyster populations. • Improved recreational and commercial fisheries of oyster-reef related species (stone crab, sheepshead, drum). • Improved water clarity in the vicinity of restored oyster reefs.
GOAL B—SUSTAINABLE MANAGEMENT OF OYSTER RESOURCES	
<p>B1) Using strategies and actions identified in this document (the Plan), develop a separate science-based oyster recovery and adaptive management plan through a transparent and inclusive process involving both commercial and recreational industries and includes: broad stakeholder and community support, a long-term, comprehensive monitoring plan that will be provided to, with the goal of implementation by, state agencies and their</p>	<ul style="list-style-type: none"> • Establish sustainable allowable catch in total biomass (kg), including harvest rate and shell budgets. • Incorporate commercial and recreational harvest in oyster stock assessment model for ABS. • Model different adaptive management approaches, to promote sustainability of

<p>contractors, a regulatory framework that allows for rapid modifications when needed to address changing environmental conditions, and enforceable regulations that contain penalties sufficient to deter violations and harm to the resource. This Plan must be constructed with the direct involvement of entities within the State of Florida (e.g., FWC, FDACS, State Legislature) in cooperation with other relevant agencies to enhance the likelihood of consideration for implementation.</p> <p>Goal for Objective B1) A stakeholder supported adaptive management plan for the ABS.</p>	<p>the fishery, and long-term planning and investment by harvesters and dealers.</p> <ul style="list-style-type: none"> • Assign some existing reefs as broodstock reefs that are closed to harvest. • FWC law enforcement increases presence during oyster open season, and develops appropriate penalties for regulation violations. • FWC establishes a long-term state-wide oyster monitoring program.
<p>B2) To evaluate oyster aquaculture best-management practices that allow for the unimpeded recovery of oyster’s reefs, the oyster fishery, and the ecological and societal health of the ABS ecosystem while providing economic opportunities to the aquaculture industry.</p> <p>Goal for Objective B1) Identify positive and negative interactions between oyster aquaculture and wild oyster restoration and fisheries.</p>	<ul style="list-style-type: none"> • FDACS, FWC or other entity supports studies to identify aquaculture practices that affect oyster restoration and fisheries, and other habitats within the ecosystem.
<p>GOAL C—A FULLY FUNDED AND SUPPORTED RESTORATION AND MANAGEMENT PLAN</p>	
<p>C1) To establish a fully funded permanent, representative stakeholder process to monitor the long-term implementation of the Plan.</p> <p>Goal for Objective C1) Establish a stakeholder group to ensure community support for the management and restoration plans.</p>	<ul style="list-style-type: none"> • Creation of an ABSI CAB successor group to continue stakeholder engagement in the management and restoration process.
<p>C2) To identify funding sources and define mechanisms for full implementation of the Plan.</p> <p>Goal for Objective C2: Obtain sufficient funding to implement restoration and management plans.</p>	<ul style="list-style-type: none"> • Form a small stakeholder group that will identify and obtain funding for large scale continued restoration of the ABS oyster reefs.
<p>GOAL D—AN ENGAGED STAKEHOLDER COMMUNITY AND INFORMED PUBLIC</p>	
<p>D1) To coordinate community engagement efforts to increase public awareness of and support for a healthy and well-managed ABS ecosystem, and to ensure that businesses, industries, non-profits, community groups, individuals, and local governments are supportive and included in these efforts.</p>	<ul style="list-style-type: none"> • Number of people with improved understanding of the ecosystem services provided by oysters. • Number of businesses, schools, industries, non-profits, and local governments participating in outreach efforts.

<p>Goal for Objective D1) An engaged and informed community, including K-12 and adults in the local area and beyond.</p>	<ul style="list-style-type: none"> • Number of volunteers participating in oyster reef restoration efforts. • Number of internship program “graduates” that enter the oyster aquaculture workforce in the ABS or other estuary in Florida. • Number of K-12 students reached by ABSI.
<p>D2) To measure public and stakeholder understanding of the issues important to the health and restoration of the Bay and socio-economic indicators.</p> <p>Goal for Objective D2) Understand stakeholder commitment to a healthy ABS ecosystem.</p>	<ul style="list-style-type: none"> • Survey of stakeholders to assess level of understanding of the ecosystem services provided by oysters, and commitment to adopting measures that improve ABS health.
<p>GOAL E—A THRIVING ECONOMY CONNECTED TO A RESTORED ABS</p>	
<p>E1) To ensure that economic indicators of the commercial oyster fishery and associated industries in the ABS demonstrate increasing viability and growth.</p> <p>Goal for Objective E1) Increased viability and growth of oyster fishery and associated industries.</p>	<ul style="list-style-type: none"> • Monitor economic indicators of a successful wild oyster industry and assess causes of positive and negative trends.
<p>E2) To ensure that industries and businesses within the ABS are compatible with a healthy and well-managed ABS ecosystem.</p> <p>Goal for Objective E2) Create a decision support tool to assess the effect of ABS industries on ecosystem health.</p>	<ul style="list-style-type: none"> • Monitor metrics associated with Goal A and with objective E1 (above) to determine whether they have positive, neutral or negative interactions.
<p>E3) To develop growth management policies, plans and regulations affecting the ABS that are compatible with a healthy and well-managed ABS ecosystem while maintaining a thriving economy and supporting cultural heritage.</p> <p>Goal for Objective E3) A healthy, well-managed ABS and thriving working waterfront industries.</p>	<ul style="list-style-type: none"> • Assess effect of growth management plans on ABS ecosystem health and economic growth

<p>E4) To develop an oyster aquaculture industry that provides economic opportunities and is complementary to the wild harvest fishery.</p> <p>Goal for Objective E4) Establish complementary oyster aquaculture and wild oyster harvest industries.</p>	<ul style="list-style-type: none"> • Assess economic indicators associated with aquaculture and wild oyster harvest • Assess social and economic compatibility between the two industries using stakeholder survey tools.
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Additional Prioritized Strategies

Several strategies were considered for the Plan that were not ranked of high enough priority to be included in Goals A-E or were considered tangential to those goals. These are included below (Table 8) for consideration by future planning groups.

Table 8: Additional Prioritized Strategies Outside ABSI Scope for Referral to Other Entities

STRATEGIES (4)	ACTIONS (0)
<p>1) Provide training and seek financial support for new workforce entrants (particularly young entrants) interested in being employed in existing industries as well as developing industries in new fisheries, aquaculture, and restoration science.</p>	
<p>2) Develop surveys or other tools that can be used to measure and track changes in stakeholder and public understanding of the issues important to the health and restoration of the Bay.</p>	
<p>3) Support existing entities in building Gulf-wide mechanisms for communities interested in the restoration and revitalization of oyster fisheries to exchange best practices and lessons learned.</p>	
<p>4) Engage the public (students, residents, and tourists) in learning about the history and the ecological and economic importance of the Apalachicola Bay region, including the natural resources, and lumber, cotton shipping, and fishing industries.</p>	

Next Steps: Implementation and Follow-Through

This report will be widely distributed to all stakeholder groups including those involved in the actual restoration and management efforts. The *Partnership for a Resilient Apalachicola Bay* (CAB Successor Group) will interface with these stakeholders and others. The Plan is intended to be adaptive. By this we mean that as chosen strategies and linked actions are implemented, monitoring and assessment of results will shape the trajectory of future actions. The Plan contains a broad spectrum of suggested strategies, linked actions and performance measures as potential options to be used by stakeholder groups to achieve restoration and management goals.

Acknowledgements

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Appendix A: Members of the Community Advisory Board

<u>Current CAB Members</u>	<u>Organization</u>	<u>Start of Service</u>	<u>End of Service</u>
Georgia Ackerman	Apalachicola Riverkeeper	October 30, 2019	November 29, 2023
Ottice Amison	Franklin County Commission	November 30, 2022	November 29, 2023
Mike Allen	UF/IFAS Nature Coast Biological Station	January 26, 2022	November 29, 2023
David Barber	Barber Seafood	May 25, 2022	November 29, 2023
Frank Gidus	Coastal Conservation Assoc. (CCA) Florida	October 30, 2019	November 29, 2023
Anita Grove	Apalachicola City Commission	October 30, 2019	November 29, 2023
Chad Hanson	The Pew Charitable Trusts	October 30, 2019	November 29, 2023
Jenna Harper	Apalachicola National Estuarine Research Reserve (ANERR) and DEP	October 30, 2019	November 29, 2023
Shannon Hartsfield	Seafood Management Assistant Resource Recovery Team (SMARRT)	October 30, 2019	November 29, 2023
Becca Hatchell	Florida Fish and Wildlife Conservation Commission (FWC) Marine & Estuarine Habitat Conservation & Restoration	October 18, 2022	November 29, 2023
Gayle Johnson	Indian Lagoon Oyster Company	January 26, 2022	November 29, 2023
Katie Konchar	The Nature Conservancy	January 26, 2022	November 29, 2023
Erik Lovestrand	Florida Sea Grant Extension, Franklin County	October 30, 2019	November 29, 2023
Chuck Marks	Acentria Insurance	October 30, 2019	November 29, 2023
Alex Reed	Florida Dept. Environmental Protection (DEP), Office of Resilience & Coastal Protection	December 18, 2019	November 29, 2023
Devin Resko	FWC, Marine Fisheries Management	May 25, 2022	November 29, 2023
Steve Rash	Waterstreet Seafood	October 30, 2019	

Portia Sapp	Florida Dept. of Agricultural Consumer Services (FDACS)	October 30, 2019	November 29, 2023
Grayson Shepard	Offshore Charter Guide, Berkshire Hathaway Home Services	April 12, 2023	November 29, 2023
Chadwick Taylor	Riparian County Stakeholder Coalition (RCSC)	October 30, 2019	November 29, 2023
Paul Thurman	Northwest Florida Water Management District (NFWMD)	October 30, 2019	November 29, 2023
Carrie Jones (FDACS alternate)	Florida Dept. of Agricultural Consumer Services (FDACS)	February 24, 2021	November 29, 2023
Ken Jones (RCSC alternate)	Riparian County Stakeholder Coalition (RCSC)	July 16, 2020	November 29, 2023

<u>Former CAB Members</u>	<u>Organization</u>	<u>Start of Service</u>	<u>End of Service</u>
Chip Bailey	Peregrine Charters	October 30, 2019	January 26, 2022
David Barber (first time)	Barber Seafood	November 11, 2020	February 24, 2021
Bert Boldt	Franklin County Commission	June 16, 2021	October 18, 2022
Michael Dasher	Waterman	July 16, 2020	September 9, 2020
Jim Estes	FWC	October 30, 2019	June 16, 2021
Lee Edmiston	ANERR, retired	October 30, 2019	January 26, 2022
Tom Frazer	University of South Florida	October 30, 2019	January 26, 2022
BJ Jamison	FWC	June 16, 2021	January 26, 2022
Ricky Jones	Franklin County Commission	July 16, 2020	16 June 2021
Brett Lolley	Seafood Work and Watermen's Association	May 31, 2023	August 9, 2023
Roger Mathis	Oysterman, R.D.'s Seafood	March 10, 2020	February 1, 2023
Lynn Martina	Lynn's Quality Oysters	October 30, 2019	March 11, 2020
Vance Millender	Millender & Sons Seafood	October 30, 2019	November 12, 2020
Mike Norberg (Estes Alternate and Substitute)	FWC	March 11, 2020	November 12, 2020
Mike O'Connell	St. George Island Civic Club, Vision 2025	October 30, 2019	February 1, 2023
Smokey Parrish	Franklin County Commission	October 30, 2019	July 16, 2020
Alan Peirce (Estes Alternate)	FWC	February 24, 2021	June 16, 2021
Rebecca Prado	DEP	October 30, 2019	December 18, 2019
Denita Sassor	Outlaw Oyster Company	July 16, 2020	January 26, 2022
John Solomon	Apalachicola Bay Chamber of Commerce	October 30, 2019	January 26, 2022
TJ Ward	13 Mile Seafood	October 30, 2019	April 12, 2023
Zack Whalen (FWC Alternate)	FWC	January 26, 2022	July 27, 2022
Cary Williams	Apalachicola Oyster Company	December 18, 2019	July 16, 2020

Appendix B: CAB Outreach Subcommittee Members

<u>Outreach Subcommittee Members</u>	<u>Organization</u>	<u>Start of Service</u>	<u>End of Service</u>
Sandra Brooke	FSU	November 19, 2020	Present Day
Felicia Coleman	FSU	November 19, 2020	December 15, 2020
Jared Fuqua	FSU	June 29, 2022	Present Day
Maddie Mahood	FSU	November 19, 2020	March 21, 2022, then rejoined June 29, 2022 until Present Day
Betsy Mansfield	FSU	August 17, 2022	Present Day
Rachel Walsh	FSU	January 31, 2022	May 11, 2022
Georgia Ackerman	Apalachicola Riverkeeper	November 19, 2020	Present Day
Cameron Baxley	Apalachicola Riverkeeper	July 11, 2023	Present Day
Bert Boldt	Franklin County Commission	June 29, 2022	August 17, 2022
Anita Grove	Apalachicola City Commission	November 19, 2020	Present Day
Chad Hanson (Chair)	The Pew Charitable Trusts	November 19, 2020	Present Day
Michael O'Connell	St. George Island Civic Club, Vision 2025	November 19, 2020	January 18, 2023
Devin Resko	FWC, Marine Fisheries Management	June 29, 2022	Present Day

Appendix C: CAB Successor Group Subcommittee Members

<u>Successor Group Members</u>	<u>Organization</u>	<u>Start of Service</u>	<u>End of Service</u>
Anita Grove (Co-Chair)	Apalachicola City Commission	February 2, 2021	Present Day
Shannon Hartsfield (Co-Chair)	Seafood Management Assistant Resource Recovery Team (SMARRT)	February 2, 2021	Present Day
Georgia Ackerman	Apalachicola Riverkeeper	February 2, 2021	Present Day
Ottice Amison	Franklin County Commission	December 12, 2021	Present Day
Jeff Blair	Facilitated Solutions, LLC	February 2, 2021	Present Day
Jim Estes	FWC	February 2, 2021	February 23 2021
Chad Hanson	The Pew Charitable Trusts	February 2, 2021	Present Day
Steve Rash	Waterstreet Seafood	February 2, 2021	November 29, 2023
Devin Resko	FWC, Marine Fisheries Management	December 12, 2021	Present Day
Chadwick Taylor	Riparian County Stakeholder Coalition	February 2, 2021	Present Day
Joel Trexler	FSU	February 2, 2021	Present Day

Appendix D: Restoration Funding Working Group (RFG) Members

RFG Members	Organization
Georgia Ackerman	Apalachicola Riverkeeper
Michael Allen	UF
Anne Birch	TNC
Daniel Ellinor	FWC
Ross Ellington	FSU
Chad Hanson	The Pew Charitable Trusts
Jennifer Harper	ANERR/DEP
Devin Resko	FWC
Portia Sapp	FDACS
Paul Thurman	NFWMD
Joel Trexler	FSU

Appendix E: Strategies Acceptability Worksheet as Approved August 9, 2023, Revised September 27, 2023, and Adopted November 29, 2023

**APALACHICOLA BAY SYSTEM INITIATIVE COMMUNITY ADVISORY BOARD
UNANIMOUS CONSENSUS RANKED GOALS, VISION THEMES, GOAL STATEMENTS,
OUTCOMES, OBJECTIVES, STRATEGIES, AND ACTIONS
FOR INCLUSION IN THE DRAFT PLAN*
APPROVED AUGUST 9, 2023 AND REVISED SEPTEMBER 27, 2023
AND NOVEMBER 29, 2023**

**Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan*

**SECTION 1 – RANKED STRATEGIES AND ASSOCIATED ACTIONS ACHIEVING A
CONSENSUS LEVEL OF SUPPORT \geq 75 SUPPORT**

**GOAL A
A HEALTHY AND PRODUCTIVE BAY ECOSYSTEM**

VISION THEME A: The Apalachicola Bay System, including its oyster reef resources, is sustainably managed. Water resources and affected habitats are afforded adequate protection to ensure that essential ecosystem functions are maintained, and a full suite of economic opportunities are realized.

GOAL A: The Apalachicola Bay System is a healthy and productive ecosystem that includes oyster reefs in locations and with oyster abundance as similar to historical conditions as possible and that supports a vibrant and sustainable oyster fishery and other economically viable activities.

OUTCOME: By 2030, the Apalachicola Bay System is a healthy, productive, and sustainably managed ecosystem that supports a viable oyster fishery while providing a broad suite of ecosystem services that, in turn, afford additional opportunities for sustainable economic development.

GOAL A OBJECTIVES

A1) To define measurable ecosystem health metrics (e.g., oyster population demographics, condition indices, reef associated community, water quality, nutrient levels, submerged aquatic vegetation, fish and wildlife populations) that can be used to quantify ecosystem services and determine the effects of change on ecosystem functions (e.g., oyster fishery harvest, habitat for other fishery species, filtration capacity) and societal benefit derived from ABS management and restoration efforts, with target and threshold levels identified.

A2) To help establish a comprehensive monitoring plan to evaluate the health of the oysters and the ABS ecosystem and its measurable ecological functions and ecosystem services with clearly

defined performance measures and strong coordination among the various entities conducting research, scientific monitoring, and restoration in the region.

A3) To use observations, monitoring, experiments, and modeling to create decision support tools that can inform how a range of natural and human influenced factors will affect the ABS ecosystem.

A4) To use decision support tools to identify viable strategies for restoration and management of the ABS oyster communities and the function of the ABS ecosystem.

GOAL A — ECOSYSTEM RESTORATION PRIORITIZED STRATEGIES

1) Establish Bay-wide metrics of ecosystem health to monitor the status of the ABS, including oyster habitat, and establish targets and thresholds that can be used to sustainably restore and manage oyster habitat and the ABS ecosystem.

- **Action 1-A)** Restore and create reef structures suitable in size, location, height, and substrate type that can support a healthy and sustainable oyster ecosystem.
- **Action 1-B)** Obtain data at a Bay-wide scale to develop system-wide ecosystem-based metrics and models that will inform restoration and adaptive management decisions.
- **Action 1-C)** Design and implement projects to achieve multiple ecological and ecosystem service targets (e.g., provision of habitat for reef-associated species, water filtration, shoreline protection).
- **Action 1-D)** Implement oyster population enhancement studies to complement cultching for restoration.
- **Action 1-E)** Establish performance measures and ecosystem service targets that can be used to guide restoration planning, implementation, and monitoring of restoration progress.
- **Action 1-F)** Use habitat suitability analyses and results from oyster larval dispersal models to select optimal locations for restoring, enhancing, and/or developing new reef structures.
- **Action 1-G)** Continue conducting restoration experiments to test efficacy of different reef structural designs (e.g., reef dimensions, orientation, shape and/or rugosity.)
- **Action 1-H)** Continue using knowledge gained from experiments to recommend best practices for broad scale restoration in the ABS.

2) Incorporate stakeholder knowledge and experience to help identify suitable substrate(s) (e.g., limestone, granite, spat-on-shell, artificial structures) and the best locations for restoring, enhancing, and/or developing new reef structures.

- **Action 2-A)** Include oystermen in discussions to evaluate cultching techniques and materials for growing oysters (e.g., historical non-traditional, trees), adding spat-on-shell or other substrates.
- **Action 2-B)** Include oystermen in discussions on spatial configuration of reefs (height, width, contours, etc.), locations (existing reefs and hard bottom), use of larger rock to protect restored reefs from siltation and sedimentation from prevailing currents and storms.
- **Action 2-C)** Include oystermen on material deployment projects for reef restoration to ensure material is deployed correctly and in appropriate locations.

3) Determine area (acres or km²) of oyster reefs that currently support live oysters as well as the area needed to ensure sufficient spat production that will support development of sustainable oyster populations.

- **Action 3-A)** Continue to update maps of existing oyster habitat using multibeam sonar and backscatter, and ground-truth for accuracy, on a timeframe determined by speed of environmental change (e.g., update mapping of the Bay every 5 years if data indicate detectable changes are occurring on this scale).
- **Action 3-B)** Continue to collect data to support estimates of oyster reef areas that support live oysters.
- **Action 3-C)** Use ecological modeling that incorporates reproductive output, recruitment (includes reef carrying capacity), natural mortality rates and fishery harvest to assess oyster population dynamics.
- **Action 3-D)** Study and incorporate into planning efforts the connectivity of shoreline (intertidal) oyster habitat with subtidal oyster reefs (e.g., larval transport modeling) when and where applicable.

4) Identify monitoring needs for assessing the health of oyster populations and detecting changes in environmental conditions and habitat quality (for oysters and other reef-associated species) over time.

- **Action 4-A)** Monitor intertidal and subtidal reef/habitat using protocols and frequencies consistent with existing monitoring. Adjust and add to monitoring program as needed to sufficiently assess oyster habitat and populations. After checking data accuracy, post updated monitoring data on a regular basis on an accessible public website.
- **Action 4-B)** Conduct rapid ‘spot-checks’ (e.g., using tong surveys) at a sufficient number of different locations in the Bay to supplement site-level monitoring. Sufficient number of sites to be determined by statistical analysis of existing data. Document volume of material (rock/shell/oysters), abundance and size of live and box oysters (dead oyster with valves and hinge intact), abundance and type of predator and environmental data.
- **Action 4-C)** Continue and expand sites for collecting long-term in situ environmental data (e.g., conductivity, pH, and temperature) and integrate ANERR environmental and nutrient data (e.g., Total Carbon, Nitrogen, and Phosphorus) as correlated with oyster metrics.
- **Action 4-D)** Generate habitat condition indicators using monitoring data, and other ecological factors (e.g., oyster-associated communities and structural complexity).
- **Action 4-E)** Evaluate the impacts of anthropogenic (human) nutrient loading and pollutants to oyster resources and the Bay ecosystem.
- **Action 4-F)** Use data to evaluate status of oyster populations, oyster ecosystem health and quality of ecosystem services.
- **Action 4-G)** Integrate ecosystem services metrics into a monitoring and adaptive management program to assess ecosystem recovery progress.

5) Use and update recently developed ecosystem models that forecast future environmental conditions and oyster population status for restoration and management strategies and decisions.

- **Action 5-A)** Ensure data collected for use in ecosystem modeling are entered, receive data quality checks, and are made available to the public in an accessible online format.
 - **Action 5-B)** Incorporate existing data to forecast acceptable future environmental scenarios (or forecasts) and analyze potential effects on oyster populations and ecosystem-level services and habitat metrics (targets).
 - **Action 5-C)** Coordinate with appropriate state and federal agencies, out-of-state user groups, and other initiatives working on both geographically constrained and basin-wide water-flow alterations and management strategies that affect the health of the ABS.
 - **Action 5-D)** Use models to identify potential oyster restoration areas that could be used as protected spawning reefs to enhance recruitment and productivity of other reefs in the ABS.
- 6) Conserve and/or restore Bay (landscape) habitat (i.e., Submerged aquatic vegetation (SAV) including seagrass, and wetland and riparian habitat) to work synergistically with oyster habitat restoration to enhance restoration of the ABS.**
- **Action 6-A)** Develop restoration projects in the Bay that work toward meeting the ecosystem-level metrics for the Bay.
 - **Action 6-B)** Monitor and model changes to foundational habitat (e.g., SAV, mangroves, salt marsh grasses) for identifying management and restoration priorities.
- 7) Develop criteria for restoring specific reefs or reef systems that are resilient to adverse environmental conditions or natural disasters and incorporate adaptive management actions into the Plan, as appropriate.**
- **Action 7-A)** Restore and manage oyster habitat and reefs that are resilient to adverse environmental conditions, episodic events, or natural disasters and incorporate adaptive management actions into the Plan, as appropriate.
 - **Action 7-B)** Develop and incorporate metrics established elsewhere in this Plan for monitoring and evaluating the degree of damage and potential for recovery.
 - **Action 7-C)** Develop an approach for mitigating damage (e.g., physical repair, spat supplements, or some combination of both).
 - **Action 7-D)** Determine periodicity of hatchery-produced spat addition (e.g., annually, or longer) with a specific timeline for continuing the approach. This approach is not intended to create a put-and-take fishery.
 - **Action 7-E)** Apply projected climate scenarios to larval dispersal and habitat suitability models to identify target areas for restoration that will persist under future conditions (i.e., increased temperature, extreme weather, sea level rise).

GOAL B

SUSTAINABLE MANAGEMENT OF THE BAY ECOSYSTEM

VISION THEME B: A restored Apalachicola Bay System has resulted in a sustainably managed and adequately enforced wild harvest oyster fishery while also providing opportunities for other economically viable and complementary industries, including tourism and aquaculture. This is

accomplished by working collaboratively with stakeholders to create, monitor and fund a plan that ensures that the protection of the habitat and the fishery it supports is informed by science, stakeholder input, and industry experience, and is implemented in a manner that provides both fair and equitable access to and protection of the resource.

GOAL B: The Apalachicola Bay System is a productive, sustainably, and adaptively managed system that supports sustainable oyster resources and ecosystem services such as water quality and wildlife and fisheries habitat.

OUTCOME: By 2030, an engaged and collaborative group of stakeholders will have contributed to and helped spearhead a fully funded science-driven plan to sustainably manage oyster resources in the Apalachicola Bay System.

GOAL B OBJECTIVES

B1) Using strategies and actions identified in this document (the Plan), develop a separate science-based oyster recovery and adaptive management plan through a transparent and inclusive process involving both commercial and recreational industries and includes: broad stakeholder and community support; a long-term, comprehensive monitoring plan that will be provided to, with the goal of implementation by, state agencies and their contractors; a regulatory framework that allows for rapid modifications when needed to address changing environmental conditions; and enforceable regulations that contain penalties sufficient to deter violations and harm to the resource. This Plan must be constructed with the direct involvement of entities within the State of Florida (e.g., FWC, FDACS, State Legislature) in cooperation with other relevant agencies to enhance the likelihood of consideration for implementation.

B2) To evaluate oyster aquaculture best-management practices that allow for the unimpeded recovery of oyster’s reefs, the oyster fishery, and the ecological and societal health of the ABS ecosystem while providing economic opportunities to the aquaculture industry.

GOAL B — MANAGEMENT PRIORITIZED STRATEGIES

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 performance metrics for determining success identified in Goal A of the Plan.

- **Action 1-A)** Evaluate the potential for limited-entry oyster fishery that would be managed adaptively based on an adopted sustainable harvest level through a transparent representative stakeholder driven consensus-building process that includes vetting the plan with local oystermen and FWC law enforcement.
- **Action 1-B)** Consider implementation of a Bay-wide summer (June – August) wild-harvest fishery closure.
- **Action 1-C)** Consider daily harvest limits in conjunction with a Monday – Friday five-day harvest week.
- **Action 1-D)** Consider a recreational wild oyster harvest limit (e.g., the hand-harvesting of only one 5-gallon bucket of oysters) and allow recreational hand-harvesting during the same season the fishery is open to commercial harvest.

- **Action 1-E)** Evaluate managing harvest areas to prevent the concentration of effort in locations by allowing all the legal and approved (by FDACS) harvest areas of the Bay to be open during the harvest season and harvesting hours (**Action 1-B** and **1-C** above).
 - **Action 1-F)** Evaluate existing allowable and minimally destructive alternative gear type options and harvest methods, including the use of experimental gear for wild oyster harvesting.
- 2. Develop specific criteria and/or conditions, with related performance measures from Goal A for the reopening and closing of Apalachicola Bay to limited wild oyster harvesting.**
- **Action 2-A)** Use the best available science and decision-support tools to develop criteria for opening and closing wild oyster harvest and for determining sustainable harvest before the harvest season and during the harvest season in conjunction with the annual stock assessments and frequent monitoring.
 - **Action 2-B)** Select a reasonable but conservative starting target for reopening the fishery and adjust (through adaptive management) the allowable harvest based on monitoring and oyster population analysis (e.g., stock assessments).
 - **Action 2-C)** Ensure that definitions of oyster population health are based on metrics/criteria specific to the resource in addition to the fishery.
 - **Action 2-D)** Evaluate harvest-level or oyster population-based metrics used to manage oyster reef harvest at sustainable target levels and above threshold levels. Consider graduated metrics that serve as targets, or indicators when harvest should be limited or closed. This should be applied by area or reef data allows.
 - **Action 2-E)** Consider temporary wild harvest closures based on the results of oyster population monitoring relative to the established metrics.
 - **Action 2-F)** Add a spatial component to the ecological and fishery modeling to approximate historical and existing reefs and reassess management strategies based on the evaluation of modeling scenarios.
- 3. Conduct an oyster stock assessment for the Apalachicola Bay System with periodic updates.**
- **Action 3-A)** Conduct annual or biannual stock assessments using fisheries dependent and independent data, with data collection methods and site selection done in collaboration with oystermen, for determining a sustainable level of wild oyster harvest for each season.
 - **Action 3-B)** Conduct monitoring (i.e., spot-checks) of oyster abundance during the fishing season to facilitate adaptive management of harvest limits.
- 4. Recommend FWC Law Enforcement review enforcement strategies and penalties to assure sufficient deterrence of harvest or sale of undersized oysters, violations that harm wild or leased oyster reefs and other natural resources, and other matters that hinder restoration efforts in the ABS.**
- **Action 4-A)** Develop strategies to increase enforcement presence and number of checkpoints to provide a deterrent to illegal activities.

- **Action 4-B)** Ensure law enforcement presence during peak harvesting periods, and on the water during harvest season hours.
- **Action 4-C)** Develop strategies to ensure consistent practices are used for enforcement of regulations regarding the harvestable and marketable size of oysters. (See Actions **5-F** and **5-G**)
- **Action 4-D)** Statutes and/or rules should be revised as needed to require FWC to check harvested oysters for size-limit enforcement* before they are washed and processed. Once processed, enforcement of oyster size-limits should be limited to oysters under 2.75” because processing changes shell height.

**Sampling and other data collection activities shall not be impacted by this recommendation.*

- **Action 4-E)** Evaluate and enhance, as needed, the regulations and enforcement practices to ensure dealers accurately identify the source of oysters after processing and packaging.
- **Action 4-F)** Evaluate and revise, as needed, the statutory and/or regulatory requirements to ensure that FWC has authority to enforce oyster regulations at the dealers’ location.
- **Action 4-G)** Work with oystermen to evaluate current rules and regulations to ensure they are enforced consistently and fairly.
- **Action 4-H)** Evaluate and seek authority to implement a tiered system of penalties for willful violators (e.g., increased fines and license suspensions ranging from increased length of suspension to the permanent loss of license) to keep willful violators out of the industry.
- **Action 4-I)** Encourage community and industry support for consistent judicial imposition of penalties within the existing penalties framework for oyster harvest violations, including imposing stricter penalties for habitual and willful violators.
- **Action 4-J)** Prior to the opening of each harvest season, conduct a joint workshop between law enforcement and the oystermen to review the current rules and regulations, identify any changes, discuss enforcement approaches relative to harvest practices and constraints on the water, and to provide mutual two-way education, and enhance communication and collaboration between law enforcement and oystermen.
- **Action 4-K)** Work together and with other stakeholders to seek funds to support the recommended increased law enforcement presence in the Bay.
- **Action 4-L)** Establish the 5% allowable undersize oyster limit for both harvesters and dealers.
- **Action 4-M)** Clarify that it is an allowable practice for oystermen to weigh oyster bags while on the water to ensure the bags meet the weight limit regulations.

5. Establish co-management advisory committees to provide advice and oversight to state managing agencies on oyster habitat and wild harvest. Evaluate the development of a policy that would require setting sustainable harvest goals and placing limitations on or a complete closure to harvesting in certain areas (e.g., important spawning reefs) based on the results of data (e.g., stock assessment, larvae transport modeling) collected and evaluated under a comprehensive monitoring program designed to sustainably manage the resource.

- **Action 5-A)** Convene a co-management advisory committee comprised of state and federal agencies, and other appropriate experts, to assess and make recommendations on oyster habitat needs in conjunction with harvest management strategies.
- **Action 5-B)** Convene an Oyster Fishery Advisory Board within FWC to review and make recommendations on management and enforcement of the oyster fishery statewide.

- 6. Recommend policies and actions that retain and recycle shell or other suitable material for habitat replenishment in the Apalachicola Bay System.**
 - **Action 6-A)** Develop agency rules and policies that require shell retention and/or obtain shell or other suitable material for habitat replenishment (through a fee or incentive program).
 - **Action 6-B)** Obtain legislative support for statutes that support or require shell recycling and oyster habitat replenishment. (e.g., Texas House Bill 51 (2017); North Carolina General Statute §130A-309.10 (2010); Maryland House Bill 184; Chapter 157, F.S. (McClellan 1881).
 - **Action 6-C)** Establish and/or expand partnerships with local organizations, stakeholder groups, industry, and universities in shell recycling programs.

- 7. Use decision-support tools to evaluate and develop a system of potential closed areas (e.g., spawning reefs) 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.**
 - **Action 7-A)** Engage local stakeholders in determining total coverage (how much to protect), placement (where to protect), and size (how large) of all types of potential closed areas using gridded maps as well as distributions of selected fishery and ecologically important species.
 - **Action 7-B)** Use ecological quantitative modeling outputs to identify: the oyster population abundance that can support sustainable harvest; percentage of the total reef area that is sufficiently productive to support sustainable harvest; annual recruitment required to support sustainable harvest; and to determine the amount and frequency of habitat replacement to maintain productive oyster reefs.

- 8. Work with FDACS and oyster aquaculture industry stakeholders 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 wild fisheries and the important cultural role of a working waterfront and seafood industry.**
 - **Action 8-A)** Develop maps using FDACS data showing all proposed and existing aquaculture activities in the ABS, superimposed on existing maps of essential fish habitat, fishing activities, seagrass beds, and natural existing hard bottom (reefs/bars) to identify potential conflicts. Maps should be updated as frequently as is feasible to assure their usefulness.
 - **Action 8-B)** Evaluate and consider programs and policies that use farmed oysters for restoration on wild oyster reefs and to retain oysters and/or shells from aquaculture industry to be recycled on wild reefs.

- 9. Assess the effectiveness of an oyster replenishment program 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 9-A)** Conduct field studies of survival of planted spat-on-shell to harvestable size and time required to attain market size.
- **Action 9-B)** Develop and 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 9-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 to ensure the economic viability of replenishing activities.
- **Action 9-D)** Monitor the stability of oyster populations using the oyster replenishment program approach to wild fishery harvest, to determine whether deploying cultch or spat-on-shell helps reduce natural fluctuations in oyster populations.

GOAL C
A FULLY FUNDED APALACHICOLA BAY SYSTEM ECOSYSTEM-BASED ADAPTIVE RESTORATION AND MANAGEMENT PLAN SUPPORTED BY APALACHICOLA BAY SYSTEM STAKEHOLDERS — STRATEGIES TO ENSURE THE IMPLEMENTATION, MONITORING, AND ADAPTABILITY OF THE PLAN

VISION THEME C: The Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan is science-based, developed with engagement and support from the Apalachicola Bay System stakeholders, and is fully funded.

GOAL C: The Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan is supported by the Apalachicola Bay System stakeholders and is fully funded.

OUTCOME: By 2030, the Apalachicola Bay System is a productive and sustainably managed ecosystem. A fully funded and well-executed science-based Ecosystem-Based Adaptive Restoration and Management Plan that incorporates the monitoring necessary for evaluation and adaptation that is developed and broadly supported by Apalachicola Bay System stakeholders with guidance from a permanent stakeholder advisory group.

GOAL C OBJECTIVES

C1) To establish a fully funded permanent, representative stakeholder process to monitor the long-term implementation of the Plan.

C2) To identify funding sources and define mechanisms for full implementation of the Plan.

GOAL C PRIORITIZED STRATEGIES

- 1) ***The Partnership for a Resilient Apalachicola Bay, which is the successor group to the CAB, will have an open and transparent process for the implementation of the Plan with many***

opportunities for stakeholder engagement and input in a variety of forms (e.g., workshops, online, public/ government meetings) for generating awareness and support while incorporating any changes the the *Partnership for a Resilient Apalachicola Bay* (PRAB) deems appropriate and necessary to fulfill the Plan's goals and objectives.

- **Action 1-A)** The PRAB actively engages with state programs to encourage their adoption of long-term monitoring guidelines and metrics (see **Goal A**) for assessing water quality, oyster abundance, and demographics and to regularly review and update these guidelines and metrics to maintain a healthy and sustainable oyster harvest and Bay ecosystem.
- **Action 1-B)** The PRAB will monitor the Plan's implementation and make recommendations for revisions required to adaptively respond to changing conditions.
- **Action 1-C)** The PRAB will encourage agencies to prioritize the Plan's recommendations for investing more funding in the management and restoration of oyster resources.
- **Action 1-D)** The PRAB will support state legislators and state agencies in the development of funding strategies, and incentives for involving local oystermen, seafood dealers, restaurants, aquaculture operations, and private citizens in oyster reef restoration efforts that will increase the viability of oyster resources.
- **Action 1-E)** The PRAB facilitates bidirectional information flow between agencies implementing the restoration and management plans and the public, other government entities and NGOs.

2) Create a comprehensive funding approach for the Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan implementation including a comprehensive analysis for future grant funding for strategies that support sustainable monitoring deriving from the Plan.

- **Action 2-A)** Evaluate and seek funding sources for implementation of management and restoration strategies included in the Plan (e.g., state agencies, region-wide Gulf trustee implementation group for oil spill settlement funding, federal agencies).
- **Action 2-B)** Evaluate and seek funding for the engineering design, permitting and implementation of habitat restoration efforts based on oyster habitat suitability mapping and modeling and restoration and management targets in consultation with stakeholders.
- **Action 2-C)** Evaluate and seek funding sources to generate awareness, education, and support for a healthy oyster and ABS ecosystem.
- **Action 2-D)** Evaluate and seek long-term funding for a comprehensive monitoring program that is used across programs and projects with a dashboard on metrics and indicators to leverage resources, standardize the metrics and indicators measured, and to share data.
- **Action 2-E)** Develop and seek a funding source to provide cultch for habitat restoration on an ongoing basis.
- **Action 2-F)** Work across estuary programs to fund and leverage large scale monitoring for the Perdido to Suwanee region.
- **Action 2-G)** The PRAB should evaluate whether to initiate the development of an Apalachicola Bay Estuary Program (ABEP) to coordinate and lead in the implementation and monitoring of the Plan. The PRAB should explore whether it's a better model to be a part of the Environmental Protection Agency's (EPA) National Estuary Program or to model an ABEP after the EPA program and assess alternative funding models such as those used by the other Florida Panhandle estuary programs.

GOAL D
AN ENGAGED STAKEHOLDER COMMUNITY AND INFORMED PUBLIC —
STRATEGIES TO SUPPORT EDUCATION, OUTREACH, AND COMMUNITY SUPPORT
FOR THE PLAN

VISION THEME D: Stakeholders of the Apalachicola Bay System are committed to working together to disseminate relevant information and advocate for a sustainably managed oyster habitat and a healthy Bay ecosystem. In so doing, the group will facilitate innovative research, development and implementation of best management practices and serve as a hub for information exchange that supports innovation, education and communication opportunities.

GOAL D: A productive and well-managed Apalachicola Bay System is supported by an actively engaged and informed stakeholder community and public.

OUTCOME: By 2030, stakeholders, private and nonprofit civic leaders, and the public are informed of the importance of sustaining the health of the Apalachicola Bay System and are engaged and working actively together along with elected and appointed leaders and managers to invest in and implement the Plan.

GOAL D OBJECTIVES

D1) To coordinate community engagement efforts to increase public awareness of and support for a healthy and well-managed ABS ecosystem; and to ensure that businesses, industries, non-profits, community groups, individuals, and local governments are supportive and included in these efforts.

D2) To measure public and stakeholder understanding of the issues important to the health and restoration of the Bay and socio-economic indicators.

GOAL D PRIORITIZED STRATEGIES

1) Build, with the help of the *Partnership for a Resilient Apalachicola Bay*, community support and stewardship by educating stakeholders on the importance of maintaining a healthy ABS ecosystem and oyster reefs and by engaging them in the Bay restoration through a variety of hands-on programs.

- **Action 1-A)** The PRAB shall support development of a community outreach strategy intended to inform and educate stakeholders and the public about the research, the Plan, and focusing on a healthy ABS ecosystem. The audience will include local city, county, and state government officials, businesses and organizations, citizens of every age, and other interested stakeholder groups.
- **Action 1-B)** Work with local groups, agencies, businesses, and other stakeholders to develop a successful shell-recycling program.

- **Action 1-C)** Work with local groups, agencies, businesses, and other stakeholders to identify sources of shell, or other restoration material.
- **Action 1-D)** Develop a “Bay Stewards” program to honor, reward, and provide incentives for businesses and individuals that demonstrate their stewardship of the resource.

2) Support and participate in providing educational opportunities for students at all levels (primary & secondary school through college) to understand the value of their coastal ecosystems, importance of stewardship and the role oysters play in ecosystem health and fisheries.

- **Action 2-A)** Work with existing entities (e.g., WeatherStem, Scientist in Every Florida School program of the Florida Museum) to expose more K-12 students to the research being conducted to support ABS restoration and management.
- **Action: 2-B)** Provide training and financial support for new workforce entrants in the Franklin County Community through an aquaculture internship program.
- **Action 2-C)** Provide research opportunities for undergraduate and graduate students in science that supports the Plan’s goals.

GOAL E
A THRIVING ECONOMY CONNECTED TO A RESTORED APALACHICOLA BAY SYSTEM — STRATEGIES TO MONITOR, ASSESS, AND REPORT ON THE ECONOMIC VIABILITY OF THE PLAN

VISION THEME E: A restored Apalachicola Bay System sustains a vibrant commercial oyster fishery, a thriving aquaculture industry and recreational and tourism-related activities and development opportunities that underpin a strong local economy and resilient coastal community.

GOAL E: The broader Apalachicola Bay Region is thriving economically as a result of a fully restored Apalachicola Bay System.

OUTCOME: By 2030, the broader Apalachicola Bay Region is thriving economically because of a restored Apalachicola Bay System that reflects a unique coastal cultural heritage, based on a vibrant oyster fishery, while simultaneously providing new opportunities for sustainable and responsible development, business, recreation and tourism.

GOAL E OBJECTIVES

E1) To ensure that economic indicators of the commercial oyster fishery and associated industries in the ABS demonstrate increasing viability and growth.

E2) To ensure that industries and businesses within the ABS are compatible with a healthy and well-managed ABS ecosystem.

E3) To develop growth management policies, plans and regulations affecting the ABS that are compatible with a healthy and well-managed ABS ecosystem while maintaining a thriving economy and supporting cultural heritage.

E4) To develop an oyster aquaculture industry that provides economic opportunities and is complementary to the wild harvest fishery.

GOAL E — PRIORITIZED ECONOMIC STRATEGIES OUTSIDE OF THE ABSI SCOPE

1) Engage all stakeholders to support the regional economy linked to a restored and functionally robust ABS.

- **Action 1-A)** Engage commercial fishermen in the restoration of the Bay and encourage future participation in restoration such as monitoring, cultching, and shell recycling.
- **Action 1-B)** Coordinate with the local business community and governing bodies (i.e., city and county commissions) to ensure that growth management plans, land use and development regulations meet strong standards that are compatible with and minimize the environmental impact of industry and business activities within the ABS and are conducive to a healthy ecosystem.
- **Action 1-C)** Coordinate with and encourage recreational businesses and activities that recognize the importance of and support a sustainable commercial oyster fishery and the importance of the seafood industry to the Region's cultural heritage.
- **Action 1-D)** Work with existing partners (e.g., the Chamber of Commerce, Apalachee Regional Planning Council, and city and county staff) and initiatives such as the Regional Recreation Economy Alliance to leverage resources to support the local economy and monitor and report on the economic benefits of a restored Apalachicola Bay System (ABS). Include key economic indicators relevant to the commercial oyster fishery and associated industries in the region. Develop a dashboard that includes key economic indicators over time based on restoration efforts in the ABS.

2) Develop economic information and tools necessary to support efforts connecting ABS restoration and management with local and regional economies.

- **Action 2-A)** Recommend economic monitoring and enforcement programs to assure quality of data necessary for metrics that measure economic output from and regional impact of harvest on oyster reefs.
- **Action 2-B) Support** development of planning strategies tied to economic indicators that consider future conditions (e.g., climate, sea level rise (SLR), altered river flow) and their effects on the ABS.
- **Action 2-C)** Review land development regulations to provide flexibility while supporting and enhancing efforts to maintain and revitalize working waterfronts in Apalachicola and Eastpoint to ensure preservation of Franklin County's cultural heritage and a viable seafood industry.
- **Action 2-D)** Work with oystermen and other community stakeholders to promote markets for post-recovery Apalachicola oysters products.
- **Action 2-E)** Develop complementary industries in wild oyster harvest and oyster aquaculture that provide new economic opportunities by building a network of experts that can help Franklin County citizens build successful programs through business training, identifying sources of funding for equipment, and developing products that will enhance and diversify local industries.

- **Action 2-F)** Develop new markets for selling oysters to areas within and outside of Florida in part by investing in location (Apalachicola Bay) branding.

**ADDITIONAL PRIORITIZED STRATEGIES OUTSIDE OF THE ABSI SCOPE
FOR REFERRAL TO OTHER ENTITIES**

- 1) Provide training and seek financial support for new workforce entrants (particularly young entrants) interested in being employed in existing industries as well as developing industries in new fisheries, aquaculture, and restoration science.
- 2) Develop surveys or other tools that can be used to measure and track changes in stakeholder and public understanding of the issues important to the health and restoration of the Bay.
- 3) Support existing entities in building Gulf-wide mechanisms for communities interested in the restoration and revitalization of oyster fisheries to exchange best practices and lessons learned.
- 4) Engage the public (students, residents, and tourists) in learning about the history and the ecological and economic importance of the Apalachicola Bay region, including the natural resources, and lumber, cotton shipping, and fishing industries.

**SECTION 2 – STRATEGIES AND ACTIONS NOT ACHIEVING A CONSENSUS LEVEL
OF SUPPORT < 75 SUPPORT**

- **Adverse Environmental Conditions or Natural Disasters.** Develop criteria for restoring specific reefs or reef systems damaged by adverse environmental conditions or natural disasters. *(Note: This strategy was revised to be more general in scope)*
- **Develop ABSI Specific Metrics.** Assess existing ecosystem services metrics used for other oyster studies, and develop a list of ABSI specific metrics to assess change over time. *(Note: This Strategy was removed from the recommendations since it was accomplished)*
- **Rotational Closures (e.g., summer bars vs. winter bars, partial bar closures).** Not supported by the CAB or the oystermen, due to support for other approaches that accomplish the goal of this approach.
- **Permanent Refuge Non-Harvest Areas (No Fishing).** The CAB and the oystermen noted that there are already closed areas and any additional areas, if needed for the Bay’s health, should be designated in close consultation with the oystermen.
- **Reduced Bag Limits.** There was not consensus for this approach by the oystermen or the CAB; however, there is receptivity to considering this approach if it was done correctly and the limit allowed for an oysterman to make a living. This should be evaluated in relation to a limited entry approach.

- **Bag Tags.** There was not consensus for this approach by the oystermen or the CAB; however, there was receptivity to this approach if it was done correctly and the limit allowed for an oysterman to make a living.
- **No Harvest During Spawning Season.** Develop strategies to limit oyster harvest to periods outside of peak spawning season. *(Note: Ranked 1.71 on the basis that the Summer Closure of June - August was supported by the oystermen and closing for longer periods would severally limit when oysters could be harvested considering the frequent closures due to poor water quality levels.)*

SECTION 3 – MODELED STRATEGIES, ACTIONS, AND ASSUMPTIONS

MODELING ASSUMPTIONS, PARAMETERS, AND TAKE-HOME MESSAGES SUMMARY

MODELING ASSUMPTIONS FOR EVALUATING STRATEGIES/SCENARIOS – ACCEPTED BY CAB 10/18/22

- Habitat is the key driver for restoration success - fewer oysters are surviving to harvestable sizes because habitat has declined below a critical minimum quantity or quality or both.
- A 3-month closure from June – August.
- The model assumes that fishing effort is capped at 1500 trips/month.
- That fishing effort can be controlled effectively. However, this will be highly dependent on enforcement and public cooperation.
- The Model assumes compensatory recruitment dynamics, that when coupled with high enough effort for a collapse to occur, can be overcome by habitat restoration.

ASSUMPTIONS AND PARAMETERS SUMMARY – ROSS ELLINGTON, FSU, AND REVISED BY ED CAMP, UF

1. All the model results will be sensitive to the recruitment dynamics, including the carrying capacity (recruitment at unfished conditions), the inherent productive (compensation ratio), the existence of a threshold level of habitat below which recruitment falls, and the steepness of the relationship between amount of habitat and the proportion of suitable recruitment habitat.
2. Season, size, and bag (5 bags) limits are the same for all scenarios.
3. Substrate used in restoration deteriorates at a very slow rate, to represent rocks being covered with organic material or degrading over time.
4. Single large restoration (SL) involves restoration of 33% of initial habitat under the baseline assumption of recruitment dynamics.
5. Semi-annual restoration after initial large restoration:
 - Replaces 1/6 of SL restoration (~5% of initial habitat).
 - Restoration is modeled as direct addition of substrate and does not consider the logistical challenges of dumping substrate from above (i.e., without burying live oysters—this is most important for semi-annual and annual restoration).
6. Mortality (M) represents an unexpected mortality event, in this case a 15% increase in natural mortality over a 5-year period five years after restoration.

KEY TAKE-HOME MESSAGES AND THOUGHTS SUMMARY – ROSS ELLINGTON, FSU, AND REVISED BY ED CAMP, UF

1. If depensation is occurring, more conservative management practices will have to be employed.
2. Potential and unpredictable increases in natural M may occur over time. This argues for implementation of more conservative management practices.
3. Scenarios were not always run to equilibrium because the dynamics of habitat change can take a very long time. This means that some of the scenarios that appear sustainable may over a long time (decades) still result in habitat loss.
4. General conclusions from 46 scenarios:
 - The limited entry + SL strategy is sustainable at harvest levels 10-60%.
 - The limited entry + M + SL strategy is sustainable only at low harvest levels (10-20%).
 - The limited entry + SL strategy + semi-annual restoration strategy is sustainable at all harvest levels.
 - The limited entry + SL strategy + M + semi-annual restoration strategy is sustainable at harvest levels 10-40%.
 - By and large, the open access strategy fails in all scenarios.
 - The active harvest + SL strategy is sustainable at harvest levels 10-50%.
 - The active harvest + M + SL strategy is sustainable only at harvest levels 10-20%.
 - The active harvest + SL strategy + semi-annual restoration strategy is sustainable at all harvest levels.
 - The active harvest + SL strategy + M + semi-annual restoration strategy is sustainable at all harvest levels except for 90%.
5. Clear winner (considering the possibility of M) is the active harvest + SL strategy + semi-annual restoration strategy, though the semi-annual restoration will also require considerable additional funding.
6. Active Harvest Management: “The total amount of harvest would be limited (e.g., 10-90% of the legal-sized oysters), but the number of fishers would not be. Size, bag, and season limits would still apply.”

FACILITATOR’S SUMMARY OF MODELING RESULTS, ISSUES, ASSUMPTIONS, AND TAKE-HOME POINTS IDENTIFIED BY ED CAMP, UF – JEFF BLAIR, FACILITATED SOLUTIONS, LLC, AND REVISED BY ED CAMP, UF

- The Fisheries Model does not have the detail (spatial resolution and scaling) to provide specifics as to the exact locations, size, spatial configuration, and locations for oyster reef restoration or the specific details for proposed management strategies.
- The Model will assist the CAB to evaluate proposed strategies and scenarios (combinations of strategies) at the level of how they perform **relative to each other** (e.g., x strategy performs better than y strategy, and a combination of x and y perform better than either x, y, or z strategies).
- Preliminary Model results suggest that extensive initial restoration to augment habitat beyond an unknown critical threshold level is necessary for any sustainable fishery.
Ed stated that after this, measures must be taken to limit overall oyster harvest (e.g., limiting effort or harvest) and habitat removal (via harvest) to avoid a subsequent decline.
- Significant funding will be required to achieve sufficient and sustainable habitat restoration, and FWC management and enforcement will be required to ensure a viable wild oyster fishery.

- An initial oyster-reef restoration sufficient to achieve the predicted threshold for sustainability (a successful restoration) using cultch that has been demonstrated to remain in place and not degrade in the near-term would be required.
- Appropriate harvest level limitations would be required once restoration sites achieve harvestable size oysters in order to provide for a sustainable fishery.
Ed Camp offered this analysis.
- Preliminary Model results predict a minimum threshold level for initial restoration of oyster reefs would be approximately 33% - 35%* of the pre-collapse level of oyster reefs.
**Ed stated that this is specific to the recruitment and depensation parameters used (i.e., it assumes we understand the relationship between amount of habitat and oyster recruitment, and there is strong evidence we do not understand this relationship). Therefore, these levels 33-35% are only an initial guess.*
Ed commented it is critical that these be empirically tested, since we have no record of “reef height” or amount of habitat, we cannot possibly recover this information from any models alone.
- Restored oyster reefs require some time to establish themselves before harvesting to provide oysters with the time they need to reach market size.
Ed noted that the time required may be short (2-3 years) if the habitat is properly restored and if there is sufficient larval supply.
- All options will need to have a cost-benefit analysis conducted including evaluating the ecological, ecosystem, socio-cultural, socio-economic, and political considerations.
- Recurring funding will be required to support ongoing active adaptive management (including monitoring) to assess the effects of restoration and fisheries.
Ed commented that this is the only way to prove what works and what does not.
- Enforcement will be critical to successful restoration and the establishment and maintenance of a sustainable wild oyster fishery.

MODELING SIMULATION RESULTS SUMMARY – ED CAMP, UF

TABLE OF TERMS FOR STRATEGIES MODELED

Management Category	Broad category of management option. Levels are limited entry (LE), open access (OA), and active harvest management (AHM).
Level	Meaning depends on the Management Category. LE is percent pre-collapse effort, OA has no levels, and AHM is percent legal oysters harvested.
Environmental Scenario	Deterministic (Determ.): Means no randomness. M inc. stands for a 15% increase in natural mortality for a 5-year period 5 years after restoration.
Restoration Scenario	Single Large is a single large restoration event (33% of initial habitat). Semi-ann. is additional restoration every other year at lower levels (5% of initial habitat).
Oyster Population	Category describing what happens to the oyster populations over time.
Profit	A scale of how much revenue (across the fishery) is predicted to be generated, where 0 is effectively no harvest and 8 is a lot. The numbers are linear, so "4" is twice as much as 2.
Limited Entry	Management in which the total amount of effort would be regulated, likely by regulating the number of entrants into the fishery (though rare, it's possible to have unlimited numbers of fishers but only a certain number of "fisher days"). Expressed as a percent of "pre-collapse" effort. E.g., 10% means only 10% of the fishing trips that happened before the collapse. Size, bag, and season limits still apply.
Open Access	Status quo management: size, bag, and seasonal limits but no limit on the number of fishers, fisher days, or the amount of oysters harvested.
Active Harvest Management	The total amount of harvest would be limited (e.g., 10-90% of the legal-sized oysters), but the number of fishers would not be. Size, bag, and season limits would still apply.

TABLE OF STRATEGIES MODELED

Management Category	Level	Environmental Scenario	Restoration Scenario	Oyster Population	Profit
Limited Entry	10%	Deterministic	Single Large (S.L.)	Sustained	1
Limited Entry	20%	Deterministic	Single Large	Sustained	2
Limited Entry	40%	Deterministic	Single Large	Sustained	4
Limited Entry	60%	Deterministic	Single Large	Sustained	6
Limited Entry	80%	Deterministic	Single Large	Short-term sustained	7

Limited Entry	100%	Deterministic	Single Large	Declining	7
Limited Entry	10%	Deterministic Natural Mortality Included	Single Large	Sustained	1
Limited Entry	20%	Determ. M inc.	Single Large	Sustained	2
Limited Entry	40%	Determ. M inc.	Single Large	Collapsed	0
Limited Entry	60%	Determ. M inc.	Single Large	Collapsed	0
Limited Entry	80%	Determ. M inc.	Single Large	Collapsed	0
Limited Entry	100%	Determ. M inc.	Single Large	Collapsed	0
Limited Entry	10%	Deterministic	S.L. + semi-ann.	Sustained	1
Limited Entry	20%	Deterministic	S.L. + semi-ann.	Sustained	2
Limited Entry	40%	Deterministic	S.L. + semi-ann.	Sustained	4
Limited Entry	60%	Deterministic	S.L. + semi-ann.	Sustained	6
Limited Entry	80%	Deterministic	S.L. + semi-ann.	Sustained	7
Limited Entry	100%	Deterministic	S.L. + semi-ann.	Sustained	8
Limited Entry	10%	Determ. M inc.	S.L. + semi-ann.	Sustained	1
Limited Entry	20%	Determ. M inc.	S.L. + semi-ann.	Sustained	2
Limited Entry	40%	Determ. M inc.	S.L. + semi-ann.	Sustained	4
Limited Entry	60%	Determ. M inc.	S.L. + semi-ann.	Collapsed	0
Limited Entry	80%	Determ. M inc.	S.L. + semi-ann.	Collapsed	0
Limited Entry	100%	Determ. M inc.	S.L. + semi-ann.	Collapsed	0
Open Access	-	Deterministic	Single Large	Collapsed	0
Open Access	-	Determ. M inc.	Single Large	Collapsed	0
Open Access	-	Deterministic	S.L. + semi-ann.	Sustained*	4
Open Access	-	Determ. M inc.	S.L. + semi-ann.	Collapsed	0
Active Harvest	10	Deterministic	Single Large	Sustained	3
Active Harvest	20	Deterministic	Single Large	Sustained	5
Active Harvest	30	Deterministic	Single Large	Sustained	6
Active Harvest	50	Deterministic	Single Large	Sustained	7
Active Harvest	70	Deterministic	Single Large	Short-term sustained	7
Active Harvest	90	Deterministic	Single Large	Short-term sustained	7
Active Harvest	10	Determ. M inc.	Single Large	Sustained	3
Active Harvest	20	Determ. M inc.	Single Large	Sustained	5
Active Harvest	30	Determ. M inc.	Single Large	Collapsed	0
Active Harvest	50	Determ. M inc.	Single Large	Collapsed	0
Active Harvest	70	Determ. M inc.	Single Large	Collapsed	0
Active Harvest	90	Determ. M inc.	Single Large	Collapsed	0

Active Harvest	10	Deterministic	S.L. + semi-ann.	Sustained	4
Active Harvest	20	Deterministic	S.L. + semi-ann.	Sustained	5
Active Harvest	30	Deterministic	S.L. + semi-ann.	Sustained	6
Active Harvest	50	Deterministic	S.L. + semi-ann.	Sustained	7.5
Active Harvest	70	Deterministic	S.L. + semi-ann.	Sustained	8
Active Harvest	90	Deterministic	S.L. + semi-ann.	Sustained	8
Active Harvest	10	Determ. M inc.	S.L. + semi-ann.	Sustained	3
Active Harvest	20	Determ. M inc.	S.L. + semi-ann.	Sustained	5
Active Harvest	30	Determ. M inc.	S.L. + semi-ann.	Sustained	6
Active Harvest	50	Determ. M inc.	S.L. + semi-ann.	Sustained	7
Active Harvest	70	Determ. M inc.	S.L. + semi-ann.	Sustained	7.5
Active Harvest	90	Determ. M inc.	S.L. + semi-ann.	Collapsed	0

SECTION 4 – INITIAL CONSENSUS LEVEL RANKED STRATEGIES ADOPTED IN THE ABS PLAN FRAMEWORK

STRATEGIES ACHIEVING A CONSENSUS LEVEL OF SUPPORT: ≥75% SUPPORT

PRIORITY OF STRATEGIES BY GOAL AREA	
ALL STRATEGIES WITHIN EACH PRIORITY LEVEL (1 – 3) ARE OF EQUAL PRIORITY AND WILL BE IMPLEMENTED BASED ON A LOGICAL SEQUENCING	
Priority 1 Strategies (10, 9, 8) = Important To Do Now	
GOAL A	GOAL B
1) Restore and create reef structures suitable for sustained oyster settlement that enhance ecosystem services in designated restoration areas. (#1 – 9.6) <i>(#1 overall rank for Goal A – 9.6 mean/average)</i>	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) <i>(#1 overall rank for Goal B – 9.3 mean/average)</i>
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)	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) Determine area (acres or km ²) of oyster reefs that currently support live oysters as well as the	3) Conduct an oyster stock assessment for the ABS with periodic updates. (#3 – 8.8)

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)^ Develop criteria for restoring specific reefs or reef systems damaged by environmental conditions or natural disasters. (#4 – 8.2)	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)^ 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)	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)
<i>^Priority #4 and #5 above received the same ranking.</i>	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 Strategies (7, 6, 5) = Important But Less Time Sensitive	
GOAL A	GOAL B
6) Develop ecosystem models that forecast future environmental conditions and oyster population status. (#6 – 7.2)	8) Recommend policies and actions that retain and recycle shell for habitat replenishment in the ABS. (#8 – 7.7)
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)	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 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)
	13)* Assess the effectiveness of an oyster repletion program 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. * <i>This Strategy was not ranked for priority.</i>
Priority 3 Strategies (4, 3, 2, 1) = As Time and Resources Allow	
GOAL A	GOAL B
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)	

PRIORITY OF STRATEGIES BY GOAL AREA	
ALL STRATEGIES WITHIN EACH PRIORITY LEVEL (1 – 3) ARE OF EQUAL PRIORITY AND WILL BE IMPLEMENTED BASED ON A LOGICAL SEQUENCING	
Priority 1 Strategies (10, 9, 8) = Important To Do Now	
GOAL C	GOAL D
1)^ The ABSI Team and the CAB will continue to have an open and transparent process for the development of the Plan with many opportunities for stakeholder engagement and input in a variety of forums (e.g., workshops, online, public/	1) Develop a Community Advisory Board (CAB) for the ABSI that provides critical information and perspective to the ABSI leadership and whose members recognize the

government meetings) for generating awareness and support while incorporating any changes the CAB deems appropriate and necessary to fulfill the goals and objectives. (#1 – 9.1) <i>(#1 overall rank for Goal C – 9.1 mean/average)</i>	importance of their role as ambassadors for the initiative*. (#1 – 8.9) <i>* Status: Initiated. (#1 overall rank for Goal D – 8.9 mean/average)</i>
2)^ A successor group to the CAB will be developed and in place by the time the Plan is completed*. (#1 – 9.1) <i>* Status: under development</i>	
3) During 2021, the ABSI Team will form a sub-committee within the CAB to evaluate the efficacy of forming a CAB successor group. The intent of a successor group would be to ensure continuity between the CAB members and the agencies responsible for oyster management. (#3 – 8.8) <i>* Status: under development</i>	
4) Create a comprehensive funding approach for the Apalachicola Bay System Ecosystem-Based Adaptive Restoration and Management Plan implementation including a comprehensive analysis for future grant funding for strategies, including support for sustainable monitoring deriving from the Plan. (#4 – 8.5)	
<i>^Priority #1 and #2 above received the same ranking.</i>	
Priority 2 Strategies (7, 6, 5) = Important But Less Time Sensitive	
GOAL C	GOAL D
	2) Build, with the help of the CAB, community support and stewardship by educating stakeholders on the importance of maintaining healthy oyster reefs and by engaging them in the Bay restoration through a variety of hands-on programs. (#2 – 7.7)
	3) Support and participate in providing educational opportunities for students at all levels (primary & secondary school through college) to understand the value of their coastal ecosystems, importance of stewardship and the role oysters play in ecosystem health and fisheries. (#3 – 6.7)
Priority 3 Strategies (4, 3, 2, 1) = As Time and Resources Allow	
GOAL C	GOAL D

PRIORITY OF STRATEGIES BY GOAL AREA	
STRATEGIES OUTSIDE OF ABSI SCOPE	
Priority 1 Strategies (10, 9, 8) = Important To Do Now	
GOAL E STRATEGIES TO BE REFERRED	ADDITIONAL STRATEGIES TO BE REFERRED
1) Engage commercial fishermen in the restoration of the bay and encourage future participation in restoration such as monitoring, shell recycling, shelling, and relaying. (#1 – 8.5) <i>(#1 overall rank for Goal E – 8.5 mean/average)</i>	
2) Recommend monitoring and enforcement programs continue with appropriate metrics to measure output from and impact of harvest on oyster reefs. (#2 – 8.3)	
Priority 2 Strategies (7, 6, 5) = Important But Less Time Sensitive	
GOAL E STRATEGIES TO BE REFERRED	ADDITIONAL STRATEGIES TO BE REFERRED
3) Coordinate with the local business community and governing bodies (i.e., city and county commissions) to ensure that growth management plans, land use and development regulations meet strong standards that are compatible with and minimize the environmental impact of industry and business activities within the ABS and are conducive to a healthy ecosystem. (#3 – 7.2)	1) Work with State legislators and state agencies to develop funding strategies, and incentives for involving local watermen, seafood dealers, restaurants, aquaculture operations, and private citizens in oyster reef restoration efforts that will increase the viability of oyster resources. (#1 – 7.7) <i>(#1 overall rank for Referred Strategies – 7.7 mean/average)</i>
4) Coordinate with and encourage recreational businesses and activities that recognize the importance of and support a sustainable commercial oyster fishery and the importance of the seafood industry to the Region’s cultural heritage. (#4 – 6.9)	2) Provide training and financial support for new workforce entrants (particularly young entrants) interested in being employed in existing industries as well as and developing industries in new fisheries, aquaculture, and restoration science. <i>(#2 – 6.4)</i>
5) Work with existing partners (e.g., the Chamber of Commerce, Apalachee Regional Planning Council, and city and county staff) to monitor and report on the economic benefits of a restored ABS, including key economic indicators relevant to the commercial oyster fishery and associated industries in the region. This can be displayed as a dashboard that includes key economic indicators over time based on restoration efforts in the Apalachicola Bay System (ABS). (#5 – 6.8)	3) Develop surveys or other tools that can be used to measure and track changes in stakeholder and public understanding of the issues important to the health and restoration of the Bay. (#3 – 6.3)

6) Support planning tied to economic indicators that consider future conditions (climate, SLR, reduced river flow) and their effects on the ABS. (#6 – 6.6)	4) Build Gulf-wide mechanism for communities interested in the restoration and revitalization of fisheries to exchange best practices and lessons learned. (#4 – 6.0)
7) Review land development regulations to provide flexibility while supporting and enhancing efforts to maintain and revitalize working waterfronts in Apalachicola and Eastpoint to ensure preservation of Franklin County’s cultural heritage and a viable seafood industry. (#7 - 6.5)	5) Engage the public (students, residents, and tourists) in learning about the history and the ecological and economic importance of the Apalachicola Bay region, including the natural resources, and lumber, cotton shipping, and fishing industries. (#5 - 5.3)
8) Work with oystermen and other community stakeholders to promote post-recovery Apalachicola oysters. (#8 – 6.2)	
9) Develop complementary industries in wild oyster harvest and oyster aquaculture that provide new economic opportunities by building a network of experts that can help Franklin County citizens build successful programs through business training, identifying sources of funding for equipment, and developing products that will enhance and diversify local industries. (#9 – 6.0)	
Priority 3 Strategies (4, 3, 2, 1) = As Time and Resources Allow	
GOAL E STRATEGIES TO BE REFERRED	ADDITIONAL STRATEGIES TO BE REFERRED
10) Develop new markets for selling oysters to areas within and outside of Florida in part by investing in location (Apalachicola Bay) branding. (#10 – 4.5)	

Appendix F: Oystermen Workshops During Management/Restoration Plan Development with Links to Meeting Summary Reports.

1. December 2, 2020
https://marinelab.fsu.edu/media/4626/absi_oystermen_workshop_summary_report_2-dec-2020.pdf
2. April 15, 2021
https://marinelab.fsu.edu/media/4835/absi_oystermens_workshop_ii_april_15-2021_facilitators_summary_report.pdf
3. July 14, 2021
https://marinelab.fsu.edu/media/4967/absi_oystermens_workshop_iii_july_14_2021_facilitators_summary_report.pdf
4. October 18, 2022
https://marinelab.fsu.edu/media/5527/absi_oystermens-workshop_facilitators_summary_report_18-october-2022.pdf

Appendix G: Community Workshops During Management/Restoration Plan Development with Links to Meeting Summary Reports.

1. October 19, 2022 https://marinelab.fsu.edu/media/5622/absi_community-workshop_facilitators_summary_report_19-october-2022.pdf
2. April 12, 2023 https://marinelab.fsu.edu/media/5687/absi_community-workshop-forum_facilitators_summary_report_12-april-2023.pdf
3. August 9, 2023 https://marinelab.fsu.edu/media/5784/absi_community-workshop-forum_facilitators_summary_report_9-august-2023.pdf

Appendix H: Outreach Events Linked to ABSI and Restoration/Management Plan Development.

Outreach Event	Location	Year	Date
Florida Seafood Festival	Apalachicola, Florida	2019	November 1 - 2
Florida State University Day at the Capitol	Tallahassee, Florida	2020	February 12
Florida Ocean's Day at the Capitol	Tallahassee, Florida	2020	February 25
Osher Lifelong Learning Institute (OLLI)	St. Teresa, Florida (FSUCML)	2020	February 29
Oysterman's Workshop #1	Eastpoint, Florida (ANERR)	2020	December 2
WFSU Perspectives Radio Show	Tallahassee, Florida	2021	January 28
Apalachicola City Commission Presentation	Apalachicola, Florida	2021	February 2
ANERR Virtual Symposium	Virtual	2021	February 18 - 19
ANERR Virtual SciCafé	Virtual	2021	February 25
Franklin County Commission Presentation	Virtual	2021	March 16
Oysterman's Workshop #2	Eastpoint, Florida (ANERR)	2021	April 15
Carrabelle Riverfront Festival*	Carrabelle, Florida	2021	June 12
Oysterman's Workshop #3	Eastpoint, Florida (ANERR)	2021	July 14
STEMtastic Virtual Lesson	Virtual	2021	July 29
ANERR's SciCafé	Eastpoint Beer Company	2021	September 22
Franklin County Commission Presentation	Apalachicola, Florida	2021	November 2 (am)
Apalachicola City Commission Presentation	Apalachicola, Florida	2021	November 2 (pm)

Florida Seafood Festival	Apalachicola, Florida	2021	November 5 - 6
Eastpoint Civic Association	Eastpoint Fire Station	2021	November 8
St. George Island Civic Club	St. George Island,, FL	2022	March 17
FSUCML Open House	St. Teresa, Florida (FSUCML)	2022	April 22
Apalachicola City Commission Presentation	Apalachicola, Florida	2022	May 3
Apalachicola Library Outreach Event	Apalachicola, Florida	2022	June 1
Franklin County Commission Presentation	Apalachicola, Florida	2022	June 7
Apalachicola Library Outreach Event	Apalachicola, Florida	2022	June 15
Eastpoint Library Outreach Event	Eastpoint, Florida	2022	June 21
Carrabelle Library Outreach Event	Carrabelle, Florida	2022	June 21
ANERR SciCafé	Eastpoint, Florida (ANERR)	2022	July 28
University of Florida Open House	Cedar Key, Florida	2022	October 15
Oystermen's Workshop #4	Eastpoint, Florida (ANERR)	2022	October 18
Community Workshop	Eastpoint, Florida (ANERR)	2022	October 19
Annual Tallahassee Science Festival	Tallahassee, Florida	2022	October 22
Franklin County Commission Presentation	Apalachicola, Florida	2022	November 1
Florida Seafood Festival	Apalachicola, Florida	2022	November 4 - 5
Sopchoppy Oyster and Mullet Festival	Sopchoppy, Florida	2022	November 11
Tallahassee Magnet Lab Open House	Tallahassee, Florida	2023	February 25
Florida State University Day at the Capitol	Tallahassee, Florida	2023	March 21

Florida Ocean's Day at the Capitol	Tallahassee, Florida	2023	March 22
Worm Gruntin' Festival	Sopchoppy, Florida	2023	April 8
Panacea Oyster Fest	Panacea, Florida	2023	April 8
Carrabelle Riverfront Festival	Carrabelle, Florida	2023	April 22
ANERR's Estuaries Day	Eastpoint, Florida (ANERR)	2023	May 5
Autism OdysSea	Cedar Key, Florida	2023	May 6
Challenger Learning Center	Tallahassee, Florida	2023	May 21
Young Engineers of Tallahassee	Tallahassee, Florida	2023	June 10
Community Workshop	Eastpoint, Florida (ANERR)	2023	August 9
Blue Crab Festival	Panacea, Florida	2023	September 30
University of Florida Open House	Cedar Key, Florida	2023	October 21
Community Workshop	Eastpoint, Florida (ANERR)	2023	October 24
Florida Seafood Festival	Apalachicola, Florida	2023	November 3 - 4
Sopchoppy Oyster and Mullet Festival	Sopchoppy, Florida	2023	November 11

Appendix I: Additional Outreach Vehicles Linked to ABSI and Management/Restoration Plan Development

Additional Outreach Vehicles	Links Where Available
Creation of ABSI Website	https://marinelab.fsu.edu/absi/
Bi-Monthly ABSI Newsletter	https://marinelab.fsu.edu/absi/community-engagement/newsletterarchive/
Creation of ABSI Rack Cards	These are distributed throughout businesses and organizations in Leon, Wakulla, and Franklin Counties
Volunteer Opportunities	To date, we have had over 20 consistent volunteers who have logged 483 volunteer hours
Creation of Oyster Life Cycle Poster	https://marinelab.fsu.edu/media/3484/oyster-life-cycle-2-004.jpg
Creation of Oyster Life Cycle Animation	https://youtu.be/xNQWzu8yLqM
Creation of a StoryMap of "A Historical Timeline of the Apalachicola Bay System." There is also a physical timeline poster displayed in the ABSI hallway	https://cosspp.maps.arcgis.com/apps/Cascade/index.html?appid=c015817d93104f7fb7cbc35ae0a993cf
Creation of a StoryMap on Shell Recycling	https://marinelab.fsu.edu/absi/community-engagement/restoremgmt/shellrecycle/
Creation of Social Media Updates	A new template was introduced in early 2023, with a consistent ABSI "FAQ" every Monday and at least one ABSI field/research update each week
Submission of two Op-Eds to local newspapers	They were picked up by <i>The Apalachicola Times</i> , <i>The St. Joe Star</i> , <i>Wakulla News</i> , <i>Wakulla Sun</i> , and Oyster Radio
Creation of ABSI's FAQ page	https://marinelab.fsu.edu/absi/faqs-and-key-points/

Appendix J: Glossary of ABSI-Related Terms.

Adaptive Management: A process that includes making decisions, evaluating the results, comparing the results to predetermined performance measures, and modifying future decisions to incorporate lessons learned.

Apalachicola Bay System: Consists of six bays: Apalachicola Bay, East Bay, Saint Vincent Sound, East and West Saint George Sound, and Alligator Harbor comprising a total of 155,374 acres (62,879 Ha). Confined to Franklin County and ending to the north at river mile zero (0). Important considerations include riverine and offshore inputs to the ABS as well as the reciprocal influences of outputs from the ABS to the Gulf of Mexico.

Ecosystem Health: A “healthy” ecosystem is one that conserves diversity, supports fully functional ecological processes, and sustains a range of ecological and ecosystem services.

Ecosystem Services: The contributions of ecosystems to human wellbeing. These include provisioning services (food, raw materials, fresh water, medicinal resources), regulating services (climate, air and water quality, moderation of extreme events, and erosion prevention), habitat services (habitat for species that support ecosystem services), and cultural services (recreation for mental & and physical health; tourism; aesthetic appreciation spiritual experience).

Estuarine Metrics: These are variables that can be measured and used to assess the benefits or impacts of the different upstream management and climate scenarios that influence freshwater flow into the ABS.

Goal: A goal is a statement of the project’s purpose to move towards the vision expressed in broad language.

Guiding Principles: The Community Advisory Board’s Guiding Principles reflect the broad values and philosophy that guides the operation of the Community Advisory Board and the behavior of its members throughout its process.

Objective: Objectives describe in concrete terms how to accomplish the goal to achieve the vision within a specific timeframe and with available resources. (e.g., By 2023, the State of Florida will have approved a stakeholder developed Ecosystem-Based Adaptive Restoration and Management Plan for the Apalachicola Bay System.”)

Outcome: Outcomes describe the expected result at the end of the project period – what is hoped to be achieved when the goal is accomplished. (E.g., an ecologically, and economically viable, healthy, and sustainable Apalachicola Bay System oyster fishery and ecosystem)

Oyster Resources: Sources of oysters that provide natural and cultural benefits to humans. These sources can come from the wild or from aquaculture. The responsible management of oyster resources requires integrated approaches that incorporate the social, economic, and environmental considerations of sustainability.

Performance Measures: The regular measurement of outcomes and results, which generates reliable data on the effectiveness, efficiency, and sustainability of programs and plans.

Restoration: The process of repairing, through human intervention, sites whose biological communities and ecosystems have been degraded or destroyed. Restoration goals are site-specific and would include restoration of the health and ecological functions that are self-sustaining over time.

Stakeholders: All groups whether public, private, or non-governmental organizations who have an interest or concern in the success of a project and can affect or be affected by the outcome of decisions or activities of the project. The Apalachicola Bay System Initiative stakeholders include but are not limited to agriculture, silviculture, business, economic development, tourism, environmental, citizen groups, recreational fishing, commercial seafood industry, regional groups (i.e., ACF Stakeholders, and Riparian Counties), local, state, and federal government, universities, and research interests.

Strategy: A method, action, plan of action, or policy that can be tested to determine whether it solves a problem and helps to achieve objectives and goals in the context of bringing about a desired future for the Apalachicola Bay System.

Sustainability: The state of having met the needs of the present without endangering the ability of future generations to be able to meet their own needs.

Vision: An idealized view of where or what the stakeholders would like the oyster resource and ecosystem to be in the future.

Vision Themes: The key issues that characterize the desirable future for the oyster resource and ecosystem. The Vision Themes establish a framework for goals and objectives. They are not ordered by priority.