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Update: EAFM Summer Flounder Management Strategy Evaluation
December 2021 Council Meeting

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This briefing document provides an update on recent activities regarding the recreational summer flounder management strategy evaluation (MSE) project. Development of this MSE is part of the continued implementation of the Mid-Atlantic Fishery Management Council's (Council) Ecosystem Approach to Fisheries Management (EAFM) structured framework process. The objectives of this MSE are to (1) evaluate the biological and economic benefits of minimizing discards and converting discards into landings in the recreational summer flounder fishery, and (2) identify management strategies to effectively realize these benefits.

At the August 2021 Council meeting, the Council met jointly with the Atlantic States Marine Fisheries Commission (ASMFC) Summer Flounder, Scup, and Black Sea Bass Board (Board) to review the projects progress and approve a range of management objectives and alternatives for further refinement and evaluation by the technical work group and core stakeholder group. Here we provide an update on the project activities that have occurred since the August meeting with a focus on the outcomes of workshop #2 with the core stakeholder group. A general overview of simulation model development by the technical work group and summary of the next steps with an updated project timeline are also provided.

At the December meeting, the Council and Board will get an update on these activities and no specific action or decisions are anticipated. Any feedback or input to the technical and core stakeholder groups regarding future project direction and considerations are welcome. As a reminder, much more information about the summer flounder MSE project, including details on past/upcoming meetings and project work products, can be found at: https://www.mafmc.org/actions/summer-flounder-mse.

Work Group Activities

Core Stakeholder Group

Background

As highlighted as part of the August MSE project update[1], stakeholder engagement and input is a critical component of successful MSE development. An important part of the stakeholder engagement process was establishing a small core group of stakeholders representing the range of fishery perspectives to help the Council more efficiently and effectively progress through the

[1] See briefing memo from August 2021 Council meeting for additional details at: https://www.mafmc.org/briefing/august-2021.

MSE process. The core stakeholder group was formed in May 2021[2] and they function as the main source of input to the technical work group and management. The core group provides feedback through a series of focused workshops designed to elicit their input on management outcomes and review model simulation results.

The first core group workshop was split into two sessions and held over the summer via webinar. These sessions introduced the MSE process and simulation model concepts. In addition, the core group developed a consensus decision statement to specify potential project outcomes and identified a draft range of management objectives, metrics, and alternatives. The Council and Board reviewed and approved these recommendations in August. The intent of the initial list of management objectives and alternatives was to ensure they capture the overall scope and range of considerations the MSE might evaluate with the expectation they would be further refined and prioritized since not everything on these lists can be modeled or fully evaluated during the project timeframe. Reviewing, refining, and an initial prioritization of management objectives, measurable metrics, and alternatives were the focus of core group workshop #2.

Workshop #2 Outcomes

The second workshop was held over two days on November 8 – 9, 2021 and was originally planned to be held in-person but was moved to a webinar format. The workshop agenda, background materials, and all presentations can be found on the workshop meeting page at: https://www.mafmc.org/council-events/2021/summer-flounder-mse-workshop-nov8-9.

While many of the specific tasks for the workshop centered around the objectives, metrics, and alternatives, the underlying emphasis of the workshop was to establish a common understanding, clear communication, and direct feedback between the core group and the technical work group developing the simulation models. The workshop started with an overview of the conceptual MSE simulation model framework and how/where the two models being developed for this project are incorporated into this framework (Figure 1). This was followed with a review of the general model(s) structure, data elements, capabilities and limitations, and the potential model outputs. This was the second time an introductory overview of the models was presented to the core group with the goal of developing a common understanding within the group of the modeling language, the plan on how to utilize the models, and the types of information the models can provide. With a better idea of the modeling components, the core group could then offer input, direction, and prioritization of objectives, metrics, and alternatives that will then in turn drive future modeling efforts. The modeling team will incorporate this feedback into the next phase of model development and the core group, at future workshops, will again offer feedback on refining, identifying, and prioritizing the next round of modeling efforts. This continual and iterative approach between the core and technical groups is a critical component to the overall MSE process to ensure there is a general agreement and support for the process and outcomes.

With the modeling discussion complete, the core group spent the rest of the workshop refining, clarifying, condensing, and prioritizing management objectives, metrics, and alternatives. If you recall, five broad management objectives were initially identified with a total of nearly 40 different sub-objectives. In addition, metrics, or measurable attributes to evaluate success, were identified for many of the sub-objectives. The core group reviewed each objective, sub-objective, and metric in detail to identify which objectives were most critical or a core consideration, what

[2] The process to identify core stakeholder group members and information on membership affiliations and representation are described in detail here: Summer Flounder MSE Core Stakeholder Group Selection.

could be combined and consolidated, and what/if metrics would provide the most informative evaluation of a particular objective.

Figures 2 – 5 are draft hierarchical diagrams for each broad management objective that show the resulting sub-objectives and associated metrics resulting from core group discussion and feedback. You will see the number of sub-objectives and metrics has been significantly refined and reduced to represent the core objectives and associated metrics. This does not mean that other sub-objectives initially identified and reviewed in August have been removed. Those sub-objectives may still be considered or they are components of the core sub-objectives identified and will be accounted for. This revised group of objectives and associated metrics are the core components to provide direction and focus for the technical work group as to what metrics/outputs the models should produce.

In addition, through this process, the five broad management objectives have also been modified and refined. Below are the original management objectives approved in August with suggested revisions in red. By broadening the scope of objective 4 to include economic and social sustainability, objective 5 (participation sustainability) would be adequately captured and evaluated under objective 4 and could, therefore, be deleted.

1. Improve the quality of the angler experience
2. Maximize the equity of anglers' experience
3. Maximize stock sustainability
4. Maximize the socio-economic sustainability of the fishery
5. ~~Maximize the sustainability of participation in the fishery~~

The initial list of alternatives and strategies was even more extensive with 15 different alternative categories and over 80 different alternative options. A similar detailed review approach with the core group was taken to refine the list of potential alternative considerations. Here the group focused on those categories that are likely to have the greatest impact and can be directly, or by proxy, modeled given the available information and modeling capabilities (e.g., size, season, possession limit, enforcement/compliance, and discard mortality/education/gear). We are still not at the stage of the project where we are deciding specific alternative options, but a more refined range of options for further evaluation – so setting the sideboards of what should/shouldn't be considered. For example, the core group identified a range of 16" – 19" minimum size, a 3 – 6 fish possession, and a season of 150 – 365 days as bounds for these specific alternative categories. Again, the goal of this process is to give direction to the technical work group to develop some initial alternative scenarios to model and demonstrate potential alternative performance and outcomes.

Future workshops

Two additional core stakeholder workshops are anticipated during the remainder of the project to help facilitate input and direction to the technical work group and management. The third workshop will likely take place over one day and is scheduled to take place in late February either via webinar or in-person. The focus of the workshop will be to review preliminary model outputs from the initial alternative scenarios and begin to develop weights to evaluate trade-offs between the different objectives. It is anticipated the fourth, and final, workshop would be in-person over the course of two days and is scheduled in late April/early May. During this workshop the core group will review the draft final model outputs and implications, finalize objective trade-offs, and develop potential recommendations for management consideration.

Technical Work Group

In addition to preparing for the second core stakeholder workshop, the primary focus of the technical work group has been development, refinement, and linkage of two simulation models – an operating/biological model and an implementation/economic model – that are part of the MSE simulation loop (Figure 1). This simulation process helps provide an understanding of the management system and allows for the comparison in performance between different management strategies in their robustness and associated trade-offs in achieving different management objectives. The update provided here is intended to give a general overview on the direction and focus of the modeling work and will not provide detailed information about the model structure, formulation, and data elements of the two simulation models. These details will be provided and presented to the Council and Board in the future; however, both the biological and economic models utilize existing platforms and build off previous projects and many components of the models have gone through different levels of peer review[3].

The operating model selected by the technical work group was used in the Council's F-based recreational management project[4] and, therefore, many of the summer flounder components had already been built. The operating model is not intended to represent or replicate the stock assessment model but reflect summer flounder life history and the overall population dynamics (note: other parts of the MSE simulation loop incorporate or simulate the stock assessment model, see Figure 1). However, the technical work group did decide to condition the operating model with many of the same inputs as the current stock assessment model (e.g., recruitment, natural mortality, four fleet structure, and catch history). The operating model, depending on data availability and quality, also has the ability to consider spatial and sex-specific dynamics and indirectly evaluate other biological uncertainties such as habitat, stock productivity, and distribution changes.

The economic model has two components: (1) a behavioral model that evaluates angler preferences and drivers of fishing effort, and (2) a simulation model that incorporates the results from the behavioral model to predict the impacts of different regulatory changes on angler behavior, welfare, and fishing mortality. The economic model can also evaluate the impacts of interactions between recreational fisheries (e.g., effects on summer flounder catch by modifying the black sea bass season). Significant advancements have been made to the model since the beginning of the project and the recent focus has been on addressing the recommendations offered during the recent Scientific and Statistical Committee (SSC) recreational model peer review[5].

Another modeling area of focus for the technical work group has been on linking the two models to ensure the different model inputs/outputs communicate with each other appropriately. The operating model projects numbers of fish-at-length, subject to recruitment variability, for given commercial and recreational removals. The population numbers-at-length at the start of the recreational season are then fed to the economic model that will estimate recreational catch,

[3] Additional information about the biological model structure and use in other MSE studies can be found here: https://www.sciencedirect.com/science/article/abs/pii/S0165783611001640?via%3Dihub and additional background information on the economic model including the behavior model and data elements can be found here: https://www.mafmc.org/council-events/2021/ssc-peer-review-panel-sept20.

[4] Additional information about the project including a presentation to the Council can be found at: https://www.mafmc.org/briefing/august-2019.

[5] The September 20, 2021SSC recreational model peer review panel report containing recommendations for the economic model can be found here: Peer Review Report of Recreational Fishery Models.

harvest and discards, at-length for a given set of management procedures (i.e., set of regulations) which will then be fed back into in the operating model to update the population dynamics. A variety of model platform modifications and coding adjustments were completed to allow for data to pass seamlessly between the models. In addition, a number of language and coding efficiencies were completed in order to minimize the amount of computation time required to run the hundreds/thousands of simulations that will be required as part of the MSE evaluation.

The technical work group is currently reviewing the outcomes and feedback of workshop #2 to develop a handful of initial alternative scenarios to evaluate in advance of the next core stakeholder group workshop. These initial scenarios will likely include a range of coastwide and regional/state configurations with modifications to the size, season, and possession limits and are not intended to represent the final alternatives or configurations for future consideration. These initial scenarios are intended to demonstrate the different biological, angler welfare, and economic outcomes produced by the models across a suite of metrics and identify which factors might be most important in influencing the outcomes. This initial simulation work will also evaluate uncertainties (e.g., stock productivity, stock assessment, and data) versus the effect of small modifications in the size limit in one or two states, for example, to help focus on options that result in detectable differences given our uncertainties and decide which are most important to the stakeholders. All of this information can then be used by the core group at the next workshop to begin to identify and prioritize potential management trade-offs and to refine the final suite of alternative scenarios for further evaluation.

Next Steps and Anticipated Timeline

The planned activities and anticipated timeline for the MSE project have been adjusted slightly from what was presented to the Council and Board in August (Table 1). These adjustments include the addition of a fourth core stakeholder group workshop and a slight delay to the anticipated completion of the project. While the first two core stakeholder workshops have been extremely productive and informative, the webinar format is not as efficient, less collaborative, and are time-limiting when compared to meeting in-person. In order to provide an opportunity to receive the necessary input on all critical aspects of the MSE process, it was decided to add a fourth core stakeholder group workshop. In addition, while there has been a lot of advancements made to the simulation models, their development is a little behind schedule due to delays in conditioning the operating model, linking the operating and economic models, and testing projections. Therefore, the anticipated project completion is pushed back by about a month to allow time to ensure completion of the simulation models and subsequent trade-off analysis.

Even with these adjustments, the overall timing and potential implementation of any MSE project recommendations should not be impacted. It is anticipated the final results and management alternatives will be presented to the Council and Board for consideration in June 2022. Any outcomes and decisions, depending on their scope, could still potentially be implemented for the 2023 recreational season as the Council and Board begin specification and regulation review and development in August 2022.

Table 1. Updated timeline of activities associated with completion of the EAFM recreational summer flounder management strategy evaluation project.

Task/Activity	**Timeframe** (subject to change)
Finalize technical work group membership and initial meeting	May 2020
Kick-off webinar and mock workshop with Council and ASMFC advisory panels (https://www.mafmc.org/council-events/2020/eop-sfsbsb-ap-meeting-sept22)	September 2020
Stakeholder scoping feedback form (https://www.mafmc.org/newsfeed/2021/summer-flounder-mse-comment-opportunity)	January 2021
Regional MSE workshops (https://www.mafmc.org/newsfeed/2021/council-to-hold-virtual-summer-flounder-management-strategy-evaluation-mse-workshops)	March – April 2021
Finalize core stakeholder group participants; core stakeholder group workshop 1 (session 1 and 2) and Council/Board meeting to develop objectives/performance metrics/alternatives; data synthesis, initial model development	May – August 2021
Continue model development and link operating/biological and economic models; begin initial simulation testing of draft management strategies; second core stakeholder workshop to finalize objectives and metrics and refine potential alternatives; update Council/Board	September – December 2021
Continue simulation model development and initial analysis of alternative scenarios; third core stakeholder workshop to review draft model outputs and begin trade-off prioritization; refine models and outputs, as needed	January 2022 – March 2022
Fourth core stakeholder workshop to review draft final results, trade-offs and recommendations; Council and Board reviews final results and considers potential management alternatives and action to address recreational summer flounder discards	April – June 2022

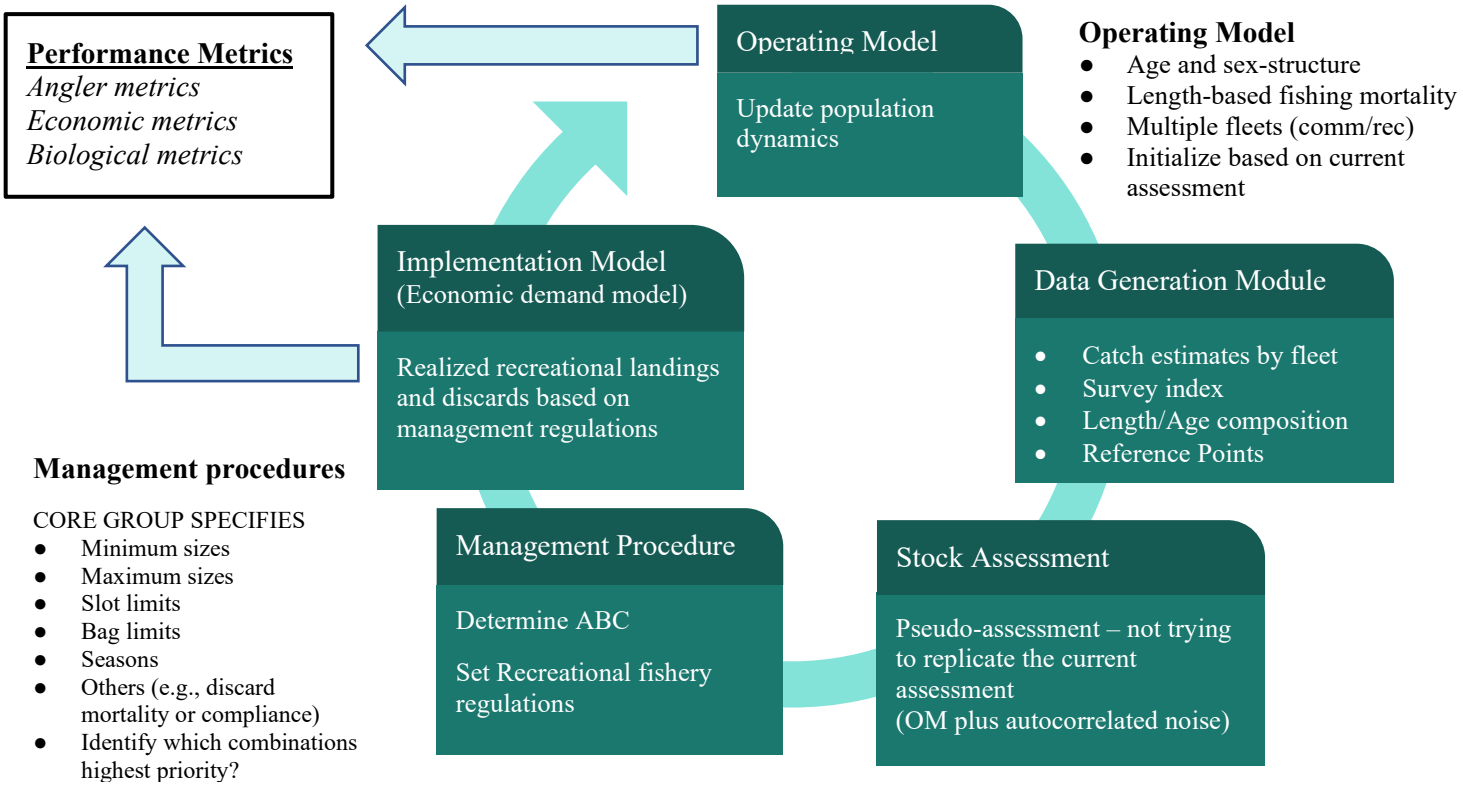

Figure 1. Conceptual model of the recreational summer flounder management strategy evaluation (MSE) simulation model framework including model inputs and outputs (figure modified from presentation by Dr. Gavin Fay, UMass Dartmouth).

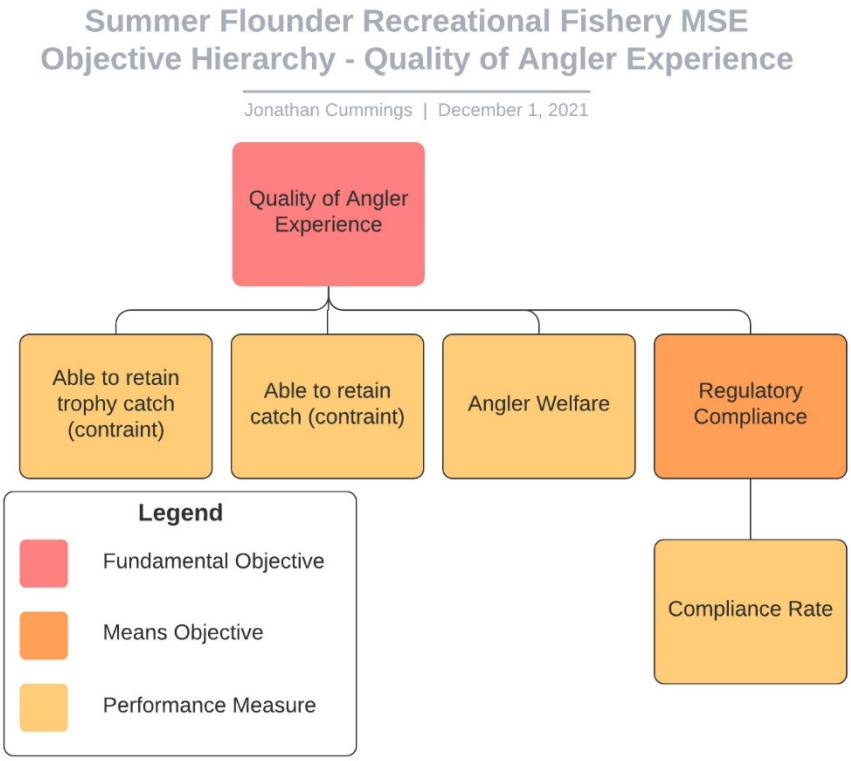

Figure 2. Hierarchical diagram for "Improving the quality of the angler experience" objective, including sub-objectives and performance metrics associated with the overall objective. The "angler welfare" metric includes angler satisfaction converted to dollars and the expected likelihood of a fishing trip.

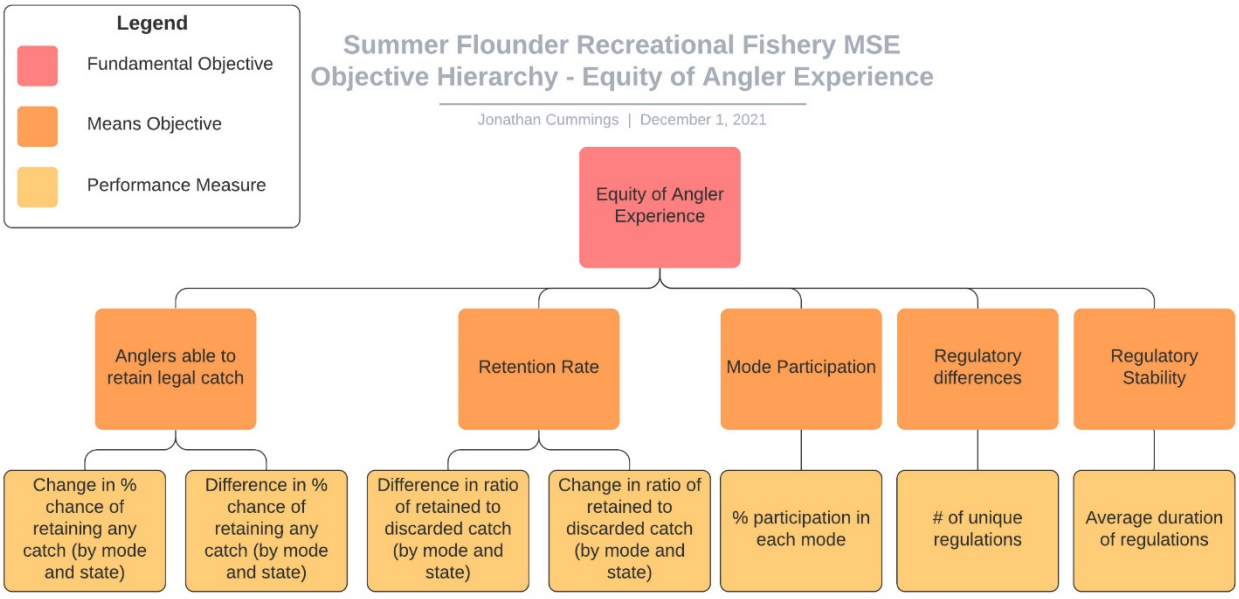

Figure 3. Hierarchical diagram for "Maximize the equity of the anglers' experience" objective, including sub-objectives and performance metrics associated with the overall objective.

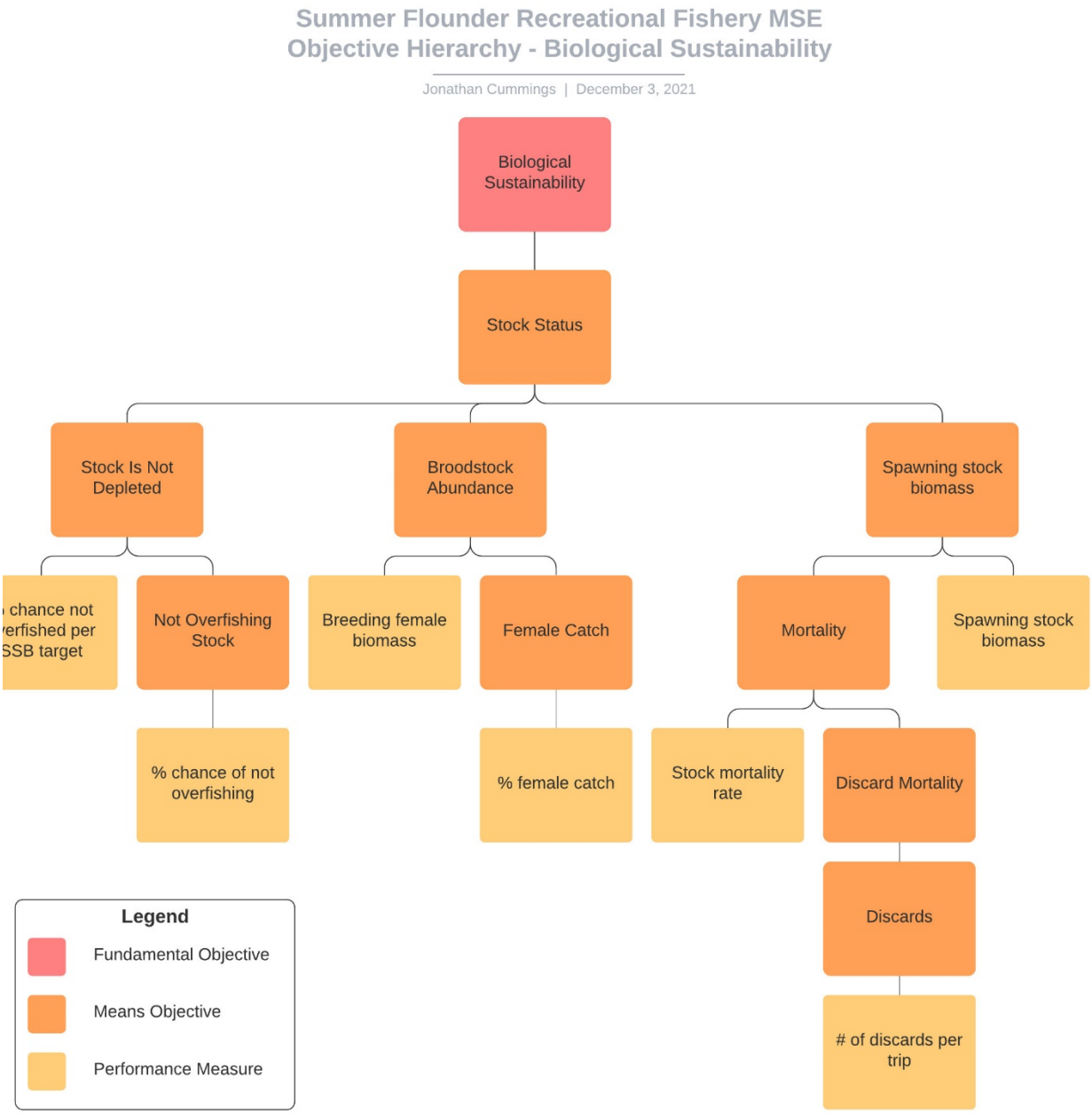

Figure 4. Hierarchical diagram for "Maximize stock sustainability" objective, including sub-objectives and performance metrics associated with the overall objective.

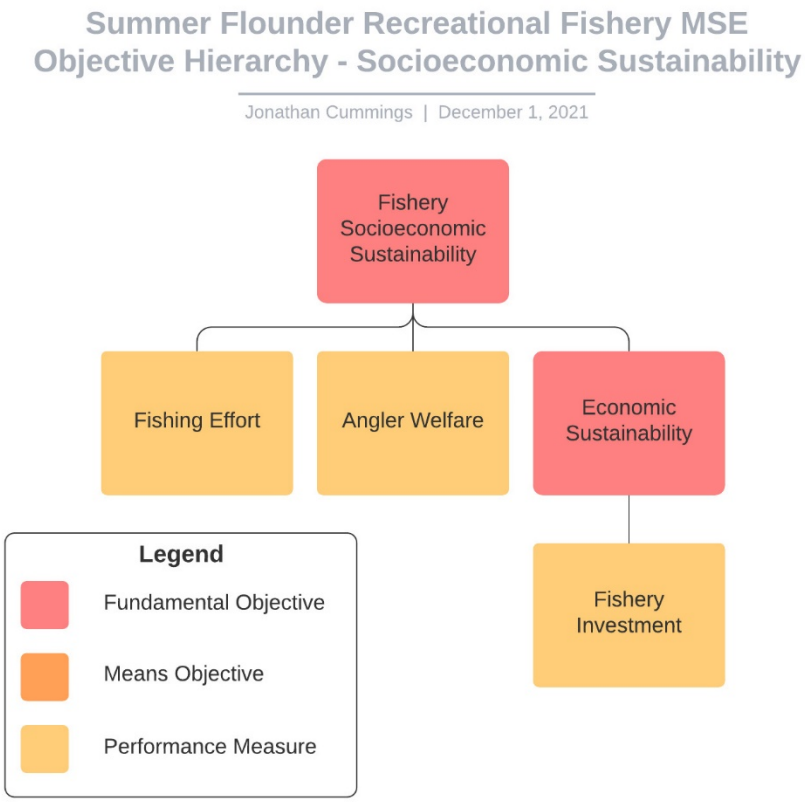

Figure 5. Hierarchical diagram for "Maximize the socioeconomic sustainability of the fishery" objective, including performance metrics associated with the overall objective. The "angler welfare" metric includes angler satisfaction converted to dollars and the expected likelihood of a fishing trip.