

2021 Atlantic Cod Stock Management Workshop Series
Workshop #5:
Evaluating Tradeoffs to Adjusting Management Measures
September 20, 2021
1:00 PM – 4:00 PM

WORKSHOP BACKGROUND AND OVERVIEW

In 2020, a report by the Atlantic Cod Stock Structure Working Group (ACSSWG) concluded that the population structure of Atlantic Cod in New England waters consists of **five distinct biological stocks, instead of the two that are currently managed**. This conclusion requires a re-thinking of the current science and management approaches to the fishery. In this effort, the New England Fishery Management Council (NEFMC), NOAA's Northeast Fisheries Science Center (NEFSC), and NH Sea Grant, is hosting a series of Atlantic Cod Stock Structure Workshops to focus on **(a) Science/Assessment Prospects** and **(b) Management**. Each workshop features presentations by technical experts followed by discussions open to the public to ensure complete information is available to best inform the cod stock assessment process.

The Management workshop series continues to build on the previous Science/Assessment Prospects workshops and serve as a bridge from the past to current understanding of cod population structure. The workshops aim to combine expert and public opinion that will best inform the Research Track for potential changes to management measures. The fifth workshop had the following **objectives**:

- Integrate the discussions from the previous management workshops and explore specific management options that could be used to manage Atlantic cod differently under a new biological stock structure.
- Evaluate tradeoffs of management options, highlighting socioeconomic considerations.

This summary report focuses on the presentations and resulting discussions among workshop participants. The agenda is found in Appendix A and presentation slides are available online: <https://seagrant.unh.edu/2021-atlantic-cod-stock-workshops>

ATTENDANCE

The virtual (Zoom) workshop was attended by 54 people (Appendix C). Participant backgrounds included a broad range of expertise in fisheries science and management including representatives from state and federal agencies, non-profit environmental organizations, academic researchers, and members of the commercial and recreational fishing industries. An initial poll indicated that 90% of participants attended at least one of the previous Stock Management Workshops while 10% had not.

A second poll characterized the affiliations of workshop attendees. Representation was identified from fishermen's organizations (6%), scientific researchers (16%), NOAA and NEFMC staff (25%), state agencies (19%), interested public (6%), and other interested parties (23%).

Introductory Presentations

Presentation – Workshop Introduction, Erik Chapman, New Hampshire Sea Grant (NHSG)

- This workshop series is a continuation of the Atlantic Cod Stock Structure Working Group's (ACSSWG) findings that were presented in two NH Sea Grant facilitated workshops in 2018 and 2019.
- The current Management workshop series has built on the previous Science/Assessment workshops that took place in June. Together, these discussions will be summarized and reported to the NEFMC and the Research Track.
- In the previous Management workshops, guided discussions focused on proposed management areas, available tools, and how potential changes could affect commercial and recreational cod fisheries. Detailed summaries of each meeting and associated presentations can be found online: (<https://seagrant.unh.edu/2021-atlantic-cod-stock-workshops>).
- Today, we will review the Science/Assessment Prospects workshop series, Management Strategy Evaluation (MSE), and then break up into groups to explore different potential management scenarios.

Presentation – Setting the Context for Atlantic Cod Management Discussions, Jamie Cournane (NEFMC)

- Due to the 2020 work of the Atlantic Cod Stock Structure Working Group (ACSSWG), we now understand the best available science suggests there are five distinct biological stocks instead of the two that are currently managed. Given that, we are engaged in this workshop series to discuss management options.
- These current workshops will bridge the two-prong approach between the science and management. The objective is to gather input from participants on potential management changes along with their socioeconomic consequences.
- These discussions will be shared with the Research Track that is currently forming and they will review these reports over the next year or so.
- The workshops will not be scoping specific management actions or making formal recommendations. They are a platform for discussions and gathering different perspectives.

Presentation – What We Learned from Science/Assessment Workshops, Russell Brown (NEFMC)

- The objective of the Science/Assessment Prospects workshop series was to summarize data availability from the proposed stock areas and identify additional data gaps that must be addressed to improve assessment prospects. The information gathered will be summarized in a final report and will inform the Research Track process.
- Additionally, the workshops have included presentations on the Management Strategy Evaluation (MSE) process for future applications aimed to better align the biology of cod with practical, effective management measures. The paper by Kerr et al. (<https://doi.org/10.1093/icesjms/fsw188>) can be reviewed to best understand the MSE management tool and to provide relevant background.

Statistical area overviews:

1. Eastern Gulf of Maine - The area is represented by sparse commercial and recreational landings with limited sampling from either fishery. Survey data have been consistent over time but are insufficient for age composition analyses, and the inshore surveys (NH, ME) catch only smaller, younger fish. Overall, the area is difficult to assess independently and would not be informative if based on current data availability.
 2. Georges Bank - Commercial landings and discards were historically abundant but have been declining recently due in part to conservative management measures. Canadian catch sampling is robust but not in the U.S. where landings and discards are insignificant. Neither country has accepted the recently proposed area considerations. In summary, using a data limited approach rather than an age-based assessment could be realistic.
 3. Gulf of Maine/Channel - This area contains two complex biological stocks (winter and spring spawners) that may require discrimination for assessment and/or management; it is otherwise considered data rich with commercial sampling input. Environmental data collection should be expanded to best understand shifting dynamics in the spawning populations. Recreational sampling is occurring but complicated for estimates due to parsing catch in Massachusetts between the Gulf of Maine and Southern New England statistical areas. Overall, managers should be able to construct adequate catch at age models and if the proposed area becomes broader (adding Statistical Areas 521 and 526), it would actually result in even more available information to inform assessments.
 4. Southern New England (SNE) – This region is considered to be data poor and not adequately sampled. Recreational catch is problematic due to lack of sampling during winter months when a significant party boat fishery occurs. Based on all available data, it is not possible to construct catch at age. Assessment strategies would be data limited.
- Overall, the potential splitting of historical data from the current two management areas into three, four, or five areas results in inadequate assessment data for some units. The proposed SNE and eGoM are particularly data deficient and will require rethinking during the Research Track.

Participant Q&A

- A participant asked: Can you provide any more details on the environmental conditions that you mentioned being incorporated into the GoM assessments?
 - Russell Brown cited a recently developed Woods Hole statistical model (WHAM) which allows for more flexibility in these types of analyses by incorporating novel, environmental covariates. The working group will explore a broad range of these variables because we can't assume ecosystems are static.
 - A further question was asked: Does the WHAM model include predator prey relationships?
 - Russell Brown added that we are currently exploring food web dynamics with different potential strategies but they can be difficult to interpret.
- A representative from the DMF asked: How well does the NEAMAP Survey address data needs for the SNE stock area?

- Russell Brown explained that in the Fall, surveys have never captured a cod but in other seasons, there are infrequent captures of small cod. Sometimes there are years in the historical data set with no cod at all. Overall, it does not do a good job of indexing the population.
- Steve Cadrin (UMass, SMAST) added that Langan et al. (2020) Fishery Bulletin 118: 145-156, reported regular catches of young cod in the RIDEM and URI GSO trawl surveys. These new sources of data were documented from the Science/Assessment workshops in relation to the proposed SNE area and will be investigated for potentially generating recruitment indices.
- A participant asked: Rather than considering the current science and processes, why isn't the new stock structure being viewed as an opportunity to revamp the existing science and assessments?
 - Russell Brown explained that this philosophy is exactly the objective of the Research Track process. They will incorporate sampling changes from the management areas and start from scratch in terms of assessment modeling. The process is open to incorporating all pertinent data regardless of whether it has been previously considered and/or incorporated. Additionally, the process allows for applications of new modeling approaches, such as state space assessment with the objective of significantly improving the estimates.

Presentation – Overview of previous workshops, Jamie Cournane (NEFMC)

- Key questions and discussion topics from the first four Management workshops were reviewed. Detailed summary reports and presentations can also be found on the NH Sea Grant website (<https://seagrant.unh.edu/2021-atlantic-cod-stock-workshops>).

Workshop 1- Setting the Groundwork:

- Management strategies may be area-specific, not overarching
- Altering boundaries is not strictly two or five management areas.
- Key emerging questions:
 - How can an ongoing mixed stock analysis be implemented (cost, effectiveness)?
 - Is “status quo” a viable option?
 - How well can external factors (climate, wind energy) be incorporated into management decisions?
- Overall, all options are on the table and will be considered during the Research Track process.

Workshop 2- Gathering Regional Perspectives from SNE and GB (East & West):

Selected Discussion Topics:

1. Spawning closures
2. Gear options
3. Additional trip reporting

Key Observations:

- Promising research is currently underway in SNE
- We have learned lessons to guide us from spawning closures (theory vs practice)
- There is no universal gear type across proposed management areas
- Recreational reporting requires improvements

Workshop 3 - Gathering Regional Perspectives from GoM (East & West):

Selected Discussion Topics:

1. Monitoring requirements for fisheries by subpopulation
2. Reference points defined first by subpopulation
3. Additional spawning closures for fisheries—with multiple components

Key Observations:

- Mixed fisheries are complex but monitoring tools are available (otoliths, genetics)
- Recreational reporting requires improvements

Workshop 4 - Gathering Recreational Perspectives:

Selected Discussion Questions:

1. How can recreational data inform management under the new stock structure?
2. What happens if the stock boundaries are moved to be more in line with the new understanding of cod stock structure? How would this effect your fishing practices or businesses?

Key Observations:

- Monitoring is expensive and may require new strategies to better illustrate the recreational fishery
- Annual monitoring for sub populations is realistic and feasible using available tools (otoliths, genetics)

Presentation – Management Strategy Evaluation (MSE) as a Tool for Decision Making, Lisa Kerr (Gulf of Maine Research Institute, GMRI)

Management vs Biological structure: We now know there are 5 unique biological populations but only 2 management units. Why should we care about this misalignment?

- Population diversity through genetic, ecological, and demographic differences results in overall resilience and stability during volatile conditions over time (portfolio effect). For example, during a changing climate, some populations may be better adapted to cope with rising temperatures.
- Misalignment of fishery management among populations and stock units can erode the population diversity.
- Population mixing is critical to address or it will lead to misperceptions in catch estimates, indices of abundance, stock recruitment relationships, and life history parameters. If ignored, it can confound the response of a stock to management measures.

*What approaches are available to address alignment of management?**

1. Status quo

2. Weakest link
3. Spatial and temporal closures
4. Stock composition analyses
5. Alteration of stock boundaries

*Or a combination of the above

What are the proposed best practices for cod?

- A holistic review of all available stock information was conducted by the Atlantic Cod Stock Structure Working Group.
 - All alternative assessment and management options are considered with their respective practical limitations related to biological structure of the species.
 - Evaluation of alternative outcomes relative to biological and socioeconomic factors are analyzed using MSE models.
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- MSE modeling provides the ability to simulate the entire fishery framework. For example, if we make X decision, what effects does it have on the system? How might alternatives perform?
 - MSE begins with a base “operating model” consisting of what we best understand to be happening with the fish and within the fishery. Then, simulations of data (survey and fishery) under imposed management strategies are run to generate catch advice which flows back into the base operating model. This allows for testing of scenarios and/or management approaches like mixed stock composition with spatial and temporal management tools (lumping areas).
 - In conclusion, meeting the goals of sustainable fishery management is difficult when statistical units do not match biology, but a range of approaches are available to best align them. The information is available from the ACSSWG and these workshops to inform alternative assessment strategies and spatial management procedures for cod.

Participant Q&A

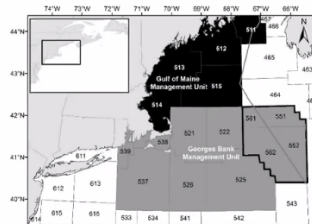
- A participant provided a clarifying comment about a reoccurring misconception regarding the cod stock management units. For historical accuracy, in the original multispecies plan, there were two management units GoM and GB (including SNE). Workshop discussions thus far have not acknowledged that any fish caught in SNE have been included in GB and were never omitted.
 - Lisa Kerr, Russell Brown, and Steve Cadrin all independently acknowledge the historical accuracy of the comment and the misconception is an artifact of the maps being used to explain areas. Currently, all cod caught in U.S. waters are included in one of the two management areas, GoM and GB. GB cod assessment data has always included commercial catch from SNE and the Mid-Atlantic but it should be noted that recreational catch was more recently added.
- A fishermen’s representative is currently participating in a Mid-Atlantic MSE process for the fluke fishery with robust assessment data. *How effective will this process be for cod with consistently data poor areas like SNE?*

- Lisa Kerr explained that even with data poor statistical areas, there are methods to simulate the fishery dynamics depending on your input goals. The MSE will still allow for unique components to be addressed.
- A participant asked: How does the timing of the MSE align with the Research Track Assessment?
 - Lisa Kerr proposed the goal to complete the MSE aspect over the next year in time to summarize for the Research Track group. The modeling framework for cod is already built, which offers a significant advantage to running these simulations so at the very least, we would be able to offer significant insight into how alternative approaches are performing.

Exploring Scenarios & Evaluating Tradeoffs

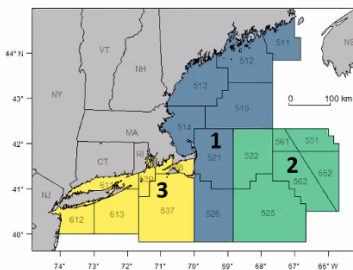
A set of breakout groups were created to efficiently explore the advantages and tradeoffs for a range of alternative options designed to better align management boundaries with our new understanding of biological stock structure. Each breakout group selected two options to discuss from the potential scenarios provided below.

Exploring Scenarios



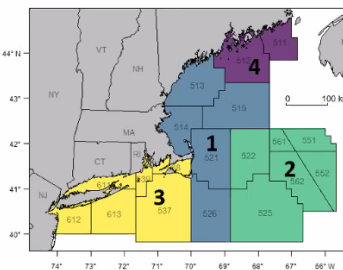
Option 1: Status Quo - 2 unit structure

1. GOM
2. GB



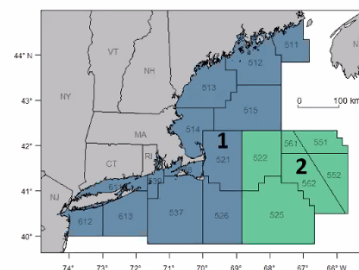
Option 2: 3 unit structure

1. GOM winter/spring
2. GB
3. SNE



Option 3: 4 unit structure

1. GoM winter/spring
2. GB
3. SNE
4. EGoM



Option 4: 2 unit structure

1. Inshore
2. Offshore

1. **What are the advantages of moving toward these management units?**
2. **What are the practical limitations of this option?**
3. **What other management may need to happen to address current stock status?**

Breakout Group Discussion Summary

The summary below provides an overview of the major issues raised in each of the four breakout groups. A more detailed summary of the issue discussed is provided in Appendix B.

Option 1 - Status Quo

- Data are currently available for this form of assessment and it limits the complexity involved with redefining management boundaries.
- The option does not take into account the biology of cod and risks misspecification during stock assessments.

Options 2 & 3 - 3 or 4 unit stock structure

- These alternatives reflect the conclusions of the ACSSWG and more closely align biology to management. This is also in agreement with National Standard 3 which stated that stocks should be managed according to their biological units.
- Both options could be communicated effectively and justified to the fishing industry with practical management actions associated with each unit (spawning closures, mixed stock analysis, etc.)
- Some areas are data poor (SNE and eGoM) but unique units may allow better tracking of depleted population(s).
- The option would require additional resources (staff capacity, funding, time etc.) for rebuilding plans and assessment across the different stocks, and revisions to the transboundary processes would be complicated and challenging.
- The reallocation of catch would be a major component to resolve and require further considerations.

Option 4 - inshore/offshore

- This option better addresses connectivity between SNE around the backside of Cape Cod compared to the current units. Additionally, it is simple with only two management areas.
- Similar to options 2 and 3, there will be logistical obstacles with assessment and reallocation.

Appendix A

**2021 Atlantic Cod Stock Structure
Management Workshop Series
Evaluating Tradeoffs to Adjusting Management Measures
September 20, 2021
1:00 PM – 4:00 PM**

Workshop Objectives:

- Integrate the discussions from the previous management workshops and explore specific management options that could be used to manage Atlantic cod differently under a new biological stock structure.
- Evaluate tradeoffs of management options, highlighting socioeconomic considerations.

1:00 Welcome and Overview – NH Sea Grant (NHSG) and New England Fishery Management Council (NEFMC)

1:15 What We Learned from Science/Assessment Workshops – Russell Brown, NEFSC

A brief summary of the key information gathered during the science/assessment workshops in June and how that information will be used to inform the Research Track process.

1:30 Setting the Context for Atlantic Cod Management Discussions – Jamie Cournane, NEFMC

Providing a general review of the current status of Atlantic cod stocks, how the fishery is currently managed and sharing feedback on management options discussed in the previous management workshops.

1:50 Management Strategy Evaluation (MSE) as a Tool for Decision Making – Lisa Kerr, Gulf of Maine Research Institute

An opportunity to learn more at the MSE process and how previous workshops are informing future work.

2:20 Break

2:35 Exploring Scenarios & Evaluating Tradeoffs - ALL

A series of small breakouts to explore the implications and tradeoffs for a range of options to better align the management boundaries with our new understanding of the biological stock structure for Atlantic cod.

3:45 Concluding Thoughts & Next Steps – NHSG and NEFMC

4:00 Adjourn

Appendix B

Advantages and Limitations of Moving Toward Alternative Management Units

Summary Notes from Breakout Discussions

Option 1: 2 Unit Structure (“Status Quo”)

Advantages:

- Data is already available for this assessment process
- Keeping stock structure the same will more likely result in an analytical model
- Limits complexity (i.e., more units complicates management, causes enforcement challenges, and leads to inadequate assessment data)

Limitations:

- Status quo does not take into account biology of cod
- Current structure does not allow dedication of resources for data collection, monitoring through A23
- Mis specified stock assessments (e.g., GB retrospective patterns may be from mis specified stocks.)
- Environmental changes may alter distribution patterns within management units.

Considerations/Additional Management:

- Cod populations are in poor shape with no signs of significant recruitment occurring. If a substructure to management units does not occur, is there a way to preserve population structure in current regiment?

Option 2: Three Unit Structure (GOM winter/spring, GB and SNE)

Advantages:

- This option better reflects the conclusions from ACSSWG. (Not lots of tagging data from eGoM. eGoM most likely separate, but the evidence is not as strong.)
- Slightly less complexity than a 4-stock option
- Simple process to compile data for the assessment (relative to option 3)
- Fewer confusing regulations for the industry to follow (relative to option 3)

Limitations:

- SNE is data-poor with limitations as opposed to lumping it in with a larger group with which it has connectivity to. It may be possible to apply weakest link approach but not easily
- Challenges to differentiate/allocate catch among some boundary lines
- Disproportionate amount of work involved in changing anything transboundary
- Inability to manage a particular stock when lumped

Considerations/Additional Management:

- Boundary lines are reviewed based on data availability (specifically referenced the eGoM area, in case the stock/science changes in the future and it makes sense to add back in the eGoM unit).
- Spawning closures
- Stock composition analyses
- Separate recovery plan for eGoM

Option 3: Four Unit Structure (GOM winter/spring, GB, SNE and eGoM)

Advantages:

- Closest to the ACSSWG's spatial structure of cod (i.e., most accurate to date) with the exception GoM spring and winter spawners.
 - National Standard 3 says we should manage stocks as their biological units
- Practical advantage to additional splits (four units vs. just two - inshore/offshore)
- Does well to differentiate SNE compared to other proposed options
- Addresses some shortfalls of the MRIP data to better capture recreational fishery catch by area or potentially broader area
- Some areas may be data poor but defined unit allows better tracking of depleted populations. Can still be monitor with index-based approaches.
- Difference in fishing effort in GoM. Virtually no commercial effort in eGoM. This proposal would allow us to set a quota/management practices consistent with population abundance.
- Easier communication with industry if we can tailor management actions by area.
 - If management units are aligned with stocks we can tailor management actions by stock. E.g.- managing recovery of Downeast Maine independent of WgoM where fisheries could benefit from more localized regulations. Currently overlapping management units can complicate management.
- Proposed boundary also more closely reflects relevant ecological conditions re: productivity. Headed towards ecosystem-based management

Limitations:

- EGoM is data limited and would require a data-limited assessment
- Additional manpower to have rebuilding plans for all the different stocks; an issue could be workload increase, more time consuming.
- Difficulty in tracking catch and reporting to the statistical areas
 - We have a high degree of confidence about the [management] area, but we have vessel trip reports that don't match VMS or what we get from reporters because it's usually one point from what could be weeks. Difficult to match unless either limiting where people fish, we do have good technology on doing this.

- Differentiating GoM spring and winter spawners from GB due to proximity. Considering the status of recreational reporting, MRIP would struggle to differentiate cod from along the boundary lines of proposed areas.
- Self-reporting by private anglers brings up issues of representativeness, and resolution of spatial accuracy. (e.g., rather than having them report by statistical area, use geographic region for increased accuracy)
- Adapting MRIP data to be more state specific spatially (e.g., Massachusetts) would be helpful but also poses challenges.
- Some areas do not have enough biological samples occurring.
- We don't know what data poor methods will produce - optimistic/pessimistic, may be more legal constraints for the fishermen
- Reallocation would be major component
- it could add expense to monitoring program
- Limited data from eGoM and SNE. Less data than we have for current units.
- Increased management complexity. Increases number of rules that fishers and managers have to keep track of.
- Potential for catch allocations. Might unfairly affect how much some fishermen catch
- Any revisions to the transboundary processes seem to take a lot of time/resources.

Considerations/Additional Management:

- For eGoM, we have little data, but is the lack of data a barrier to making it a management unit? Could it be a separate stock area, declared overfished and managed as a no possession or research only fishery?
- We don't have the resolution because vessels fish in multiple areas. Our current system may allow for maximum flexibility, but is that becoming a barrier to our management of this stock? Does that standard of the council need to change, like a trip needs to be placed into a single area? Would increased assessments using otoliths easier to attribute to different areas?
- Other management: Gear considerations and spawning time/space closures to better fit the changing areas.
- A phased approach is common and possible to cod management (e.g., start with spawning closures, then address boundary changes, and any additional measures).
- Could direct research to support better management
- Trying to accurately and efficiently monitor the winter/spring spawners
- Using measures that consider timing and areas of these critical populations
- How to address winter/spring overlap in WGOM. Spawning closures, stock composition. Spawning closures are the lowest hanging fruit since already in effect.
- Consider spawning closures in SNE and EGoM
- Discards/bycatch from lobster fishery. Are they reported? Separating EGoM could make it easier to report.

Option 4: Two Unit Structure (Inshore – Offshore)

Advantages:

- Acknowledges the connectivity between SNE around the backside of Cape Cod and GoM.
- Stock assessment is simpler just because you only have two stock areas.
- The recreational fishery regulations diverge in the GoM and the GB-SNE area, GoM is only open 4 weeks a year for 1 fish and SNE has 10 fish at a time year-round. Potential value in having a consistent regulations, from an enforceability perspective and equitability. But will a singular measure across a region ignore biological structure?

Limitations:

- If there's a gradient in growth rates, they would need to be accounted for.
- If council sticks with catch shares then anyone with catch shares in 521/525 may transfer into the GoM area and managers may have to deal with these shifts.
- The allocations based on catch history would look very different than they currently do. Vessels in sectors with allocation history based on SNE or close to Cape Cod, could move allocation around within the sector and open the GoM to additional fishing pressure. During the transition to sectors in the first place, vessels that fished offshore got GoM quota and vessels with a lot of quota found it more profitable to stay closer to home than going to their traditional offshore grounds which some folks have argued the fishing the 2009-2012 range has contributed to this.
- Logistics and impacts of dealing with reallocation issues.

Considerations/Additional Management:

- Review previous efforts: Were there conversations in 2010 about inshore-offshore? What were the thoughts back then?
 - There was discussion just for the split occurring in the GoM as a management-based alternative but ignoring biological structure
- Have there been conversation about keeping 521 and 525 as a separate stock?
- How do you minimize the impact of choosing winners and losers which will happen with reallocation? Can you realign and allocate with creative methods to focus on equity and not demolishing businesses?
- Allocation does not need to follow management areas, but the total allocation to the area needs to match allowable.
- "Allocation is a Council decision but could be done in various ways, not limited to:
 1. Apply the current approach to allocation to the new areas – re-allocation
 2. Manage the current allocation in sub-areas - allocations and sub-allocations
 3. Split up the fisheries allocations more – recreational allocation is currently only in the GOM stock areas – not other areas
 4. Develop a new approach to allocation to the new areas – complete revision and re-allocation"
- Option 4 may be most appropriate than other options. I.e.,-not splitting pie many ways, with having 2 management units, assessment can functions as-is. Con is mixing biological units

together. In essence some fishermen may be happy and some not when they see what is in their portfolio if the pie gets sliced even more.

- In-shore populations get lumped together getting recreational and commercial vs. GB harvest primarily commercial
- It does not completely appeal to biological units but more than status quo does

Overall Comments:

Why not 5 management units?

- It would be difficult to have separate allocation/management for spring and winter spawners. It can be factored into assessments, but not practically managed. Annual (end of season) stock composition analysis is the most realistic approach because the resources are not available to perform it within a season.
- Are there things we still need to know to have ability to do within season?
 - Startup cost, ability to analyze archived samples for historic reference points
 - Resource allocation for sampling each year
 - How would the assessment translate into management?
- Observer ramifications of changing stock boundaries?
 - Reallocate trips based on stock area.
 - Port sampling assignments divided by stock. E.g., additional samplers for eGoM would take them away from other docks.
- Heard in last meeting that estimating recreational catch has lots of uncertainty. If we take away two statistical areas we make it a smaller sample size for SNE, which will increase uncertainty.
 - Issue for recreational catch, possibly for commercial as well
- Some fishermen may cross management lines and misreport what area they're in. Do we create an incentive to misreport stock area, if you don't have to go as far to cross boundaries?
 - How often does misreporting occur? Making it harder to misreport is a benefit
- Recreational harvest could be better estimated by state, not stock.
- Considering practical limitations, the five stock option should remain in the back of minds as the ultimate goal.
- Be flexible for adaptation as assessment issues arise. Start with all best available science/data (tagging studies, genetic analyses, surveys) and don't allow for initial data limitations to deter from best possible approaches for biological populations. The four stock unit is a practical compromise but fewer management areas loses sight of the resource management goal.
- Major issues are growth rates, maturation rates for subunits/genetic units. Affects minimum size rates
- There needs to be consideration for unique features of populations and scales appropriately.
- Aren't current efforts to reduce mortality through spatial and temporal closures enough?
- Need more robust monitoring and reporting in recreational component, private anglers data lacking.

Appendix C

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Micah Dean (Mass DMF)
Michael Pierdinock (CPF Charters)
Michelle Lemos (NH Sea Grant)
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Nathan Hermann (UNH)
Paul Nitschke (NEFSC)
Rebecca Peters (Maine DMR)
Rich Balouskus (RI DMF)
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Robin Frede (NEFMC)
Roger Brothers (GMRI)
Russell Brown (NOAA, NEFSC)
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Fred Serchuk
Gareth Lawson (CLF)
Geoffrey Smith (TNC)
Greg Ardini (NMFS, NEFSC)
Hal Weeks
Hank Soule (Sustainable Harvest Sector)
Irene Andrushchenko (Fisheries and Oceans Canada)
Jackie Odell (Northeast Seafood Coalition)
Jamie Cournane (NEFMC)
Janice Plante (NEFMC)
Jerelle Jesse
Jessica Joyce (Tidal Bay Consulting)
Jocelyn Runnebaum (TNC)
Kathy Cooper-MacDonald (DFO Canada Resource Manager)