

2021 Atlantic Cod Stock Management Workshop Series

Workshop #3: Gathering Regional Perspectives from Gulf of Maine East & West

August 19, 2021

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 third workshop had the following **objectives**:

- Discuss and define available and potential management tools that could be used to manage Gulf of Maine East & West stocks differently to account for new understanding of biological stock structure.
- Share advantages and disadvantages of options.

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 59 people (Appendix B). 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 78% attended the previous meeting and 22% did not.

A second poll characterized the affiliations of workshop attendees into some general categories. Representation was identified from fishermen's organizations (12%), scientific researchers (15%), NOAA and NEFMC staff (30%), interested public (6%), state government agencies (18%), recreational and commercial fishermen (6%), and other interested parties (12%).

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 will occur throughout August-September and build off of the previous Science/Assessment Prospects workshops that took place in June. Together, these discussions will be summarized and reported to the Research Track (timeline provided).
- In the first management workshop, we set the stage by briefly reviewing the previous Science/Assessment workshop series before discussing the current cod management system
- In Tuesday’s workshop, participants voted for options from a list of management tools to guide discussions around Southern New England (SNE) and Georges Bank (GB) areas. They included:
 1. Spawning closures
 2. Gear options
 3. Additional trip reporting
- Today, we will continue onto the Gulf of Maine East (eGoM) and West (wGoM) to review current management systems in place, stock assessment approaches, and available tools to better understand the feasibility of management for each proposed stock area.

Presentation – Goals and Objectives of the Management Workshops, Jamie Cournane (NEFMC)

- The peer reviewed results of the 2020 Atlantic Cod Stock Structure Working Group (ACSSWG), have led to an understanding that 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-pronged 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 – Understanding Existing Atlantic Cod Management in GoM, Jamie Cournane (NEFMC)

- US cod are managed as part of the Northeast Multispecies (groundfish) Management Plan.
- Stock assessments take place every two years and were last conducted in 2019. The GoM stocks were concluded to be overfished with overfishing occurring so deemed subject to rebuilding plans.

- Management tools in place include seasonal closures, spawning/habitat closures, catch limits, gear and mesh restrictions
- The recreational fishery is subject to short fishing seasons in April and September when anglers can keep one fish per day at a minimum size of 21 inches.
- Detailed catch reports and management area maps can be found in the presentation posted on the NH Sea Grant website (<https://seagrant.unh.edu/2021-atlantic-cod-stock-workshops#management-ws3>)

Participant Q&A

- A participant commented about the maps being presented that compared the current management areas to the new biological populations. Areas 464 and 465 have a component in US waters where catch is currently considered as part of the GoM unit but it appears that is the “Scotian Shelf” biological group. Would we consider this as a 6th group or another transboundary management unit?
 - Russell Brown (NMFS, NEFSC) confirmed that this observation is correct. Areas 464 and 465 are currently included in the GoM regulatory definition/assessment. All US cod catch must fall within designated stock areas to avoid mis-reporting but we can’t speak to what proposed management may account for at this time.
 - Jamie Cournane agreed and added that this area discrepancy can be resolved during stock assessment process and will depend on how areas are re-drawn to best incorporate accurate catches.
 - Rich McBride (NMFS, NEFSC) provided detailed descriptions of management in the Zoom chat and referenced the published map figures: Catches on the US side of the Hague line in areas 464, 465, and 511 are assigned to the Gulf of Maine unit, whereas catches on the Canadian side of the Hague line in these areas are assigned to Canada.
 - A fishermen’s representative expressed appreciation for discussion on this topic because many of their colleagues fish these areas out of Maine and they are important to consider.
- A participant mentioned a proactive management measures called the “Gulf of Maine Declaration” that is taking place within some sectors to improve reporting and should be considered in discussions. The assessment tool allows for allocation of catch between areas from an otherwise pooled quota to minimize the risk of overages.

Presentation – Winter and Spring Spawning Cod in the Gulf of Maine, Steve Cadrin (SMAST)

- Extensive research has been conducted to define the complex wGoM spawning groups and their respective seasons. Genetic sampling clearly demonstrated reproductive isolation but now the challenge is applying this information to fisheries management where successful rebuilding requires conservation and protection of both distinct groups.
- Although these mixed stock fisheries are complex, the tools are available to manage effectively.
- For example, Baltic herring have different spawning groups but are overlapping within the fishery so otoliths are used to proportion out catches. Similarly, Pacific salmon with many populations are routinely sampled within season for genetic stock analyses.

- These same practices could be applied to cod. Otoliths are currently sampled for age composition analyses only, but growth rings could also be examined to determine population origin. Genetic tools have been validated in research to differentiate spring from winter spawners and could be made available for assessments. The results of both techniques agreed with each other in studying historical samples and showed an initial balance between stocks but shifts towards a winter dominated proportion over time.

How can we use the data for management?

1. "Status quo" continuation managing as a single stock with seasonal spawning closures.
2. Monitor the two spawning populations separately and apply a combined catch allocation based on stock composition.
3. Monitor the two spawning populations separately and apply separate catch allocations based on stock composition

Participant Q&A

- A recreational fishing representative asked if the resources are available to monitor the two wGoM stocks, with separate allocations, at commercial scale? What are the cost/benefits to the industry of doing this in a real-time manner? Many assessments have data needs on a weekly basis in terms of frequency.
 - Steve Cadrin cited the fishery examples (salmon, herring) provided during his presentation where assessments are conducted at the end of each year. Cod would likely need to take a similar approach where sectors could get an allocation at the end of the season.
 - The representative noted that any added costs would mean less fishermen would be interested in participating.
- A participant asked, what is the capacity of NOAA to implement this level of a sampling program in a complex industry?
 - Steve Cadrin explained one potential approach in which NOAA would not need to significantly expand their current sampling program. Otoliths are already sampled and used for age composition so those same samples could be used for stock composition. This may require some added time at a microscope to process individuals but it would not be likely to require additional, large scale sampling.
 - Rich McBride (NMFS, NEFSC) agreed that commercial catch is already represented adequately from surveys and port samples. Real-time monitoring is less realistic but seasonal/annual assessments are doable.
 - Charles Perretti (NMFS, NEFSC) added that port sampling has actually been cut dramatically and it's not yet clear how many samples would be available after 2020.
- Do the winter and spring spawners co-exist together year round? Where do they go if not?
 - Steve Cadrin explained that during previous research, sampling on the active spawning aggregations (Ipswich Bay, Stellwagon, etc.) showed clear separations between the two populations. After their respective spawning, fish disperse in similar manners and fishermen are presumably catching a mix throughout wGoM.

- A fisheries biologist from Massachusetts DMF responded that based on trawl surveys with thousands of tows, winter and spring spawners are only separated during their spawning seasons. Individual fish might spend 30 days on a spawning ground but the spawning season can last close to 100 days so there could potentially be short fringe overlaps.
 - A participant asked for clarification to the spawning season fringe overlap based on the biologist's comment.
 - Steve Cadrin clarified that there is usually a short, seasonal division between the spawning seasons.
- Although otoliths seem promising for population differentiation, are genetic samples more cost effective or faster?
 - Steve Cadrin hypothesized that if an otolith is already being examined under a scope for age determination, then it might be more cost effective and timely but this all depends on the logistics of sampling and interest in archived samples. The efficiency of genetic analyses are constantly improving and show potential for application but would require some adjustments to current sampling strategies.
- Could markers be used to separate spring spawners that might accidentally spawn during winter? What if the shifting environment is causing fish to “switch teams?”
 - Steve Cadrin explained that there are multiple tools available like differences in body shape that can also be used to differentiate populations but overall, they have less certainty than genetics. Together, all approaches suggest there is no changing teams (switching from one spawning population to another, mixing between populations). Both populations remain reproductively distinct with little to no hybridization. Please see the research by Adrienne Kovach (UNH) for additional details.
- A participant commented that port sampling is problematic when fishing occurs in multiple stock areas. Therefore, historical data may be difficult to decipher and future port sampling strategies should be reconsidered when there is multi-area fishing.
- Charles Perretti added that recreational catch can represent about 50% of landings/discards depending on the stock area for which managers have no age data or tissue samples. This is concerning and there have been no proposed solutions to address the recreational component.
 - A recreational representative suggested Tim Tower (Bunny Clark Charters) fishing out of Maine may be able to provide recreational samples from the GoM.
 - A second charter captain added he operates a head boat out of Plymouth and serves on the Marine Fisheries Advisory Commission and party boat associations among other groups. His boat regularly lands cod and would be willing to participate in any sampling/tagging efforts along with many colleagues. Would it be feasible to tag, analyze, and release a fish?
 - Rich McBride explained that it would be possible to collect a small fin clip from a fish, tag, release and then analyze the sample. Russel Brown agreed and added that we also have the capability to differentiate samples that we have in hand. The recreational

sampling requires significant improvement and must be done in a manner that is representative of spawning populations.

- A participant offered some insight into the winter and spring spawning population imbalance. Adult populations spawn separately but depending on currents and water temperatures, they slightly shift their spawning ground locations which results in larval dispersal into less ideal environments. This has been the case for the past 7-10 years with warming waters. Otherwise, adults mix evenly during summer months.
- A participant from the Maine DMR asked, are there other case studies where one group (winter spawners) might continue to dominate? Is it always one directional or do things balance out?
 - Steve Cadrin referenced the work of Micah Dean (Mass DMF) regarding some seasonal closures that may expose one group to the fishery more than the other which could be addressed through management. However, warming water temperatures might impact groups differently and that would be more one directional.
- Is there any ongoing research into fine scale resolution spawning behavior for the winter and spring spawners in wGoM?
 - Steve Cadrin mentioned some ongoing work in wGoM (Ipswich Bay, Mass Bay, etc.) but it consists primarily of fishermen interviews. There is no fine scale tagging or acoustic studies like what has been done previously by researchers like Micah Dean.
 - Micah Dean agreed that fishermen's knowledge and tagging summaries that were analyzed by spawning time/area offer the most recent information. Currently, it would be difficult to initiate new studies because the historically strong spawning aggregations are now much weaker.

Additional Open Discussion

The following list of management tools/options was presented to participants with the opportunity to add additional options that would be of interest. A poll was conducted to identify the three most popular topics that would be productive to discuss during the remaining workshop time.

Management Options/Tools:

- Additional spawning closures for fisheries - with multiple components
- Changing trip limits/bag limits by fishery, area, and season
- Reallocation among areas and fisheries
- Additional trip reporting
- Monitoring requirements for fisheries by sub population
- Gear modifications for fisheries
- Sector operations plans to declare specific areas
- Modifying management unit boundaries
- Monitoring the lobster fishery
- Define reference points for each stock or subpopulation

The top three discussion topics selected by participants:

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

First Topic- Monitoring requirements for fisheries by sub population

- A fishermen's representative commented that the fishery is already operating at 85% of the original allocations which has basically eliminated interest. Allocations are currently too small for commercial viability. The issue is not all about managing fishermen. Instead, we should also focus on managing external factors like predation (seals) that are influencing the cod population.
- Multiple participants mentioned the high additional cost associated with increased monitoring. It is expensive to cover a trip but if we implement new sampling, there should be increased observer training for better data sets and including other fisheries (lobster) for new data sources. Some of the current observer protocols do not provide the necessary biological or spatial data and a cost benefit analysis may be required to execute more efficient sampling.
- A participant voiced concern that the mixed-stock fishery catch would not be sampled in a representative manner that characterizes true populations. There are many challenges to monitoring, especially in real time, and the nature of the otolith technique is overly dependent on postmortem port sampling.
- Do the fishery independent trawl surveys provide enough information on either sub population for separate assessment/management?
 - Charles Perretti answered that input beyond the surveys includes catch composition data from commercial and recreational fisheries. There is not enough survey data alone to provide a sense of the relative proportions in the ocean. We would need to differentiate between the stocks using other forms of assessment from an analysis perspective.
 - Micah Dean added that the goal for monitoring subpopulations is to describe the mixture. Therefore, managers don't require overly fine-scale observer at-sea programs. Assessment relies on the assumption that the port sampling is representative of commercial catch but with subsampled fin clips (genetics), we could monitor the catch of most stocks. Charles Perretti and some attending fishermen have posed the idea of recreational fin clip sampling programs, which are feasible to monitor the stock composition moving forward. The challenge is looking at historical data sources and establishing reference points, which is essential in management.
- A participant posted in the Zoom chat that more effort should also be devoted to acoustic detection and monitoring of spawning aggregations. There is an important winter spawning

aggregation on the NW corner of Stellwagen Bank that we (SBNMS and NEFSC) have detected successfully with acoustic receivers. Spawning aggregations are highly ephemeral and therefore difficult to sample with traditional techniques. Whereas acoustic receivers are out there all the time listening 24/7. The problem is we need to deploy more of them in more areas and the personnel to analyze the data.

Appendix A

**2021 Atlantic Cod Stock Structure
Management Workshop Series
Gathering Regional Perspectives from Gulf of Maine East & West
August 19, 2021
1:00 PM – 3:00 PM**

Workshop Objectives:

- Discuss and define available and potential management tools that could be used to manage Gulf of Maine East & West stocks differently to account for new understanding of biological stock structure.
- Share advantages and disadvantages of options.

1:00 Welcome and Introductions – Erik Chapman, NH Sea Grant and Laura Taylor Singer, Facilitator

1:10 Goals and Objectives of the Management Workshop Series – Jamie Cournane, NEFMC

1:25 Understanding Existing Atlantic Cod Management in SNE/GB - NEFMC

1:50 Considering Additional Fisheries Management Options & Tradeoffs– NEFMC/All

2:50 Overview of Next Steps

3:00 Adjourn

Appendix B

Alexander Dunn (NMFS, NEFSC)
Alison Frey (UMass SMAST)
Allison Lorenc (Conservation Law Foundation)
Amanda Hart (UMass, SMAST)
C Foley (NMFS, NEFSC)
Charles Perretti (NMFS, NEFSC)
Cole Carrano (UMass SMAST)
Dan Salerno (Northeast Fisheries Sector V&XI)
Ben Haskell (Stellwagon Nat. Marine Sanctuary)
Cheri Patterson (NH Fish and Game)
Elizabeth Moore (GMRI)
Erik Chapman (NH Sea Grant)
Greg Ardini (NEFSC)
Hal Weeks
Hank Soule (Sustainable Harvest Sector)
Chris Kellogg (NEFMC)
Jackie Odell (Northeast Seafood Coalition)
Jamie Cournane (NEFMC)
Dan Caless (GARFO)
Jocelyn Runnebaum (TNC)
David Goethel
Edward Barrett (MA Bay Grounfishermen's Assoc.)
Kyle Molton (NMFS, GARFO)
Laura Singer (Sambas Consulting LLC)
Linas Kenter (UNH)
Gabi Clardy (NOAA)
Steven Cadrin (Umass, SMAST)
Togue Brawn (Downeast Dayboat)
Tom Nies (NEFMC)

Gabi Clardy (NOAA)
Lucy McGinnis (UMass Dartmouth)
Maggie Raymond (Associated Fisheries of Maine)
Mark Alexander (NEFMC)
Mark Grant (NMFS)
Matt Gates (CT DEEP)
Megan Ware (DMR)
Melanie Griffin (Mass DMF)
Micah Dean (Mass DMF)
Michael C. Plaia (Rec Advisory Panel)
Michael Pierdinock (CPF Charters)
Geoffrey Smith (TNC)
Michelle Lemos (NH Sea Grant)
Nathan Hermann (UNH)
Kaitlyn Shaw (NOAA, NMFS)
Kelly Whitmore (MA DMF)
Paul Nitschke (NEFSC)
Rebecca Peters (Maine DMR)
Mary Hudson (MCFA)
Scott Steinback (NOAA)
Tim Brady
Rich McBride (NMFS, NEFSC)
Vito Giacalone (Northeast Fisheries Sector IV)
Robin Alden
Robin Frede (NEFMC)
Russell Brown (NOAA, NEFSC)
Ryan Morse (NMFS)
Stephanie Sykes (Cape Cod Fishermen's Alliance)