

## 2021 Atlantic Cod Stock Structure Science/Assessment Workshop Series

### Workshop #2: Gulf of Maine Stocks Summary Report

June 7, 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, hosted 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 second workshop focused on the available data from the proposed Gulf of Maine stocks with the following **objectives**:

- Establish a common understanding of the goals and objectives of this Atlantic Cod Stock Structure Workshop series
- Summarize the historical and current data availability for Gulf of Maine Stocks
- Identify additional data that are available or upcoming research that could be used to inform the cod assessment for Gulf of Maine Stocks.
- Generate initial data gaps and ideas for research to improve the assessment prospects for Gulf of Main Stocks

*This summary report focuses on the data presented 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 52 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 67% of respondents attended the previous Cod Structure Workshop on June 1 while 33% of respondents did not.

## ***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 2021 workshop series will include two separate components:
  - Science/Assessment
  - Management Implications and Options
- Audience participation is important because establishing an accurate cod stock structure is foundational for the success of sustainable groundfish management. If management stocks don't approximate biological stocks sufficiently, we are swimming upstream in our quest for a sustainable fishery.

### *Presentation – Goals and Objectives of the Workshops, Russell Brown (NMFS, NEFSC)*

- The schedule for the 2021 workshop series was reviewed. Four Science/Data Workshops will occur on June 1, 7, 25 and July 1, followed by 4-6 Management Workshops in August and September.
- Recent science (ACSSWG report) suggests a finer scale stock structure than the current management units. Assessment of the available data is needed to determine if management is practical at this scale.
- The purpose of this workshop series is to assess the available and emerging data by stock area to inform the upcoming Research Track Working Group stock assessment process, and to identify data gaps and needs that would limit assessment. E.g., are there sufficient data to conduct age-specific modeling by stock area?
- This workshop series will not be performing stock assessments for the proposed stock units, nor other detailed analyses. This workshop series will also not focus on management implications, as that will be the focus of the next workshop series.

### *Presentation – Review of Findings of ACSSWG, Richard McBride (NMFS, NEFSC)*

- The full ACSSWG findings is available online:  
[https://seagrant.unh.edu/sites/default/files/media/pdfs/R2O/Cod-Population/2021/draft\\_tmchap9\\_syn\\_acsswg\\_mar2021.pdf](https://seagrant.unh.edu/sites/default/files/media/pdfs/R2O/Cod-Population/2021/draft_tmchap9_syn_acsswg_mar2021.pdf)
- Since 1970s, cod in US waters have been assessed and managed as two units – 1) the Gulf of Maine and 2) Georges Bank and South. The ACSSWG used an interdisciplinary approach, to address the question: how do geographic management units (i.e. the North-South, 2-stock model) relate to the biological stock structure of Atlantic cod? The working group was charged with focusing only on biological stock structure, considering all evidence, and not to consider management implications.
- A synthesis of information on life history, adaptive and neutral genetic markers, natural markers (phenotypic data) and applied markers (tagging) resulted in a proposal of 5 stocks in US waters:

- 1) Southern New England, 2) Eastern Georges Bank; 3) Western Gulf of Maine Winter-spawning; 4) Western Gulf of Maine Spring-spawning; 5) Eastern Gulf of Maine.
- The work of the ACSSWG was presented to the New England Fishery management Council, NOAA Northeast Fishery Science Center; NH Sea Grant, and the Maine Fishermen's Forum.

*Presentation – Stock Assessment Building Blocks, Mark Terceiro, (NMFS, NEFSC)*

- An overview of relevant fisheries definitions, statistics and data collection strategies were explained to provide general background information on stock assessments prior to the proceeding cod-specific presentations.
- Commercial and recreational fisheries data (Pre- trip notifications, observers, vessel trip reports, port surveys, sale/dealer reports etc.) must be representative and stratified to produce accurate assessments but both have associated challenges (multiple locations within a trip, discards).

*What does all this mean for cod?*

- Previous data that were collected under the assumption of a two stock structure may not be appropriate or sufficient for a five stock structure.
- The more you split things up into smaller management units, the more challenging it becomes to track changes over time with the limited data sets.
- It is critical to get stock definitions correct because using wrong stock definitions can lead to poor management, as was shown in simulation studies.

*Presentation – Stock Area Data Overview – Eastern and Western Gulf of Maine, Charles Perretti, (NMFS, NEFSC)*

- The data presented here today are only preliminary estimates with the goal of providing a general overview of data availability and trends in these two areas. Historical fisheries estimates have not been broken up in this way previously.
- The NMFS Bottom Trawl Surveys cover the Gulf of Maine in fall and spring. These surveys show that eastern Gulf of Maine (eGoM) and western Gulf of Maine (wGoM) had high indices of abundance and biomass in the 1970s-80s but low abundance since 1990. Spatial distributions in both areas also illustrate historically high abundances that have since disappeared, especially in eGoM. WGoM showed similar trends with a slight increase in the 2000s.
- The Maine/NH Spring Trawl Survey also extends into both regions of the GoM and in Spring and Fall seasons. Data from these surveys similarly show a declining abundance for both eGoM and wGoM and a limited length distribution with mostly age 0-1 year old fish (25 cm).
- The Massachusetts Division of Marine Fisheries (MADMF) Bottom Trawl Survey is conducted in the Spring and has shown similar declining trends with a bit more “noise” fluctuation in the data. Those data are also comprised primarily of young fish.
- The Eastern Gulf of Maine Sentinel Surveys use jig and longline methods to capture a broader size-age distribution than other surveys, peaking around age 4-5 and therefore not capturing the full spectrum of cod ages (age 9 maximum). The index of abundance is historically very low but generally stable from 2012-2020. Environmental and biological data are available as well, but limited only to the eGoM.

- Potentially valuable data for wGoM only can be found in the NMFS Northern Shrimp Survey and the NMFS Bottom Longline Survey, but neither of these data sets has been summarized yet.
- Fisheries dependent data include the NEFSC Study Fleet Program, consisting of about 40 vessels and representing a valuable data source for the wGoM only.
- Commercial landings have decreased over time in biomass and are especially limited in the eGoM over the past two decades, with some significant gaps of missing catch data over time. Overall, wGoM is relatively data rich and the length distributions are sufficient to attempt an age-based assessment if both spring and winter spawners are treated as a single stock.
- The commercial discard data quality is related to the number of trips observed, which is very limited in the eGoM compared to wGoM and has shown a small increase in recent years. Still, sparse availability and spatial coverage in the eGoM preclude an accurate length distribution.
- Recreational fisheries data follow a similar trend to the other sources with limitations in the eGoM, where there has been little to no data since 1990 compared to the data rich wGoM.
- In summary, the information available would be sufficient to attempt an age-structured assessment for the wGoM, particularly if the spring and winter spawners are treated as a single stock. Currently, data from the wGoM drives the assessment for the entire GoM. Performing an age-structured assessment for the eGoM would be challenging. Instead, an index-based assessment would likely be needed.

#### *Participant Q&A*

- Have you considered an eGoM index of abundance from the ME/NH trawl data?
  - Charles Perretti stated that this has not been done yet. Russ Brown stated that this was not done because the Maine DMR biologist for the ME/NH trawl data was not available prior to this meeting due to at-sea obligations.
- The Massachusetts DMF cod IBS survey, from the Canadian border to Chatham, may offer an additional data source. Also, Maine DMR and any lobster fishery bycatch data might have information on cod.
  - Charles agreed that these data sources are potentially helpful, especially for IBS, and that the lobster bycatch is going to be considered in the Research Track meetings.
- A graduate student from University of Maine provided some additional information on the timing of the Sentinel Survey (June – Oct) and offered to answer any questions about biological data being collected and/or their availability.
  - Are the fish being aged and what is the status of those data?
  - Otoliths are consistently collected over time, but most haven't been processed yet. It appears that the survey is mostly capturing 1-2 year old fish but occasionally a little bit older.
- A participant from the Nature Conservancy commented about some newer assessments in the last five years or so, through two different programs, and the role of electronic monitoring for discard data. The audit program is currently on 30 vessels and the max retention program would be collecting sub-legal lengths. Those discard data are now more readily available from the electronic monitoring program.

- The max retention lengths are currently included in the assessment and provide very useful data sources.
- There is a lack of information in the eGoM and this likely prevents doing separate assessments for that area. Could you clarify whether wGoM stock assessment is separate from East?
  - Charles Perretti clarified that the objective here was to overview data availability and then provide some perspectives for assessment if the stocks were broken up and assessed separately.
- Participants in the chat discuss the importance of otolith samples as a data source for age information, but also acknowledge they should be considered for use in stock assignment (i.e. Winter and Spring spawners). Stock composition should be added to assessment strategies.
- There have been targeted research projects that have led to the cod protection closure areas in the GoM since around 2015. Is anyone aware of the status of these studies? Are they ongoing?
  - These studies are now complete, and the findings can be found in this paper on winter cod spawning research in the wGOM: <https://academic.oup.com/icesjms/article/76/6/1610/5475874>
- There was state of Massachusetts project as well? MFI/ SMAST ongoing work in wGOM?
  - Researchers responded that some studies focused on winter spawning cod and others on spring, spawning site fidelity, dispersal and straying from spawning area etc. Together, these are research studies that can assist with stock identification, but are less applicable to assessment or long-term monitoring programs.
- There are a number of charter/party boats that fish in the eastern GOM, particularly Fippinies and Cashes ledge. Their VTR data may be useful.
  - Charles Perretti mentioned that VTR should already be included unless the fishing is further east than we are aware of.
- Areas are currently closed in the wGoM. Is there ongoing work to monitor these closures and determine what needs to be reexamined or moved/updated. We often collect data enough to establish closures, but rarely follow up and monitor. What are we learning from area closures?
  - Jamie Cournane (NEFMC) responded that management could respond to this in different ways (e.g. an adaptive management approach). She also indicated that she is unaware of current studies monitoring these areas to assess efficacy of closures but those types of studies, combined with spawning dynamics, would be useful to have.
  - Researchers at GMRI may be doing some work on area closures and have upcoming results on these studies. A preliminary technical report can be made available (from Lisa Kerr).
- Why are we using max retention but not EM data?
  - Charles Perretti clarified max retention is port sampled and used as landing data.
  - Recreational boats have still been able to fish in the closed areas and their VTR data could be very useful for this.

## Open Discussion

*Are there data folks are aware of that haven't been listed yet, or ongoing/future studies, that would assist this assessment of these stocks being discussed today?*

- Richard McBride commented on the ACSSWG results about fishermen's ecological knowledge that suggested additional wGoM spawning grounds and will be updated in the technical memorandum. What is the quantity and temporal span of cod otoliths available from the UMaine Sentinel survey?
  - A participant from UMaine responded that there should be at least 50 samples per year for the last 5 years but this needs to be confirmed. Collections might have started as early as 2012-13.
  
- The wGoM has a high degree of mixing. Genetic analyses and otolith chemistry allows us to discriminate between Winter and Spring spawners in the WGoM. Do we want to monitor and tease populations apart for management as different stocks or manage these as a mixed stock to inform harvest restrictions? We have the means to separate the components but the path is currently unclear/undecided.
  - If we want to move to a new cod management scheme, we need more cod data. Less catch recently leads to less data on top of all the current gaps. People are fishing haddock, dogfish, pollock etc. instead. No one is targeting cod so we might need a more dedicated regional cod survey and associated funding support.
  - Not only are there reduced catches, people are fishing multiple stock areas and are not sampled in detail due to questionable stock origin. All active, offshore boats need to be considered, especially in regards to the GoM.
  - Russel Brown acknowledged the problematic GoM sampling strategies. The only way for stock origin to be determined would be to have catch segregated on the boat by stock area within a fishing trip. This type of "product tracing" would require mass industry support which is an unlikely approach (labor and space intensive) but could be discussed.
  - Charles Perretti added that there are some good examples of age assessments in the data-rich wGoM so increased sampling across mixed sites wouldn't offer much of a contribution in the area.
  
- What kind of sampling are we talking about? Abundance or biological sampling to support the age-based assessment?
  - Increased biological sampling would be especially critical in the areas with low abundance or in closed areas where the data produced by surveys is sparse.
  - Russel Brown noted that there are some fishery independent surveys that cover these areas of discussion and might be able to offer additional data.
  
- What is the decision process for moving forward with assessments for these stocks, especially with the extremely data-limited eGoM region? What are the alternative options?

- We are trying to approach things using these workshops on a stepwise basis because of the “chicken vs. egg” situation happening among scientists and managers. Identifying data gaps is the goal and then management workshops, covering alternatives options, will dovetail with these discussions.
- The eGoM stock appears to be at very low levels of abundance compared to historical levels in the 1970s-80s. Management will have to consider and reflect these changes over time moving forward.
- A graduate student from UMaine adds that most of the eGoM data from their Sentinel survey is collected only in shallow, rocky areas that are most likely under sampled by the NEFSC bottom trawl survey. Is there anything else we can do to increase coverage?
  - Charles Perretti acknowledged the importance and use of these small areas being included for supplemental data but notes it may not be representative of the entire stock. We also need to consider why the bottom trawl surveys captured substantial data in the 1980s but no longer do.
- A sensible strategy would be to protect the known spawning grounds from exploitation, irrespective of what level of assessment. If we know the spawning grounds and know abundance is low, then it doesn't matter so much if we can assess them, we at least should protect the spawning grounds and their genetic integrity.
  - Jamie Courname added that we will be asking the Council about some of these potentially immediate management actions in the September meetings based on results from the ACSSWG. Please keep an eye out for those reports.
- There is ongoing research among Workshop participants on Management Strategy Evaluations that will be presented at the next workshop on June 25 and offer some insight into some of these biological vs. management assessment options.
- Are there pieces of information/ data that are currently missing from the assessments which would help make them more robust?
  - Charles emphasized that these data gaps are the objective of the workshop. One example is that maturity data for the wGoM is sufficient but that is assuming the winter and spring spawners are the same. If we were to split the components we would need to split the other biological data as well, and the eGoM is currently lacking this data resolution.
  - Basic biological information on maturity and length-weight should be a higher priority because so many management measures regulate through size that could be specifically tailored to a stock.
  - Richard McBride expanded on the topic that apparent mixing occurs within statistical areas, but biological data is most important if there is evidence of spawning and reproduction in the area. If stock abundances are low, then the urgency for biological data is not great.

- If the surveys and commercial data are missing older fish, where should we look for those data and are there concerns about this selectivity?
  - Russel and Charles addressed the shared concerns about this data gap. The NEFSC bottom longline survey targets areas where the trawl misses, but when comparing their selectivity for older fish, there is still little difference.
  - The Sentinel survey similarly struggles with longline catch rates and the permitting process to implement such surveys.

## Additional Research Feedback

Using an on-line tool, workshop participants were asked to respond to the following prompt and input their ideas into a common database. Participants could put in as many ideas as they liked and they were allowed to “upvote” others’ ideas (only a single time). This was not a deliberative ranking exercise, but allowed a sense of energy and enthusiasm from the group to emerge around more compelling ideas.

*Of the discussion we just had, what’s the most compelling research need that would help us better assess cod under a five stock structure?*

Research need	Up Votes
Recreational data in the eGoM	0
Closed area research	1
Additional eGoM sampling	3
Further investigation of best data source for representative index of eGoM	4
A quick method to identify winter from spring spawners. Sampling from ports or at sea.	1
Apportioning catch between spring and fall spawners in wGoM	4
Stability of the mix of spring and winter spawner populations in the wGOM.	2
Mixed stock composition of survey and fishery samples	3
Characterizing natural mortality	2



## Appendix A

### 2021 Atlantic Cod Stock Structure Science/Assessment Workshop Gulf of Maine Stocks

June 7, 2021 1:00 PM – 5:00 PM

#### Workshop Objectives:

- Establish a common understanding of the goals and objectives of this Atlantic Cod Stock Structure Workshop series
- Summarize the historical and current data availability for Gulf of Maine Stocks
- Identify additional data that are available or upcoming research that could be used to inform the cod assessment for Gulf of Maine Stocks.
- Generate initial data gaps and ideas for research to improve the assessment prospects for Gulf of Main Stocks

**1:00 Welcome and Introductions**

**1:10 Goals and Objectives of the Science/Assessment Workshops**

**1:20 Quick Review of the Cod Stock Structure Working Group Results**

**1:30 Stock Assessment Data and Building Blocks**

**1:50 Stock Area Data Overview – Western Gulf of Maine**

**2:40 BREAK**

**2:55 Discussion on Western Gulf of Maine Data**

1. *Given the goal to inform the science and management of a five stock structure, is there data that hasn't been listed today that would be pertinent to the assessment?*
2. *Are you aware of any upcoming, ongoing or future studies that would be relevant?*

**3:15 Stock Area Data Overview and Discussion – Eastern Gulf of Maine**

1. *Given the goal to inform the science and management of a five stock structure, is there data that hasn't been listed today that would be pertinent to the assessment?*
2. *Are you aware of any upcoming, ongoing or future studies that would be relevant?*

**4:10 Discussion of Data/Research Needs**

*What are the priority research needs and data gaps to recommend to the cod assessment working group to better assess cod under a five stock structure?*

**4:45 Overview of Next Steps**

**5:00 Adjourn**

## Appendix B

### Attendance

Michelle Lemos (NH Sea Grant)  
Anna Tilley (Govt of Newfoundland and Labrador)  
Linus Kenter (UNH)  
Erik Chapman (NH Sea Grant)  
Michael C. Plaia  
Laura Singer (SAMBAS Consulting LLC)  
Rich McBride (NMFS, NEFSC)  
Russell Brown (NMFS, NEFSC)  
Charles Perretti (NMFS, NEFSC)  
Dan Salerno (NE Sectors V & XI)  
Adrienne Kovach (UNH)  
Steven Cadrin (SMAST)  
Jamie Cournane (NEFMC)  
Liz Sullivan (NMFS, GARFO)  
Mark Terceiro (NMFS, NEFSC)  
Jocelyn Runnebaum (TNC Maine)  
Jim Kendall (New Bedford Seafood Consulting)  
Alison Frey (SMAST)  
Tim O'Donnell (GMGI)  
Robyn Linner (UMaine)  
Nathan Hermann (UNH)  
Allison Lorenc (Conservation Law Foundation)  
Cole Carrano (SMAST)  
Mark Grant (NMFS)  
Scott Steinback (NMFS, NEFSC)  
Fred Serchuk (NEFMC)  
Lisa Kerr (GMRI)  
Kathy Sosebee (NMFS, NEFSC)  
Alex Hansell (MADMF)  
Janice Plante (NEFMC)  
Rebecca Peters (MDMR)  
Mary Hudson (MCFA)  
Andrew Jones (NEFSC)  
Daniel Caless (GARFO)  
Jeff Vieser (NFMS)  
Megan Ware (DMR)  
Moe Nelson (NOAA)  
Kate Draa (NOAA)  
Kyle Molton (NMFS, GARFO)  
Katrina Zarrella Smith  
Alexander Dunn (NMFS, NEFSC)  
Spencer Talmage (GARFO)  
Lucy McGinnis (UMass Dartmouth)  
Libby Etrie (NESSN)  
Carla Guenther (MCCF)  
Melanie Griffin (MADMF, NEFSC)  
Geoffrey Smith (TNC)  
Chris McGuire (TNC)  
Robin Frede (NEFMC)  
Maggie Raymond (Associated Fisheries of Maine)  
Jackie Odell (Northeast Seafood Coalition)  
Melissa Smith (DMR)