

2021 Atlantic Cod Stock Structure Science/Assessment Workshop Series

Workshop #1: Southern New England and Georges Bank Stocks Summary Report

June 1, 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 featured 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 first workshop focused on the available data from the proposed Southern New England and Georges Bank 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 Southern New England and Georges Bank Stocks
- Identify additional data that is available or upcoming research that could be used to inform the cod assessment for Southern New England and Georges Bank Stocks.
- Generate initial data gaps and ideas for research to improve the assessment prospects for Southern New England and Georges Bank 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 50 people (Appendix B) of the 74 that registered. 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 24% (8) of respondents attended previous Cod Structure Symposia in 2018 and 2019 while 64% (21) of respondents did not and 12% (4) were unsure.

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/R20/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, Chris Legault (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 to support assessment and management under 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.

Participant Q&A

- How is the changing environment being considered into the proposed stock structure? For example, cold water stocks are moving to deeper waters. These environmental changes should be a consideration for new long-term stock structure
 - Chris responded that this will be an important but challenging factor to consider. Stock structure is an abstract, challenging concept that we use for management; if there is a change in underlying distributions over time (like moving fish) it will make management even more difficult.
- With winter and spring spawning seasons as well as genetic differences related to heat shock tolerance, cod populations may react differently to climate change.
- Will there be consideration of catch data from other fisheries, (e.g. lobster fishery) and how is that spatial overlap being incorporated into proposed stock assessments?
 - The goal is to assess all fishery removals, including fisheries like lobster. This has been challenging historically (insufficient observations), but data are improving with a strong potential for including some of these estimates moving forward.
- A participant posed a question about the ability of current surveys to capture smaller stock dynamics (e.g., Southern New England, where fishery independent surveys miss data). How would we accurately capture these local spawning sites in the future?
 - Russell Brown responded to hold onto this question, as it will be covered in the next presentation.

Presentation – Stock Area Data Overview – Southern New England (SNE), Russell Brown (NMFS, NEFSC)

- Data are available from commercial and recreational fisheries, NEFSC Survey Data, other surveys – state-specific, and local/regional agencies with varying degrees of complexity. These are the same general data sources for all areas, including the SNE.
- Overall, all commercial landings have declined for all areas since the 1970s. SNE has historically comprised a small proportion of the landings relative to the other stocks, although it has contributed relatively more in recent years than historically, albeit still at very low relative levels.
- Survey-specific data gaps make SNE a difficult stock to assess. Sampling effort is allocated by catch, and without a significant catch, sampling effort has been historically limited.
- SNE is minor relative to other stock areas and there is little or no information available to characterize the size and age composition. Surveys catch primarily younger fish (age 0-3) with no fish older than 4 years.
- The NEFSC Study Fleet Program provides an additional, potentially important source of fishery-dependent data that could be mined for more detailed information from the SNE. For this program, fishermen have collected high resolution data since 2006, although there has been a decline in the number of vessels participating and the number trips where cod were observed by this program over time.
- The recreational catch data are complex to dissect because they are collected on a state by state basis and landings have to be allocated to stock/area by port location. This can be more problematic for certain states, e.g., within Massachusetts catches are allocated to SNE or GoM based on port location, which may not actually correspond to location where fishing occurred. This type of allocation division will become more complex with more stocks to assess.
- There are eight surveys that provide fishery-independent data for SNE cod, including the NEFSC Bottom Trawl Survey (spring and fall), Massachusetts DMF Inshore Trawl Survey (spring and fall), Northeast Area Monitoring and Assessment Program (NEAMAP) Survey (spring and fall), and the RIDEM monthly and seasonal trawl surveys. None provide consistent information on size and age composition of the population.
- Additional data exploration from some fishery independent survey sources may yield more detailed information and is warranted especially for RIDEM, MADMF and they yet unexplored dataset from URI-GSO surveys.

Participant Q&A

- Why/how did we characterize SNE with such little available data especially for adults? Also, clarify whether genetic data were collected from young or spawning fish to confirm distinction of the region.
 - Russell Brown confirmed there are adult cod in the SNE; scientists and other fishermen can attest to this. However, due to the fine scale habitat use by this stock, fisheries-independent surveys are failing to sample these individuals in sufficient numbers.
 - Multiple workshop attendees responded that genetic samples were collected from adults on spawning grounds (e.g. Cox Ledge), as is appropriate for characterizing population structure.

- A participant questioned the effectiveness of gear types used in these surveys and whether they were most appropriate for SNE. Fixed gear (bottom lines) could be considered to better identify discrete spawning habitats.
 - A new fishery independent survey might be best if it used a different type of gear or multiple gear types to describe this region, which is currently “bottom trawl centric.” Establishing a longline survey may improve data but also represents a change in resource allocations.

Presentation – Stock Area Data Overview - Cape Cod and Great South Channel, Russell Brown (NMFS, NEFSC)

- Commercial and recreational catch and biological sampling has historically been and continues to be significant in these two statistical areas. There are some limitations with seasonality and isolating data from adjacent areas like SNE and the WGoM in Massachusetts, which will limit the data available for characterizing length and size composition on a finer scale.
- The study fleet (NEFSC Trawl Survey) data contains over 10 years of sufficient biological data with some seasonal limitations in the Fall. Abundance and biomass have declined over the years, as is true for other stock areas.
- The MDMF spring and fall Trawl Surveys provide an additional source of fishery-independent data, but only include two strata in the stock area.
- It remains an open question whether an accurate stock assessment can be assessed considering some of these current limitations.

Participant Q&A

- A Participant commented on information from a presentation at URI GSO a couple of years ago by someone from a wind company, who was doing fishery sampling on Cox ledge, and found larval cod off coast of RI. These data sources may hold potentially useful information.
 - Russell Brown responded he remembered the talk and acknowledged there are other wind energy studies as well showing active spawning in the SNE area. These are important data moving forward and should be accounted for by the Research Track Assessment. He also points out there is a lack of time series dynamics information in those data sets, which is a limitation.
- Recreational data (party boat and charter) might be useful to characterize where vessels from different ports are targeting fishing efforts. These would include the Vessel Trip Reports (VTRs), and voluntary recreational catch reporting online.
 - VTR recreational sources could provide some additional, useful data, including time series info, especially for SNE. It would also be important to note that much of recreational catch reporting online is voluntary and this brings up the issue of representativeness

- Commercial and recreational fishing strategies differ, are there any strategies proposed to collect more biological data (spawning condition, photos etc.) to help characterize stocks? This would be useful in the overlapping WGoM stocks.
 - Fishery independent surveys collect a lot of detailed biological data in these regions, but not necessarily stock origin specific. The question is how to deal with the mixing and how to allocate catch to the different stocks. One solution is to have a mixed fishery and sample it in real time (genetics or other way to assign stock origin). There are always going to be funding/resource limitations on data collection.
- The whaleback closure in Massachusetts may be responsible for the significant drop in catch observed.
- A participant asked for confirmation that surveys have not caught a cod older than 4 years of age in the SNE?
 - Russell Brown clarified that this is correct, but noted that these surveys don't catch many adult cod overall in some regions.
- How well does this correlate to commercial/recreational catch or port sampling efforts?
 - Russell Brown clarified that port sampling for SNE cod is generally sporadic at best and insufficient to capture market categories or other important data

Presentation – Stock Area Data Overview- Eastern Georges Bank, Russell Brown (NMFS, NEFSC)

- Commercial catch numbers for eastern Georges Bank have been declining over time and shifting towards younger age classes. This still represents a data rich region where historical and biological data allow characterization of a catch at age, spawning stock biomass, and cohort tracking over time.
- There are no significant recreational fishery landings or discards for this area.
- The NEFSC Bottom Trawl Surveys show notable differences between Spring and Fall fish distributions within the area, with fall distributions concentrated on the Northeast Peak and spring distributions more widely distributed across the bank. There has been a decline in the number of study fleet vessel trips over time, making this dataset thinner than for other regions.
- The Canadian DFO Spring Trawl survey provides a third fishery-independent data source for this region. This survey does not extend all the way to the western part of the bank.
- Overall, this area is data rich, but recent low catches require a data-limited modeling approach.

Participant Q&A

- A participant posed a question/comment about lowering the bar to an index-based assessment and availability of a data stream to support the index.
 - A focus on charter boat data and VTR may be able to provide trends in abundance and catch rates over time. Fishery independent data is insufficient, except maybe on age 0-1, which could be relevant for recruitment, but otherwise lacks the required age structure.
- Will changes in GB stock effect the assessment of the eastern GB stock?

- We hope to have a joint assessment with the Canadians. If this proposed GB stock area is adopted by both countries, then it would replace the current Transboundary stock assessments.
- Why is cod management so different from the current cooperative Canada/US strategy we use for haddock?
 - Russell Brown clarified that there is a difference in the stock units. There's no guarantee for Canada's participation in the new proposed stock units. Management units and stock structure does not necessarily need to be the same, although that poses some threats to management policy.
- The Canadian management unit is not the same as a stock unit. Do we expect that management unit to change?
 - We don't know yet. The ACSSWG was an international effort, but we don't yet know how Canadians will view changing management units. Russell Brown reminded participants that our goal today is to provide fishery managers with information on stock assessment, which will then inform the decisions about the management units.
 - Jamie Cournane (NEFMC) echoed these considerations and acknowledged they will be considered further in the upcoming management workshops.

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 3 stocks being discussed today?*

A link to a google sheet was provided in the chat for documenting these data sources.

- A participant mentioned again Charter/Party Boat and VTRs. Tim Tower out of Maine keeps meticulous records and this may provide a time series.
 - Russell Brown referred to Charles Peretti who leads the GOM assessment and will be speaking at the next workshop. He also noted potential representativeness issue with such data.
- Russell asked if anyone on the call (RI DMF) would be comfortable speaking more about the RI survey data right now, i.e. to characterize the cod catches and whether either survey could be tracking cod recruitment, etc.
 - A participant from RI DMF answered that they have seasonal Spring and Fall surveys with fixed stations in Narragansett Bay and Block Island Sound with a few catches of adults primarily at mouth of Bay.... But primarily YOY catches. Available datasets go back to 1979 (seasonal) and 1990 (monthly) and are worth digging into. Connor McManus can also contribute and we should follow up on these data sources.
- The URI GSO trawl survey contains some cod data

- Russell Brown acknowledged that this is a distinct data source that needs to be investigated.
- A participant showed appreciation for the "good job" looking at survey data available. He noted the ACSSWG report says that these represent genetic stocks. If we want to preserve genetic integrity of stocks, then protecting spawning grounds are important. This sets the stage for data needs. One could manage these stocks through different maturity and growth rate knowledge (mesh size implications) beyond just spawning closures etc., "a more holistic view."
 - Russell Brown agreed it is important to get more information on growth rates of stocks and compare. Currently the data are insufficient but targeted charter boat efforts (Cox and Block Island) may provide some new data sources. NEFSC would require resources to support such efforts.
- There is concern about changes and shifts in stock distributions in the future. Long term monitoring (genetic data) is needed.
 - Rich McBride commented that there is a strong SNE fishery winter but survey data is lacking in northern states where there is a lot of recreational fishing. This represents some important data being missed when a recreational fishery is not sampled year round.
- There are two recreational fisheries in SNE: 1) Winter (not captured by surveys); 2) Summer on Cox Ledge (would be captured).
- Russell Brown asked if the two fisheries taking place are in different areas.
 - The winter fishery is typically inshore of Cox Ledge, around Fairway buoy, southeast of Block Island, whereas the summer fishery is right on Cox Ledge including participation from the "Viking boats." If looking for VTRs, a large part of fleet that fishes the winter comes out of Montauk.
- Jamie Cournane added there is mandatory and voluntary data collected during the winter on SNE. Electronic reporting, port sampling by state, mail surveys. They will be digging into that further but issues exist with data uncertainty.
 - A manager of the groundfish sector around SNE (Point Judith area) commented that catch tends to be significant during the Winter. If interested in the commercial sector, reach out for connections with fishermen to collect additional samples.
 - RMIP program in RI did start to ride on head boat trips but was forced to stop by Covid. It will be returning soon and should be monitored.
 - A participant complimented the introductory *Building Blocks* presentation by Chris LeGault on being helpful. If we can't reach data needs for some of these stocks, how/if can we make sure we have enough data to make robust enough assessments? What are the metrics going to be on what makes a robust index?

- This comment should be a focus of the June 25th workshop. For that meeting, we will run through some models of stock assessment and what tools will be needed. We need to sort out the type and quality of information that can be delivered to managers.
- A graduate student from SMAST described ongoing work with party/charter boats and other fishery-dependent sources. Acoustic tagging of spawning fish and passive acoustic monitoring for vocalizations during spawning activity may provide a future data source.
- A second researcher commented they are also working on the above study. The passive acoustic portion of the study will help to further distinguish SNE spawning aggregations. Studies have just completed the second year, and a third year is planned. Result analyses are ongoing. By this fall, researchers should have sense of whether there are other spawning hot spots/aggregations.
- A participant asked a question about the interesting physiological difference between spring/winter spawners, especially in light of environmental/temperature change. Are there studies of adaptive genetic or reproductive differences?
 - Adrienne Kovack from UNH responded that yes, there are and evidence shows they are associated with temperature and other environmental differences. In addition, there are shifts in the allele frequencies in the spring group, which is also declining, in genes associated with temperature/environment.
 - A second researcher added that little is actually known about fecundity or fitness differences between the winter and spring.

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.

Based on the discussion we just had, what’s the most compelling research need to prioritize?

| Research need | Up Votes |
|--|----------|
| Ground truth sparse survey information with alternative surveys (fixed gear) and fishery catch information (LPUE). | 0 |
| Resolving data sources representative indices of abundance of stocks discussed | 1 |
| cost/benefit of data poor assessments vs wrong stock structure (modeling) | 3 |
| Sampling the fisheries catches for genetic information | 1 |
| More detailed sampling of commercial and recreational catch that corresponds with smaller stock areas | 3 |
| Identifying spawning locations of SNE stock | 4 |
| basic biological data for sne | 1 |
| differences in growth rate/age at maturity for five proposed stocks | 4 |

Appendix A

2021 Atlantic Cod Stock Structure Science/Assessment Workshop Southern New England and Georges Bank Stocks

June 1, 2021 8:30 AM – 12:30 PM

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 Southern New England and Georges Bank Stocks
- Identify additional data that is available or upcoming research that could be used to inform the cod assessment for Southern New England and Georges Bank Stocks.
- Generate initial data gaps and ideas for research to improve the assessment prospects for Southern New England and Georges Bank Stocks

8:30 Welcome and Introductions

8:40 Goals and Objectives of the Science/Assessment Workshop

8:50 Quick Review of the Cod Stock Structure WG Results

9:00 Stock Assessment Data and Building Blocks

9:20 Stock Area Data Overview - Southern New England

9:45 Stock Area Data Overview - Channel/Western George's Bank

10:25 BREAK

10:40 Stock Area Data Overview - Eastern George's Bank

11:20 Discussion of Data/Research Needs

- 1. Given the goal to inform the science and management of a five stock structure, are there data that haven'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. 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?*

12:15 Overview of Next Steps

12:30 Adjourn

Appendix B

Attendance

| | |
|--|---|
| Michelle Lemos (NH Sea Grant) | Scott Olszewski (RIDMF) |
| Jim Kendall (New Bedford Seafood Consulting) | Paul Nitschke (NMFS, NEFSC) |
| Liz Sullivan (NMFS, GARFO) | Rich Balouskus (RI DEM) |
| Linus Kenter (UNH) | Kyle Molton (NMFS/GARFO) |
| Adrienne Kovach (UNH) | Alex Hansell (MADMF) |
| Chris Legault (NMFS, NEFSC) | Becca Van Hoeck (UNC Chapel Hill/NEFSC) |
| Russell Brown (NMFS, NEFSC) | Spencer Talmage (NMFS, GARFO) |
| Erik Chapman (NH Sea Grant) | Janice Plante (NEFMC) |
| Rich McBride (NOAA) | Melanie Griffin (MA DMF/NEFMC) |
| Jeff Vieser | Haley Oleynik (NOAA) |
| Michael C. Plaia | Mark Terceiro (NMFS, NEFSC) |
| Alexander Dunn (NOAA) | Jason Didden (MAFMC) |
| Laura Singer (SAMBAS Consulting LLC) | Jamie Cournane (NEFMC) |
| Dan Salerno (NE Sectors V & XI) | Libby Etrie (NESSN) |
| Lisa Kerr (GMRI) | Jackie Odell (NSC) |
| Steven Cadrin (SMAST) | Robin Frede (NEFMC) |
| Charles Perretti (NMFS, NEFSC) | Danny Badger (MIT Sea Grant) |
| Alison Frey (SMAST) | Allison Lorenc (CLF) |
| Cole Carrano (SMAST) | Mark Grant (NOAA/GARFO) |
| Fred Serchuk (NOAA – retired) | Moe Nelson (NOAA) |
| Maggie Raymond (Assoc. Fisheries of ME) | Mary Hudson (MCFA) |
| Andrew Applegate (NEFMC) | Dan Caless (NOAA/GARFO) |
| Nathan Hermann (UNH) | Conor McManus (RI DMF) |
| John Mohan (UNE) | Wesley Brown |
| Alexander Dunn (NMFS, NEFSC) | |