



Mid-Atlantic Fishery Management Council

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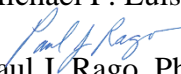
Michael P. Luisi, Chairman | P. Weston Townsend, Vice Chairman

Christopher M. Moore, Ph.D., Executive Director

MEMORANDUM

Date: May 28, 2021

To: Michael P. Luisi, Chairman, MAMFC

From:  Paul J. Rago, Ph.D., Chair, MAFMC Scientific and Statistical Committee

Subject: Report of the May 2021 SSC Meeting

The SSC met via webinar on the 11th and 12th of May, 2021 to address the following topics:

Review potential changes to the 2021 *Illex* ABC specifications and set the 2022 *Illex* ABC, (2) Receive an update on butterfish fishery and review previously recommended ABC for 2022; (3) Receive an update on longfin squid fishery and review previously recommended ABC for 2022; (4) Receive an update on the Atlantic Surfclam fishery and review previously recommended ABC for 2022; (5) Receive an update on Ocean Quahog fishery and review previously recommended ABC for 2022; and under Other Business (6) discuss approaches for incorporating State of the Ecosystem report information into SSC decisions (Attachment 1).

All 20 SSC members participated in the meeting on the first day and 19 on the second day (Attachment 2). Other participants included Council members, Council staff, NEFSC and GARFO staff, industry, and the general public. Council staff provided outstanding technical support before, during and after the meeting. I thank Sarah Gaichas and Geret DePiper for their excellent meeting notes and members of the SSC and Council Staff for their comments on an earlier draft of this report. I also thank Tom Miller who expertly crafted the summary discussion of the section on *Illex* ABCs and Mike Wilberg who chaired the sessions on *Illex* squid.

All documents referenced in this report can be accessed via the SSC's meeting website <https://www.mafmc.org/ssc-meetings/2021/may-11-12>

I convened the meeting and made an opening statement regarding my role as a contractor to the Council for the purpose of providing technical support for the *Illex* Quota Working Group. My analyses formed part of the basis for consideration of the 2021 and 2022 ABCs. To avoid any appearance of conflict of interest, I asked Dr. Michael Wilberg (SSC vice chair) to chair this portion of the meeting and Dr. Thomas Miller to lead the discussions on the Terms of Reference. I also clarified the scope of my contractual support from the Council, noting in particular that my participation as a member of the Research Track Assessment Working Group was not supported by either the Council or any other entity.

***Illex* Squid**

This session opened with a presentation by Jason Didden who provided an overview of the Research Track Assessment and summarized the findings in the Advisory Panel Fishery Performance Report.

Lisa Hendrickson, the NEFSC assessment lead for *Illex*, elaborated on the progress of the Research Track Assessment (RTA). The RTA is a comprehensive benchmark of *Illex* that will include new data on ageing and maturity, as well as the importance of environmental data for interannual variations in availability to the fishery and surveys, and an analyses of statolith microchemistry to evaluate inshore vs offshore inhabitation and movements by *Illex*. An economist on the Working Group will be examining various economic factors affecting in season effort distribution and possibly advance our understanding of landings per unit effort in relation to abundance. Interviews with commercial harvesters and processors are also underway to provide context for interpretation, and for the first time, results of the Study Fleet may be incorporated into the assessment. An assessment model framework used in the Falklands will be evaluated for use in the US. Given the complexity of the model and some COVID-related staffing and data availability issues, a delay in the assessment until early 2022 is being considered and will be considered by the NRCC later in May.

Questions for Lisa Hendrickson were related to the assessment model and its data requirements. The model allows for in season recruitment and migrations and requires an estimate of initial stock size. Data requirements include weekly estimates of average size, fishing effort and landings. As a sub-annual species, *Illex* is much different than other managed species such that special considerations must be given to the needs of in-season management its relationship to the overall assessment model.

Finally, it was noted by Jason Didden that 2020 was the fourth consecutive year of high catch rates by the fleet and early closure due to ABC restrictions. Fishermen reported seeing large squid near the time of fishery closure. Unlike many fisheries, the pandemic had only modest impacts on fishing patterns. *Illex* is primarily a frozen product and was less affected by reduced demand by restaurants.

Following Jason's presentation, there were two scientific presentations by Dr. John Manderson and Dr. Paul Rago. Dr. Rago's work provides a modeling framework for evaluating a range of feasible estimates of biomass and fishing mortality for *Illex*. The feasibility of these estimates rests on obtaining realistic estimates of factors such as overlap between the fishery and the resource area, overall availability of *Illex* to the bottom trawl survey domain and estimates of capture efficiency. Dr. Manderson's work summarized various approaches to refine such estimates using a variety of advanced statistical modelling approaches.

Manderson Presentation

Dr. Manderson provided an overview of work that he and colleagues are preparing for the RTA and a detailed summary of work in support of 2021-2022 ABC for *Illex*. The published paper of Lowman et al. (2021) was updated to incorporate the NEFSC spring and fall bottom trawl survey and the Canadian DFO survey in NAFO Area 4VWX. *Illex* habitat was defined using presence-

absence data (rather than absolute catch per tow) and analyzed using a Generalized Additive Model to define a spatially-distributed probability of occupancy. This differed from the approach used in Lowman et al (2021) who used the VAST model for comparable estimates in the US fraction of the stock area. Neither approach accounts for the fraction of the stock that occurs outside the survey sampling areas so the estimates are considered minimal estimates of total *Illex* distributional area. Diagnostic methods suggested reasonable predictive power for the model. Analyses of spatial footprint of the commercial fishery from VTR records suggested that fishing activity occurs in less than 1.2% of the habitat area for the period 2008-2019. Using estimates of the overall *Illex* distributional area, the NEFSC fall survey covers about 43% of the stock area while the spring survey covers only about 29% of the habitat because many of squid are thought to be still offshore.

Interviews with fishers were used to obtain ball park estimates of gear efficiency based on patterns of squid behavior revealed by sonar. Commercial nets can be up to an order of magnitude larger than research trawls in both the horizontal and vertical dimensions. Median estimates of net efficiency were 0.363 and 0.121 for commercial and research trawls, respectively.

Questions from the SSC included clarification about the basis for capture efficiency estimates. It was noted that many of the respondents have been active participants in the Study Fleet program and have also been involved with research conducted by the Northeast Trawl Advisory Panel (NTAP). Technical questions regarding the spatial modeling of *Illex* habitat addressed concerns about spatial autocorrelation and the potential use of an alternative statistical Bayesian approach to VAST known as INLA. See <https://becarioprecario.bitbucket.io/inla-gitbook/>. This approach has been used by investigators at both VIMS and CBL. It was noted that the Manderson et al. approach was patterned after a similar analysis in a recently published paper for a case study in Europe (Moriarty et al. 2020).

Rago Presentation

Dr. Rago presented an overview of several indirect methods for bounding the historical range of biomass and fishing mortality estimates and assessing the implications of alternative quotas for 2021 and 2022. The methods rely on analyses of spring and fall NEFSC bottom trawl surveys (1997-2019), landings (1997-2019), and VMS records (2017-2019). In addition, conventional Leslie-Davis depletion models were used to estimate initial population sizes and catchability coefficients. The depletion models include measures of weekly fishing landings, effort, and average size of squid. The indirect methods can be viewed as a system of models that can be used to iteratively refine our understanding of the stock dynamics of *Illex* and highlight key sources of uncertainty. The derivation of various bounds on stock size and fishing mortality are dependent upon estimable quantities of availability of *Illex* to the shelf area and overlap of the fishery and the surveys. Estimates of survey and fishery catchability also factor into the estimation. In this context, the analyses summarized by Manderson and colleagues were essential for advancing this evaluation.

Results of the standard depletion analyses revealed severe violations of the underlying assumptions, particularly those related to closed population. The failures of the models to fit the underlying data in most years were interpreted by the SSC in 2020 as evidence of low fishing

mortality and/or high rates of migration. To explore the magnitude of unknown growth, migration and natural mortality (defined as the variable X), a simple mass balance was developed to illustrate the potential magnitude of their combined effects. The model can be written as a function of the ratio between fishing and natural mortality and the product of gear efficiency and availability. A characteristic feature of these analyses was an exploration of the uncertainty over a broad range of the joint parameter space. For the 1997-2019 period, the average unexplained biomass (X) ranged from 31,000 to 234,000 mt. Even the minimum estimate of X was equal to the largest average catch during this period.

One of the central problems of fisheries science is the dilemma of determining whether an observed catch is the product of a high F applied to a small stock or a low F applied to a large stock. These relationships can be explored by the use of an Envelope Method that examines the realized range of biomass estimates based on an assumed wide range of historical F and catchability estimates applied to a time series of landings and survey values. The Envelope Method develops a range of feasible estimates that are consistent with the joint effects of the assumed F and catchability values. The method also incorporates a range of natural mortality estimates from the published literature.

The biomass of *Illex* alive at the end of the fishing season can be compared to what would have been present in the absence of fishing mortality using an Escapement Model. In this approach, the initial biomass at the start of the fishery is estimated by adding to terminal biomass to the catch adjusted for natural mortality. Results suggested that the average escapement rates over the 1997-2019 period ranged from 0.36 to 0.95, over a large range of parameter values. Moreover, when hypothetical values of historical catch of 30,000 mt or 33,000 mt were assumed, the average escapement was above 40% over a broad range of plausible values for M and catchability.

The final indirect method considered was an analyses of Vessel Monitoring System (VMS) data to estimate fishing mortality. The spatial footprint of the fishery is highly concentrated with nearly all fishing activity occurring in an area less than 900 nm² in 2019. In 2017 and 2018 the fishery footprint was less than 550 nm². Estimates of area swept by vessels suggest rates of fishing mortality that would not be sustainable or profitable unless the population was continuously replenished by migrations. This conclusion is directly supported by the results of the mass balance model, even though the models are completely independent of each other and share no common data or parameters. The VMS analyses were further extended to consider the effective fishing mortality on the entire in the US stock area. Effective F can be written as a function of the ratio of population densities in the fished and unfished areas and the total areas for each. Based on these assumptions the estimated maximum total fishing mortality on the population would range from 0.001 to 0.038 (i.e., 0.013/24 to 0.912/24) week⁻¹. The high value of 0.038 is approximately an order of magnitude below the candidate fishing mortality reference points reported in Hendrickson and Hart (2006).

The system of indirect methods can be refined by incorporating the results of Manderson et al. and the results of the VMS analyses. With these updates, the average biomass estimates for the 1997-2019 period ranged from 137 to 652 kt using the Envelope Method. The corresponding average escapement values ranged from 0.66 to 0.97 given the observed catches. Given a hypothetical annual catch of 33 kt over this same period, the range of average escapements was

0.42 to 0.92. Finally, the range of feasible effective Fs for 2017-2019 was 0.082/24 to 0.167/24 or 0.003 to 0.007 week⁻¹.

The SSC followed up with a series of questions related to assumptions about catchability. The catchability parameter does not consider the dispersal of squid above the net which could occur even during day time hours when *Illex* are largely on the bottom to avoid predators. Commercial harvesters report a large fraction of squid above the headropes of their nets which are several fold higher than research bottom trawls. These observations suggest lower overall q values and therefore higher swept areas biomass estimates. By consistently overestimating q the resulting estimates of F are also overestimated.

SSC further suggested that in view of the limited overlap of populations between seasonal surveys and no generational overlap between annual surveys, the focus for assessments should be on the most recent years.

The SSC questioned whether the minimal overlap of the fishery footprint with the population footprint is sufficient to conclude that fishing mortality is low. The simple answer is no, because it is the flux of animals through the footprint of the fishery that determines the rate of fishing mortality. Think of a net at the mouth of a salmon river. Although it constitutes a small fraction of the habitat it still has a high potential to exert a high F on the stock because most of the population will transit through the fished area. Such a concept for *Illex* is highly unlikely, but same principle applies. A low percentage of overlap does not guarantee a low exploitation rate.

The SSC's questions led to further clarification of the "move-along" rule used to interpret the behavior of harvesters in small areas. The move-along rule is a function of the school density below the vessel rather than the average density in the stock area.

During preparation of this report, several harvesters noted that many fishable areas are inaccessible due to gear conflicts. This would in fact lead to increased escapement. Conceptually escapement in these analyses assumes that only part of the stock is observable in US and Canadian waters. If some fraction of the resource is never available to the survey or fishing areas, then the estimated escapements would be biased low. For example, if escapement were estimated as 0.5 but if 30% of the population always remained offshore, then the actual escapement would be $0.5 * 0.7 + 1.0 * 0.3 = 0.65$. In other words, 70% of the population would be exposed to a 50% escapement fishery and 30% of the population would have 100% escapement.

The SSC noted that the methods provide insights on the potential magnitude of escapement but do not provide insights into what is necessary for a sustainable fishery. The approaches presented do not provide an estimate of the overfishing limit (OFL).

Didden Staff Memo

Jason Didden summarized the staff recommendation to increase the quota to 33,000 mt. This value is within the scope of a pending new EA which analyzed potential effect of catches up to 40,000 mt and appeared consistent with the Council's recent adoption of a liberalized risk

policy. The proposed 10% increase from the 2020 quota is viewed as an interim measure until the results and outcomes of the 2021 *Illex* RTA can be considered.

The SSC members questioned the choice of a single alternative ABC. Only one value was selected for evaluation in consultation with Council leadership. The Escapement Model was used to compare last year's quota of 30,000 mt with the proposed value of 33,000 mt. The SSC expressed concerns that future analyses of this type should include discussion of options with the SSC in advance on the meeting to avoid the appearance of a foregone conclusion. The SSC agreed that this was a reasonable interim step given that a Research Track Assessment is in progress. Should such an analysis be required in the future, the SSC requests it be consulted beforehand to help refine the request. Further discussion of this topic is summarized under

Other Business.

As a further point of clarification, the analyses treated the ABC as equivalent to catch but that the actual commercial quota would be adjusted downward to account for discards.

Public Comment

An industry member asked whether the risk of overfishing for *Illex* was less than that afforded other species under management in the Mid-Atlantic region. In response, it was noted that direct comparisons of risk were not possible but that all of the analyses suggested that the risk of overfishing was low across the full range of plausible parameter values. The industry member urged consideration of the full range of quotas up to the current limit of 40,000 mt specified in the EIS.

Industry members appreciated the quality of the work and the uniqueness of the *Illex* fishery. Commenters noted that the robust life history of squid, the relatively small fleet, low discards, and concentration of fishing mortality into relatively short season all suggest low risk of overfishing.

Another industry representative noted that fishermen reduce transit and search times as much as possible by focusing on known areas of abundance. It was suggested that an increase of the ABC to 35,000 mt, when reduced by discard estimates would result in a quota of 33,000 mt, which would allow an extra week of fishing by the fleet at the end of the season. The valuable collaboration with industry and their provision of data and expert judgement was also highlighted.

By way of written comment, one fishermen observed that Russian vessels fished around the perimeter of squid aggregations which tended to drive squid to the bottom and reduce dispersal. The commenter also suggested inclusion of a fishermen on the SSC.

***Illex* ABCs for 2021 and 2022**

Following this general discussion, the SSC addressed the Terms of Reference for *Illex* Squid. Responses by the SSC (in *italics*) to the Terms of Reference provided by the MAFMC are as follows:

For *Illex* Squid, the SSC will provide a written report that identifies the following for the 2021-2022 fishing years:

- 1) Review the appropriateness of the staff recommendation to modify the *Illex* squid ABC from 30,000 MT to 33,000 MT for the 2021 fishing season and an ABC of 33,000 MT for the 2022 fishing season. If the staff recommendation of 33,000 MT is inappropriate, specify an alternative ABC for 2021, if needed, and for 2022 and provide any supporting information used to make this determination.

*There is no OFL available for *Illex* squid. The SSC did not develop a method to generate an F_{MSY} proxy. Accordingly, the SSC reviewed and accepted an ad hoc approach to developing an ABC recommendation presented in a working paper presented by Dr. Paul Rago (Rago 2021, working paper).*

*Based on evidence presented to it, including patterns that suggest an increase in abundance, low levels of exploitation, and catches that have been constrained by existing ABCs for the last four years, the SSC continues to believe that the *Illex* stock is at a high level of abundance and experiencing a low exploitation rate.*

*Under its risk policy, the Council accepts a higher risk of overfishing when a stock is at a high level of abundance (i.e., $B/B_{MSY} > 1$). While awaiting results of a Research Track Assessment that is currently underway, Council staff recommended an incremental approach to establishing an ABC that recognizes the high likelihood that *Illex* squid are at a high level of abundance and experiencing a low rate of exploitation. Council staff recommended an interim ABC of 33,000 MT.*

Analyses presented to the ABC in Dr. Rago's working paper indicated that an ABC of this level is likely not to be in conflict with the Council's risk policy.

The SSC recommends an ABC of 33,000 MT for 2021 and 2022 pending acceptance of results from the Research Track Assessment that is currently underway and may be available early in 2022.

- 2) If appropriate, specify any metrics the SSC could examine in late 2021 or 2022 to determine if any 2022 ABC modification might be appropriate;

In the short term, the SSC will consider:

- a) *Pattern and distribution of landings during the upcoming fishing season, and*
- b) *Pattern and distribution of catches (if available) during the upcoming surveys.*

The SSC recommends further analyses similar to those presented in the Rago (2021, working paper), including a wider range of ABC specifications be explored in the future. The SSC notes its discussions were constrained during the meeting because only analyses of a single

ABC value were made available. The SSC notes it was not possible to evaluate whether ABCs higher than 33,000 MT were similarly compliant with the Council risk policy. Additional analyses that evaluate other possible ABCs may set the foundation for a continued incremental approach to increasing ABC.

The SSC recommends including the approach explored in the Rago working paper (2021, working paper) in the Research Track Assessment so that it receives more complete peer review. Currently, results are available for only two levels of ABC (30,000 MT and 33,000 MT), and these preclude an assessment of how risk changes as ABC varies.

- 3) The most significant sources of scientific uncertainty associated with determination of the ABC;

The SSC notes the following important sources of scientific uncertainty:

- a) The extent, distribution and magnitude of the Illex stock remains poorly defined. The lack of biomass and exploitation rate estimates for this species.*
- b) The extent to which catch is driven by variation in availability to the fishery as opposed to variation in underlying abundance remains largely unknown.*
- c) Whether a 40% escapement B_{MSY} proxy is appropriate as a foundation for management of Illex is uncertain.*
- d) The level, extent and inter-annual variability in immigration into, emigration from and recruitment to the stock are poorly described.*
- e) Despite progress from the analyses presented, the relative catchability between fishing fleets and the survey remains poorly quantified.*

- 4) The materials considered by the SSC in reaching its recommendations;

- *Rago, P (2021). Indirect Methods for Bounding Biomass and Fishing Mortality for Illex Squid and Implications of an Alternative Quota in 2022. Working paper submitted the SSC, Mid-Atlantic Fishery Management Council. May 2021. ([Rago document link](#))*
- *Manderson, J. P., B. Lowman, B. Galuardi and A. Mercer (2021). Plausible bounds for availability of and net efficiency for northern shortfin squid in the US fishery and Northeast Fishery Science Center Bottom Trawl Survey. Working paper submitted the SSC, Mid-Atlantic Fishery Management Council. May 2021. ([Manderson et al. document link](#))*
- *Staff memorandum Butterfish, Longfin and Illex ABC. Mid-Atlantic Fishery Management Council. ([Staff Memo link](#))*
- *Illex Fishery Information Document (2021). Mid-Atlantic Fishery Management Council, April 2021. ([2021 FID link](#))*
- *Squid and Butterfish Fishery Performance Reports (2021). Mid-Atlantic Fishery Management Council, April 2021. ([2021 FPR link](#))*

- 5) A conclusion that the recommendations provided by the SSC are based on scientific information the SSC believes meets the applicable National Standard guidelines for best scientific information available.

The SSC certifies the recommendations are based on the best scientific information available.

The second day of the meeting began with a review of four previously specified ABCs for Butterfish, Longfin Squid, Atlantic Surfclam, and Ocean Quahog. Each species included an overview by the Council lead and an update by the Assessment Lead from the NEFSC. There were no formal Terms of Reference for these stocks, although the SSC had the option of revising the SSC in light of new information. The Covid pandemic affected data collection for all species and influenced the commercial fisheries to varying extents.

Butterfish

Jason Didden began with an overview of the 2020 fishery, findings in the Advisory Panel Fishery Performance Report and a review of previously approved ABC. A Research Track Assessment for butterfish is currently underway with Dr. Charles Adams serving as the lead scientist. Dr. Adams provided an overview of the working groups (WG) progress. Notably the WG is hoping to implement a state space model (known as WHAM—Woods Hole Assessment Model) for the first time. This model will allow for incorporation of covariates and estimation of misreported catch. A young of year index, derived from six different fishery independent surveys will be incorporated into the model. The effects of shifting biomass will be addressed via changes in survey strata definitions and the Ecosystem Dynamics and Assessment Branch will be working on productivity measures. The results of the 2021 RTA will be available in 2022 and be used to set 2023 and 2024 specifications,

The SSC inquired about previous inconsistencies in the estimation of weights at age for older Butterfish. These concerns are not only relevant to butterfish but other species as well and may be due to low sampling frequencies in some years.

Jason Didden observed that fishery prices were down only slightly in 2020 and that dogfish bycatch was impeding fishing activity for some trips. The SSC requested that “new” information in the Fishery Performance reports be highlighted in some way.

The SSC noted in the 2020 Management Track Assessment that biomass has been declining for some time and recruitment has been down since 1999. Stock biomass has remained above B_{msy} due to low fishing mortality. Following a 2/3 reduction in ABC between 2020 and 2021 the stock biomass is projected to increase in 2022. Dr. Adams commented that the projections were based on the most recent 10 years of recruitment estimates reflecting a period of lower productivity.

While these trends were of concern to the SSC, several factors led the SSC to conclude that a downward adjustment to the quota was not necessary for 2022. The projected total removals for 2020 are likely to be biased high suggesting a slightly lower F than used in the projections. Industry members reported almost no chance that the quota in 2021 would be attained due to a weakened export market for butterfish and low domestic demand. Results of the RTA for Butterfish will be available in 2021 for use by the SSC in 2022.

The SSC urged that trends in abundance should be followed closely but did not find any compelling evidence to reject the previously **approved ABC of 17,854 mt** for 2022.

Longfin Squid

Jason Didden provided an overview of the fishery and management issues for Longfin Squid. Last year the SSC recommended a constant **ABC of 23,400 mt for 2021-2023**. Landings were down in 2020 due to reduced restaurant demand during the pandemic. Restrictions on shipping and transportation impacted export markets. Revenues decreased even more due to an overall price drop.

The assessment model for Longfin squid does not adequately reflect the intra-year and spatial biological features of the stock. It is thought that there are two dominant cohorts per year with differing productivity, and fishery exploits one predominantly. Current management by trimesters indirectly addresses the linkages between inshore and offshore production differences but a more realistic model to address these differences is preferred. Lisa Hendrickson reported that an ongoing research on maturity and migration (via statolith microchemistry) will lay the basis for an updated assessment approach, but a Longfin squid RTA is currently not on the RT schedule but is being considered for 2026.

The Management Track Assessment process does allow for introduction of more complicated models but the expected effects of such a change are expected to be well beyond the scope envisioned under the MTA. Prior to 2000 a two-cohort model was employed so such a change is not without precedent. Concerns of the SSC included the potential impacts of offshore wind energy development on squid fishing areas and the presence of fishing in known spawning areas. For these reasons, the SSC urged consideration of conducting the RTA before 2026.

Notwithstanding these concerns about modeling and management approaches there was no compelling evidence to change the recommendations from the 2020 MTA and SSC specified ABCs. Therefore, the SSC recommended continuing with the previously **approved ABC of 23,400 mt** for 2022.

Atlantic Surfclam

Jessica Coakley provided an overview of the fishery and management issues for Atlantic Surfclam. The current ABCs for Atlantic Surfclams were specified by the SSC in 2020 following a Level 3 MTA in 2020. Surfclams are not overfished and overfishing is not occurring. Landings through 2020 have been summarized but no surveys were conducted in 2020. Atlantic Surfclam and Ocean Quahog are surveyed by commercial vessels over their entire range every 6 years. The slow rate of change in these sessile stocks, low rates of exploitation, and model formulation justify this sampling strategy.

Spatial analyses of fishing activity by 10-minute squares reveals a shift in landings from south to north over time. Overall LPUE has been declining but remains high in Southern New England and on Georges Bank. Landed value of the fishery declined by about \$5 million between 2019 and 2020. In the Fishery Performance Report industry advisors preferred stability in the quota. Sales continue to be low due to Covid but distributors are hoping for a more normal summer.

Wind energy development continues to be a concern because it will reduce access to traditional fishing areas and concentrate effort elsewhere.

The SSC expressed concerns about the apparent conversion of high fishing success areas into average density areas. Earlier assessments interpreted these average density areas as thresholds for profitable fishing activity of roughly 50 bushels per hour fished. The population consequences of these serial reductions in density are not known but restrictions due to wind energy development may exacerbate these uncertainties. Dr. Daniel Hennen reported that survey data are inadequate to determine threshold patch densities for reproductive success. A number of GIS exercises are underway at Rutgers University to map overlap of fishing areas with wind farms but these products are not yet available for public distribution. GARFO has produced a useful mapping utility that overlaps wind lease areas and historical landings areas across species <https://www.fisheries.noaa.gov/resource/data/socioeconomic-impacts-atlantic-offshore-wind-development>. Industry representatives expressed some concerns about two 10-minute squares off Atlantic City that are in the path of proposed power cables from offshore projects; these areas currently produce about 65% of the regional landings.

Although the resource remains above Bmsy, stock size is beginning to approach this level, a characteristic of a mature fishery. Risk assessments suggest that Surfclam and Ocean Quahog are highly sensitive to climate change. Coupled with the northeastern shift in fishing effort, the updated perception is that the Georges Bank population is not as large as previously thought, and because of the potential effects of wind energy development, close monitoring of changes is recommended. None of these concerns were sufficient at this time for the SSC to recommend changes in previously agreed ABCs for 2022.

Ocean Quahog

Jessica Coakley provided an overview of the fishery and management issues for Ocean Quahog. Ocean Quahog was last assessed in 2020 via a Level 1 Management Track Assessment. The stock is not overfished and overfishing is not occurring. The SSC used the modified OFL probability distribution with CV of 100% and P* of 0.49 based on new risk policy to set a constant six-year ABC for 2021-2026. Landings have been declining in southern areas but the overall pattern of LPUE is much flatter than for Atlantic Surfclam. Total revenue declined by about \$3M in 2020 compared to 2019.

SSC members reiterated concerns about exploitation of this long-lived species especially in the face of climate changes and wind energy development. The NEFSC assessment lead Dr. Daniel Hennen suggested that these concerns are not as acute as for Atlantic Surfclam. He noted that the Georges Bank stock is large and relatively untouched and that recruitment appears to be consistent over time. Other SSC members noted that wind energy development could create refugia beneficial to maintaining population stability. This aspect would be hard to quantify in view of the relatively few 10-minute squares now being fished heavily.

Industry advisors identified an important interjurisdictional concern related to the designation of EFH by the New England Fishery Management Council. A joint meeting with representatives from both Councils, the GARFO and industry is recommended to address impacts on the clam industry.

None of these concerns were sufficient at this time for the SSC to recommend changes in previously agreed Ocean Quahog ABC for 2022.

Other Business

Development of a Working Group to “Operationalize” the State of the Ecosystem Report

Following the presentation of the 2021 State of the Ecosystem Report in March 2021, the SSC report to the Council noted that a “more focused effort on how broader ecosystem indices might transfer into uncertainty of OFL estimates to derive ABCs could be a valuable advance. Ideally, the linkage of SOE with the appropriate level of OFL CV could become a regular part of future analyses.” There was broad support by the SSC for “establishing a working group to identify information and trends in the SOE that can be used in the setting of ABCs.”

Drs. Sarah Gaichas and Geret DePiper (NEFSC) initiated the discussion of how this process might work. Tasks could be broken down into short and long-term objectives. Short-term objectives ensure that the SOE is relevant to upcoming assessments whereas longer term items would include a process for integrating results of the SOE into the SSC’s decisions on ABCs. Brandon Muffley noted that an effort to operationalize the SOE would have management benefits for strategic planning by the Council and their funding of research priorities. Conceptually the approach would be similar to the Ecosystem and Socio-economic Profile (ESP) Reports used by the North Pacific Council. The ESP reports include the human dimension of ecosystems. A similar approach for mid-Atlantic stocks would ensure consideration of factors not always captured in stock assessments. Such considerations may require broadening the bases used to determine the CV of the OFL for ABC determination. Discussions sparked an enthusiastic response by SSC members to participate in a WG.

The WG could also address climate changes beyond temperature effects to include oceanographic changes. Some cautionary notes were expressed by the SSC noting that it will be necessary to identify specific causal links between an indicator and its effects on species yields. Major gaps in our understanding persist. Simply increasing the uncertainty of the OFL estimate to reduce the ABC may be inappropriate if a reduction in the OFL *per se* is more scientifically justified.

Conceptually, both bottom-up and top-down approaches could be tried. One or more case studies might be used to test competing approaches by walking through the SOE report to evaluate how a given factor or index would affect the uncertainty in development of catch advice.

A critical question remains--If an assessment model had no explicit consideration of an ecosystem component how do you superimpose the potential effects on that species/assessment? Stock assessments generally include the cumulative effects of changes in average weights and other life history parameters. It will be important to avoid “double counting” of effects for instances where an ecosystem factor is responsible for a given change that is already included in the assessment. To address this concern and others it will be important to include stock assessment scientists in this discussion.

In summary, support for the working group was strong and an initial list of volunteers (Gaichas, Fay, Latour, Wilberg, DePiper, Jiao, Gabriel, Secor) was identified.

Research Track Assessment Schedule

Brandon Muffley provided the SSC with an overview of the Research Track Assessment process and solicited comments on the initial set proposed assessments for 2026. Currently, one topic based and three species-specific assessment proposals are recommended for consideration by the NRCC. If the topic-based proposal is selected, that would occupy one of the two available peer review slots (spring and fall) and the other could be used for species specific assessments; if species-based proposals are selected, there would be four assessments. Assessment of the Winter Flounder complex (3 stocks) – would take two slots given the number of stocks assessed. Longfin squid and Monkfish are the other two species under consideration and could fill the other available slot. The topic-based proposal under consideration for 2026 is an ecosystem topic focusing on considerations of ecosystem and climate information in the stock assessment process.

SSC members inquired about the genesis of the RTA proposals. It was noted that these are the result of collaborations between the NEFSC staff and a subcommittee of the NRCC. The longer planning horizon is designed to ensure sufficient time for research on the topic or species. However, in some cases, the critical research gaps may preclude a particular species. For example, a validated ageing procedure for Monkfish has yet to be developed. The SSC will have the opportunity to provide direct input at its September meeting. Concerns were expressed that there should be a tighter link between SSC research recommendations and RTA planning. In particular, it was noted that the expected effects of wind energy development would create greater needs for spatial methods of stock assessment. Some concerns were raised that the theme-based RTAs may not have their intended benefits if they duplicated broader efforts in these areas. For example, dynamic reference points are being addressed by many research groups around the world. Consideration should be given to the value of the information produced and reducing overlap with other research efforts.

Others on the SSC advocated for more of a systems engineering approach to identify critical needs. Brandon noted that the NRCC is likely to formalize a RTA Steering Committee to look at specific and general research needs across both Councils and all FMPs. By design, the RTAs are to be products of longer-term research effort so the ability to alter the schedule is limited. This may be counterproductive if priorities change over the five-year planning horizon.

National SSC

The 7th meeting of the Scientific Coordination Subcommittee (SCS) was originally scheduled for August 2020 in Sitka, AK. The meeting was subsequently rescheduled to be a virtual meeting in 2021. Upon further consideration, the SCS Steering Committee is now recommending that an in-person meeting in 2022 would be more beneficial overall. The CCC will be considering this proposal at its next meeting.

***Illex* Process Discussion**

Following the first day of the meeting, Dr. Tom Miller, species lead for *Illex* squid, expressed important concerns about the process used to reconsider the *Illex* ABC for 2021 and 2022, and the limited number of alternative ABCs considered. Following a series of emails with Tom, I proposed that we discuss Tom's concerns in greater detail under Other Business on May 12. Dr. Michael Wilberg again served as chair of the meeting for this discussion.

Dr. Miller's comments were not criticisms of the work that was done but he did have concerns about the process of identifying potential ABCs in advance and restricting the analyses to limited options. Transparency, a primary objective of all SSC deliberations, was obscured by the wording of the Terms of Reference which appeared to constrain the options of the SSC. In most instances, the SSC considers a full range of factors before deciding upon the basis for a particular ABC value. In this instance, the SSC began with consideration of a particular value, followed by the justification.

The SSC acknowledged that prior to most SSC meetings Council staff will prepare a candidate ABC based on an earlier decision by the SSC. However, this is viewed as a starting point for discussions and not necessarily definitive. Members of the SSC supported Dr. Miller's perspective, and again noted the paramount importance transparency and trust in the derivation of ABCs. To maintain this perspective one alternative may be to have the SSC species lead make a specific recommendation for an ABC. In any event, several options should be analyzed prior to such discussions. These recommendations are consistent with the Council's Standard Operating Procedures for the SSC.

SSC members also noted that the wording of TOR 1, especially the use of "appropriate" and "inappropriate" could be improved. Such words can be viewed as divisive and should be more neutral and fully reflect the nature of scientific uncertainty. While specificity of the TOR was a concern, several members noted that other Councils do make staff recommendations on a regular basis, with the understanding that they are not binding. From a group dynamics perspective, beginning with a specific alternative often serves to catalyze discussions better than a blank slate.

The SSC concluded the discussion with a number of concerns which included

- Improved specification of scenarios and necessary computations for presentation,
- Improvements on wording of ToRs
- Clarification of the process for considering staff and external recommendations and boundaries about what the SSC is allowed to do. Deviations from staff recommendations have occurred in the past even in instances where no analyses have been done.
- Can decisions about data poor species be done in a more rigorous and consistent fashion?

Members of the public suggested that SSC consider sources of "certainty" as well as the traditional emphasis on "uncertainty" to help balance the discussions about data poor species. Others also recommended that the SSC's debate about the process for *Illex* be fully characterized in the report to the Council.



**Mid-Atlantic Fishery Management Council
Scientific and Statistical Committee Meeting**

May 11 – 12, 2021 via Webinar

Webinar Information

(Note: same information for both days)

Link: [May 2021 SSC Meeting](#)

Call-in Number: 1-844-621-3956

Access Code: 129 786 6609##

AGENDA

Tuesday, May 11, 2021

12:30 Welcome/Overview of meeting agenda (P. Rago)

12:40 Review and potential change to 2021 *IIIex* ABC specifications and set 2022 *IIIex* ABC

- Review updated work products from the *IIIex* Quota Work Group
- Review of staff memo and 2021 - 2022 ABC recommendations (J. Didden)
 - Update on the 2021 *IIIex* Research Track stock assessment
- SSC 2021 – 2022 *IIIex* ABC recommendations (T. Miller)

5:30 Adjourn

Wednesday, May 12, 2021

8:30 Butterfish data and fishery update; review of previously recommended 2022 ABC; update on the 2021 Butterfish Research Track stock assessment (J. Didden)

9:15 Longfin Squid data and fishery update; review of previously recommended 2022 ABC (J. Didden)

10:00 Atlantic Surfclam data and fishery update; review of previously recommended 2022 ABC (J. Coakley)

10:45 Ocean Quahog data and fishery update; review of previously recommended 2022 ABC (J. Coakley)

11:30 Other Business

- Mid-Atlantic State of the Ecosystem report
 - Discussion on ways to operationalize report; formation of SSC sub-group
- Review and feedback on possible 2026 Research Track assessment priorities

12:30 Adjourn

Note: agenda topic times are approximate and subject to change

ATTACHMENT 2

MAFMC Scientific and Statistical Committee

May 11 – 12, 2021

Meeting Attendance via Webinar

Name

Affiliation

SSC Members in Attendance:

Paul Rago (SSC Chairman)	NOAA Fisheries (retired)
Tom Miller	University of Maryland – CBL
Ed Houde	University of Maryland – CBL (emeritus)
Dave Secor	University of Maryland – CBL
John Boreman	NOAA Fisheries (retired)
Geret DePiper	NOAA Fisheries NEFSC
Lee Anderson (May 11 th only)	University of Delaware (emeritus)
Jorge Holzer	University of Maryland
Yan Jiao	Virginia Tech University
Rob Latour	Virginia Institute of Marine Science
Brian Rothschild	Univ. of Massachusetts – Dartmouth (emeritus)
Olaf Jensen	Rutgers University
Sarah Gaichas	NOAA Fisheries NEFSC
Wendy Gabriel	NOAA Fisheries NEFSC
Mike Wilberg (Vice-Chairman)	University of Maryland – CBL
Alexei Sharov	Maryland Dept. of Natural Resources
Mike Frisk	Stony Brook University
Mark Holliday	NOAA Fisheries (retired)
Cynthia Jones	Old Dominion University
Gavin Fay	U. Massachusetts—Dartmouth

Others in attendance (only includes presenters and members of public who spoke):

Lisa Hendrickson	NEFSC
Charles Adams (May 12 th only)	NEFSC
John Manderson (May 11 th only)	Open Ocean Research
Jason Didden	MAFMC staff
Brandon Muffley	MAFMC staff
Eric Reid	NEFMC Vice-Chair
Greg DiDomenico	Lunds Fisheries
Katie Almeida	The Town Dock
Jessica Coakley (May 12 th only)	MAFMC staff
Dan Hennen (May 12 th only)	NEFSC
Peter Himchak (May 12 th only)	LaMonica Fine Foods