2023 September Management Track Peer Review Panel Report

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Executive Summary

Seven stock assessments were reviewed by the September 2023 Management Track peer review panel. Four of these were Level 2s Expedited Review: northern and southern red hake (*Urophysis chuss*), Atlantic mackerel (*Scomber scombrus*), and northern windowpane flounder (*Scophthalmus aquosus*), and three of these were Level 3 Enhanced Reviews: Acadian redfish (*Sebastes fasciatus*), skate complex, and spiny dogfish (*Squalus acanthias*). Levels of review were as recommended by the Assessment Oversight Panel (Appendix A).

The Peer Review Panel (Panel) for the September 2023 Management Track Assessments met via webinar on September 18-20, 2023. The Panel was to determine whether the completed management track assessment was technically sufficient to (a) evaluate stock status, (b) provide scientific advice and (c) successfully address the assessment Terms of Reference (Appendix B). Table 1 presents a list of the stocks, name of the lead analyst/presenters, and conclusions about stock status.

Attendance at the meeting is provided in Appendix C with the Agenda shown in Appendix D.

We thank Russ Brown (Population Dynamics Branch Chief) and Michele Traver (Assessment Process Lead) for their support during the meeting and to the staff of the Population Dynamics Branch at NEFSC for the open and collaborative spirit with which they engaged the Panel.

Our thanks also extend to the rapporteurs for taking extensive notes during the meeting and to staff of the Mid-Atlantic and New England Fishery Management Councils. Last, we thanks the analysts for their diligent and highly professional work in completing their assessments.

The Panel has suggestions for improvements that could be made for review of Management Track assessments:

1. The Panel suggests continued development of supplemental information, including age/length-frequency plots and comparisons between discards estimates broken down by gear and year, as these were important to interpretation of trends. The Panel recognizes that different analysts construct different assessment models, but there could be some future effort of identifying the best data visualizations for the similar data types.

The Panel also has several crosscutting recommendations with respect to the individual stock assessments:

1. Projections and ABC setting, and best practices around developing them remain a challenge. For example, the time-series of recruitment used to generate OFL projections. The time series used, or inclusion of autocorrection, in generation of recruitment could be considered during projections,. In other stocks, periods of exploitation rates where populations were viewed as stable were used to develop the ABC. The choice of time series length and what is deemed stable are ad hoc procedures, and this area would benefit from a Research Track effort to determine best practices that could guide PDT development of projections and advice setting during SSC deliberations, and lead to more consistency and transparency in the approach.
2. When empirical approaches are used in the assessment, there needs to be a standard set of procedures for setting ABCs. We saw four methods of setting ABCs in this process, based on SSC deliberations and from an FMP. The Panel recommends exploring 75 and 25 percentiles of historical biomass time series as an empirical target and limit reference points, respectively for the red hake stocks, although in the past a target exploitation rate of 1.5% was used. For the skate complex, the SSBmsy proxy is considered the 75th percentile of the survey, the ABC calculation uses the Median C/B by species*most recent 3-year moving average of the survey, and the MSY calculation is the Median C/B by species*Bmsy proxy. The development of BRPs, ABCs and projections in non-analytical assessments remains an important area of focus in Research Track Assessments or its own RT assessment with crosscutting recommendation #1 above.
3. Two stocks reviewed are in rebuilding plans but the analytical assessment failed in previous peer review and thus there is no way to understand if the stock is rebuilt, or if the reference points are current, given the potential productivity changes due to climate change and/or other factors. This is a consistent issue and needs to be addressed. Essentially, these are an extension of the short term projections into long term projections and how to know where the population is without a biomass and fishing mortality estimate.
4. Incomplete individual age matrices in Acadian redfish assessment, from catch and the spring survey, needs continued effort. Aging was an issue in multiple stocks, and samples that are on hand or future collection would aid in the assessment process.
5. The Catch Accounting and Monitoring System (CAMS) was implemented to provide a single source of commercial fishery data for quota monitoring and stock assessment. Stock assessment updates continue to check CAMS estimates against current or historical estimates of discards and harvest, where available to ensure that the differences remain negligible. In the assessment of northern red hake, the inclusion of lobster observer data based on 18 trips in 2021 and 22 samples (and CVs of 0.54 -0.80) contributed to elevated total removals. Because red hake catch is low, no impact occurred in the assessment, but details of discard estimates are important to include and flagging lower confidence values.
6. Figures for exploitation rates should be more explicit, for example if it is fully selected fishing mortality, then this should be the y-axis label.

Table 1. Stocks reviewed at September 2023 Management Track Assessment Peer Review.

Stock	Lead Analyst/Presenter	Peer Review Panel conclusion on Stock Status
Expedited Review		
Red hake (north)	Toni Chute	Stock's overfished status and overfishing status are both unknown. Biomass indices are high and the exploitation rate remains at low levels.
Red hake (south)	Toni Chute	Stock's overfished status and overfishing status are both unknown. Biomass indices are low and the exploitation rate remains at low levels.
Windowpane flounder (north)	Toni Chute	Stock's overfished status and overfishing status are both unknown. Biomass indices are at time-series lows and the exploitation rate remains at low levels. This is a discard fishery.
Atlantic mackerel	Kiersten Curti	Stock is Overfished and overfishing is not occurring. The stock is near time-series lows but closure of directed Canadian fishery and lower US catch resulted in not overfishing in the last year of the assessment.
Enhanced Review		
Acadian redfish	Brian Linton	The stock is not overfished and overfishing is not occurring. The stock is not being fully utilized and it appears unlikely that full utilization will occur unless market conditions change.
Skate complex	Kathy Sosebee	Stock's overfished status and overfishing status are both NA. BRP's are defined in past development of the Skate FMP, and these support an overfished status for Thorny Skate and

Stock	Lead Analyst/Presenter	Peer Review Panel conclusion on Stock Status
		recent overfishing in Little and Winter Skate.
Spiny dogfish	Dvora Hart	The stock is not overfished and overfishing is not occurring. Exploitation rates are relatively high and at the FMSY Proxy, thus it appears likely that catch will achieve ABCs.

Expedited Reviews

Red Hake

Red hake (*Urophysis chuss*) is a gadid species with relatively small maximum age and size (8 years, ~45cm). Red hake is managed as two separate stocks. The northern stock encompasses the Gulf of Maine and the northern flank of Georges Bank. The southern stock, also termed SNEMA, encompasses coastal waters of southern New England and the Mid-Atlantic and the eastern and southern flanks of Georges Bank. Data on both red hake stocks from 1981-2022 were evaluated. Catches of hake in both stock areas declined sharply between 1981-2000 and have since remained low. The northern hake stock abundance index was increasing late in the time series and the southern declining.

In 2020, an expert working group released a report on the structure of red hake in the northeast Atlantic (NEFSC. 2020). This report documented the assessment history of this stock. Evidence from distributional patterns, vital rates, otolith microchemistry and physical oceanographic factors was examined. The report concluded that the information available is " insufficient to reject the null hypothesis of two stocks." This finding was based on "clear evidence" of phenotypic stocks with clear trends in abundance. The report acknowledged the potential for exchange, particularly during early life stages, but the report concluded that evidence for exchange "did not provide a sufficient basis to reject the null hypothesis of two stocks."

The Panel does not wish to re-explore the question of whether or not there is sufficient evidence to support any specific stock structure. The Panel raises the issue of stock structure to identify an important source of uncertainty in the inferences drawn regarding stock status of both the putative northern and southern stocks, and as a necessary question towards understanding differing responses of the stocks to historical exploitation rates. If there are indeed two separate stocks, are there any exchanges between the two stocks, or are they isolated as is assumed in the current approach? Are there characteristic patterns, frequencies and magnitudes of exchanges between stocks that affect management? Are both putative stocks resilient, or does one serve more often as a source population subsidizing the other? Alternatively, if red hake lack the putative stock structure and are rather a single, well-mixed population, what is the importance of latitudinal differences in vital rates and the disparate spatial distributions documented? Would the stock structure be considered differently if the null hypothesis was a single population? The Panel recommended strongly continued research to resolve questions of stock structure in this species.

The two stocks of red hake also demonstrate a pattern in population trends that are consistent with climate change, with the southern stock declining and the northern stock increasing.

Northern Red Hake Stock

Previous assessments have applied an index method (AIM) to northern red hake as a part of the Research Track Assessment (RTA, NEFSC 2020). This was not successful, leading the peer review panel for the RTA to conclude that fishing was likely not the driver for changes in

abundance of northern red hake. Consequently, the 2020 Management Track Assessment (MTA, NEFSC 2022) brought forward an empirical approach based on estimating total swept-area biomass with model-based net efficiencies. This method does not produce reference points and accordingly the 2020 MTA did not determine stock status. The same method was used for the 2023 MTA and consequently stock status remains unknown. Indices developed from NEFSC Bottom Trawl Surveys (BTS) indicate that biomass is high, and relative exploitation rate is low.

The Panel concluded that the Term of Reference related to catch was broadly met. However, the Panel notes that discard estimates in 2021 and 2022 were approximately 4 times higher than estimates for earlier in the time series. This large increase stems from incidental catch of red hake in lobster pots in the Gulf of Maine based on federal observer coverage. These observations are based on a limited number of trips and more work is required to determine how representative they may be of the wider lobster fishery in the Gulf of Maine. If these discard estimates are supported by a broader examination of bycatch in the lobster fishery, discard mortality on northern red hake in the lobster fishery could have important implications for past catches, and our understanding of the pattern of exploitation of red hake. The Peer Review Panel (Panel) recommended efforts to more fully evaluate the discard estimates from the lobster fishery throughout the catch time series.

The Panel suggested considering using historical biomass and relative exploitation rates time series as potential reference points to gauge the stock status in relation to historical levels. For example, 75 and 25 percentiles of historical biomass time series can be considered as an empirical target and limit reference points, respectively. The development of BRPs, ABCs and projections in non-analytical assessments remains an important area of focus in research track assessments. Specific to northern red hake, relative exploitation rates are low and biomass is near time series highs. The stock ranges between 205-849 MT in total catch.

Nothing reviewed would cause the Panel to suggest a change to what the SSC decided during past setting of catch specifications, however, there is also not much support for the somewhat arbitrary use of the period of stable catches with a 1.5% exploitation rate. The Panel felt there were a number of times that catch could be viewed as stable, including the whole time series. Thus, the Panel suggests further thinking around what exploitation rate is appropriate for this stock, and considering constant catch levels since catch is low and biomass trends appear unrelated to fisheries removals.

Research suggestions

Analyze ME Department of Marine Resources (DMR) lobster sea sampling data which include groundfish bycatch to estimate potential red hake discards in the coastal GOM lobster fishery. Better understand potential discards and the mortality rates.

Identify possible drivers that led to reduced sizes at age over time as population growth. Potential drivers include density-dependent factors (e.g., changes in size/age at maturity) and environmental drivers (e.g., climate induced changes). Discussions of the differing responses of the stocks to historical exploitation rates should be useful, particularly if such discussions lead to more refined analyses of underlying causes.

A genetic study would help with understanding stock structure since there was little support in otolith microchemical studies thus far.

The sharp drop in the number of the larger (older) individuals is consistent throughout all the length frequency figures. Red hake are not a particularly large fish and this could reflect the slowing of growth as fish age and length frequency bins. Behavioral or size-dependent distributions, however, could introduce some bias. A starting point might be a comparison of size composition changes over depth and in discards.

Panel conclusions

The Panel concluded that the 2023 assessment update for northern red hake fulfilled the recommendations of the AOP, and is the Best Scientific Information Available. The Panel believes the Terms of Reference for the stock's assessment were broadly met. Catch was estimated from all sources including landings and discards. An abundance index was generated, broken down to strata and length frequencies provided. Annual fishing mortality, recruitment and stock biomass were not possible to estimate as a result of the assessment method for the time series. The same model was used as the last assessment. No BRP's are defined , nor any stock status provided. Temporal trends in length frequencies and a back up i-smooth option provided. No short-term stock projections were appropriate, although some different time series periods with different mean exploitation rates were provided and applied to the 3-year moving average swept-area biomass estimate of 221,920 mt. No more than 2% of the stock has been removed annually since the 1980s and it will be difficult to justify an appropriate time period for the exploitation rate. Most previous comments in past peer reviews or SSC concerns from the most recent assessment will require a research track assessment to explore another framework, likely once improved estimates of M, selectivity, and recruitment, and an expanded time series become available.

Southern Red Hake Stock

Previous assessments have applied an index method (AIM) to southern red hake as a part of the Research Track Assessment (RTA, NEFSC 2020). This was not successful, leading the peer review panel for the RTA to conclude that fishing was likely not the driver for changes in abundance of southern red hake. Consequently, the 2020 Management Track Assessment (MTA, NEFSC 2022) brought forward an empirical approach based on estimating total swept-area biomass with model-based net efficiencies. This method does not produce reference points and accordingly the 2020 MTA did not determine stock status. The same method was used for the 2023 MTA and consequently stock status remains unknown. Indices developed from NEFSC Bottom Trawl Surveys (BTS) indicate that biomass is low, and relative exploitation rate is low.

The Panel discussed the small footprint of the red hake southern stock relative to the survey area, as viewed in the distributional maps. This stock is not experiencing overexploitation but is still declining, leading to concerns about the interpretation of the survey index. Data to inform stock structure remains uncertain. The biggest case for separation is the division is historical growth and different index trends. But whether these data can support the division of fish caught

on Georges Bank into allocations to two stock areas remains unclear. The Panel still views the stock structure as a potential source of uncertainty.

The Panel concluded that the Term of Reference related to catch was met. Catch is low and biomass trends appear unrelated to fisheries removals.

The Panel concluded that the Term of Reference related to abundance indices and life history was met.The index is statistically sound, but missing stations and in particular spring survey issues could have impact on estimates and map of center of gravity.

The Panel questioned the feasibility in evaluating a rebuilding plan with a rebuilding F and rebuilding biomass without management reference points.The Panel suggested considering using historical biomass and relative exploitation rates time series as interim reference points to gauge the stock status in relation to historical levels. For example, 75 and 25 percentiles of historical biomass time series can be considered as an empirical target and limit reference points, respectively.

The Panel suggested an investigation of the causes that resulted in a southern stock declining and northern stock increasing. Climate change may be one of the causes that need to be evaluated. but the mechanism could be the result of either differential production and survivorship or from migrations.

Research suggestions

Many of the same research recommendations were reiterated from the northern stock. Comparisons between northern and southern stocks and look for inconsistencies between biomass trends and survey indices, recruitment? Timing of the survey in the south could greatly impact the index due to the phenology of fish migrations.

Panel conclusions

The Panel concluded that the 2023 assessment update for southern red hake fulfilled the recommendations of the AOP, and is the Best Scientific Information Available. The Panel believes the Terms of Reference for the stock's assessment were broadly met. Catch was estimated from all sources including landings and discards. An abundance index was generated, broken down to strata and length frequencies provided. Annual fishing mortality, recruitment and stock biomass were not possible to estimate as a result of the assessment method for the time series. The same model was used as the last assessment. No BRP's are defined , nor any stock status provided. Temporal trends in length frequencies and a back up i-smooth option provided. No short-term stock projections were appropriate, although some different time series periods with different mean exploitation rates were provided and applied to the 3-year moving average swept-area biomass estimate of 53,968 mt. Exploitation rates appear low and it will be difficult to justify an appropriate time period for the exploitation rate. Most previous comments in past peer reviews or SSC concerns from the most recent assessment will require a research track assessment to explore another framework, likely once improved estimates of M, selectivity, and recruitment, and an expanded time series become available.

Atlantic mackerel

Atlantic mackerel (*Scomber scombrus*) is a broadly distributed pelagic fish species. Atlantic mackerel school and grow to a maximum of around 40 cm. Atlantic mackerel is considered a unit stock, with two spawning contingents, a southern contingent spawns in April and May in U.S. waters and a northern contingent spawns in June and July in the Gulf of St. Lawrence. The Canadian directed fishery was closed in 2022 in response to lowest estimated spawning stock biomass on record, and US removals were also low. The result is that the past year had low fishing mortality.

The mackerel assessment was originally a level 1 for direct delivery to the SSC. Changes in the assessment, driven by the addition of 2022 data (i.e. new data during a fishery closure, not changes to the assessment model parameterization), resulted in the updated model suggesting a change in status, which resulted in an upgrade to a level 2 assessment for this Management Track peer review. The primary assessment model for the Atlantic mackerel stock is ASAP. The model uses a constant M of 0.2 and one fishing fleet with a flat topped selectivity (1 at age 6 y). A range-wide egg survey that combines a targeted effort by Canada and the ECOMON survey in the United States provides an important index of SSB. In the assessment, the SSB index is complemented by data from the spring bottom trawl survey (ages 3+, dome-shaped selectivity) for each of the Albatross years (1974-2008) and Bigelow years (2009+). Long-term projections for BRPs are based on empirical CDF derived using recruitment estimated from 1975 onward. In the last assessment, the Fmsy proxy (F40%) was 0.22, and thus the stock was overfished (24% MSY proxy) and overfishing was occurring (208% of FMSY proxy). The stock is in a rebuilding plan with $F_{Rebuild}$ 0.12, using a two stanza recruitment to limit highest recruitment to larger stock sizes.

The Atlantic mackerel stock is overfished and overfishing is not occurring with a small but not insignificant retrospective pattern. The not overfishing status is the first such designation for this species in almost 20 years. There is age truncation in the population. Recruitment patterns suggest recruitment overall is low and there has been a greater relative recent contribution of the southern contingent to egg production (and presumably recruitment)..

The Panel was concerned how the fit to the abundance index shows systemic positive and negative patterns over time and the potential this is an indication of process errors that is not fully captured in the current stock assessment model. The Panel encourages the continued development of a state-space model such as the WHAM model to attempt to better deal with changing ecosystems.

The Panel recognizes the importance of the Canadian egg surveys and the US ECOMON survey to develop the egg production SSB index. This could be improved on the US side by additional

sampling during the mackerel peak spawning, earlier than when the current ECOMON survey is conducted. Efforts are currently underway to collect spawning mackerel from the southern contingent to provide updated fecundity estimates. These could improve the assessment in the future.

This stock utilized an SSB-based recruitment time-series in short-term projections in which low SSBs (less than ½ reference pt) produced a truncated time series where large past recruitments are not possible until SSB > 1/2 reference point, at which point the full time series is used. The Panel appreciated the thought that went into this as it represents a method of recognizing both the recent productivity that is more likely and the possibility of large recruitment possible at larger SSB values. However, a feeling that projections were optimistic remains, Past projections have similarly been shown to be optimistic. Another key uncertainty is the Canadian closure of the fishery and the likelihood it will remain in effect over the intervening time until another assessment and SSC deliberation occur.

Research suggestions

The Panel encourages the continued development of a state-space model such as the WHAM model to attempt to better deal with changing ecosystems. In addition, continued attention to the recruitment time-series and attempting to limit the optimistic projections either using shorter time series, or autocorrelation, to maintain lower recruitment. Part of the higher projections could be explained by higher R/SSB values in the last few years.

There is evidence of size-varying M. The Panel suggested that this be evaluated in future stock assessment.

The Panel thought efforts to develop a predation pressure index may be useful for this and other stocks, however the changing demographics and areas of spawning/young of year habitat may influence which predators contribute most to predation pressure.

Better delineation of the stock structure (using genetics) is needed.

Panel conclusions

The Panel concluded that the 2023 assessment update for Atlantic mackerel fulfilled the recommendations of the AOP, is technically sufficient to evaluate stock status and provide scientific advice and meets the Terms of Reference for the stock's assessment. Catch was estimated from all sources including landings and discards. An abundance index was generated, and an ASAP model used including bridge runs to last assessment that used the same modeling framework. Annual fishing mortality, recruitment and stock biomass were estimated, as well as BRP's. The stock is overfished but overfishing is not occurring and there is a minor retrospective pattern that did not justify any rho-adjustment. Short-term stock projections were appropriate, and since the stock is in a rebuilding plan used the $F_{Rebuild}$ (F=0.11), recommending 6864, 8571,

and 9830 mt in 2024, 2025 and 2026, respectively. There is a consistent pattern of optimistic projections, and longer term projections reflect this, suggesting that catches could double by 2029. Exploitation rates remain variable and the spawning stock biomass near the all time low. It appears likely that catch will be close to the ABC. A better understanding of how abundance indices are tracking the population (Tor 6) and estimation of a stock-recruit relationship remain as carry over recommendations.

Northern windowpane

Windowpane flounder are a small flatfish species that does not grow larger than 40cm in length, with most achieving 35cm length. Historically maximum age was up to 12 years old, although maximum age is now closer to 8-9 yr. Males are often the largest and oldest in the population. Catches were much higher prior to 1994, but fell precipitously and since the year 2000 the stock is primarily a discard fishery.

The stock was last assessed in 2020 using data through 2019. The application of the AIM model was discontinued in the 2019 assessment update because the fit was poor, although the AIM model continues to be used for the southern windowpane stock. Consequently, the 2020 Management Track Assessment (MTA, NEFSC 2022) was brought forward as an empirical approach based on estimating total swept-area biomass with model-based net efficiencies. This method does not produce reference points and accordingly the 2020 MTA did not determine stock status. The same method was used for the 2023 MTA and consequently stock status remains unknown. Indices developed from NEFSC Bottom Trawl Surveys (BTS) indicate that biomass is low and currently the abundance index is at a record low for the time series, and the relative exploitation rate is low.

The Panel was concerned about the potential for unaccounted mortality in discards. The stock has continued to decline while under low fishing pressure, in contrast to the southern stock that has stabilized, thus it is likely that there is unaccounted mortality or an unknown population process. We are not seeing recruitment materialize into the population.

This stock suffers from not having an analytical model that allows for estimating reference points to determine stock status. This is one of a number of current stocks that are in rebuilding plans but where the analytical assessments have not passed peer-review. For these stocks it is not clear if (1) the BRPs and rebuilding targets from past analytical assessment should be maintained, (2) the relevance of any such past values given the inability to understand present status, and (3) how to approach rebuilding without current status in setting current ABCs.

Research suggestions

There appears to be some unaccounted mortality, likely in discards, that possibly explains for the dichotomy between the low relative exploitation rate and lack of response by the stock.

Additional research on windowpane discards, likely in the scallop dredge fishery or recreational catches, are warranted. This research could include better accounting of current bycatch and development of fishery practices that limit discards.

Mentioned above in the cross cutting themes, there needs to be some broader work, perhaps its own RT assessment, on the time-periods used for determining exploitation rates that had a stable population.. This stock and the two hake stocks all had similar issues.

Panel conclusions

The Panel concluded that the 2023 assessment update for northern windowpane fulfilled the recommendations of the AOP, and is the Best Scientific Information Available. The Panel believes the Terms of Reference for the stock's assessment were broadly met. Catch was estimated from all sources including landings and discards. An abundance index was generated using the fall survey due to limited catches in the spring, broken down to strata and with annual length frequencies provided. Annual fishing mortality, recruitment and stock biomass were not possible to estimate as a result of the assessment method for the time series. The same model was used as the last assessment. No BRP's are defined , nor any stock status provided. A back up i-smooth option provided. No short-term stock projections were appropriate, although some different time series periods with different mean exploitation rates were provided and applied to the 3-year moving average swept-area biomass estimate of 7094 mt. Exploitation rates appear low and it has been difficult to justify an appropriate time period for the exploitation rate in past SSC deliberations. The stock is in a rebuilding plan and biomass is decreasing even though catches have been low. The lead analyst suggested basing catch advice on the exploitation rates from recent years for that reason as they most likely reflect the current condition of the stock. The Panel concurs that this is likely the best approach, although 3 time series (2010-2022, 2009-2022 and 1995-2001) all produced exploitation rates between 1.759 and 1.948% leading to a catch between 125 and 138 mt. Most previous comments in past peer reviews or SSC concerns focussed on the time period used and the associated exploitation rate.

Enhanced Reviews

Acadian Redfish

Acadian redfish (*Sebastes fasciatus*) is a species with a long life history that makes them more susceptible to overfishing and slower to recover. The species is a live bearer which complicates our understanding of stock and recruitment relationships. A fishery occurs in deeper water in the center of the Gulf of Maine. Catch remains low with 2023 at 1,813 mt.

Management advice for redfish is based on an 2008 GARM III ASAP model, updated in 2020, and again in this assessment. Mohn's Rho adjusted 2022 F and SSB were within 90% CIs of unadjusted values from the 2023 Base model, and thus no Rho adjustment was applied.

The model estimated Biological Reference Points for Acadian redfish with the Fmsy proxy of 0.037 and SSBMSY 184,322 mt, both values slightly lower than the past assessment. These

values were used in projections, thus for the 2024-2026 Forecast used the FMSY proxy of F50% (0.037). Recruitments drawn from empirical CDF (1969-2020) for projections. Current catch for 2023 is significantly below the FMSY proxy at 0.006, and thus it seems unlikely that catch in the projection time period will exceed the BRP.

The Panel discussed the impact of the lack of age data and performance of the models in relation to the age residuals, noting that during big changes in biomass the model has a hard time estimating values. Comments regarding the appearance of older fish during the recent increase in biomass, and the very unlikely scenario that biomass changes are biologically realistic (e.g. mass die-off of deep water fish), leads to the conclusion that biomass changes more likely result from a population process such as migration (Frisk et al. 2010) than from population dynamic responses. Canadian data are missing in general for the stock, and should be evaluated in future assessments both for potential catch, and for trends in surveys that might support movement among stocks.

Lack of age data in many years is a major source of uncertainty in the assessment. Samples for ageing have been collected for the entire period but many have not been processed. Additional commercial age data for 1986–2016 and for years post 2017 would be likely to decrease uncertainty in the next assessment. Discard estimation is available for Acadian redfish, but age composition is not available and not reflected in the fishery age composition data, which may influence the estimation of selectivity. However, because the amount of discard is relatively small, such impacts are not expected to be large.

Many groundfish stocks in the Northeast US have experienced reduced productivity. This species demonstrates an opposite pattern with an increase in predicted recruitment at the end of the time series. It is unknown if the increasing trends will be sustainable into the future and and/or if this resulted from possible overestimation in the assessment.

Research suggestions

The Panel suggested that temporal variability in weight at age be evaluated.

SSB and recruitment were estimated in the assessment. The Panel suggested exploring possible stock-recruit relationships internal or external to the stock assessment model, but also to consider the way recruitment was modeled with a linear ramp from 0.1 in 1964 to 0.8 in 1969, and then a linear ramp from 0.8 in 2017 to 0.52 in 2019. It is unclear how these CVs play out in the model results and how they would be adapted in more work on the S-R relationship.

The Panel recommended that a genetic study and/or tagging study be conducted to investigate transboundary stock movements, but initial explorations could look for signals in age frequencies or Canadian Survey data.

Given the large change in the ecosystem, the Panel suggested considering moving to WHAM or a state-space model which can accommodate large process errors occurring in the ecosystem and the Panel suggested that static M and age at maturity assumptions in the current stock assessment be evaluated.

Panel conclusions

The Panel concluded that the 2023 assessment update for Acadian redfish fulfilled the recommendations of the AOP, is technically sufficient to evaluate stock status and provide scientific advice and meets the Terms of Reference for the stock's assessment. Catch was estimated from all sources including landings and discards. Abundance indices were generated, and an ASAP model used including bridge runs to last assessment that used the same modeling framework. Annual fishing mortality, recruitment and stock biomass were estimated, as well as BRP's. The stock is not overfished and overfishing is not occurring. Short-term stock projections were appropriate, recommending 11,041, 10,900, and 10,998 mt in 2024, 2025 and 2026, respectively.. Exploitation rates appear low and it appears likely that catch will not achieve the projected catch. Most previous comments in past peer reviews or SSC concerns from the most recent assessment focus on aging and the need for more age data. Additional age data was included in this assessment, and there will be more aging of missing years in the future. A better understanding of how abundance indices are tracking the population (Tor 6) and estimation of a stock-recruit relationship remain as carry over recommendations.

Skate complex

The skate complex was last assessed in the 2008 Data Poor Workshop. This represents the first time the Skate complex has been through a management track assessment process. Seven species of skates form the skate complex: Winter Skate *(Leucoraja ocellata)*, Barndoor Skate *(Dipturus laevis)*, Thorny Skate *(Amblyraja radiata)*, Smooth Skate *(Malacoraja senta),* Little Skate *(Leucoraja erinacea)*, Clearnose Skate *(Raja eglanteria)* and Rosette Skate *(Leucoraja garmani)*. Winter skate, barndoor skate and thorny skate are all considered large skates over 100 cm in size at maturity, while little skate, clearnose skate, smooth skate, and rosette skate all are under 100cm at maturity. All skate species are found offshore, while winter, thorny, smooth, clearnose and little skates can also be caught inshore. The distributions of the skates are slightly different among species with clearnose and rosette skates confined mainly to the mid-Atlantic.

The assessment used an index-based approach and all the skate species are considered data poor, with the fishing mortality RPs based on the average CV of the survey. The Bmsy proxy is the 75th percentile of the survey through 2022 for 6 species, but is set at the 1963-1966 average biomass for barndoor skate. The ABC calculation uses the Median C/B by species multiplied by the most recent 3-year moving average of the survey, and the MSY calculation is the Median C/B by species multiplied by the Bmsy proxy. The spring survey is used for little skate and the fall survey

Due to challenges of skate identification over time in catches particularly as when skates were pooled as mixed skates, and due to the lack of price difference among the species there is no incentive to collect species-level landings data. Landings were generally not reported by species, with over 99% of the landings reported as "unclassified skates" until the FMP was implemented

in September of 2003. Identification in the observer program has been historically inaccurate but is improving over time. Therefore, a method was developed to assign both landings and discards to species. For landings, the length frequencies from all species were assigned to bait or wing based on a 60 cm split (<= 60 = bait and >= 61 cm = wing). These lengths were used to derive total length frequencies by half year and area (GOM, GB, SNE, and Mid-Atlantic). For discards, the same procedure was applied by gear, half year and area. The proportions at length from the surveys were applied to these length frequencies to derive species composition in number and weight. These calculations were conducted for 1994-2022, the time period when length frequencies were routinely collected by the observer program. An adjustment was made for the possession prohibitions for barndoor skate, thorny skate and smooth skate starting in 2004 and then allowing for barndoor landings starting in 2018. To get the species composition prior to 1994, the biomass by species was applied to the landings and discards by area and half year. This may overestimate landings of smaller species in the wing fishery and smaller species discarded in the longline and gill net fisheries. A January 14th, 2008 Memo to the SSC details the process, summarized here (See Appendix E).

CAMS shows a similar pattern in discards to the past Stock Eff method but deviates by as much as 10% in the same year. For the stock status in the last few years, two-year averages were used since the 2020 spring and fall surveys did not occur. This was 2021-2022 for all species. Since the 2023 spring survey was not considered to be representative for any species, this will be an issue for the next update.

The Panel was concerned over the level of uncertainty in this assessment. There was a sequence of decisions that were necessary to allocate total catch and discards to the species owing to the past mis-identification of species, the use of two mixed skate categories, and the way landings data are collected . These decisions, while acknowledged as needed to produce the assessment and completed by an expert on this stock, likely add compounding errors to the assessment that are not fully captured in the indices CIs. Simulations on key decisions would help to uncover any biases or areas where uncertainties are important. Potential concerns could be improvements in ID of species over time that allocate them to species differently,

The Panel also was concerned about the overfishing definitions used for the stocks, and spent time looking at reference materials to understand the underlying scientific basis (see Appendix E). The use of a strict overfishing definition with the high uncertainty in catch and discards could lead to issues in SSC deliberations and make the setting of specifications challenging. Overfishing reference points make a strong assumption that these species are controlled by fishing. Looking at survey mean weight per tow there is clear evidence that fishing is not the only driver, could be climate, or geographic shifts, etc. The biomass trends and projections (with potential ABCs) for the skate will remain detached from the stock status of each species.

The Panel also thought that looking at a correlation matrix of all the species indices would help define potential commonalities in response. These analyses should include Canadian data.

There were few estimates of discard mortality available, and those that were suggested that discard mortality is lower than the default 0.5 rate. However, there is also reason to believe that the rates could be quite a lot higher in certain fisheries. Another place where a simulation could be informative to potential biases in the results, particularly for Thorny skate which are a discard only fishery.

Research suggestions

Species ID remains an issue with this stock complex. Determining the best strategy to provide a quick and accurate ID of the species is still needed, and may require an update to the dichotomous key used in Bigelow and Schroeder.

Maturity and age data would help with understanding the SSB and prevalence of age 1 fish, respectively. There are substantial vertebrae available for aging and this data would be useful for future assessments.

Moving to either a stock synthesis or length-based model that provides status information, if even for only little and winter skates, as they are the dominant catch, would improve the assessment and should be considered in future efforts. Length-based models for little skate have been developed previously.

Simulation of the assumptions for splitting stocks and the 0.5 discard mortality rate to see impact on results, and to identify deficiencies and help the SSC better understand the uncertainty and potential biases.

Size morphs in thorny skate should be ID'ed, if important for management (different life histories assumed), using clasper/cloaca measurements at size

Potential interactions with offshore wind infrastructure, particularly as it relates to the behavioral and distributional responses of skates to EMF radiation associated with electricity conduction, should be evaluated.

Panel conclusions

The Panel concluded that the 2023 assessment for the skate complex fulfilled the recommendations of the AOP, and is the Best Scientific Information Available. The Panel believes the Terms of Reference for the stock's assessment were broadly met. Catch was estimated from all sources including landings and discards. An abundance index was generated, broken down to strata and length frequencies provided. Annual fishing mortality, recruitment and stock biomass were not possible to estimate as a result of the assessment method for the time series. The same model was used as the last assessment. BRP's are defined in past development

of the Skate FMP, and these support the low stock status for thorny skate and recent overfishing in little and winter skate. The official overfishing and overfished status for the complex is NA. ABC options were provided based on C/B using commercial and commercial and recreational landings from over 1981-2022 and a shorter time series (1994-2022) and these seem appropriate for SSC deliberations. Another modeling framework could improve this assessment, but age and growth studies are needed.

Spiny dogfish

Atlantic spiny dogfish (*Squalus acanthias*) is a relatively small shark species with sexual dimorphism in growth and size at maturity. Males grow up to 3.3 feet in length and reach sexual maturity at age 6 yr, whereas females grow up to 4 feet and reach sexual maturity at 12 yr Spiny dogfish reproduce in winter in offshore waters and females birth live offspring. Females produce between two and 12 pups per spawning season that require 18 to 24 months of gestation. The slow life histories demonstrated by spiny dogfish suggests that there are significant lags before recruitment enters the fishery and, combined with broad movements demonstrated in past research (Sulikowski et al. 2010) and high inter-annual variability in the exploitation rate, suggest significant uncertainty about the stock dynamics.

Atlantic spiny dogfish stock assessment presented is an update to the research track assessment completed in 2022, which used 2019 as the terminal year. This assessment added commercial and recreational catch data, survey indices of abundance, and assessment models through 2022, as well as initializing the model starting in 1924 instead of 1989, in order to satisfy the need of the SS3 model to start at an equilibrium point.

The Panel was concerned about the potential decline in size-at-maturity and overall lengths of females affecting offspring fitness. It is unknown whether the smaller size would impact a maternal effect (i.e., quality of offspring declines with spawners' size). While recruitment survival is implicitly estimated by the model and would not be affected by a possible declining pups' survival rates, the estimation of the F 60% SPR may be implicitly affected. More studies may be needed to evaluate the impacts of possible declining size-at-maturity.

Discards, once again, form one of the biggest sources of uncertainty, particularly when extrapolating discards pre-1989, and the 1990s with low trip coverages. The assumptions are more uncertain as we go back in time. A sensitivity was performed assuming discards were 100% higher in the past, which was considered extreme. This led to a higher biomass estimate as we essentially assumed more catch in the past and a greater potential stock productivity. This led to a large concern in using data back to 1924. It is understood that SS3 tends to perform better with an equilibrium population assumption at the beginning of the time series, although the shorter time-series performed very similarly. Using data back to 1924 is considered a better option than starting in 1989, if concerns about an equilibrium starting point are the focus. However, the reverse is true if concerns about discards and accurate catch histories are greater. While the Panel found the similar estimates regardless of data series reassuring, there was an

unease about using the longer data series given the high levels of uncertainty in catch prior to the 1980s.

There are a large number of zero-size bins in the two tails of size composition data, which may greatly increase the weights of size composition data in model fitting. The Panel suggested that a dynamic binning approach be explored to reduce the weighting of zero-size-bin data in modeling.

The choice of likelihood weighting factor, lambda, affects the status determination. Even with increased lambda, the fit to the spring survey was not that great, and this is worrisome to the Panel. Because the decline in spawning output was reasonably captured, the model is capturing some real trends in spawning output. Further, there was good support for the lambda= 6 model in the fit, but also in the treatment of the Albatross and Bigelow time series. However, even the proposed model suggests overfishing has been occurring for all years except 2022. Thus, the Panel has some concerns this stock will re-enter an overfishing point soon. Still, the survey index fit, and catchability estimates agreeing with the empirical estimate suggest the correct lambda was used.

Research suggestions

We encourage more thought about non-equilibrium starting points in the SS3 modeling framework.

Aging is again a major source of uncertainty, in particular because it is likely growth has changed over the past decades.

Panel conclusions

The Panel concluded that the 2023 assessment update for spiny dogfish fulfilled the recommendations of the AOP, is technically sufficient to evaluate stock status and provide scientific advice and meets the Terms of Reference for the stock's assessment. Catch was estimated from all sources including landings and discards. An abundance index was generated, and an SS3 model used including bridge runs to last assessment that used the same modeling framework. Annual fishing mortality, recruitment and stock biomass were estimated, as well as BRP's. The stock is not overfished and overfishing is not occurring. Short-term stock projections were appropriate, recommending 7818, 7956, and 8085 mt in 2024, 2025 and 2026, respectively. Exploitation rates are relatively high (F=0.025, at the F_{MSY} Proxy) and it appears likely that catch will achieve the projected values. Most previous comments in past peer reviews or SSC concerns from the most recent assessment focus on aging and the need for more age data.

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Appendix A. Summary of Assessment Oversight Panel Meetings for September 2023 Management Track Stock Assessments

The NRCC Assessment Oversight Panel (AOP) met to review the operational stock assessment plans for the skate complex, northern and southern red hake, Acadian redfish, northern and southern windowpane flounder, and northern and southern silver hake/offshore hake stocks on May 22, 2023. Three assessments were recommended for Level 1 Reviews (Direct Delivery) and these assessments will undergo an internal review before being delivered to the appropriate management body. The assessments for stocks/species recommended for Level 2 and 3 peer reviews will be reviewed during a meeting September 18-22, 2023.

The AOP consisted of:

Chris Legault, Ph.D. (AOP Chair), Northeast Fisheries Science Center, Woods Hole, Massachusetts.

Gary Nelson, Ph.D., representing the Atlantic States Marine Fisheries Commission, Massachusetts Division of Marine Fisheries.

Lisa Kerr, Ph.D., Chair of the NEFMC Scientific and Statistical Committee, Gulf of Maine Research Institute.

Paul Rago, Ph.D., Chair of the MAFMC Scientific and Statistical Committee, NOAA Fisheries (retired).

Meeting Details:

These meetings were guided by the NRCC-approved stock assessment guidance documents. Three background documents were provided to the Panel: (1) an updated prospectus for each stock; (2) an overview summary of all the salient data and model information for each stock; and (3) the NRCC Guidance memo on the Operational Assessments. Prior to the meeting, each assessment lead prepared a proposal for their Management Track Assessment. The proposal reflected the research track or most recent assessment results, the peer review panel Summary Report results and any initial investigations conducted for the management track assessment.

At the meeting, each assessment lead gave a presentation on the data to be used, model specifications (if applicable), evaluation of model performance, the process for updating the Biological Reference Points, the basis for catch projections, and an alternate assessment approach if their analytical assessment was rejected by the peer review panel.

Major Recommendations for Review of Individual Stocks:

In general, the AOP approved the plans presented, but recommended several points of emphasis to the recommended review levels as summarized below. AOP guidelines can be found in the stock assessment process document.

Stock	Assessment Lead	Review Level	Rationale and Comments
Skate Complex	Kathy Sosebee	Level 3	**Rationale:** First time through MT process, species identification issues, add recreational catch, new methods for catch by species, examine new surveys, consider new reference point for thorny skate
Red Hake (North and South)	Toni Chute	Level 2 (both stocks)	**Rationale:** Fishing does not appear to be driving trends in the population recently, missing 2020 surveys, CAMS catch, swept area biomass survey values same as 2020, stocks trending in different directions, MRIP data has high PSEs
Acadian Redfish	Brian Linton	Level 3	**Rationale:** Evaluate splitting the Albatross-Bigelow survey time series, reweighting model components, CAMS catch, tow-specific swept-area survey values, aging backlog, explore fishery selectivity changes if enough age data, examine possible change in growth over time
Windowpane Flounder (North and South)	Toni Chute	Level 2 (North) Level 1 (South) - provisional on status change	**Rationale:** Explore dk ratios over time, CAMS catch, possible incidental mortality in scallop dredge fishery, northern stock in a rebuilding plan, important bycatch in scallop fishery, consider using chainsweep experiment results for southern stock, explore scenarios for deciding years of exploitation rate for northern stock
Silver/Offshore	Jason	Level 1 (both	**Rationale:** CAMS catch not different,

Stock	Assessment Lead	Review Level	Rationale and Comments
Hake (North and South)	Boucher	stocks)	not overfished not overfishing for both, 2020 surveys as missing, consider time period for reference points (not obvious how to do this), stock ID question would require a research track

Individual Stock Discussion Summaries:

Skate Complex (AOP Lead: Lisa Kerr)
Recommendation: Level 3 (Enhanced Review)

The skate complex is currently assessed using an empirical approach that relies on the NEFSC survey time series. The F_{MSY} proxy is defined as the average CV of the survey and the B_{MSY} proxy is defined as the 75th percentile of the time series for all species but barndoor skate. The barndoor skate B_{MSY} proxy is based on the average of the autumn survey biomass indices from a short period of time (1963-1966). The terminal year F is estimated as the percent change in the three-year moving average of the survey time series. The stocks are declared to be overfished when the three-year moving average of the NMFS trawl survey index (mean weight per tow) is less than one half of the 75th percentile of mean weight per tow of the reference survey series for that species ($B_{threshold}$). Overfishing status is determined if the three-year moving average of the survey biomass index for a skate species declines by more than a critical percentage from the previous year's moving average, then fishing mortality is assumed to be greater than F_{MSY} and overfishing is assumed to be occurring for that skate species.

The level of review suggested for the 2023 skate complex management track assessment was Level 3 and the work plan included several proposed updates and changes to the assessment. All fishery and survey data will be updated through 2022. The analyst will explore adding an additional data source (i.e., recreational data) to the catch time series. In the past, recreational data has been used in catch accounting but not in assessment and is estimated to comprise up to 5% of total catch. Work will be conducted to evaluate the methods for attributing commercial fishery landings and recreational catch of skates by species. Skates are difficult to identify by species, and use of dealer and observer data to characterize the catch by species has been hampered by known data errors. The analyst will explore opportunities to improve the utility of the dealer and observer data streams for allocation to species. For skates that have been managed with a possession prohibition, the analyst will examine the use of fishery compliance assumptions to reduce the landings attributed to these skates and increase landings attributed to other species. The analyst plans to explore the utility of other surveys to inform the skate complex assessment. This will include exploration of the fall NEFSC bottom trawl survey as an additional index for little skate and spring survey for others, MA-DMF spring and fall surveys as additional indices for winter, little, thorny and barndoor skates, the ASMFC shrimp survey as an additional index for thorny and smooth skate, and the NEFSC bottom longline survey as an index for thorny and barndoor skates. The analyst plans to examine the potential difference between landings and discards produced through AA tables and CAMS methods.

The NEFSC bottom trawl surveys were not completed in 2020 due to the pandemic. The analyst will explore whether to treat missing 2020 survey data as missing or to impute a value for 2020. The analyst also noted that they will explore the utility of 2020 survey data from the southern region, which did get some coverage before the survey stopped. The analyst will calculate the ABC based on decisions made on survey time series and approach to dealing with missing 2020 data. The backup assessment for the skate complex is LOESS smoothing of both NEFSC surveys indices to infer future catch change (Ismooth).

This management track assessment will involve substantial changes, including the potential addition of new survey indices. **The AOP agreed with the analyst's suggestion of a Level 3 – Enhanced Review for this stock.**

Red Hake - North and South (AOP Lead: Paul Rago)
Recommendation: Level 2 (Expedited Review)

Northern and Southern Red Hake stocks were last updated using an empirical approach in a Level 3 Management Track Assessment (September 2020). Prior to this update, the stocks were evaluated using the AIM approach which relates a measure of population growth rate to the exploitation rate of the stock. The AIM model is rejected when the expected linear relationship is statistically insignificant. Low rates of exploitation and/or imprecise survey estimates can lead to this outcome. In 2020, rejection of AIM led to an alternative model in which actual biomass and exploitation are approximated using experimentally derived estimates of gear efficiency.

Both assessments are based on the same empirical approach wherein annual exploitation is computed as the ratio of total catch divided by an improved estimate of total stock biomass. Total stock biomass is based on the minimum swept-area estimate of biomass from the fall bottom trawl survey in year t and the spring bottom trawl survey in year t+1. The average biomass is improved by dividing it by an estimate of catchability experimentally derived from a comparison of standard research fishing gear with a chain sweep (Miller et al. 2020). The true biomass of the population is expected to be higher because the capture efficiency of the chain-sweep trawl is less than one.

The revised empirical model does not provide biological reference points but does rely on an external decision about the relevant period during which the stock appears to have responded to management measures followed by a period of stability. For Northern Red Hake the period of stability was defined as 1981-1994; for Southern Red Hake, the comparable period was 2001-2019. The mean exploitation rate during these intervals is multiplied by the most recent three-year average of biomass to estimate overfishing limits (or ABCs?). The previous AOP report in 2020 noted that the selection of the exploitation period is "not trivial" and "that there was no clear recommendation from the [RTA] reviewers as to the preferred model, but the approach being used seems to follow the advice of the reviewers by and large."

Estimated exploitation rates were low in both stocks (<1% North, <3% South) in 2019. Despite low catches and low exploitation rates on both stocks since about 2004, the Northern stock has increased markedly in both the spring and fall surveys. In contrast, the Southern red hake stock has remained at relatively low levels. Causes for the lack of response in the Southern stock are

unknown. Climatic effects may be occurring but there is limited evidence of migration or changes in geographic centers of gravity. Moreover, coherence between spring and fall abundance indices remains high in both areas.

Comparisons of landings and discard data under the new CAMS approach with previous estimates using the AA method are ongoing. In view of the low overall rates of exploitation, the transition to CAMS is unlikely to have a major impact on exploitation estimates. A potentially greater effect is the inclusion of recreational catch data from MRIP. These estimates are highly imprecise at the annual level. Decomposition of these data into finer stock areas will increase their uncertainty.

The AOP's recommendation of a Level 2 Management Track Assessment in September 2023 is based on the potential cumulative effect of several ostensibly minor factors. The AOP expressed concerns about treatment of missing survey data in both spring and fall of 2020. Methods that have been used to impute biomass for missing data for other stocks will need to be applied and evaluated for both red hake stocks. The offset of average survey estimates across calendar years and the overall coherence of spring and fall survey data for both stocks should reduce the effects of missing data in 2020. The use of CAMS estimates for commercial catch and MRIP for recreational catch is expected to have a minor impact. Discussions of the differing responses of the stocks to historical exploitation rates should be useful, particularly if such discussions lead to more refined analyses of underlying causes.

Acadian Redfish (AOP Lead: Gary Nelson)
Recommendation: Level 3 (Enhanced Review)

The current assessment methodology for the Acadian Redfish stock is a statistical catch-at-age model (ASAP) in which estimates of recruitment, fishing mortality and abundance are made by using commercial landings (plus discards), NEFSC spring and survey indices, and age information. The current configuration uses an M of 0.05, assumes one fishery fleet, and uses a single fishery selectivity block. The stock was last assessed in 2020 and the status stock determination, after retrospective adjustment of the terminal F and spawning stock biomass, was that overfishing was not occurring and the stock was not overfished.

The proposed plan for the 2023 management track assessment is to update several sources of information. All NEFSC survey indices will be updated and changed to the new tow-specific swept-area measures (the 2020 index will be treated as missing). US commercial landings and discards for 2020-2022 will be updated by using the CAMS approach. Little impact is expected on the landings, but there will be some impact on the discards estimates. Age data will be updated to include current and historical, previously unavailable data. In addition, two primary changes to the current model structure will be made; these include splitting the Albatross-Bigelow spring and fall surveys and readjustment of fishery and survey weights. If deemed necessary, the terminal F and spawning stock biomass will be adjusted for retrospective bias. New reference points will be calculated and projections for 2024-2026 will be made using the same approaches developed in the 2020 assessment. The lead analyst will also explore possible changes in fishery selectivity and growth over time.

Due to the potential for significant impact of the proposed changes on the assessment results, the lead analyst recommended a Level 3 Management Track Assessment; the AOP unanimously concurred.

Windowpane Flounder - Northern (AOP Lead: Lisa Kerr)
Recommendation: Level 2 (Expedited Review)

Northern windowpane flounder was last assessed during the September 2020 management track assessment. At that time, the AIM model was rejected for use due to the lack of significance in the relationship between population response and fishing mortality. Northern windowpane is currently assessed using an empirical approach that uses catch/swept area biomass (expanded from fall NEFSC survey) to estimate annual exploitation rate. There were no reference points derived from the estimates of relative exploitation rate. For catch advice setting, several scenarios were considered where the mean relative exploitation rate during a period could be applied to the current biomass estimate for a catch recommendation. It was decided to apply the mean exploitation rate during the period of 2010-2019, the time period when the "no possession" rule was in place, to the final biomass estimate to derive catch. Northern windowpane stock status is overfished as determined by NMFS and the overfishing status is unknown. The back-up assessment plan for this stock is LOESS smoothing of survey index time series to determine slope of trend and adjust catch accordingly (Ismooth).

The analyst suggested a Level 1 review for this stock for the 2023 management track assessment. The analyst proposed to use the same swept-area biomass method with updated Bigelow net efficiency conversion factors for northern windowpane, survey indices, catch and discards through 2022. While there are no proposed changes to the model, two data streams (i.e., NEFSC Trawl Survey and the discarded catch) have changes in how they are calculated, and Covid-19 disruptions resulted in missing surveys and reduced observer and port sampling of catch data in 2020. The NEFSC has adopted swept area biomass calculations of indices and the impact of the adjustment to the NEFSC trawl survey data was reported to be minimal for northern windowpane. Discards from 2019-2022 will be estimated using the CAMS method and the difference between AA tables and CAMs estimates should be examined for this stock (i.e., 2019 comparison between AA and CAMs method). The analyst proposed to impute a value for the 2020 missing trawl survey using a mean of 2019 and 2021 survey indices will be used to replace the missing 2020 survey value.

The AOP suggested that a Level 2 review be conducted for this stock. A Level 2 is required when: 1) evaluating effects of delayed seasonal surveys or missing strata on fishery independent measures of abundance if significant analysis is required to characterize the effects, and 2) recalibrated catch estimates (e.g., CAMs). Furthermore, the AOP suggested additional analyses be pursued in this management track assessment. The analyst was asked to evaluate any potential sources of incidental mortality or additional removals from the population that could be characterized to improve the assessment (e.g., overages in limits in scallop fishery). Furthermore, the analyst was asked to examine whether there are any trends in catch rates as estimated in the D/K indices over time that may provide additional information on the trend in relative abundance for this stock. The analyst was also asked to look at a recent publication on survey efficiency to evaluate whether this information should be used to adjust survey-based biomass estimates for this stock (Miller et al. 2023). Finally, any further insight from the analyst on the appropriate

time period to use in deriving mean exploration rate as an Fmsy proxy or comment on the prior time series used would be helpful in catch advice setting.

This stock is of particular concern as northern windowpane is overfished and in a rebuilding plan. Although northern windowpane is a no possession species, it is caught as bycatch in the groundfish and scallop fisheries and accountability measures are in place. It was noted that there have been overages in catch in the scallop fishery in recent years and accountability measures for scallop fishery triggered the past two years.

Windowpane Flounder - Southern (AOP Lead: Lisa Kerr)
Recommendation: Level 1 (Direct Delivery)

Southern windowpane was last assessed in the September 2020 management track using AIM (An Index Model). Southern windowpane is not overfished and overfishing is not occurring. Reference points (Fmsy, Bmsy proxies) are estimated for this stock but short-term projections are not conducted.

The 2023 management track assessment for this stock will run the AIM model, adding fall bottom trawl survey indices, landings and discard estimates from 2020-2022. Similar to other assessments, this assessment will need to deal with missing 2020 survey data. The analyst proposed using the mean of the 2019 and 2021 fall bottom trawl survey indices as a replacement for the 2020 value. The discards from 2019 to 2022 will be estimated using the CAMS method. The analyst should confirm that there are minimal differences between AA tables and CAMS methods of estimation. The alternative assessment plan is an empirical approach where relative exploitation rates for the time series are calculated using catch/swept-area biomass. In this case, an Fmsy proxy can be derived using the mean of the same series of years as the AIM model uses, or any other time series. Alternatively, LOESS smoothing of survey index time series to determine slope of trend and adjust catch accordingly (Ismooth) could be used.

The analyst suggested a Level 1 review for this stock for the 2023 management track assessment. There are no changes proposed to the assessment methods. The management track will focus on updating the assessment model with three years of new data. **The AOP agreed with the Level 1 review for this stock but noted that the level of review should be upgraded if any unexpected issues arise or there is a change in stock status.**

Silver Hake - North (AOP Lead: Gary Nelson)
Recommendation: Level 1 (Direct Delivery)

The current assessment methodology for the Northern Silver Hake stock is an empirical approach in which annual exploitation rates are developed from a 3-year moving–average of the NEFSC autumn survey index and catch. Reference points, overfishing and biomass thresholds, are available and are based on a reviewed approach from the 2010 benchmark assessment. The assessment was last updated in 2020. The 2020 stock status determination was that the Northern stock was not overfished and overfishing was not occurring.

The proposed plan for the 2023 management track assessment is to update US commercial landings and discards through 2022 using the CAMS approach instead of AA methodology; little

impact is expected with the switch to the CAMS approach. In addition, the NEFSC autumn trawl survey indices will be updated through 2022. The 2020 fall survey was not conducted due to COVID restrictions; therefore, the 2020 survey index value will be treated as missing and only a two-year moving average will be used to calculate relative exploitation rates where applicable. All biological reference points will remain the same. Projections will not be performed due to the limitations of the empirical approach.

The AOP concurred unanimously with the lead assessment scientist's determination that the update plan reflects a Level 1 Management Track Assessment. However, the AOP members did express concern that the reference points may be outdated and should be re-examined in the future.

Silver Hake/Offshore Hake - South (AOP Lead: Gary Nelson)
Recommendation: Level 1 (Direct Delivery)

The current assessment methodology for the Southern Silver Hake stock is an empirical approach in which annual exploitation rates are developed from a 3-year moving–average of the NEFSC autumn survey index and catch. Reference points, overfishing and biomass thresholds, are available and are based on a reviewed approach from the 2010 benchmark assessment. The assessment was last updated in 2020. The 2020 stock status determination was that the southern stock was not overfished and overfishing was not occurring.

The proposed plan for the 2023 management track assessment is to update US commercial landings and discards through 2022 using the CAMS approach instead of AA methodology; little impact is expected with the switch to the CAMS approach. The NEFSC autumn trawl survey indices will be updated through 2022 as well. The 2020 fall survey was not conducted due to COVID restrictions; therefore, the 2020 survey index value will be treated as missing and only a two-year moving average will be used to calculate relative exploitation rates where applicable. Because commercial landings of Silver Hake are mixed with landings of Offshore Hake, species composition data from the updated surveys will be used to partition landings into species contributions. All biological reference points will remain the same. Projections will not be performed due to the limitations of the empirical approach.

The AOP concurred unanimously with the lead assessment scientist's determination that the update plan reflects a Level 1 Management Track Assessment. However, as with the Northern Silver Hake stock, the AOP members did express concern that the reference points may be outdated and should be re-examined in the future.

AOP Meeting Conclusions:

The AOP met on May 22, 2023 to review the stock assessment plans for 8 stocks scheduled for the September 2023 Management Track cycle. The panel concluded that a Level 1 review (Direct Delivery) was warranted for northern and southern silver hake and southern windowpane flounder; Level 2 reviews (Expedited Review) for northern and southern red hake and northern windowpane flounder; and Level 3 review (Enhanced Review) for the skate complex and Acadian redfish. The Level 2 and 3 reviews will occur during the September 2023 Management Track Peer Review scheduled for September 18-22, 2023. Spiny dogfish will be reviewed at this

meeting, based on the recommendation from the NRCC. Changes in the required review level would be triggered by a Northeast Fisheries Science Center request to increase the review level for a given stock. The AOP could concur to increase the review level via email or request to reconvene the AOP panel to have further discussions with the stock assessment lead. In the case of southern windowpane flounder, if there is a status change, the AOP agreed to raise the review level to Level 2 (Expedited Review) via correspondence. Any need to reconvene the panel would be a publicly announced meeting and any subsequent changes to the review level would be publicized to assessment partners and stakeholders.

Appendix B. Assessment Oversight Panel Meeting participants (names only, no call-in numbers).

Chris Legault, AOP Chair (NEFSC)
Paul Rago, AOP (MAFMC)
Gary Nelson, AOP (ASMFC)
Lisa Kerr, AOP (NEFMC)
Michele Traver - NEFSC

Alex Dunn - NEFSC
Alex Hansell - NEFSC
Andrew Applegate - NEFMC Staff
Andrew Jones - NEFSC
Angela Forristall - NEFMC Staff
Ben Levy - NEFSC
Brian Linton - NEFSC
Charles Adams - NEFSC
Connor Buckley - NEFMC Staff
Dave McCarron - NEMFC Staff
Emily Bodell - NEFMC Staff
Jacqueline O'Dell - Northeast Fisheries Coalition
Jamie Cournane - NEFMC Staff
Jason Boucher - NEFSC
Jon Deroba - NEFSC
Julie Nieland - NEFSC
Kathy Sosebee - NEFSC
Kelly Whitmore - MA DMF
Kristan Blackhart - NEFSC
Leona Burgess - NEFSC
Libby Etrie - NEFMC Member
Mark Alexander - NEFMC Member
Melanie Griffin - MA DMF
Paul Nitschke - NEFSC
Rachel Feeney - NEFMC Staff
Robin Frede - NEFMC Staff
Sefatia Romeo Theken - Deputy Commissioner for MA Fisheries and Game
Scott Olszewski - NEFMC Member
Shannah Jaburek - GARFO
Susan Wigley - NEFSC
Tim Miller - NEFSC
Toni Chute - NEFSC
Tony Wood - NEFSC

Key:
ASMFC - Atlantic States Marine Fisheries Council
GARFO - Greater Atlantic Regional Fisheries Office

MADMF - Massachusetts Division of Marine Fisheries
MAFMC - Mid-Atlantic Fisheries Management Council
NEFMC - New England Fisheries Management Council
NEFSC - Northeast Fisheries Science Center

Appendix C. Management Track Stock Assessment Terms of Reference

1. Estimate catch from all sources including landings and discards.

2. Evaluate indices used in the assessment (e.g., indices of relative or absolute abundance, recruitment, state surveys, age-length data, etc.).

3. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) as possible (depending on the assessment method) for the time series using the approved assessment method and estimate their uncertainty. Include retrospective analyses if possible (both historical and within-model) to allow a comparison with previous assessment results and projections, and to examine model fit.
    a. Include bridge runs to sequentially document each change from the previously accepted model to the updated model proposed for this peer review.
    b. Prepare a backup assessment approach that would serve as an alternative for providing scientific advice to management if the analytical assessment were to not pass review

4. Re-estimate or update the BRP's as defined by the management track level and recommend stock status. Also, provide qualitative descriptions of stock status based on simple indicators/metrics (e.g., age- and size-structure, temporal trends in population size or recruitment indices, etc.).

5. Conduct short-term stock projections when appropriate.

6. Respond to any review panel comments or SSC concerns from the most recent prior research or management track assessment.

* Major changes from the previous stock assessment require pre-approval by the Assessment Oversight Panel.

Appendix D. September 2023 Management Track Peer Review meeting attendees.

GARFO - Greater Atlantic Regional Fisheries Office
MA DMF - Massachusetts Division of Marine Fisheries
MAFMC - Mid-Atlantic Fisheries Management Council
NEFMC - New England Fisheries Management Council
NEFSC - Northeast Fisheries Science Center
NC DMF - North Carolina Division of Marine Fisheries
RI DEM - Rhode Island Department of Environmental Management
SMAST - University of Massachusetts School of Marine Science and Technology
UMASS - University of Massachusetts

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Adrian Jordaan - Chair
Yong Chen - Panel
Tom Miller - Panel

Russ Brown - NEFSC
Michele Traver - NEFSC

Alan Bianchi - North Carolina DMF
Alex Dunn - NEFSC
Alex Hansell - NEFSC
Amanda Hart - NEFSC
Andrew Minkiewicz - Kelley Drye & Warren LLP
Andy Applegate - NEFMC Staff
Andy Jones - NEFSC
Angela Forristall - NEFMC Staff
Brian Linton - NEFSC
Cami McCandless - NEFSC
Cate O'Keefe - NEFMC Executive Director
Charles Adams - NEFSC
Charles Perretti - NEFSC
Chris Legault - NEFSC
Connor Buckley - NEFMC Staff
Conor Mcmanus - RI DEM
Cynthia Ferrio - GARFO
Dave McElroy - NEFSC
David McCarron - NEFMC Staff
Dvora Hart - NEFSC
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Emily Bodell - NEFMC Staff
Greg Ardini - NEFSC
Greg DiDomenico - Lund's Fisheries
Jacqueline ODell - Northeast Seafood Coalition
James Fletcher - United Commercial Fishermen's Association/industry
Jason Boucher - NEFSC
Jason Didden - MAFMC
Jeff Kaelin - Lund's Fisheries
Jeff Kneebone - MA DMF
Jessica Blaylock - NEFSC
John Whiteside - Whiteside Law
Jon Deroba - NEFSC
Jui-Han Chang - NEFSC
Julie Nieland - NEFSC
Kathy Sosebee - NEFSC
Kelly Whitmore - MA DMF
Kiersten Curti - NEFSC
Larry Alade - NEFSC
Libby Etrie - NEFMC member
Lindsey Nelson - NEFSC
Liz Sullivan - GARFO
Louis Forristall - GARFO
Mark Grant - GARFO
Mark Alexander - NEFMC member
Mark Terceiro - NEFSC
Melanie Griffin - MA DMF
Michelle Passerotti - NEFSC
Nichola Meserve - MA DMF
Paul Nitschke - NEFSC
Rachel Feeney - NEFMC Staff
Robin Frede - NEFMC Staff
Scott Olszewski - RI DEM
Sefatia Romeo Theken - Deputy Commissioner for MA Fisheries and Game
Steve Cadrin - SMAST
Susan Wigley - NEFSC
Tara Trinko Lake - NEFSC
Tobey Curtis - NOAA Office of Sustainable Fisheries
Toni Chute - NEFSC

Appendix E. Realized Agenda for September 2023 Management Track peer review.

September Management Track Peer Review Meeting
September 18-20, 2023

Google Meet joining info: https://meet.google.com/qza-zvku-oig
Or dial: (US) +1 252-987-4102 PIN: 732 891 507#

AGENDA (v. 9/15/2023)

**All times are approximate, and may be changed at the discretion of the Peer Review Panel chair. The meeting is open to the public; however, during the Report Writing sessions we ask that the public refrain from engaging in discussion with the Peer Review Panel.*

Monday, September 18, 2023

Time	Subject	Presenter
9:00 a.m. - 9:15 a.m.	Welcome/Logistics/Conduct of Meeting	Michele Traver, Russ Brown, Adrian Jordaan, Chair
9:15 a.m. - 10:15 a.m.	Red Hake (North and South) Discussion/Questions	Toni Chute Panel
10:15 a.m. - 10:30 a.m.	Break	
10:30 a.m. - 11:30 a.m.	Red Hake (North and South) cont. Discussion/Questions	Toni Chute Panel
11:30 a.m. - 11:45 a.m.	Morning Wrap Up Summary/Discussion	Panel
11:45 a.m. - 12:00 p.m.	Public Comment	Public
12:00 p.m. - 1:00 p.m.	Lunch	
1:00 p.m. - 2:00 p.m.	Acadian Redfish Discussion/Questions	Brian Linton Panel
2:00 p.m. - 3:00 p.m.	Break	
3:00 p.m. - 4:30 p.m.	Acadian Redfish cont. Discussion/Questions	Brian Linton Panel
4:30 p.m. - 4:45 p.m.	Afternoon Wrap Up Summary/Discussion	Panel

Time	Subject	Presenter
4:45 p.m. - 5:00 p.m.	Public Comment	Public
5:00 p.m.	Adjourn	

Tuesday, September 19, 2023

Time	Subject	Presenter
9:00 a.m. - 9:05 a.m.	Welcome/Logistics	Michele Traver Adrian Jordaan, Chair
9:05 a.m. - 10:30 a.m.	Skate Complex Discussion/Questions	Kathy Sosebee Panel
10:30 a.m. - 10:45 a.m.	Break	
10:45 a.m. - 12:00 p.m.	Skate Complex cont. Discussion/Questions	Kathy Sosebee Panel
12:00 p.m. - 12:15 p.m.	Morning Wrap Up Summary/Discussion	Panel
12:15 p.m. - 12:30 p.m.	Public Comment	Public
12:30 p.m. - 1:30 p.m.	Lunch	
1:30 p.m. - 3:30 p.m.	Atlantic Mackerel Discussion/Questions	Kiersten Curti Panel
3:30 p.m. - 3:45 p.m.	Break	
3:45 p.m. - 5:00 p.m.	Northern Windowpane Flounder Discussion/Questions	Toni Chute Panel
5:00 p.m. - 5:15 p.m.	Afternoon Wrap Up Summary/Discussion	Panel
5:15 p.m. - 5:30 p.m.	Public Comment	Public
5:30 p.m.	Adjourn	

Wednesday, September 20, 2023

Time	Subject	Presenter
9:00 a.m. - 9:05 a.m.	Welcome/Logistics	Michele Traver

Time	**Subject**	**Presenter**
		Adrian Jordaan, Chair
9:05 a.m. - 12:00 p.m.	Spiny Dogfish Discussion/Questions	Dvora Hart Panel
12:00 p.m. - 12:15 p.m.	Morning Wrap Up Summary/Discussion	Panel
12:15 p.m. - 12:30 p.m.	Public Comment	Public
12:30 p.m. - 1:30 p.m.	Lunch	
1:30 p.m. - 4:30 p.m.	Report Writing	Panel
4:30 p.m.	Adjourn	