

Description of New England and Mid-Atlantic Region Stock Assessment Process

Overview

The Northeast Region Coordinating Council (NRCC) developed the enhanced stock assessment process described here with the goals of (a) improving the quality of assessments, (b) allowing more improvement to occur within the routine assessment process, and (c) providing more strategic and longer-term planning for research and workload management. The process lays out two tracks of assessment work: a management track that includes the more routine assessments but with more flexibility to make improvements than in the past, and a research track that allows comprehensive research and development of improved assessments on a stock-by-stock or topical basis. The process provides clear opportunities for input and engagement from stakeholders and research partners, and the process also provides a longer-term planning horizon to carry out research to improve assessments on both tracks, but particularly the research track. A key aspect of this process is the NRCC's development and negotiation of long-term management track cycles for each stock (i.e., how often each stock is assessed and in what years) as well as a five-year research track schedule, which will be updated through time by the NRCC.

Roles and Responsibilities

Northeast Region Coordinating Council

The Northeast Region Coordinating Council (NRCC) consists of members from the Atlantic States Marine Fisheries Commission (ASMFC), Greater Atlantic Regional Fisheries Office (GARFO), Mid-Atlantic Fishery Management Council (MAFMC), New England Fishery Management Council (NEFMC), and Northeast Fisheries Science Center (NEFSC). The NRCC fulfills several functions, and, in the context of stock assessments, the NRCC's primary roles and responsibilities focus on setting priorities and scheduling of assessments. With respect to assessment priorities, the NRCC (a) sets long-term (five-plus year) schedules for both the management and research track, (b) reviews and adjusts those schedules as needed, and (c) recommends priorities among complex management track assessments (i.e., assessments requiring expedited or enhanced peer reviews) in situations where more complex assessments are proposed than can be accommodated. Designated staff from each NRCC member organization form the "NRCC Deputies" panel, which reviews and approves research track stock assessment working groups as well as external experts nominated to serve on management track or research track peer review panels.

Assessment Oversight Panel

The Assessment Oversight Panel (AOP) consists of four members (a) the Chief of the Population Dynamics Branch, NEFSC, or designee, who serves as Chair of the AOP, (b) the Chair of the NEFMC SSC, or designee, (c) the Chair of the MAFMC SSC, or designee, and (d) the Chair of the ASMFC Assessment Science Committee, or designee.

The primary responsibilities of the AOP are to (a) evaluate and approve management track assessment plans, or changes in those plans, and (b) determine the likely extent or duration (i.e., “level”) of peer review required to evaluate the scientific validity of the proposed management track assessments using the guidelines for peer review levels provided below (see Management Track and Peer Review Levels). In the near term, if the plan for an alternative backup approach has not yet been developed and reviewed in a prior assessment peer review, the AOP also (c) evaluates and approves the plan for the alternative backup approach to be used if a future peer review finds the primary management track assessment is not suitable for providing management advice. The AOP does not directly peer review assessments, neither primary nor alternative backups; rather it evaluates and comments on assessment plans. AOP members may participate in scientific discussion with assessment leads about aspects of the assessments beyond a simple evaluation and approval of the assessment plan. Such broader scientific discussions can be fruitful as part of the scientific process, but are neither required nor binding.

AOP meetings are open to the public. Council, Commission, and GARFO staff are welcome to participate, and those staff with lead responsibilities for stocks under consideration will be requested to serve as invited participants. At least one staff representative should participate from GARFO and each Council and Commission with stocks under consideration. The Chair of the upcoming associated management track peer review is also encouraged to attend to hear the discussion and recommendations and promote continuity between AOP and peer review.

Following each AOP meeting, the AOP produces a report describing their review and recommendations, which is shared with the NRCC, relevant stock assessment leads, and the associated management track peer review panel. This report is appended to the management track assessment summary report that is published following the management track assessment peer review, which is described below (Step 5 of Management Track Assessment Process section).

Research Track Steering Committee

The Research Track Steering Committee (RTSC) is chaired by the NEFSC and includes 10 positions: 1 Chair, 1 representative from each Council’s Scientific and Statistical Committee and from the Commission’s Assessment Science Committee (3 total); 2 regional scientific representatives, one each with expertise in Mid-Atlantic and New England stocks, respectively; 3 NEFSC stock assessment leads with broad expertise to cover all managed stocks; and 1 NEFSC ecosystem dynamics and assessment expert. All RTSC members are appointed by the relevant NRCC body, other than the 2 regional scientific representatives, which are selected by the NRCC Deputies from a list of applicants identified via public solicitation. The tenure of RTSC members may vary by position, but care should be taken to ensure

continuity of expertise and experience across the RTSC by minimizing turnover and avoiding replacing multiple members in any one year.

The Research Track Steering Committee (RTSC) guides and oversees the research track with a focus on ensuring that research track assessments benefit from research conducted in advance. The RTSC serves as a coordinating group responsive to all NRCC partners and can lay out and modify plans for research track assessments into the future for NRCC consideration. This requires more planning and coordination than is feasible or efficient to do at a lower, more dispersed, level, and it needs close connection with the NRCC level. Without the RTSC, the NRCC cannot effectively prioritize and plan research track assessments, nor foster the research needed to inform those assessments. The RTSC reports to the NRCC and is tasked with: a) identifying critical assessment research needs (see page 18 of this document), b) monitoring progress of critical assessment research, c) developing annual research track assessment proposals to be scheduled and prioritized by the NRCC, d) considering the need for reevaluation of a Research Track stock's structure, and e) communicating assessment research outcomes and findings. Tasks a-c are the core responsibilities of the RTSC.

Given the scope of stocks and topics to be addressed in the research track, it is not expected that all relevant expertise will be present on the RTSC, and the RTSC is encouraged to invite additional experts to participate in meetings or provide input as needed. The RTSC is also expected to engage regularly with stakeholders to gather input and feedback, and RTSC meetings will be open to the public. Council, Commission, and GARFO staff are welcome to participate, and those staff with lead responsibilities for stocks or topics under consideration are encouraged to attend. At least one staff representative should participate from GARFO and each Council and Commission.

Northeast Fisheries Science Center

Fish stock assessment scientists from the NEFSC support both management and research track assessments. NEFSC assessment scientists have primary responsibility for planning and carrying out management track assessments for all federally managed stocks, as those assessments are conducted on a routine basis and require consistent capacity and expertise. As part of the management track process for stocks with NEFSC lead responsibility, NEFSC assessment scientists develop initial plans for assessments and alternative backups in advance of upcoming assessments and revise those plans if necessary in response to new data; where possible, alternative approaches should be developed in advance in prior research track assessments. NEFSC assessment scientists provide initial management track assessment plans for review by the AOP, which in turn reviews and provides recommendations to the NRCC. In unusual situations where more assessments are proposed for expedited and enhanced peer review than can fit in the time planned for peer review, the NEFSC consults with the NRCC to determine an appropriate plan to deal with this problem: whether to extend the peer review or to "downgrade" NRCC-selected assessment plans to a lower assessment level and peer review. NEFSC assessment scientists, as well as other NEFSC scientists and other federal, state, academic and other non-governmental scientists participate in research track assessments.

Atlantic States Marine Fisheries Commission

ASMFC Technical Committee and Assessment Science Committee members may support both management and research track assessments. The ASMFC has primary responsibility for planning and carrying out management track assessments for several state-managed stocks, some of which require substantial NEFSC staff engagement and are managed according to the assessment process described here. As part of the management track process for jointly managed stocks with ASMFC lead responsibility, the relevant ASMFC Technical Committee develops initial plans for assessments and alternative backups in advance of upcoming assessments and revises those plans if necessary in response to new data. The Technical Committees' initial management track assessment plans are reviewed and approved by the Assessment Science Committee, which then provides those assessment plans to the AOP for its review and subsequent recommendations to the NRCC. In unusual situations where more management track assessments are proposed for expedited and enhanced peer review than can be accomplished in the time available for peer review, then the ASMFC consults with the NRCC to determine which assessments to "downgrade" to a lower assessment level and peer review. For ASMFC managed stocks that are scheduled following the process described here, ASMFC may opt to follow the AOP and management track peer review process, or use traditional ASMFC planning and review processes, though care must be taken to coordinate with the management track process to avoid any work or review conflicts. ASMFC Technical Committee members, as well as NEFSC scientists and other federal, state, and academic scientists participate in research track assessments.

Peer Review Panels

Peer review panels are convened to review expedited (level 2) and enhanced (level 3) management track assessments and research track assessments. Peer review panels review the assessment(s) for technical merit and provide recommendations to the relevant Agency, Council(s), and or Commission on whether the assessment represents Best Scientific Information Available (BSIA), and should or should not be used for management. In cases where a peer review panel determines an assessment is not valid to be used for management, the panel clearly describes the key issues driving that decision. For management track assessments, the peer reviews will be conducted by a small panel of SSC members with additional external experts if needed. Reviewers will be nominated by the relevant Council(s) and/or Commission and confirmed by the NRCC Deputies. When nominating and confirming membership for management track peer reviews, consideration should be given to providing some continuity from one peer review to the next to promote consistency in decisions across peer review panels. For research track assessments, peer reviewers will likely, but not exclusively, be provided by the Center for Independent Experts (CIE). In some cases, it may be preferable to convene a research track peer review panel outside of the CIE process; in those cases, the relevant NRCC members will nominate panelists, who will be confirmed by the NRCC Deputies. Consideration will be given to including SSC members in the peer review, including the possibility of having an SSC member chair the peer review; this approach has been helpful in the past to provide some continuity across the peer review and subsequent SSC review.

Assessment Scheduling Process

During 2016-2017, the NRCC developed a process for scoring and prioritizing stocks for both management and research track assessments, and the results were used to inform the development of the initial management and research track schedules. The scoring and prioritization process built off of the process described in the National Marine Fisheries Service's "[Prioritizing fish stock assessments](#)". An NRCC working group evaluated the scoring process and factors recommended by the NMFS report, selected the factors that were most relevant to NRCC stock assessment scheduling, modified the factor descriptions and scoring rubrics, and added new factors as needed. The working group then organized these factors into six categories: management needs, fishery importance, stock status and trend, ecosystem importance, assessment information, and stock biology. Briefly, and generally speaking, NRCC working group members scored each stock within their jurisdiction for each factor¹, and then those scores were averaged across all members for each factor, averaged across all factors for each category, and then averaged across categories for each stock, resulting in one overall score for each stock. A different suite of factors was used to calculate the final score for management track vs research track assessment priorities, and a few factor or category scores were provided independent of the overall score because they were deemed particularly important for developing assessment schedules.

With the resulting scores as information, the NRCC working group developed initial strawman schedules for both management and research tracks. Those strawman schedules, prioritization scores, and other information were used by the NRCC to develop an initial five-year schedule of research track assessments and an initial schedule of management track assessments, with each management track assessment assigned a starting year and a certain cycle or periodicity ranging from annual management track assessments to 6-year intervals between management track assessments. The resulting schedules were informed, but not driven, by the prioritization scores; final decisions regarding the schedules were made through NRCC negotiation.

In order to maintain a five-year research track schedule each year, as what had been the fifth year becomes the fourth year, the NRCC will consider the existing research track schedule, research track scores, and research track recommendations by the NRCC Deputies based on the proposals developed by the Research Track Steering Committee and identify which stocks or topics should be addressed in the new fifth year of the schedule. The NRCC will also consider any changes to the existing research or management track schedules as needed. In the absence of changes, the management track schedule will continue with the same periodicity for each stock.

The prioritization scores developed for both research and management tracks in 2016-2017 may degrade in terms of relevance over time. When the NRCC feels those scores are no longer relevant for informing scheduling discussions, the scoring process will be conducted again to provide fresh scores to inform the scheduling process. Because the scoring process is laborious, the NRCC anticipates refreshing the scores on an infrequent basis, perhaps once every 5-7 years.

¹ NMFS working group members scored all stocks; GARFO scored factors related to management and regulations, and NEFSC scored factors related to science. The Councils and Commission scored their respective stocks.

Management Track Process

Management track assessments are designed to provide routine, scheduled, updated advice to directly inform management actions. Management track assessments are designed to be simpler, quicker, and more efficient than research track assessments. However, the management track provides some flexibility to allow assessments to improve over time by building off the previously accepted assessment, without requiring a research track assessment for every step along the way. The management track process, described below, provides appropriate peer review to ensure validity of any improvements. The modifications allowed within the management track are intended to provide analysts with the flexibility needed to improve the science and modify a previously accepted assessment within limits when problems arise or new data become available. The opportunity to improve the science within the management track and to incorporate new data sources is particularly important given the ongoing observed changes in Northeast and Mid-Atlantic marine ecosystems and associated impacts on population dynamics of stocks.

Management Track and Peer Review Levels

The flexibility in management track assessments allows for different levels of complexity and extent of changes to be applied. These different levels of complexity and extent of changes, in turn, call for different levels of peer review and public engagement. The different levels of public engagement and peer review are described below, noting that peer review “level” refers to the extent or duration of peer review required to evaluate the scientific validity of a proposed suite of assessment changes. Generic terms of reference for management track assessments are also provided below.

When developing the list of changes indicative of different peer review levels, it was recognized that not all possible changes could be anticipated given the evolving nature of science and assessment methods. Consequently, the following lists represent specific changes that would typically require each level of peer review but should not be considered exhaustive. The items in the list, in most cases, do not account for any prior peer review (e.g., peer reviewed publication or stand-alone peer review) of new data streams or other information entering an assessment. The AOP will consider the context of any such prior peer review, or the lack thereof, when evaluating an assessment plan's peer review level, with the objective of ensuring appropriate peer review of all changes. For example, incorporation of a new data stream collected using peer-reviewed methods would likely require less assessment peer review than would be required for incorporation of a new data stream collected using new methods that have not been previously peer reviewed. If a change proposed by an analyst is not detailed below, the AOP will recommend the level of peer review needed.

During and prior to the assessment planning stage, stakeholders may provide input on all assessments. During the “input” phase of management track assessments (described below), NEFSC, ASMFC and NRCC partners will work together to engage with stakeholders, academic and state partners to solicit new data and ideas for any and all levels of upcoming management track and research track assessments. Additional stakeholder engagement would occur during the public comment periods of the AOP meeting (described below) where the assessment plans presented by NEFSC and ASMFC

analysts will be reviewed. Opportunities for public engagement during assessment reviews are specific to the assessment level and are described below.

Data Updates

In some cases, data updates may be requested by a Council or the Commission between scheduled Management Track assessments. Data updates are just that, summaries of new data that have become available since the last Management Track assessment. Data updates do not include rerunning any assessment model and in most cases do not provide a formal update of stock status. The NEFSC is actively working to automate much of the assessment data processing, with the goal of being able to provide standardized data updates through an automatic reporting system. Previously, some requested data updates were quite extensive and required data processing and manipulation that would be challenging to automate, and in some cases those requested data updates required as much work as what would be considered a Level 1 assessment in the current process. In addition to cases needing additional work beyond updating available data, cases where data must be acquired from sources outside of the NEFSC (e.g. state survey index datasets) may take additional efforts and may not be possible to provide in a data update framework. If extensive data examinations are requested in the future, they would need to be added to the Management Track schedule to accommodate the workload requirements. However, requests for standardized, automated data updates would not need to be added to the Management Track schedule because they could be provided at very low cost in terms of staff time. During the development phase of the automated data update system, data update requests are negotiated through the NRCC.

Standardized, automated data updates are not formally considered as Management Track assessments and do not undergo any peer review, only quality assurance and control procedures. The intent of data updates is to provide reassurance that multi-year specifications based on the most recent Management Track assessment are still appropriate without requiring a new assessment. Such updates are most useful when they are formally accounted for within a fishery management plan with clear decision rules on what action should be taken if a data update implies a strong change in stock status. Without such decision rules, data updates may just highlight a concern that cannot be addressed without a formal management track assessment, which would require adding an assessment to the schedule on short notice, or waiting for the next scheduled assessment.

Level 1: Direct delivery

A level 1 management track assessment is essentially a simple update of the previously approved assessment with new data. This level of assessment update will be delivered directly from the NEFSC, following internal review, to the appropriate Council or Commission technical body (e.g., SSC) and will not undergo additional review beyond that conducted by those technical bodies, because the scientific validity of the assessment has already been approved through assessment peer reviews in prior years. Furthermore, although there will be opportunities for public input on assessments in advance during the input phase described below, there will be limited opportunity for public engagement during the assessment review, which will occur during the public comment period of the technical body's meeting. The list below describes the types of changes that would be considered minor adjustments to the

previously approved assessment and, therefore, appropriate for direct delivery. Any scientifically substantive changes would require peer review and would be considered level 2 or 3 assessments.

- Model that has been updated with revised data, with minor changes (such as small adjustments to data weights, fixing parameters estimated at bounds, correcting minor errors in previous model)
- Incorporation of updated data from recent years in the estimation of biological information (growth, maturity, length-weight relationship)
- Calculate updated values for the existing BRPs using same methods
- Evaluating effects of delayed seasonal surveys or missing strata on fishery-independent measures of abundance
- If adding or revising data reveals problems in model performance, analyst should identify concerns that may need further analyses and/or review
- If adding or revising data and implementing a Level 1 assessment after the AOP meeting results in a proposed change in stock status, the assessment warrants additional peer review and therefore qualifies for a Level 2, expedited peer review. This upgrade from Level 1 to Level 2 does not require additional AOP review, though the AOP should be informed.
- Standard QA/QC procedures employed by the NEFSC

Level 2: Expedited review

A level 2 management track assessment can involve a little more flexibility for deviations from the previously accepted assessment, but that flexibility is limited to allow for efficient peer review of multiple assessments in one peer review meeting, similar to what previously had been carried out for groundfish operational assessments for the NEFMC. Level 2 assessments will undergo a formal, but expedited (approximately 1-2 hours), peer review by a panel of SSC members from the relevant Council(s), along with additional external experts if desired, before submission to the appropriate Council or Commission technical body. Any external reviewers outside of the SSCs will be nominated by the Council or Commission and confirmed by the NRCC Deputies. In addition to opportunities for public input on assessments in advance, opportunities for public engagement may occur during the public comment periods of the public review meeting and the subsequent meeting of the Council or Commission technical body. Given the moderate level of peer review and engagement, level 2 assessments will generally use the same assessment structure and data as the previously accepted assessment but also incorporate some changes that warrant review by an external body. The list below describes the type of changes that typically would call for expedited (level 2) peer review. In this level, the cumulative impacts of the number of changes should also be considered; any individual change may be minor, but if there are several changes, the overall impact could be substantial and may warrant enhanced peer review, thereby shifting an assessment to level 3.

- Updated discard mortality estimates, when based on peer-reviewed experimental evidence
- Evaluating effects of delayed seasonal surveys or missing strata on fishery independent measures of abundance if significant analysis is required to characterize the effects
- Recalibrated catch estimates (e.g., transition to Marine Recreational Information Program, area allocation tables, conversion factors (whole to gutted weight))

- Simple changes, corrections, or updates to selectivity, including but not limited to:
 - Changes to most recent selectivity stanza
 - Changes to historical selectivity stanza if they are corrections or reinterpretations of previously used block timeframes
- Retrospective adjustment to management metrics following established retrospective adjustment protocols

Technically, when either the rho-adjusted SSB or F (point estimate / (1 + Mohn's rho)) falls outside the 90% confidence interval of the terminal year estimate, the retrospective adjustment is applied for both status determination and to the starting population for projections.
- Adjustment of method for estimating biological information (growth, maturation, sex ratio, changes to length-weight relationships, etc.), when based on methods developed with sufficient peer review or justification for its use
- Calculate new values for the existing BRPs using new or modified approach (e.g., new methods, different assumptions, etc.)
- Changes in stock status, even if the underlying assessment structure and data are largely unchanged from prior assessments

Level 3: Enhanced review

A level 3 management track assessment incorporates more extensive changes than a level 2 assessment and therefore requires a more extensive peer review (approximately one-half to one full day, sometimes more as needed). The flexibility in level 3 provides an opportunity to make progress within the management track toward the Next Generation Assessments envisioned in the [Stock Assessment Improvement Plan](#), by including more detailed spatial, temporal, environmental and species interactions within existing model frameworks. It is important to note, however, that full achievement of Next Generation Assessments will likely require research track efforts as well. As in level 2 assessments, public engagement opportunities will occur during the public comment periods of both the public review and the subsequent meeting of the appropriate Council or Commission technical body, as well as during the input phase of the assessment process as described below.

Level 3 assessments will be reviewed by a panel of SSC members from the relevant Council(s) as well as additional external experts as needed; any external reviewers outside of the SSCs will be nominated by the Council or Commission and confirmed by the NRCC Deputies. Given the enhanced peer review, changes to most assessment elements, with the exception of stock structure, can occur in level 3 assessments. The list below describes the types of changes that typically would call for enhanced (level 3) peer review. Cumulative impacts should be considered by the AOP when considering whether the full suite of proposed changes would call for an “enhanced review” (level 3) or the more comprehensive peer review provided in the research track process. If the full suite of proposed changes would call for a research track level peer review, the AOP and assessment lead would discuss the subset of proposed changes that better aligns with level 3 peer review.

- Inclusion of new or alternate interpretations of existing indices

- Changes to estimation method of catchability, including but not limited to:
 - Empirical estimations
 - Changes in habitat/availability/distribution on catchability
 - Use of informed priors on catchability in a model
- Updating of priors based on new research if done on a previously approved model
- Recommend significant changes to biological reference points, including but not limited to:
 - Change in the recruitment stanza
 - Number of years to include for recent means in biological parameters
 - Suggestions of alternate reference points if based off a similar modeling approach (e.g. age-based, length-based, etc.)
- Updating of historical selectivity stanzas
- Changing recruitment option used, meaning using a stock-recruitment relationship, or cumulative distribution function, etc.
- Changes to selectivity functional form (i.e. such as a new selectivity model) if supported by substantial empirical evidence.
- Changes to fleet configuration
- Changes to natural mortality (M)
- New modeling framework, if the new framework was evaluated during a previous research track topic peer review, and the species in question was one of the examples evaluated. Through research track topics focused on methods, new models could be implemented in parallel with an accepted model and provide a basis for eventual shift to a new model through a level 3 management track assessment. This would allow model evolution, technical innovations, and testing without the penalty of forgoing research on stock dynamics until a new Research Track process is scheduled.
- Return to a preexisting modeling framework - if a previously approved assessment is rejected in a later management track or research track peer review, the previously approved modeling framework can be reintroduced in a subsequent management track assessment. The issues that led to the rejection must be addressed and the AOP must determine that the extent of changes proposed to address those issues are consistent with these peer review level guidelines.

Incorporation of Ecosystem Influences

As mentioned above, the opportunity to improve the science within the management track and to incorporate new data sources is particularly important given the ongoing observed changes in Northeast and Mid-Atlantic marine ecosystems and associated impacts on population dynamics of stocks. The influence of ecosystem changes on population dynamics can be described and shared as context alongside management track assessments. Those influences can also explicitly be incorporated within management track assessment models in many ways, including, but not limited to (a) the incorporation of environmental covariates when estimating biological information such as growth or developing survey indices, (b) a change in natural mortality informed by predation estimates, (c) estimation of survey catchability through the development of habitat suitability models, or (d) changes in the recruitment stanza used to develop reference points as a result of shifts in ecosystem productivity.

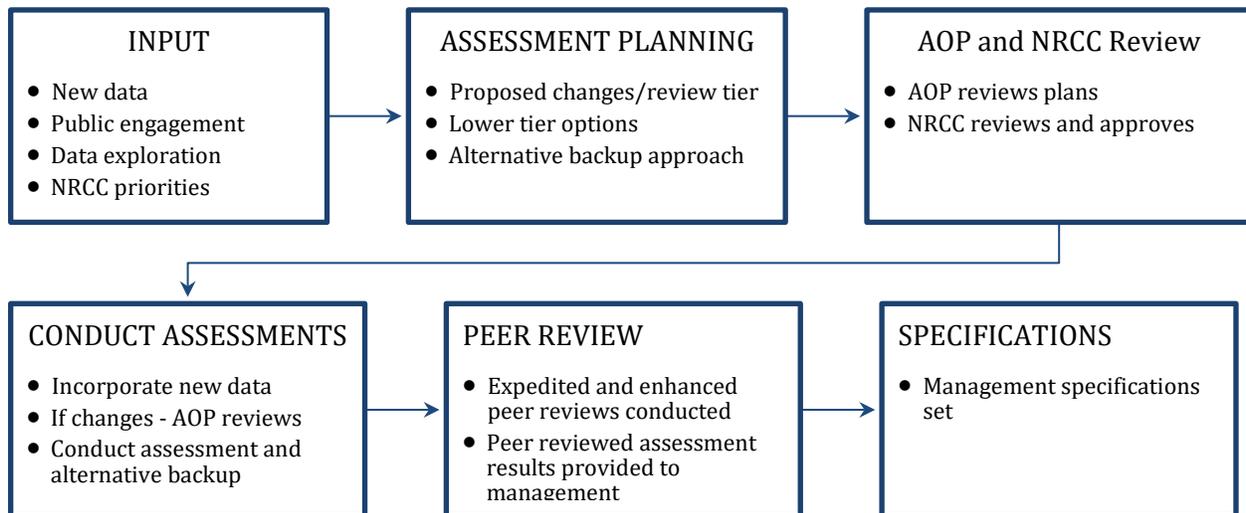
Management Track Assessment Terms of Reference

Generic Terms of Reference (TORs) for assessment updates that will be used directly for management (Management Track assessments) are provided below. They include the TORs necessary for updating the necessary input data (catch and survey), assessment model, biological reference points and short-term projections. They do not include the research-oriented TORs that are included in Research Track assessments.

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 analytical 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.
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.

Management Track Process and Logistics

Management Track Process Flow Chart



Step 1: Input

Throughout the year data come in and new ideas are generated. As part of the new management track assessment process, the NEFSC and ASMFC will work with the NRCC and others to engage with stakeholders, academic and state partners to solicit new data and ideas. This engagement strategy will involve ongoing, regular two-way communications with stakeholders and partners using a variety of approaches, which could include, but not be limited to, social media and web interactions as well as face-to-face stakeholder engagement meetings convened by NRCC members or hosted by stakeholder groups. The engagement strategy will be adapted as needed to improve two-way communication, but at a minimum will involve biannual engagement efforts to provide updates on the most recent management and research track assessments and to seek input on upcoming assessments. This engagement will solicit input on all levels and types of assessments, but will particularly focus on research track assessments where there are not only more opportunities for change and improvement but also opportunities for joint research planning and direct collaborative research efforts with stakeholders and partners, which the NRCC is particularly interested in fostering. All input received will be provided to the assessment leads to support development of their assessment plan. Six months or more in advance of a scheduled management track assessment, the NEFSC or ASMFC assessment lead for the stock will compile available input and do initial exploratory work to determine how complex the next management track assessment should be in terms of new data streams or model changes incorporated.

Step 2: Assessment planning

Following data input and exploration, and based on the explicit management track guidelines, the assessment lead proposes to the AOP the extent of assessment changes to be explored and the associated level of peer review. The assessment lead also provides proposals for assessment complexity

under lower levels of peer review, to provide options for consideration. In the case of ASMFC led stock assessments, this initial proposal is developed by the relevant Technical Committee and reviewed by the Assessment Science Committee before being proposed to the AOP. The resulting assessment plans should indicate what input was considered and how it will be addressed, included or excluded, in the assessment; this provides the explicit connection between public or other input and the assessment plan.

Step 3: AOP and NRCC review

After data have arrived and exploration has occurred, the AOP is convened to provide technical review of the proposed management track assessment plans for the upcoming year. For any assessment proposed for level 2 or 3 peer review, the AOP considers the proposed assessment plan (and plan for an alternative backup approach if not previously vetted by a research track or prior management track assessment) and approves the plan (and plan for backup), and applies the peer review level guidelines to confirm the level of peer review for the most complex proposed version of assessment (i.e., levels 2-3 above).

At the completion of the AOP review, the NEFSC, which manages the logistics of the peer review process, reviews the AOP approved suite of assessments to ensure that the peer review logistics are feasible. In unusual situations where more assessments are proposed for expedited and enhanced peer review than can be accomplished in the time planned for peer review, the NEFSC consults with the NRCC to determine an appropriate plan to deal with this problem: whether to extend the peer review or to “downgrade” NRCC-selected assessment plans to a lower assessment level and peer review. The resulting recommendations from the AOP, modified if needed and approved by the NRCC, are then implemented by the NEFSC and ASMFC assessment leads.

Step 4: Assessment conducted

This step may include several phases. First, each assessment lead evaluates any new data that have arrived since they developed the original proposal for assessment complexity and level (see step 2). If any changes to the approved assessment plan are needed in response to new data, the assessment lead proposes those revisions. If those proposed revisions could result in changes in the peer review level, then the AOP provides technical review and applies the management track peer review guidelines to determine the appropriate level of peer review, likely via conference call or virtual meeting. In unusual cases where such changes could result in substantive changes to the overall suite of planned peer reviews, the NRCC would be consulted with respect to priorities. The assessment leads then carry out the management track assessment within the scope of the approved assessment plan for each stock.

Step 5: Peer review

Expedited and enhanced (levels 2 and 3, see above peer review levels) management track peer reviews are scheduled and convened, as described below, seeking to combine peer reviews as appropriate for efficiency and to optimize the ability to provide timely peer reviewed results to as many fishery management action processes as feasible. Outputs of peer reviews are provided as expeditiously as possible to the appropriate Council or Commission technical bodies and then to the Councils and/or Commission to inform management action (Step 6 in the management track process flow chart). These

outputs will be provided in the form of a summary report for one or more stocks, which will address the assessment terms of reference (see above) and will include the AOP report with its review of the assessment plans and peer review level recommendations. In all cases, associated data and analytical details will be accessible. Early in the implementation of this process, the NRCC will develop and approve standard report templates for each level of management track assessment (and data updates).

General Timing of Management Track Process

Two management track peer reviews for level 2 and 3 assessments will be conducted each year to accommodate the variation in fishing year among stocks and minimize the time lag between the final year of the assessment model and the subsequent implementation of new specifications. Each peer review could include both level 2 and level 3 assessments, and the peer review panel would be composed appropriately with SSC members from the relevant Council(s) and any additional experts as needed. For the majority of stocks, the fishing year starts at the beginning of January or May. Consequently, a peer review will be conducted during the beginning of September for those stocks with fishing years around May 1 and another peer review will be held at the end of June to accommodate stocks with fishing years beginning around January 1 (see table below). This timing is designed to ensure that products from the assessment review can be provided in time to meet the associated management timelines. Assessment models examined during the September peer review will incorporate data through the end of the previous year. For the suite of stocks that undergo peer review in June, it will be difficult to incorporate fishery catches through the end of the previous year due to timing constraints of data availability; it is likely that assumptions may need to be made for the terminal year catch. Assessment reviews for transboundary stocks carried out under the auspices of the Transboundary Resources Assessment Committee will continue to be scheduled based on bilateral negotiation.

Level 1 management track assessments will be delivered directly to the appropriate Council or Commission technical body and are not evaluated as part of the two peer reviews. If desirable, some level 1 assessments can be prepared and delivered throughout the year according to the Councils' and Commission's current delivery schedules. If, upon incorporating the most recent year of data, a level 1 assessment needs to be upgraded to a higher level that requires peer review, delivery of the assessment will be delayed until the next peer review, typically resulting in a delay of weeks to a few months. In such situations, the relevant Council or Commission would be consulted to discuss the needed changes and the resulting delay. In some situations, changes may be required to provide valid scientific advice to management. In others, the changes may be needed to provide improvements to the quality of the advice, in which cases the relevant Council or Commission may prefer to maintain the original delivery timeline while sacrificing the improvement. Furthermore, as the management track schedule comes into effect and workloads, timing, and demands shift, one way to enhance the efficiency of the process may be to simplify the delivery system to have most or all level 1 assessments coincide with the timing of the peer reviews, eliminating the need for some additional consultation and sacrifices.

Fishing year and peer review dates for each species or fishery management plan (FMP)

<i>Species or FMP</i>	<i>Beginning of Fishing Year</i>	<i>Management track peer review</i>
Tilefish	November 1	End of June
Northern Shrimp	December 1	End of June
Bluefish	January 1	End of June
Mackerel/Squid/Butterfish	January 1	End of June
Fluke/Scup/Black sea bass	January 1	End of June
Surf clam / Ocean quahog	January 1	End of June
Atlantic herring	January 1	End of June
Striped bass	January 1	End of June
River herring / Shad	January 1	End of June
Red crab	March 1	End of June
Jonah crab	Undefined	End of June
Sturgeon	None	End of June
Scallop	April 1	Beginning of September
Spiny dogfish	May 1	Beginning of September
Monkfish	May 1	Beginning of September
Groundfish (NE multispecies)	May 1	Beginning of September
Hakes (Small mesh multispecies)	May 1	Beginning of September
Skates	May 1	Beginning of September
American Lobster	July 1	Beginning of September

Research Track Process

Research Track Assessments

Research track assessments are complex scientific efforts focused either on (a) assessments of individual stocks with comprehensive evaluation of new data streams and model changes (research track stock assessments) or (b) research topics that apply to assessments of several stocks (research track topic assessments). Generally speaking, applied scientific efforts in the fish stock assessment arena lie along a continuum from “general research” to “research track” to “management track,” with each step informing the next and getting closer to directly informing management decisions. “General research” may be designed to inform the research track, but typically is not designed to directly inform the management track. Research track assessments, on the other hand, are designed to directly inform future management track assessments, but might not immediately inform management decisions. Research track assessments can inform management track assessments by, among other things, (a) direct examination and development of an assessment or (b) tackling analytical, data, or other issues facing multiple assessments.

Research Track Assessment Terms of Reference

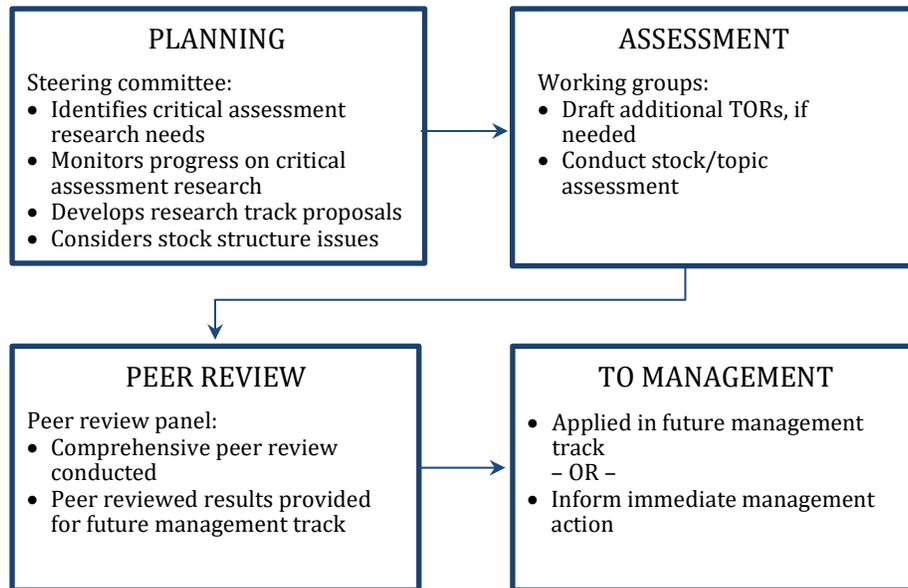
Terms of Reference (TORs) for research track topic assessments will be developed individually for each topic and reviewed and approved by NRCC Deputies. Generic TORs for Research Track stock assessments are provided below. The final TOR (#9) provides flexibility for Research Track Working Groups to identify any additional stock-specific TORs to augment the generic TORs. Any such additions will be reviewed and approved by NRCC Deputies. The generic TORs are:

1. Identify relevant ecosystem and climate influences on the stock. Characterize the uncertainty in the relevant sources of data and their link to stock dynamics. Consider findings, as appropriate, in addressing other TORs. Report how the findings were considered under impacted TORs.
2. Estimate catch from all sources including landings and discards. Describe the spatial and temporal distribution of landings, discards, and fishing effort. Characterize the uncertainty in these sources of data.
3. Present the survey data used in the assessment (e.g., indices of relative or absolute abundance, recruitment, state surveys, age-length data, application of catchability and calibration studies, etc.) and provide a rationale for which data are used. Describe the spatial and temporal distribution of the data. Characterize the uncertainty in these sources of data.
4. Use the appropriate assessment approach to estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series, and estimate their uncertainty. Compare the time series of these estimates with those from the previously accepted assessment(s). Evaluate a suite of model fit diagnostics (e.g., residual patterns, sensitivity analyses, retrospective patterns), and (a) comment on likely causes of problematic issues, and (b), if possible and appropriate, account for those issues when providing scientific advice and evaluate the consequences of any correction(s) applied.

5. Update or redefine Status Determination Criteria (SDC; point estimates or proxies for BMSY, BTHRESHOLD, FMSY and MSY reference points) and provide estimates of those criteria and their uncertainty, along with a description of the sources of uncertainty. If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for reference points. Compare estimates of current stock size and fishing mortality to existing, and any redefined, SDCs.
6. Define appropriate methods for producing projections; provide justification for assumptions of fishery selectivity, weights at age, maturity, and recruitment; and comment on the reliability of resulting projections considering the effects of uncertainty and sensitivity to projection assumptions.
7. Review, evaluate, and report on the status of research recommendations from the last assessment peer review, including recommendations provided by the prior assessment working group, peer review panel, and SSC. Identify new recommendations for future research, data collection, and assessment methodology. If any ecosystem influences from TOR 1 could not be considered quantitatively under that or other TORs, describe next steps for development, testing, and review of quantitative relationships and how they could best inform assessments. Prioritize research recommendations.
8. Develop a backup assessment approach to providing scientific advice to managers if the proposed assessment approach does not pass peer review or the approved approach is rejected in a future management track assessment.
9. Identify and consider any additional stock specific analyses or investigations that are critical for this assessment and warrant peer review, and develop additional TOR(s) to address as needed.

Research Track Process and Logistics

Research Track Process Flow Chart



Research Track Steering Committee

The Research Track Steering Committee (RTSC) guides and oversees the research track process with a focus on ensuring that research track assessments benefit from research conducted in advance. The RTSC reports to the NRCC and is tasked with the following:

1. *Identify critical assessment research needs:* For each new stock added to the research track schedule, the RTSC reviews assessment research priorities identified for that stock found in previous peer reviews, including any SSC research recommendations following the peer review, as well as any relevant assessment research priorities from NRCC members. The RTSC consults with the lead assessment scientist on the status of the associated management track assessment and, particularly, any critical research needs to address existing or anticipated problems in the assessment. The RTSC also solicits input from stakeholders on any questions, ideas, or priorities they may have with respect to assessment research, and the RTSC translates that input into assessment research priorities as appropriate. The RTSC reviews all the assessment research priorities provided, and considers any additional priorities identified by the RTSC itself. The RTSC then identifies a limited number of critical assessment research priorities for each research track stock or topic assessment and provides that list of priorities to the NRCC. NRCC members are encouraged to incorporate those priorities into their respective organizational priorities moving forward. In this way, the RTSC serves a centralizing function, taking all the existing sets of assessment research priorities and condensing them into a focused, prioritized list to promote tangible action by NRCC members and others.

The action needed to promote critical assessment research falls on NRCC members. The RTSC works through NRCC members to encourage funding of projects or allocation of staff resources to conduct the needed research. NRCC members can promote assessment research priorities through any appropriate research funding processes they conduct, such as Research Set-Aside programs, federal agency requests for proposals, Atlantic Coastal Cooperative Statistics Program funding opportunities, etc. NRCC members also can promote these priorities by publishing the assessment research priorities and encouraging external funding entities to consider the needs when making their funding decisions.

2. *Monitor progress of critical assessment research:* The RTSC monitors ongoing assessment research that addresses one or more of the critical assessment research needs identified above to assess whether the research will be completed in time for an upcoming research track assessment. Based on this ongoing monitoring of critical assessment research, the RTSC advises the NRCC regarding any possible research track schedule adjustments.
3. *Develop annual research track assessment proposals:* The RTSC considers its own review of scientific information, as well as input from stakeholders, science and management partners, and NRCC members, to identify likely topics or stocks for consideration. The RTSC, in consultation with assessment lead(s), develops short proposals describing the topics or stocks,

the key science issues to be addressed, and the importance to the NRCC. The RTSC then compiles and prioritizes their suite of proposals and submits those to the NRCC Deputies, who in turn review and provide to the NRCC the proposals and their recommendations regarding which stocks or topics should be added to the research track assessment schedule.

4. *Consider the need for reevaluation of a stock's structure:* Based on any substantial new information on stock structure, and advice from assessment leads, NRCC members, and stakeholders, the RTSC considers whether the structure of any stock on the research track schedule warrants further consideration as part of a research track stock assessment. The RTSC informs the NRCC as early as possible if that is the case. This allows stock structure to be investigated and addressed separately and prior to, or very early in, the stock assessment work itself.
5. *Communicate assessment research outcomes and findings:* The RTSC maintains a continuous review of critical assessment research relevant to the stock and topical assessments on the research track schedule and provides regular updates to the NRCC Deputies and research track working groups as appropriate and provides updates to the NRCC at NRCC meetings. Since the NRCC identifies research track stocks and topics five years in advance, while research track working groups typically are formed two years in advance, the RTSC starts its review of critical assessment research well before working groups are formed. Thus, at the time of research track working group formation, the RTSC shares information on any existing and new critical assessment research relevant to the working group. Once research track working groups are formed, they take over the role of tracking existing and new assessment research relevant to their efforts. It is expected that the RTSC will convene public meetings at least once a year, during which it can solicit feedback on research priorities as well as request updates of ongoing research.

Working group(s)

Research Track Working Groups will be convened following the process established for past [Stock Assessment Workshop working group protocols](#). Research track working groups, both topic and stock-specific, will be tasked with implementing the relevant terms of reference (TORs). In the case of research track stock assessments, the working group starts its work by reviewing the generic TORs and identifying any additional stock-specific TORs to be added, as mentioned above. Once the additional terms of reference are finalized, the working group carries out the necessary research and compiles the results to inform the research track effort, incorporating public planning, data, and analytical meetings as appropriate.

For both stock and topic working groups, the working group should indicate which outputs will be applied, and how, to future management track assessments and/or management actions. This is most critical for research topics, where the terms of reference should clearly indicate what outputs will inform future management track assessments, and how they would do so. For research track stock

assessments, the working group should develop alternative backup approaches to providing management advice if a research track or future management track assessment should be deemed unsuitable for use in management. In most, if not all cases, the peer review panel would evaluate such backup approaches after the panel completed its review of the proposed research track assessment. These approaches should be considered as backup plans for any future problems with an assessment, not an alternative to the developed research track assessment, unless that research track assessment is rejected for use in management advice. In situations where a backup approach has been developed and approved through a research track peer review, the expectations are that approach would be applied in future management track assessments as a backup, and the AOP would not need to repeat the review and approval of that backup approach.

In order to promote an effective and innovative research track, topic and stock assessments in this track typically will be carried out over longer periods and with fewer requirements for using the most recent data, etc. In the two-track approach, the research track is intended to be the opportunity for extensive and comprehensive research and analysis, so it is helpful to remove timing constraints as much as possible. This is different from the management track, which is very much driven by the need to meet specific management timelines and apply the most recent data feasible. As appropriate and feasible, the research and management track schedules are designed to have management track assessments quickly follow research track assessments for those stocks. This allows the comprehensive and innovative research to occur with fewer limitations but ensures immediate application of the research results with the inclusion of the most recent data in a management track assessment.

Comprehensive peer review

Research track peer reviews are considered “comprehensive” peer reviews, in contrast to the expedited and enhanced peer reviews carried out for management track assessments. These peer review meetings generally require 1.5-4 days. They are intended to consider all aspects of the research topic or stock assessment, provide advice on the validity of the research and analyses conducted, and provide recommendations as to whether the outputs are suitable for use in future management track assessments and/or to inform future management actions. Typically, but not exclusively, peer review panels would be provided through the Center for Independent Experts (CIE) and would include at least one relevant SSC member to provide continuity with later Council, Commission, and SSC reviews and actions. It is often helpful for an SSC member to serve as Chair of the peer review for similar continuity reasons. As mentioned previously, in some cases it may be preferable to convene a research track peer review panel outside of the CIE process; in those cases, the relevant SSCs, NEFSC, and/or ASMFC Assessment Science Committee will nominate panelists, which will be reviewed and confirmed by the NRCC Deputies.

Outputs of research track peer reviews are provided as soon as possible to the NEFSC and/or ASMFC Assessment Science Committee for use in future management track assessments. These outputs will be provided in the form of an assessment summary report, a peer review report, and a comprehensive set of assessment documentation that covers the full suite of work carried out. The peer review report could either be a single report from the panel, or a compilation of individual peer review reports along

with a summary panel report. Working group papers, associated data, and background materials will be accessible if needed.

Translate to Management

In many cases, research track outputs will be incorporated into future management track assessments, as indicated in the research plans. In some cases, research track outputs may also be used to directly inform immediate management actions. This would typically occur when research track outcomes indicate important or urgent changes in stock status that require immediate attention. Otherwise, the expectation is that it usually will be more appropriate to take the research track outputs and apply those with updated data in the next scheduled management track assessment to inform future management action.