

Summary of Assessment Oversight Panel Meeting

May 27, 2020

Via Video Conference

The NRCC Assessment Oversight Panel (AOP) met to review the operational stock assessment plans for 14 stocks/species on May 27, 2020. The stock assessments for these stocks/species will be peer reviewed during a meeting from September 12-16, 2020.

The AOP consisted of:

Jason McNamee, Rhode Island Department of Environmental Management, representing the New England Fisheries Management Council

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

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

Russell W. Brown, Ph.D. (Chair), Northeast Fisheries Science Center, Woods Hole, Massachusetts.

Meeting Details:

This meeting included implementation of the newly approved NRCC stock assessment guidance document. Three background documents were provided to the Panel: (1) an updated prospectus for each stock; (2) an overview summary all the salient data and model information for each stock; and (3) the NRCC Guidance memo on the Operational Assessments. The NRCC guidance memo was recognized as particularly relevant during the deliberations of the AOP. Prior to the meeting, each assessment lead prepared a plan for their assessments. The reports were consistent across species and reflected both the past assessment and initial investigations.

At the meeting, each lead scientist for each stock gave a presentation on the data to be used, model specifications, evaluation of model performance, the process for updating the biological reference points, the basis for catch projections, and an alternate assessment approach if their analytic assessment was rejected by the peer review panel. In some cases, stocks were already being assessed using an “index-based” or “empirical” approach.

Major Recommendations for Review of Individual Stocks:

In general, the AOP approved the plans presented, but recommended several revisions to recommended review levels as summarized below:

| Stock | Lead | Review Level | Major Recommendations |
|--|---------------|--|--|
| Wolffish AOP: Paul Rago | Chuck Adams | Level 2 Expedited Review | Cumulative effects of revised MRIP data and changes in maturity. |
| Ocean Pout AOP: Paul Rago | Chuck Adams | Level 1 Direct Delivery | No proposed changes to the assessment approach |
| Atlantic Halibut AOP: Paul Rago | Dan Hennen | Level 1 Direct Delivery | May get interesting next year due to effects of COVID (loss of time series) |
| Acadian Redfish () AOP: Jason McNamee | Brian Linton | Level 2 Expedited Review | Additional age data, adding selectivity time block, updated maturity at age data, retrospective adjustments |
| Northern Red Hake AOP: Jason McNamee | Toni Chute | Level 3 Enhanced Review | New Research Track Assessment - 2020. AIM model was abandoned. New survey catchability estimates. Sensitive decision on exploitation rate. Unclear how to define reference points. |
| Southern Red Hake AOP: Jason McNamee | Toni Chute | Level 3 Enhanced Review | New Research Track Assessment - 2020. AIM model was abandoned. New survey catchability estimates. Sensitive decision on exploitation rate. Unclear how to define reference points. |
| Sea Scallop AOP: Paul Rago | Dvora Hart | Level 3 Enhanced Review | Dynamic selectivity in relation to fishing intensity |
| Northern Silver Hake AOP: Gary Nelson | Larry Alade | Level 1 Direct Delivery | Simple update to a previously approved assessment approach. |
| Southern Silver Hake/Offshore Hake AOP: Gary Nelson | Larry Alade | Level 2 Expedited Review | Simple update to a previously approved assessment approach. Significant missing survey data - imputation vs. missing data (high impact). |
| Northern Windowpane flounder AOP: Jason McNamee | Toni Chute | Level 2 Expedited Review (compressed) | Fit for the AIM model is questionable. Potential to move to a plan B, which could use review. Inclusion of the swept area results. |
| Southern Windowpane Flounder AOP: Jason McNamee | Toni Chute | Level 2 Expedited Review (compressed) | AIM model is better, but the potential to rescale based on the swept area estimates. |
| GOM Winter flounder AOP: Gary Nelson | Paul Nitschke | Level 2 Expedited Review | New data available from the chain sweep study - plan to re-estimate survey q; revised MRIP catch estimates (though may not directly affect the assessment). |
| GB Winter flounder AOP: Gary Nelson | Dan Hennen | Level 3 Enhanced Review (compressed) | Expected retrospective pattern; change reference point to $F_{40\%}$ |

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|--|-----------|-------------------------|--|
| SNEMA Winter flounder AOP: Gary Nelson | Tony Wood | Level 3 Enhanced Review | Changes to the selectivity blocks and selectivity form; inclusion of new MRIP data; change reference point to F40%. Maybe NEAMAP data as comparison. |
|--|-----------|-------------------------|--|

Individual Stock Discussion Summaries:

Wolffish (AOP Lead - Paul Rago):

Atlantic wolffish are currently assessed with the SCALE model last updated in 2017. It is a relatively simple application using one fleet, with spring survey for recruitment and spring and fall estimates for adults. The model also uses MADMF spring survey index. NEFSC surveys are calibrated to Albatross units by borrowing calibration estimates for ocean pout. Wolffish have low catchability owing to their cryptic behavior and preferred habitats (rocky, less trawlable). It may be worth comparing scale differences with the cooperative longline survey. The assessment lead noted that the trend in the longline survey has been increasing which conflicts with the results of the trawl surveys. Moreover, under present guidelines, introduction of new survey indices is likely to require a Research Track assessment.

New information on recreational catches (MRIP) will be included in this assessment but the effects are expected to be minor. Maturity ogives were also recently updated leading to small increase in L50 from 50 to 52 cm. As with the inclusion of the MRIP data, the effects of this change are expected to be minor.

No landings are permitted in the commercial fishery but the quota is monitored for overages from discards. Quota is set by applying 75% of Fmsy proxy to biomass estimate and holding for 3 yrs. In view of the combined effects of potential scale changes caused by the increased estimates of recreational landings and an increased size at maturity, the AOP recommended a **Level 2 Expedited Review** for this stock.

Ocean Pout (AOP Lead - Paul Rago):

The assessment method relies entirely on the relative biomass estimates of ocean pout from the NEFSC spring bottom trawl survey and estimates of total catch. The benchmark and associated reference points for this stock were derived at the 2008 GARM. Relative F is computed as the ratio of current catch and a 3-year moving average of survey biomass. The SSB proxy of (4.94 kg/tow) is based on a period of moderate historical abundance. As of 2016 the stock is only 5% of the target biomass but overfishing is not occurring. Despite many years of low F no recovery of the stock is apparent.

No changes to the assessment methodology are proposed or warranted at this time. In view of the simplicity of the approach and absence of any complicating factors, a **Level 1 Direct Delivery Review** is recommended.

Atlantic Halibut Lead (AOP - Paul Rago):

This assessment is based on the FSD model (First and Second Derivative) approved by the NEFMC SSC in 2018. It relies on estimates of the aggregate rate of change in 3 indices of relative abundance, two of which are based on rates of discarding in trawl and gill net fleets. Previous year's catch is adjusted

depending on the slope of the indices (first derivative) and the rate of change in the slope (second derivative). The approach is similar to the LOESS smooth approach used in other assessments by the NEFSC.

No changes are proposed for this assessment and there are no immediate needs to update the methodology. However, it is anticipated that the COVID 19-induced reduction in observer coverage may compromise the quality of two of the three relative abundance indices for 2020 if observer coverage does not resume. Similar concerns were raised regarding the fall survey for 2020 but no decisions have been made regarding the execution of this planned survey. Nonetheless, it is anticipated that adaptations may be required in 2021 when this assessment is updated. The assessment lead will work with the PDT to incorporate consideration of Canadian catches into the OFL and catch recommendation for the SSC. In view of the simplicity of the approach and absence of any complicating factors, the AOP recommended a **Level 1 Direct Delivery Review**.

Acadian Redfish (AOP Lead - Jason McNamee):

This assessment is based on the 2008 GARM III approved ASAP model, which was updated last in 2017. All fishery and survey data were updated through 2019. This model includes new commercial age data for 2017, prior to this the last year of commercial age data was 1985. Preliminary catch data from GARFO was used for 2020. Additional data was also reviewed such as the evaluation of the potential use of MREM EFP biological data (exists for 2018 (Aug-Dec) and 2019). An evaluation of the effect of missing stratum in the 2018 NEFSC fall bottom trawl survey will be investigated for impacts to this assessment. An evaluation of the addition of a new fishery selectivity time block will also be undertaken. The BRPs for this stock will be updated using the 2008 GARM III SSB_R F50% and SSB_{50%} projection approach. Projections will be performed for the years 2021 through 2023. Finally, the Plan B approach for this species, should the model fail review, will be a LOESS smoothing of averaged NEFSC spring and fall bottom trawl survey indices to infer future catch changes.

If the new selectivity time block along with some of the other proposed evaluations were to be used in the model used for management advice, this would potentially tip the AOP's recommendation to a level 3 (enhanced review), but as long as these changes are maintained as evaluations, the proposed review level should be adequate. In addition, the harvest has been well under the quota recently, therefore it is a lightly fished stock and there is not much risk in keeping it at the recommended review level. There is a retrospective pattern in this assessment and it has been beyond the 90% CIs, but CIs are tight for this assessment, so this did not give the AOP much concern. In view of the information about the approach as described above, the AOP recommended a **Level 2 Expedited Review**.

Northern Red Hake (AOP Lead - Jason McNamee):

Previously this stock employed AIM (An Index Model) to estimate an F_{msy} proxy. This approach was developed during the benchmark assessment for Northern red hake in 2010. The B_{msy} proxy was derived from the average survey index in kg/tow. Based on the recommendation of the Red Hake Stock Structure research track assessment peer review panel, the AIM approach will not be used during this management track assessment for estimating reference points for Northern red hake due to poor fit based on the relationship between survey index and estimated removals.

An empirical approach was developed during the research track assessment process for providing catch advice for Northern red hake. The approach is the same approach recently used for witch flounder and GB yellowtail flounder. The approach uses relative exploitation rates and these rates are calculated for the time series using catch divided by the swept-area biomass. An Fmsy proxy can potentially be derived using the mean of the same series of years as the previous update, which used the AIM approach. Estimates of efficiency from the chainsweep comparison study of the Bigelow net for red hake were used for the analysis.

The approach proposed is already a Plan B approach, but the analyst offered that a LOESS smoothing of survey index time series to determine slope of trend could also be used as a fall back procedure to adjust catch.

The AOP mentioned that the choice of exploitation rate is not trivial and will need some options and vetting, as this has been the experience with the other stocks that use this approach. Additionally, the use of the catchability info is new, so could use some review. Determination of reference points will be an important thing to consider during the current review as the empirical approach being proposed does not provide reference points. There was a discussion about the fact that there was no clear recommendation from the reviewers as to the preferred model, but the approach being used seems to follow the advice of the reviewers by and large. This would be a new modeling approach for this stock and this combined with the other items mentioned above compelled the AOP to recommend a **Level 3 Enhanced Review**.

Southern Red Hake (AOP Lead - Jason McNamee):

Similar to the Northern stock of red hake, this stock previously employed AIM (An Index Model) to estimate an Fmsy proxy. This approach was developed during the benchmark assessment for Southern red hake in 2010. The Bmsy proxy was derived from the average survey index in kg/tow. Based on the recommendation of the Red Hake Stock Structure research track assessment peer review panel, the AIM approach will not be used during this management track assessment for estimating reference points for Southern red hake due to poor fit based on the relationship between survey index and estimated removals.

An empirical approach was developed and approved during the research track assessment process for providing catch advice for Southern red hake. The approach is the same approach recently used for witch flounder and GB yellowtail flounder. The approach uses relative exploitation rates and these rates are calculated for the time series using catch divided by the swept-area biomass. An Fmsy proxy can potentially be derived using the mean of the same series of years as the previous update, which used the AIM approach. Estimates of efficiency from the chainsweep comparison study of the Bigelow net for red hake were used for the analysis.

The approach proposed is already a Plan B approach, but the analyst offered that a LOESS smoothing of survey index time series to determine slope of trend could also be used as a fall back procedure to adjust catch.

As mentioned for the Northern stock of red hake, the AOP mentioned that the choice of exploitation rate is not trivial and will need some options and vetting, as this has been the experience with the other

stocks that use this approach. Additionally, the use of the catchability info is new, so could use some review. Determination of reference points will be an important thing to consider during the current review as the empirical approach being proposed does not provide reference points. There was a discussion about the fact that there was no clear recommendation from the reviewers as to the preferred model, but the approach being used seems to follow the advice of the reviewers by and large. This would be a new modeling approach for this stock and this combined with the other items mentioned above compelled the AOP to recommend a **Level 3 Enhanced Review** for the Southern stock of red hake as they did for the Northern stock.

Sea Scallop (AOP Lead - Paul Rago):

This assessment has been updated annually by the NEFSC and PDT for more than a decade. The assessment relies on the integration of survey information from multiple sources including dredge and HabCam surveys by the NEFSC, a drop camera grid survey by SMAST, and a dredge survey by VIMS. The RSA supports the activities by SMAST and VIMS. The timing of the surveys and assessment process is typically tight as data products in late summer of the current year are necessary for specification of the fishing season early in the following year (i.e., 2020 survey data are used for May 2021 fishing year regulations). In contrast, most other assessments in the Northeast use previous year's information (e.g., 2019) to set specification for 2021.

Three separate models are used for assessment. CASA is the primary assessment model that estimates overall abundance and mortality rates for the Mid Atlantic and the open and closed areas of Georges Bank. These results are then compared to a reference point model (SYMS) that determines the stock status. Finally, in recognition of the complex management of the mostly sessile resource and the mosaic of open and closed fishing areas, a tactical model (SAMS) is used to specify fishing levels over multiple areas.

The 2020 assessment will be the first time the above described process will be reviewed in the Management Track. Given the strict deadlines and timing requirements for the 2021 specifications, the assessment review will be restricted to a review of the 2019 results. One of the important changes meriting additional review is the need to review the natural mortality estimates used in the SYMS model. These estimates are based on the rate of disarticulation of dead scallop shells. The variability of this process is unknown and current estimates lead to high variability in M and resultant reference points estimates from SYMS.

In addition to concerns about the reference points, there is evidence that the selectivity curve for scallop shell height is also a function of fishing intensity. Rather than assuming that selectivity and fishing effort are separable, it appears that high fishing mortality alters the shape of the selectivity function estimates. To address this possibility the reference points themselves would have to be expressed in terms of a dynamic selectivity function that changes with fishing effort. In other words changes in fishing effort can also change the force of mortality over the entire population. Several mechanisms could be responsible for this effect including the effect of high effort leading to fishing activity in areas with lower recruitment, slower growth or both factors. This would shift the selectivity toward smaller scallops. Similarly, the absence of larger scallops in the catch, and occasional presence of large scallops in lightly fished areas can lead to a dome shaped selection. The scallop assessment

also relies on updates to growth transition matrices by region which project the population from one size range to another.

In view of the complexity of the assessment, and the potential revisions to the basis for computing reference points, a **Level 3 Enhanced Review** was recommended for sea scallops.

Northern Silver Hake (AOP Lead - Gary Nelson):

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. The proposed plan for the 2020 management track assessment is to update US commercial landings and discards, and the NEFSC autumn trawl survey through 2019. In addition, the autumn trawl survey data from 2009-2017 will be converted from Bigelow to Albatross units using calibration factors. The lead analyst indicated the proposed work fell under a **Level 1 Expedited Review** and the AOP concurred unanimously.

Southern Silver Hake/Offshore Hake (AOP Lead - Gary Nelson):

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. The proposed plan for the 2020 management track assessment is to update US commercial landings, discards and mixed species proportions, and the NEFSC autumn trawl survey through 2019. Also, the autumn trawl survey data will be converted the 2009-2017 data from Bigelow to Albatross unit using calibration factors.

A major issue discussed was that, due to unforeseen circumstances, only 20% of the trawl survey area for the southern stock was covered in 2017. The lead analyst presented several methods that could be used to impute the missing data, all of which will be explored during the assessment update. Because the chosen method may have significant impact on the assessment results, the AOP changed the assessment from a level 1 to a **Level 2 Expedited Review** which allows some flexibility in the management track process.

Northern Windowpane flounder (AOP Lead - Jason McNamee):

Northern windowpane flounder has gone through the new management track assessment previously. It was assessed as a level 2 management track assessment in 2019. The model used for Northern windowpane flounder is AIM (An Index Model). The data used for AIM is the fall NEFSC bottom trawl survey biomass indices from 1975-2019. Catch is comprised of U.S. commercial landings from 1975-2019 and commercial discards from 1975-2019 are estimated using SBRM methodology. The reference points that are currently in use are actually the reference points generated for the 2017 Operational Assessment process because there was a poor model fit to the indices in 2019, and in 2017 the model fit was better; therefore, these early reference points were adopted. It is not expected that reference points for Northern windowpane will be updated during this assessment. The proposal is to run the AIM model with no changes other than adding updated fall bottom trawl survey indices, landings and discard estimates from 2019.

The Plan B approach is to use an empirical approach where relative exploitation rates for the time series are calculated using catch divided by swept-area biomass (as described under the red hake stocks). An

Fmsy proxy can potentially be derived using the mean of the same series of years as the previous update. Estimates of efficiency of the Bigelow net for windowpane flounder are available from the chainsweep comparison study.

The AOP discussed the fact that the AIM has been performing poorly for this stock, therefore the analyst might anticipate that it will be rejected, requiring the use of the Plan B approach. With the addition of the chainsweep study information being new, the AOP recommends a **Level 2 Expedited Review** for the Northern stock of windowpane flounder.

Southern Windowpane Flounder (AOP Lead - Jason McNamee):

Southern windowpane flounder has gone through the new management track assessment previously. It was assessed as a level 1 management track assessment in 2019. The model used for Southern windowpane flounder is AIM (An Index Model). The data used for AIM is the fall NEFSC bottom trawl survey biomass indices from 1975-2019. Catch is comprised of U.S. commercial landings from 1975-2019 and commercial discards from 1975-2019 are estimated using SBRM methodology. The reference points that are currently in use are generated from the 2019 Operational Assessment process because there was a good model fit to the indices in 2019. Reference points for Southern windowpane will be updated during this assessment. The proposal is to run the AIM model with no changes other than adding updated fall bottom trawl survey indices, landings and discard estimates from 2019.

The Plan B approach is to use an empirical approach where relative exploitation rates for the time series are calculated using catch divided by swept-area biomass (as described under the red hake stocks). An Fmsy proxy can potentially be derived using the mean of the same series of years as the previous update. Estimates of efficiency of the Bigelow net for windowpane are available from the chainsweep comparison study.

The AOP discussed the fact that the AIM has been performing well for the Southern stock, so could qualify as a direct delivery. However, with the addition of the chainsweep study information, the fact that this could rescale the swept-area biomass estimates for this stock, and the fact that the Northern stock was going to be reviewed at a higher level, the AOP recommends a **Level 2 Expedited Review** for the Southern stock of windowpane flounder.

GOM Winter flounder (AOP Lead - Gary Nelson):

The current assessment method is an index-based approach that uses catch and estimates of 30+ cm biomass from three non-overlapping fall surveys (MENH, MDMF, NEFSC). The proposed work for the 2020 management track assessment is to update the fall surveys and catch through 2019. The updated catch will include the new MRIP estimates of recreational catch. Also, the plan proposes to explore updating the estimate of q with recent NEFSC survey data and using a two-year average of biomass in the calculation of the ABC.

The AOP discussed the issue of changing to a two-year average of biomass and whether the changes may be significant enough to warrant the elevation of the proposed level 2 assessment to a level 3. In the end, the AOP agreed to keep the proposed **Level 2 Expedited Review**.

GB Winter flounder (AO Lead - Gary Nelson):

The current assessment method for Georges Bank Winter Flounder is a VPA model that includes age-specific US and Canadian landings and discards, and age-specific trawl indices (NEFSC fall, NEFSC spring and CA DFO spring surveys). The proposed work for the 2020 management track assessment includes updating all landings, discards and survey data through 2019. In addition, the lead analyst proposed transitioning the current MSY biological reference points (calculate from the model stock-recruitment relationship) to proxy-based reference points (F40%, SSBMSY40%) to match the other winter flounder stocks and recommendations of a panel review in 2019. There will be no change to the current model configuration. The AOP discussed the potential impact of changing reference points given that the stock is in a rebuilding plan and recommended that the old method should also be calculated for continuity. The AOP agreed that the **Level 3 Enhanced Review** recommended by the lead analyst is appropriate given the proposed change to reference points.

SNEMA Winter flounder (AOP Lead: Gary Nelson):

The current assessment method for SNE/MA Winter Flounder is an ASAP model that includes age-specific commercial and recreational landings and discards, and 11 age-specific trawl indices from the NEFSC, five state fisheries agencies, and URI/GSO. The proposed work for the 2020 management track assessment includes updating all commercial landings and discards, updating the recreational harvest and discards with the new MRIP estimates, and updating all survey data through 2019. There will be no change in the current model configuration, although other selectivity forms and time blocks will be explored. In addition, the lead analyst proposed transitioning the current MSY biological reference points (calculate from the model stock-recruitment relationship) to proxy-based reference points (F40%, SSBMSY40%) because of the poor stock-recruitment relationship and to match the other winter flounder stocks. The AOP agreed that the **Level 3 Enhanced Review** recommended by the lead analyst is appropriate given the proposed selectivity and reference-point changes.

AOP Process Discussion and Summary:

The NEFSC continues to seek meaningful stakeholder engagement in formulating stock assessment plans for management track assessments. In summary, the meetings were productive and an effective implementation of the new assessment planning document. The peer review panel will meet from September 12-16, 2020 to complete their review.

Appendix 1: Assessment Oversight Panel related guidelines.

Overarching statement from the Guidance Document. “If a change proposed by an analyst is not detailed below, the AOP will determine whether the modification is permissible and which level of peer review would be required.”

Table elements in the columns 3 to 5 would be factors considered by the Panel. The Panel would put its comments in the most appropriate box irrespective of the Guidance Level (column 2). The final recommendation would be based on the preponderance of the evidence of comments in each column. A summary of the cumulative effects of within each Guidance Level is a row following each level. This would be an opportunity for synthesis of the evidence regarding the above factors.

Guidance Template for Deriving Recommended Level of Assessment Review

| <i>Task</i> | <i>Guidance Level</i> | <i>Direct Delivery (1)</i> | <i>Expedited Review (2)</i> | <i>Enhanced Review (3)</i> |
|--|-----------------------|----------------------------|-----------------------------|----------------------------|
| Model 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) | 1 | | | |
| Incorporation of updated data from recent years in the estimation of biological information (growth, maturity, length-weight relationship) | 1 | | | |
| Effects of delayed seasonal surveys or missing strata on fishery-independent measures of abundance | 1 | | | |
| Identification by lead analyst on potential problems of adding or revising data on model performance | 1 | | | |
| Cumulative Impact of Level 1 changes | | | | |
| Updated discard mortality estimates, when based on peer-reviewed experimental evidence | 2 | | | |
| Evaluating effects of delayed seasonal surveys or missing strata on fishery independent measures of abundance if significant analysis is required to characterize the effects | 2 | | | |
| Recalibrated catch estimates (e.g., transition to Marine Recreational Information Program, area | 2 | | | |

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| 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 | 2 | | | |
| Retrospective adjustment to management metrics following established retrospective adjustment protocols | 2 | | | |
| 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. | 2 | | | |
| Calculate new values for the existing BRPs | 2 | | | |
| Cumulative Impact of Level 2 changes | 2 | | | |
| Inclusion of new or alternate interpretations of existing indices | 3 | | | |
| Changes to estimation method of catchability, including but not limited to: <ul style="list-style-type: none"> ○ Empirical estimations ○ Changes in habitat/availability /distribution on catchability ○ Use of informed priors on catchability in a model | 3 | | | |
| Updating of priors on parameter estimates based on new research AND if done on a previously approved model | 3 | | | |
| 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.) | 3 | | | |
| Updating of historical selectivity stanzas | 3 | | | |

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| Changing recruitment option used, meaning using a stock-recruitment relationship, or cumulative distribution function, etc. | 3 | | | |
| Changes to selectivity functional form (i.e. such as a new selectivity model) if supported by substantial empirical evidence. | 3 | | | |
| Changes to fleet configuration | 3 | | | |
| Changes to natural mortality (M) | 3 | | | |
| New modeling framework, if the new framework was evaluated during a previous research track topic investigation, and the species in question was one of the examples evaluated. | 3 | | | |
| Cumulative Impact of Level 3 changes. Determine if Research Track is warranted. | | | | |
| Overall recommendation of Assessment Oversight Panel | xx | A pithy summary here. | | |