

Supplemental Review Panel Report for Widow Rockfish

Pacific Fishery Management Council

October 14 and 16, 2025 (Virtual)

Review Panel

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Overview

A supplemental review for the update assessment of widow rockfish (*Sebastes entomelas*) off the US West Coast was held virtually on October 14 and 16, 2025. The meeting was hosted by the Pacific Fishery Management Council (PFMC) and followed the Terms of Reference for the Groundfish Stock Assessment Review Process for 2025-2026 (TOR; [PFMC 2024](#)) and Accepted Practices Guidelines for Groundfish Stock Assessments in 2025 and 2026 ([PFMC 2025a](#)). The draft update assessment (Kinneen et al. 2025) was originally reviewed by the Scientific and Statistical Committee (SSC) Groundfish Subcommittee (GFSC) on August 12 and 13, 2025. The GFSC recommended a supplemental review of the 2025 update ([PFMC 2025b](#)) due to unexpected results, which included a change in stock trajectory and a shift in the timing of that change following a technical correction to the 2019 update assessment (Adams et al. 2019). The 2019 update assessment was based on the most recent benchmark assessment in 2015 (Hicks and Wetzel 2015). The SSC concurred with the GFSC recommendation for supplemental review ([Agenda Item G.3.a Supplemental SSC Report 2, September 2025](#)), which was tasked by the Council in September 2025. The justification was that supplemental review would relax some of the constraints placed on update assessments (e.g., making structural changes to the model) and allow for a more thorough evaluation of several aspects of the assessment.

The review panel was comprised of five members of the GFSC and an external CIE reviewer. Several GFSC and STAT members are NOAA employees and were unable to participate due to federal furlough. Remaining GFSC members were unable to participate due to scheduling conflicts. Although the review panel worked diligently to complete the task of making recommendations based on the documents provided, the absence of the STAT and other federal scientists considerably limited the depth of discussion. It also constrained the ability of the review panel to fully evaluate STAT model decisions, assumptions, and interpretations. Continued collaboration among state, federal, and academic scientists, advisory bodies, and the public is

essential for producing the rigorous scientific advice and transparency that the PFMC process depends on. As such, future stock assessment reviews should be conducted only when key stock assessment scientists and technical reviewers are able to fully participate.

For this report, the proposed base model that was reviewed during the August GFSC meeting (Kinneen et al. 2025) will be referred to as the ‘August 2025 model’. The proposed base model (Taylor et al. 2025a) that was reviewed as part of this supplemental review will be referred to as the ‘October 2025 model’. The review panel discussed STAT responses to GFSC requests (Taylor et al. 2025b) and other modifications made to the August 2025 model. Although model input and output files were made available, a revised stock assessment report was not provided at the time of the supplemental review. Bridging analyses, some sensitivity results, and model diagnostics were provided in advance. Additional runs that would have improved understanding of cause-and-effect relationships were not possible without the STAT.

Based on the materials provided, the review panel recommended endorsing the October 2025 model as best scientific information available (BSIA). The review panel made one formal request during supplemental review, should the STAT return from furlough in time to provide responses for SSC review before Council action. Recommendations provided in this report are not contingent on responses to the additional request, given an informal sensitivity run made during the supplemental review meeting. Many uncertainties remain (e.g., tensions between fishery and survey composition data) and results of this assessment have considerable impacts on overfishing limits (OFLs). Thus, the review panel strongly encourages prioritization of a benchmark assessment for widow rockfish in the next biennium.

Summary of Data and Assessment Models

The 2025 update assessment for widow rockfish was performed using an integrated age-structured model (single area, two sexes) in Stock Synthesis (SS3 v3.30.23.1). The following “Input Data” (Fig. 1) and “Model Specifications” sections pertain to the October 2025 model, as proposed by the STAT.

Input Data

- Three (3) sources of catch data: bottom trawl, midwater trawl, and the at-sea hake fishery.
- Three (3) fishery-independent indices of abundance: NWFSC West Coast Groundfish Bottom Trawl Survey (WCGBTS), Alaska Fisheries Science Center (AFSC)/NWFSC Triennial survey, and Southwest Fisheries Science Center (SWFSC) and NWFSC/Pacific Whiting Conservation Cooperative (PWCC) Midwater Trawl “juvenile” Survey.
- Three (3) fishery-dependent indices of abundance: Oregon bottom trawl, domestic hake fishery, and foreign at-sea hake fishery.
- Five (5) fleets with length composition data: trip- and state-expanded bottom trawl, midwater trawl, and hake fisheries; tow- and stratum-expanded WCGBTS and Triennial survey.
- Three (3) fleets with age composition data: trip- and state-expanded bottom trawl, midwater trawl, and hake fisheries.
- One (1) fleet with conditional age-at-length (CAAL) data: WCGBTS.

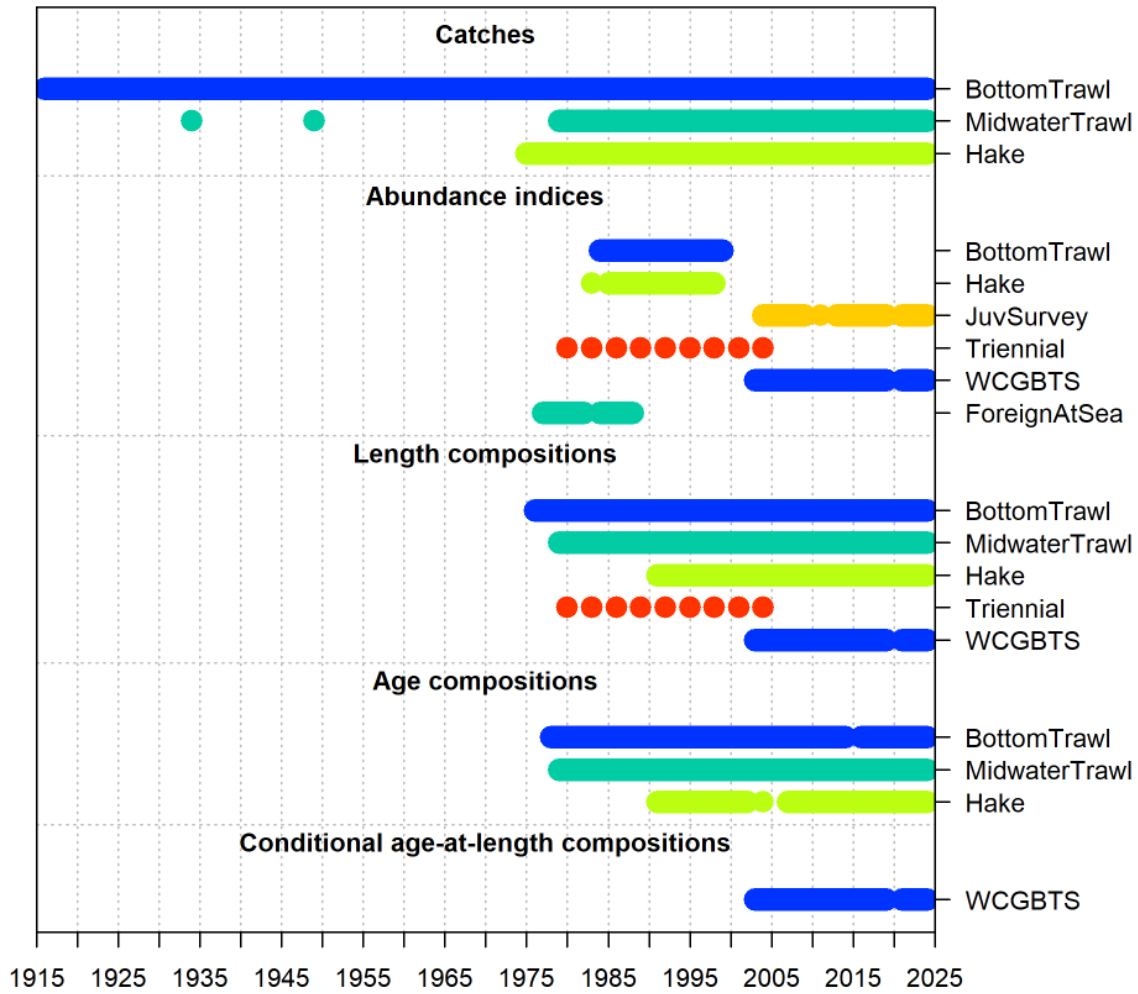


Figure 1. Input data for the October 2025 model, organized by year, fleet, and type (catches, indices of abundance, length compositions, age compositions, and conditional age-at-length compositions).

Model Specifications

- The model started in 1916, when the first catch record was available. The stock was assumed to be unfished and in an equilibrium state at that time.
- The model includes age 0 to 40+ year old fish with a 1 yr step size and lengths 8 to 56+ cm with a 2 cm step size.
- The length-weight relationship was estimated externally as:

$$W = 1.5885 \times 10^{-5} L^{2.9873} \text{ for females and } W = 1.4507 \times 10^{-5} L^{3.0123} \text{ for males.}$$
- Estimates of age-at-maturity were retained from the 2015 benchmark assessment (Hicks and Wetzel 2015). The age-at-50%-mature was estimated at 5.47 yr.
- The fecundity was externally estimated using the following length-fecundity relationship for unobserved *Sebastes* species: $F = 7.21847 \times 10^{-8} L^{4.043}$ (Dick et al. 2017).
- Ageing error matrices were retained from the 2015 benchmark assessment (Hicks and Wetzel 2015).
- Sex-specific time-invariant growth was internally estimated based on the von Bertalanffy growth function.

- Sex-specific natural mortality (M) was estimated using a lognormal prior with a median of 0.10 yr^{-1} and standard deviation of the log (σ) of 0.31. The prior (*sensu* Hamel and Cope 2022) was based on a maximum age of 54 yr.
- Recruitment dynamics were assumed to follow the Beverton-Holt stock-recruit relationship with steepness (h) fixed at the mean of a beta prior (0.72).
- Recruitment deviations were estimated from 1900 to 2024, with the main recruitment estimation period being between 1970 and 2020. The model used a sum-to-zero constraint for recruitment deviations and σ_R fixed at 0.60.
- Discards from the bottom and midwater trawl fishery fleets were estimated externally using several data sources (i.e., Pikitch study, Enhanced Data Collection Project [EDCP], and the Groundfish Expanded Mortality Multiyear [GEMM] report). Estimated discards were then added to catches for the associated fleets.
- Length-based selectivity curves for the bottom trawl and hake fisheries were asymptotic (using the double-normal formulation in SS3), whereas the midwater trawl fishery used the double-normal formulation with a descending limb. The selectivity curve for the foreign at-sea hake fleet mirrored that for the domestic hake fishery. Selectivity for the WCGBTS and Triennial survey used a cubic spline with three nodes. Time blocking was used for bottom trawl, midwater trawl, and hake fishery selectivities.
- Data weighting was based on the Francis method for age and length compositions, with additional variance estimated for the bottom trawl, foreign at-sea hake fishery, and juvenile survey.
- Time-varying catchability (q) was estimated for the Triennial survey and hake fishery by using one time block for each index of abundance.

Review Panel Conclusions on STAT Responses to GFSC Requests

The following summarizes review panel conclusions about STAT responses to GFSC requests. All GFSC requests, GFSC rationales, and STAT responses are detailed in Taylor et al. (2025b). The review panel appreciates the efforts of the STAT to address all of these requests in a short time frame, including those ranked as lower priorities. Their responses to these requests improved the review panel's understanding of the model and reasons for changes in estimated stock size following the 2019 update assessment.

Request 1: This sensitivity analysis continues to show unexpectedly large effects of the relatively minor hook-and-line and net fisheries on estimates of stock size. Without the STAT present, it was not possible to understand the reason(s) for this. The review panel had questions about the mechanism for an 11% decrease in 2027 ACL between the August and October 2025 models, given that the scale of the population does not appear to decrease enough to prompt such a change. This suggests that hook-and-line and net fishery data influence perceptions of stock productivity and hence estimates of F_{MSY} .

Request 2: This sensitivity analysis demonstrated that the August 2025 model generated results similar to that the 2019 update assessment would have had the data error been identified at that time. Considerable differences in estimates of stock size between the 2019 update assessment and August 2025 model would not have occurred had the data error not existed. The review panel had some difficulty interpreting the utility of a scenario in which M was set to the value estimated in the August 2025 model.

Request 3: This sensitivity analysis illustrated how perceptions of stock size are sensitive to the method and eventual scale of data weighting. The review panel recognizes that the McAllister-Ianelli method and a lambda of 0.5 reflected the accepted data weighting practices in 2015, when

the most recent benchmark assessment was conducted and that the TOR does not permit changes in data weighting methods for update assessments. Current best practices, however, are to use the Francis method and lambda of 1.0 for data weighting. The STAT implemented these changes for the October 2025 model, which results in reduced estimates of spawning stock output. The review panel concluded that the October 2025 model reflected an improvement to the August 2025 model but notes that formulaic methods (including Francis 2011) may not generate the most appropriate data weights for all assessments. It is important to ensure sufficient flexibility for STATs to explore alternative data weighting methods and their relative effects on model results, especially when there are substantive composition data and multiple abundance indices.

Request 4: The review panel appreciated the exploration of selectivity curves for the WCGBTS that are more aligned with current best practices. The cubic spline used in the 2015 benchmark assessment still offers the best fit to WCGBTS data, though the choice of selectivity curve had little effect on model results. The STAT retained the cubic spline in the October 2025 model, which the review panel found to be appropriate.

Request 5: Changing the start year of the bias adjustment ramp from 1971 (August 2025 model) to 1970 (October 2025 model) to avoid starting between two of the strongest year classes led to a slightly improved model fit, slightly higher estimate of 2025 stock size, and slightly higher 2027 ACL. The review panel concurred with the use of a 1970 start year.

Request 6: This sensitivity analysis demonstrated the large effect of recent age compositions, which includes many more old individuals, on estimates of M . Specifically, the removal of WCGBTS age data increased female M from 0.122 yr^{-1} to 0.153 yr^{-1} , showing that these data support a lower M . Lower M is also supported by the likelihood profiles. However, the review panel was unable to fully understand changes that resulted from simultaneous data removals without the STAT present.

Request 7: This sensitivity analysis showed that updating the historical catch reconstruction for Washington had little effect on model results. The STAT implemented this correction in the October 2025 model. The review panel concurred with the STAT.

Request 8: This sensitivity analysis showed that estimates of M were highly influenced by recent age data. With each year of data removal, M increased toward the value estimated in the 2015 benchmark assessment.

Request 9: This open-ended request gave the STAT flexibility to explore other potential issues and/or provide sensitivities that they deemed helpful or informative for supplemental review. The STAT explored three such issues and/or sensitivities, as follows:

Simplification of fleet structure

Given the complexity of the fleet structure used in the 2015 benchmark and the unexpected influence of data from minor fixed gear fisheries, the STAT explored several options for simplifying fleet structure. This included aggregating fleets, removing small amounts of composition data, and adding external estimates of discards to catches rather than estimating retention curves for each fleet. Biomass trajectories that resulted from these sensitivities were very similar.

Opposing trends in midwater trawl fishery and bottom trawl survey age compositions

The STAT illustrated conflicts between M based on age compositions from the bottom trawl survey and M based on age compositions from the midwater trawl fishery. The proportion of older fish has increased in the bottom trawl survey (supporting a lower M) and decreased in the midwater trawl fishery (supporting a higher M) since approximately 2019. This helped to explain why M increased when WCGTBS data were removed (Request 6) and why M increased towards the 2015 benchmark assessment value with each retrospective peel (Request 8). However, the STAT and the review panel caution that each year of data is informed by different numbers and locations of samples. As such, apparently disparate trends may be spurious or driven by other factors such as differences between fish caught by the midwater trawl fishery and those sampled by the bottom trawl survey or ontogenetic shifts in movement rates or spatial distributions.

Based on industry reports that fishing is confined to a narrow set of locations, the STAT explored the potential for spatially conflicting signals. The STAT concurred that the fishery is confined to two narrow latitudinal bands off the Columbia River and central Oregon. Mean ages from the survey have been lowest off the Columbia River in recent years, suggesting that large removals in a relatively small area may have removed older fish and skewed the age structure toward younger ages in that region. Other potential causes of this pattern may include spatial differences in recent recruitment or age-related movement. The review panel identified that a useful sensitivity analysis would be to constrain the spatial extent of the assessment to see how results may change when the model relies only on data from the area that is actively fished. The review panel would have benefitted from seeing how age compositions varied by fleet, but was unable to do so without the STAT.

Exploring time-varying selectivity in the midwater trawl fleet

The STAT explored several different time blocks to estimate selectivity for the midwater trawl fleet. This was motivated by industry comments about changes in fishing behavior in recent years. In general, the STAT found that alternative time blocks had little effect on model results. However, forecast trajectories began to vary substantially when time blocks were introduced after 2017, which allows forecast selectivity to deviate from historical selectivity. The review panel noted that this issue has come up in other assessments (e.g., rougheye/blackspotted rockfish; Field et al. 2025) and that it would be valuable to establish guidelines for time blocking selectivity. Notably, time blocks for selectivity should be motivated by changes in fishery dynamics or management actions rather than patterns in the data (e.g., the appearance of older ages). Additional care should be taken for time blocks in terminal years.

The STAT extended the 2002-2010 time block from the 2015 benchmark assessment to end in 2016, given that the midwater trawl fishery did not begin in earnest until 2016. Thus, the October 2025 model included the following time blocks for estimating midwater trawl selectivity: 1916 to 1982, 1983 to 2001, 2002 to 2016, and 2017 to 2024. The review panel concurred with the use of these time blocks.

Request 10: The review panel appreciated STAT updates to the description of the fishery, given considerable changes in effort since the 2015 benchmark assessment. The revised and expanded text provide important context for understanding the decisions for and results of the August and October 2025 models. The review panel recommends updating descriptions of the fishery for all assessments.

Request 11: The figures provided context that helped the review panel better understand how fishery-specific selectivities have changed across recent assessments.

Request 12: Constraining uncertainty in the pre-recruit index to that of sigma-R increased the estimate of 2023 recruitment. This was anticipated given a better fit to the pre-recruit index, which has a substantial but delayed effect on the forecast trajectory. Constraining uncertainty would require high confidence that the pre-recruit index meaningfully tracks recruitment. This seems unlikely given poor fits to relatively high estimates from 2013 to 2016, which should be well informed by composition data. Given that the pre-recruit index was not particularly informative, the STAT did not constrain its uncertainty for the October 2025 model. The review panel concurred with the STAT. If the index had been more informative, constraining uncertainty would likely have been appropriate.

Request 13: This sensitivity analysis accounts for length-dependent fecundity in rockfish (*sensu* Dick et al. 2017) and reflects current best practices. Accounting for hyperallometry did not change model fit and led to small decreases in stock status (3% in 2025) but larger decreases in ACL (9% in 2027). The STAT used a length-fecundity relationship for ‘unobserved rockfish’ in the October 2025 model. The review panel recommends using the species-specific relationship provided in Dick et al. (2017).

Request 14: This request was addressed as part of Response 9. The figures were very helpful for illustrating the concentration of fishing effort in a limited portion of the species’ range.

Supplemental Review Panel Requests to the STAT

The review panel identified one formal request (Request 15) during supplemental review, should the STAT return from furlough in time to provide responses for SSC review before Council action. Recommendations provided in the rest of the report are not contingent on responses to the additional request, given an informal sensitivity analysis that was conducted during the supplemental review.

Request 15: Use the length-fecundity relationship that is specific to *Sebastes entomelas* (Table 6; Dick et al. 2017). **Rationale:** The length-based fecundity parameters used in the October 2025 model pertained to ‘unobserved rockfish’. Species-specific values should be used because they are available.

Text Revisions to the Proposed Base Model Document

The review panel identified the following areas of improvement for the final stock assessment report:

- Clarify whether the change in treatment of discard data was done separately or at the same time as the simplification of fleet structure. The text currently indicates that there was a substantial change when updating the historical catch reconstruction, simplifying fleet structure, and augmenting the treatment of discard data. It is unclear whether the scale of that change was due to removing composition data from fixed gear fleets, changing the treatment of discards data, or both.
- Expand on the justification for using a length-fecundity relationship. This approach leads to a substantial shift in management advice, so using it should be well justified in the text.
- Clarify how M affects recent changes in stock size.
- Some changes in OFLs seem disproportionate to associated changes in model parameters. For example, there is a considerable decrease in the 2027 OFL when the length-fecundity relationship is updated, but estimates of stock size were fairly similar between the models that use different assumptions about fecundity. How this relates to a change in “currency” for reproductive output and other potential drivers should be explicitly stated. Generally, it would

be helpful to clearly articulate how models with similar biomass trajectories can produce very different OFL projections.

Technical Merits of the Assessment

The review panel found the following technical merits for this assessment:

- The October 2025 model improved upon the August 2025 model in the following ways:
 - A technical error from the 2019 update assessment was corrected.
 - The historical catch reconstruction for Washington was updated to reflect an improved method for apportioning unidentified rockfishes.
 - The fleet structure was simplified. Catches from fixed gear fleets (hook-and-line and net) were combined with catches from the bottom trawl fleet and composition data for fixed gear fleets were removed. Catches made by the foreign fishery targeting Pacific Ocean perch (1966 to 1976) were moved from the hake fleet to the bottom trawl fleet.
 - Discards from the bottom trawl and midwater trawl fleets were estimated externally using several data sources (i.e., Pikitch study, Enhanced Data Collection Project [EDCP], and the Groundfish Expanded Mortality Multiyear [GEMM] report). Discard estimates were then added to the catches for their associated fleets.
 - The data weighting procedure was updated from McAllister-Ianelli to Francis methods to reflect the accepted practices guidelines. The likelihood multiplier (λ) was also updated from 0.5 (a 50% reduction in weights for fishery-dependent composition data) to 1.0 (no reduction in weights for fishery-dependent composition data).
 - The time block for midwater trawl selectivity was updated from 2002-2010 to 2002-2016. This change better reflects when the midwater trawl fishery began (following a rebuilt status designation for widow rockfish) rather than when the individual fishing quota (IFQ) program was implemented.
 - A relationship for length-dependent fecundity (*sensu* Dick et al. 2017) was used instead of assuming that the number of eggs is proportional to body weight.
 - The recruitment bias adjustment ramp was shifted from starting in 1971 to 1970 to account for well-informed recruitment in that earlier year.
- The model showed a broadly similar stock trajectory compared to earlier assessments.
- The assessment includes large amounts of fishery-dependent and -independent data. Several long-term indices include the WCBTS, the Triennial survey, a coastwide pre-recruit (juvenile) index of abundance, and three historic commercial fishery CPUE indices.
- There were considerable amounts of age and length data from fleets with the largest catches.
- Overall, the model fit well to age data, given assumptions about selectivity.
- The value for steepness ($h = 0.72$) reflects the mean of a prior for West Coast rockfishes (Thorson et al. 2019).

Technical Deficiencies of the Assessment

The review panel found the following technical deficiencies for this assessment:

- Fishery-independent and -dependent indices of abundance were fairly uninformative.
- Bottom trawl surveys may not produce the most reliable indices of abundance of midwater rockfish species.
- WCBTS age data show a rapid increase in the proportion of older fish in recent years, whereas age compositions from the midwater trawl fleet show the opposite trend. The model was highly sensitive to these data.
- Tensions between age compositions from the WCBTS and other sources of age data are evident from the component likelihood ratios.

- The model fit well to commercial length data in some years but not throughout the time series, given assumptions about selectivity.
- The model was sensitive to the data weighting procedure used.
- Sensitivity analyses that illustrated the effects of estimating spawning output (with the inclusion of a length-fecundity relationship) as opposed to spawning biomass were limited. This was informally explored by the review panel. A formal evaluation was not possible without participation by the STAT.
- Retrospective patterns were overstated in the text. The review panel would have benefitted from being able to evaluate projections from a model that excluded the most recent five years of data. This was not possible without participation by the STAT.
- Stock boundaries for widow rockfish likely extend into Canada and Mexico, although the assessment is limited to waters along the US West Coast.

Unresolved Problems and Major Uncertainties

The review panel identified the following remaining uncertainties for this assessment:

- The reason for a disproportionate impact of the hook-and-line (H&L) composition data on model results remains unclear.
- Age compositions from the WCG BTS and midwater trawl fleet differ considerably from one another. Since 2019, the WCG BTS sampled many more older fish than the midwater trawl fishery. The reason for this remains unknown. Given that ageing error increases with age, data sources with greater proportions of older individuals (e.g., WCG BTS) could be disproportionately impacted by ageing error.
- Although the Francis method is now preferred over the McAlister-Ianelli method for data weighting, the relative weighting of composition data and abundance indices may have unidentified implications for estimates of recruitment, stock trajectory, and stock status.
- Natural mortality is a major uncertainty for this assessment. Estimates of natural mortality for females decreased with each previous assessment, from $M = 0.157 \text{ yr}^{-1}$ in the 2015 benchmark to 0.144 yr^{-1} in the 2019 update assessment and 0.122 yr^{-1} in the August 2025 model. The estimate of female natural mortality increased in the October 2025 model, to $M = 0.135 \text{ yr}^{-1}$. All internally estimated values of M are higher than would be inferred based on a maximum age of 54 yr ($M = 0.10 \text{ yr}^{-1}$ *sensu* Hamel and Cope 2022).
- Older fish identified in the WCG BTS may have an outsized effect on estimates of M . The review panel was unable to evaluate how results would have changed when fixing M based on a prior informed by maximum age (*sensu* Hamel and Cope 2022). The reporting about effects of M on recent changes in stock size was also unclear.
- The STAT referenced a meta-analysis by Dick et al. (2017) for the length-fecundity relationship. However, the species-specific relationship was not used. Although revising the length-fecundity relationship from ‘unobserved rockfish’ to the relationship specific to widow rockfish is not expected to alter model results or diagnostics, it could impact OFLs and ABCs. Medians and 95% confidence intervals for length-fecundity parameters for widow rockfish were reported in Dick et al. (2017) as follows:
 - $a = -14.966$ ($-17.21, -10.79$)
 - $\exp(a) = 3.165 \times 10^{-7}$ ($2.62 \times 10^{-9}, 1.38 \times 10^{-5}$)
 - $b = 4.545$ ($3.86, 4.91$)

Description of Alternative Models used to Bracket Uncertainty in the Decision Table

No decision table was provided for the October 2025 model. The states of nature in the decision table for the August 2025 model were based on a recognition that both M and h contribute greatly to uncertainty. This remains the case for the October 2025 model. The 12.5th and 87.5th quantiles

for M and h were chosen as the states of nature for the August 2025 model ($M = 0.113 \text{ yr}^{-1}$ and 0.131 yr^{-1} for females; $M = 0.126 \text{ yr}^{-1}$ and 0.144 yr^{-1} for males; $h = 0.536$ and 0.904 for both sexes). The low combination of these two factors defined the low state of nature and the high combination the high state of nature for the August 2025 decision table.

The review panel agreed that M and h should be used for the October 2025 decision table and that projections should be made based on $ACL = ABC$ with $P^* = 0.45$ and a sigma of 0.5. The low and high values for M and h will need to be updated using quantiles from the October 2025 model. The results of the decision table should be expressed in terms of spawning output and age 4+ biomass to inform the Council about consequences of the change from reporting spawning biomass to reporting spawning output.

Recommended Category and Sigma Value

The model estimated sigma at 0.341 (log scale) for the 2027 OFL. This likely represents an underestimate of uncertainty. Several model parameters (e.g., h) were pre-specified, the fishery-independent indices of abundance (e.g., WCGBTS) were not very informative, and there was an unusually large influence of age composition data from the WCGBTS on M . The review panel recommends a Category 1b designation for this assessment, with default sigma of 0.5.

Recommended Next Assessment Type

Widow rockfish is important to several West Coast fisheries. Remaining uncertainty warrants further investigations that cannot be made as part of an update assessment or during the expedited supplemental review process that occurred between September and October 2025. Although the October 2025 model represents an improvement over the August 2025 model, the 2019 update assessment, and the 2015 benchmark assessment, the review panel recommends that a benchmark assessment be conducted during the 2027-2028 biennium to address tensions among the various input data, particularly age and length compositions.

Areas of Disagreement

There were no disagreements among members of the review panel. Given that the supplemental review took place during a federal government shutdown, the STAT was not able to participate in discussions or respond to additional requests. Thus, it was not possible to document disagreements between the STAT and the review panel.

Management, Data, or Fishery Issues

The GAP advisor sees the circumstances and results of the 2025 update assessment calling into question its adequacy to be considered best scientific information available and to be used for management. The circumstances are an update on a 10-year-old benchmark for which the fishery has undergone drastic changes since that time. The results are a model defined by a significantly declining and modestly productive coast-wide spawning biomass that are in direct conflict with the evidence of fishery execution. More description below:

- 1) The fishery description provided in response to Request 10 is appreciated. However, a full benchmark would allow the impacts of the vast and mostly regulatory driven fishery changes to be evaluated from the beginning of an assessment process.
- 2) The fishery is primarily executed in two locations along the US West Coast, though the stock range is extensive (see STAT Response 9b; Taylor et al. 2025b). CPUE remains robust in 2025 even after a seven-year average of 10,000+ mt annual fishing mortality. The vast majority of the range of the stock has extremely low or no fishing pressure, spawning year after year and allowing young fish to grow. This result is in direct conflict with a model that

projects 10-year ACLs below 6,000 mt and low productivity shown by relatively flat stock status and spawning output for those ten years. The model is not validated by fishery observations.

- 3) Model sensitivity to age data affecting natural mortality seems excessive (see the second table in STAT Response 6, which shows that removing WCG BTS age composition data would increase the 2027 OFL by 74%, from 4,532 to 7,875 mt).

The GAP advisor questions changes in the treatment of hook-and-line data that leads to a reduction in stock status. If understood correctly, the intent was to correct an error from the 2019 update assessment, which would reduce estimates of recruitment in 2013 and 2014. To negatively impact allocations for the next 10 years based on year class estimations that are over a decade old for a stock that seems to be even more productive than was projected in the 2019 assessment seems questionable.

The GAP advisor suggests a more detailed look at survey data. Widow rockfish are encountered, on average, in 26 successful tows in the WCG BTS per year. It may be informative to further evaluate individual tow data (e.g., by location, depth, age class, number of fish per tow) for the last few years given that age compositions are so impactful in the model and there is considerable variability, such as differences between 2023 and 2024 (Fig. 5; Kinneen et al. 2025). Figures presented as part of STAT Response 9b were a good start to better understanding the spatial nature of the fishery and stock, but additional analyses would be helpful for interpreting the data.

The GMT has concerns regarding the spatial limitation of the midwater trawl fleet, which does not overlap with all areas of the WCG BTS and exhibits very different age composition data. The midwater trawl fishery targets specific areas that are likely to have higher aggregations of widow rockfish, and therefore, may not be reflective of the entire extent of the widow rockfish population. Given that the midwater trawl fishery contributes the vast majority of fishery-dependent data, this seems to pose problems in the assessment model, especially given the absence of older fish in the midwater trawl fleet. This absence may be driven by an inability for widow rockfish to reach older ages in heavily targeted areas. Although the WCG BTS encounters older fish and spans the entire coast, the survey gear is not designed to frequently encounter midwater rockfishes and may not be thoroughly sampling widow rockfish. For future stock assessments, the GMT supports further exploration into additional data sources as well as development of a survey that is better designed to encounter midwater rockfishes. However, the GMT suggests balancing new data sources with further exploration into how to better incorporate and account for existing data sources (i.e., midwater trawl fishery and WCG BTS) given their long time series. While the WCG BTS is not a perfect data source for a midwater species, it is a consistent source of index information that can be compared across years and assessments.

The GMT also has concerns regarding the inability to thoroughly investigate changes to the fecundity relationship during this review, given the absence of the STAT. The October 2025 model changed the fecundity relationship, which resulted in spawning output being expressed in billions of eggs rather than spawning biomass expressed in metric tons. This change appears to impact management outcomes (i.e., OFL) without changing the biology of the stock, since it is effectively a change in units. The GMT understands that the accepted practices guidelines allow for a divergence from the fecundity relationship outlined in the meta-analysis by Dick et al. (2017), provided that a sensitivity analysis is conducted. The review panel ran a preliminary sensitivity analysis but was unable to understand all decision points and cause-and-effect relationships associated with the new length-fecundity relationship without the STAT present. The GMT hopes

that review panel Request 15 will be explored before full SSC review in November, given that the length-fecundity relationship will impact harvest limits.

Recommendations for Future Research and Data Collection

The review panel identified the following research recommendations for this assessment:

- Due to the influence of age compositions on model results, increased precision for ageing older individuals is highly desirable. Increasing precision may include re-ageing older samples and conducting additional double reads.
- Although some age validation relying on edge analysis has been conducted for widow rockfish (Pearson 1996), this method is not likely to be suitable for older fish. An age validation study that includes all observed age classes could improve age estimation for this species.
- Additional research on age-specific movement rates and shifts in distributions or densities may improve our understanding about the tension between fishery-independent and -dependent sources of composition data. This line of research could also inform the potential for hyperstability in the fishery, as a result of, for example, density-dependent or behavioral effects (Hilborn and Walters 1992; Gillis and Peterman 1998; Harley et al. 2001; Erisman et al. 2011; Hicks 2013). Exploring the potential for hyperstability has already been identified as an area for future research for West Coast rockfishes (Cope et al. 2021).
- The review panel recommends evaluating how results may vary when M is fixed based on a prior that is informed by maximum age (*sensu* Hamel and Cope 2022).

The Panel identified the following research recommendations for groundfish stock assessments (in general):

- Update the TOR to allow for changes in the data weighting procedure used in update assessments. This is similar to a technical correction. If there is a change in the data weighting procedure used in an update assessment, the STAT should evaluate relative effects on model fits to indices. If the change leads to considerable differences in model results, the update assessment should be recommended for supplemental review.
- Update the TOR to allow for the consideration of qualitative data weighting methods (e.g., based on the representativeness of composition data). Sufficient justification for relative weights and sensitivity analyses should be provided when using qualitative methods.
- Update the TOR to require descriptions of the fishery for update assessments. Fishery descriptions would provide the context necessary for interpreting results and evaluating the efficacy of modeling decisions (e.g., time blocks used to estimate selectivity), especially when the most recent benchmark assessment is 10 yr old or older.

Acknowledgments

The review panel would like to thank the STAT for producing detailed and scientifically rigorous responses to GFSC requests within a relatively short timeframe. The review and discussion of this material would have greatly benefitted from STAT participation, which was not possible due to the coincidence of this meeting and a federal government shutdown. To provide the best possible scientific advice for management, future stock assessment reviews should be conducted only when STATs are able to fully participate. The review panel was appreciative of the thoughtful contributions made by GMT and GAP advisors, and public comments throughout the review. The review panel also thanks Council staff for their technical support and ongoing guidance on the administrative aspects of this process.

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