Scientific and Statistical Committee's
Groundfish Subcommittee
Review of the 2025 Groundfish Stock Assessments Report 2

Pacific Fishery Management Council
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The Groundfish Subcommittee (GFSC) of the Scientific and Statistical Committee (SSC) met at the University of Washington School of Aquatic and Fishery Sciences in Seattle on August 12-13, 2025 to review the new groundfish stock assessments that will be considered by the full SSC and the Pacific Fishery Management Council (PFMC, referred as the Council) at the September 2025 Council meeting. These included the benchmark assessments reviewed by Stock Assessment Review (STAR) Panels during 2025, two stock assessment updates reviewed only at this meeting (noting that updates "reset" time-varying sigma), and numerous catch-only projections reviewed only at this meeting (noting that catch-only projections do not reset time-varying sigma, but often lead to changes in overfishing limit (OFL) and acceptable biological catch (ABC) projections by virtue of accounting for differences between assumed and realized catches from past assessments). Per the Terms of Reference for the Groundfish Stock Assessment Review Process for 2025-2026 (TOR), this meeting is intended to provide time for a more thorough review of the new assessments than would otherwise be available to the SSC at the September Council meeting, when the assessments are scheduled to be formally adopted for use in the groundfish harvest specification process. A list of participants and their affiliations is provided in Appendix A.

The SSC GFSC provided recommendations for the three benchmark assessments reviewed during STAR Panels 1 and 2 in a separate report for the SSC meeting scheduled on September 3, 2025. The remaining recommendations are included in this report for the SSC and September 2025 Council meeting.

Widow Rockfish Update Assessment

The GFSC reviewed the 2025 update assessment for widow rockfish (*Sebastes entomelas*), which is the second update to the 2015 benchmark assessment. The previous update assessment was conducted during 2019 and a catch-only-projection during 2023.

The model that the 2025 update assessment is based on follows the same model structure as the 2015 benchmark assessment and the 2019 update assessment. It is structured as a single area, two-sex population, spanning U.S. waters from Canada to Mexico. The model covers the period 1900 to 2024 and includes five fishing fleets and three fisheries-independent surveys. The widow rockfish stock was overfished and declared rebuilt in 2011. A targeted fishery for widow rockfish was established during 2017 and the catches increased rapidly to above 10,000 mt in 2018 and have remained high since then.

The base model estimated parameters for length-based selectivity for all fleets and surveys, retention curves for the bottom trawl and midwater trawl fleets, a sex-specific length-at-age relationship, sex-specific natural mortality, and recruitment deviations. A Beverton-Holt stock-recruitment function was used to model productivity, and the steepness parameter (h) was set to be the prior mean of 0.72. The natural mortality (M) prior was updated based on Hamel and Cope (2022) approach while the maximum age of 54 is unchanged from the 2015 or 2019 models. The McAllister-Ianelli method was used for data weighting. The changes made in the 2025 model fell within the TOR for an update assessment.

During the process of updating assessment data, an error in the 2015 benchmark and 2019 update assessments was identified, in which the nearshore fixed-gear discard length samples were erroneously included in the hook-and-line (H&L) gear discard length samples. Fish sizes in the nearshore fixed-gear samples were much smaller than the sizes in the H&L samples, as demonstrated in Figure 17 in the draft assessment. Removing the nearshore fixed-gear discard length samples reduced the sample sizes for H&L discard length data and led to the inability of the model to reliably estimate retention parameters. Therefore, H&L discards were added to H&L landings instead of being modeled through a retention curve, and H&L discard length data were removed in the 2025 base model. This correction translated into lower estimated recruitment in the 2010s (particularly the strength of the 2013 year class) than that estimated in the 2019 update assessment and, consequently, contributed to a decrease in stock size in recent years (Figs. 22-26 in the draft assessment). The STAT and the GFSC agreed that the compositional data from this fleet should not have considerable impacts on the model results, given that H&L landing and discard accounted for a small portion of the total mortality, less than 1% in the recent ten years.

The STAT and the GFSC also noted that M estimates have declined after 2015 (females: 0.157 yr^{-1} and males: 0.171 yr^{-1}) to 2019 (female 0.144 yr^{-1} and male 0.155 yr^{-1}) to 2025 (females: 0.122 yr^{-1} and males: 0.135 yr^{-1}). All these M values were estimated while implementing a prior assuming a maximum age of 54, though few widow rockfish older than about 30 yr were observed (Fig. 20 in the draft assessment). The STAT produced a helpful figure for the presentation to the GFSC (slide 33) that clearly demonstrated the increased frequency of occurrence of older fish in the WCGBTS data. This figure should be included in the final assessment, and comparable figures with fishery data may also be helpful. The estimates of M varied slightly depending on the weight given to age and length data or removing recent years of data.

The draft assessment used the McAllister-Ianelli method for weighting composition data, as this was the approach applied in the 2015 assessment. The model was quite sensitive to the choice of data weighting. It may be worth further exploring other methods for weighting compositional data, such as "Francis weighting", showing, for example, the impacts of weighting on M, or the influence of H&L compositions weighting on model results.

The recruitment deviations started in 1965, as was the case for the 2019 update assessment. There are two large recruitment years (1970 and 1971) that were estimated soon after the start of recruitment deviations, but close to the time period used for the bias adjustment. The 2015 benchmark assessment used 1974 as the starting year for bias adjustment, whereas the 2019 update used 1971 as the start of the bias adjustment, which is exactly between two of the strongest year

classes estimated in the assessment (1970 and 1971). It was also noted that the estimated magnitude of the 2013 year class, which was unusually large and a key contributing factor to the sharp increase in biomass over recent years within the 2019 update model, was greatly reduced in the 2025 update model, although it was still among the highest estimated recruitment events. The estimated size of the 2014 year class also dropped substantially between the two models.

The 2025 spawning biomass (SB) relative to unfished equilibrium SB is 55%, above the target of 40% (95% confidence interval of 36 to 74%). However, the model estimated productivity and projections from the 2025 update are considerably more pessimistic than those from the 2019 update. SB is estimated to be at 46,934 mt in 2025 (95% confidence interval of 23,842 to 70,026 mt). These estimates are very different from the estimates in the 2019 update and the 2023 catch-only-projection. The fraction unfished from the 2023 catch-only projection was 81.1% at the beginning of 2025, with spawning biomass estimated at 71,324 mt.

The GFSC received public comments on changes of fishery practices since 2015, especially where fisheries operated, due to regulations. Different selectivity curves or time-blocking on the selectivity can be considered.

Endorsement as the Best Scientific Information Available (BSIA)

Given the substantial change in the projections of stock status and the estimated stock productivity, which was in part due to unusual model sensitivity to a small amount of data that should not have been so influential in the 2019 update, supplemental review and additional investigation are desired. The GFSC recommends that the widow rockfish assessment be referred to the Supplemental Review meeting in mid-October, which will allow for a more thorough evaluation of the factors influencing the change in perception. The supplemental review will also allow the assessment team to more rigorously explore and implement changes that they consider appropriate which are otherwise outside of the Terms of Reference, such as changes in the shape of selectivity functions (Request 4), and changes in data weighting (Request 3). Most other requests would represent sensitivity analyses or changes that are consistent with the Terms of Reference for an update assessment. A list of 14 prioritized sensitivity analyses and considerations for a revised model are listed below. Although the time available is not sufficient to develop a new benchmark, the GFSC recommends that the assessment team consider any other sensitivity analyses or improvements to the base model that they deem appropriate (e.g., Request 9).

GFSC Requests for Supplemental Review

Higher Priority Requests

- **Request 1:** Conduct a sensitivity that a) removes, b) combines (if practicable, with recognition that it may not be), and c) down-weights the hook-and-line (H&L) and other fixed gear compositional data (only if removal has a large influence, if removal has no influence, disregard).
  Rationale 1: The H&L and net fisheries represent a very small fraction of the landings but appear to have had a greater influence on model results than might be expected. This sensitivity analysis would inform the degree of influence that these "minor" fisheries have on model results.

- **Request 2:** Apply the changes and corrections to the H&L discard data made for the 2025 model to the 2019 model and compare revised 2019 model results to the original 2019 model results. Please provide a projection of the OFLs that would have arisen from the corrected 2019 model and actual and projected catches through 2026.
  Rationale 2: This bridging analysis would improve our understanding about the relative influence of the discard data error relative to other differences between the current draft update assessment and the 2019 update assessment.

- **Request 3:** Reweight the compositional data using Francis methods (as was done in the sensitivity analysis for the draft document) and provide a profile across *M* with Francis weighting.
  Rationale 3: Most assessments in the past several cycles have used Francis weighting methods rather than McAllister-Ianelli methods for weighting for compositional data. Consideration of Francis weighting methods was outside the TOR for an update assessment but can be considered for a revised base model during the Supplemental Review.

- **Request 4:** Consider alternative selectivity curves for WCGBTS index.
  Rationale 4: The 2015 assessment used a spline to estimate WCBTS selectivity. Few assessments since then have used the spline option for selectivity, and the time series is now twice as long. Revisiting selectivity using dome-shaped and asymptotic curves would coincide with current practices and enable an evaluation of how sensitive the model is to the shape of this curve.

- **Request 5:** Explore alternative start years for the bias adjustment ramp used to estimate recruitment deviations.
  Rationale 5: The 2015 benchmark assessment used 1974 as the starting year for bias adjustment. The 2019 update assessment shifted the start date to 1971, which inadvertently started the ramp between two year classes that are among the strongest estimated in the assessment (1970 and 1971). These year classes were likely well sampled during the rapid development of the fishery in the 1980s. Adjusting the bias ramp to start before 1970 would inform how sensitive model results are to this decision point.

- **Request 6:** Conduct a "leave-one-out" sensitivity analysis, where survey indices and composition data are sequentially removed from the proposed base model. Provide a table that reports associated likelihood values by the remaining fleets and components, as well as key parameter estimates (including *M*), along the lines of Tables 29-31 in the draft yellowtail rockfish assessment or Tables 14-16 in the draft chilipepper assessment.
  Rationale 6: This sensitivity will inform the relative influence of each index and composition dataset on model results, particularly the estimated natural mortality rate. This was done for some but not all of the datasets in the draft update assessment.

- **Request 7:** Include an updated historical catch reconstruction for Washington (WA) into the base model.
  Rationale 7: Although these data were provided after the data deadline, they were used in a sensitivity analysis. Including updated catch data in the base model represents an improvement over the data used in previous assessments. It was noted that across all states,

recreational catches were comparable in volume to some of the commercial fleets, and should be accounted for in future models. There is likely not sufficient time to accomplish this task prior to the supplemental review.

- **Request 8:** Provide two 10-year retrospective analyses, one using both McAllister-Ianelli and the other using Francis weighting of the compositional data. Include a table that reports key model parameters and outputs (e.g., the model estimate of *M*, depletion, $SPR_{50\%}$ the MSY proxy) along the lines of Tables 29-31 in the draft yellowtail rockfish assessment or Tables 14-16 in the draft chilipepper assessment.
- **Rationale 8:** The change in perception of stock status is substantial between the current and previous assessments. The method of weighting compositional data also seems to have a substantial influence on model results. A 10-year retrospective would improve our understanding about the effects of data and weighting methods on the shift in stock status.

- **Request 9:** Explore other potential issues and/or provide other sensitivities that the Stock Assessment Team (STAT) deems helpful or informative. As with the above explorations, any such changes or improvements need not adhere to the terms of reference for update assessments.
  Rationale 9: Responses to these requests and other STAT investigations may lead to additional improvements or insights that would help inform the reason for substantial changes in stock status or productivity between the current and previous assessments, or (more importantly) to improvements in the proposed base model for Supplemental Review.

Lower Priority Requests

- **Request 10:** Update the fishery description section to reflect changes since the 2015 benchmark assessment (Groundfish Advisory Panel [GAP] recommendation).
  Rationale 10: Fisheries have changed considerably since 2015 (e.g., with changing ecological conditions, other stock dynamics, and varied management actions). It would be helpful to update the description of the fisheries for the 2025 assessment, even though this is not required for an update assessment.

- **Request 11:** Compare selectivity curves for the fisheries and surveys from the 2015, 2019, and 2025 assessments.
  Rationale 11: A direct comparison will illustrate how the shapes of the selectivity curves have changed across recent assessments.

- **Request 12:** Provide a sensitivity analysis in which the pelagic juvenile survey index (age-0 abundance) is retuned and the total coefficient of variation (CV) does not exceed sigma-R.
  Rationale 12: With conventional tuning practices, the influence of the index is often "tuned out" of the assessment entirely (particularly when CV with additive variance greatly exceeds sigma-R). This practice was adopted for the 2025 chilipepper assessment and allows the recruitment index to be more influential for the most recent years of data.

- **Request 13:** Provide a sensitivity analysis in which size-dependent fecundity is accounted for based on the fecundity parameters from Dick et al. 2017 (see

https://github.com/EJDick-NOAA/Rockfish-Fecundity/blob/main/README.md for converted parameters).
Rationale 13: Accounting for size-dependent fecundity in rockfish stocks using the meta-analysis from Dick et al. (2017) or other information has become standard practice in recent years and is included in the TOR and Accepted Practices Guidelines documents.

- **Request 14:** Provide a summary of differences in compositional data (for example, mean length or mean age) by fishery (fleet) and state for the most data-rich fisheries. Oregon and Washington can be combined if there are insufficient numbers to allow for a robust analysis at that scale.
- **Rationale 14:** Catch data and public comments indicate that catches have been increasingly concentrated off central Oregon waters during recent years. It would be helpful to understand whether signals in the compositional data suggest differences in recruitment and/or fishing intensity. Currently, data from the various states are pooled into an overall (catch-weighted) average. This is simply a data exploration request.

Major Uncertainties and Considerations for Decision-Making

Natural mortality and steepness were identified as major sources of uncertainty in the draft assessment.

Stock Category and Sigma Recommendations

Stock category and sigma recommendations will be made following Supplemental Review.

Recommendation for the Next Assessment

Although this topic should be discussed again following the results of the supplemental review, the GFSC currently recommends that a benchmark assessment be prioritized for widow rockfish.

Yelloweye Rockfish Update Assessment

The GFSC reviewed the 2025 update assessment for yelloweye rockfish (*Sebastes ruberrimus*), for which model structure was unchanged from 2017. The assessment is of a single stock with two areas and a single sex. Natural mortality was unchanged from the 2017 benchmark (fixed at $0.044yr^{-1}$) and steepness was fixed at 0.72, comparable to the 2017 benchmark (0.718). The fleet structure was, and remains, moderately complex (7 fleets), and age data are treated as conditional on length. Landings for this stock peaked during the 1980s, declined sharply during the early 2000s, and have been slowly increasing over the past decade. The model includes eight relative abundance indices (five fishery-dependent, and three fishery-independent indices). Revisions to historical catch information from Oregon and Washington were also included in the update.

The STAT noted that information about the number of trips associated with recreational fishing data was unavailable, and consequently a simple linear regression was used to develop sample size information for some recreational data used within the update. The need to discuss this further during the 2025 assessment cycle process review was noted. The GFSC agreed with the STAT that changes to the catchability (q) and selectivity time blocks for the recreational indices were appropriately done, although it was also recognized that a more robust description of the 2017

model in the bridging discussion would have been useful. The GFSC also noted that fits to mean age data from International Pacific Halibut Commission (IPHC) longline survey data are quite poor, and there was some discussion regarding why this might be. It was noted that this survey is selecting the largest fish- but there is a limit to how old fish within that survey could get, and recognition that age data are fairly limited for that survey. The GFSC recommends that this be explored more deeply in future assessments.

Model bridging and sensitivity analyses demonstrated that the updated catches, abundance indices and compositional data did not substantively alter model estimates of abundance and trend, although the tuning of compositional data did alter the estimated stock trajectory slightly. This was primarily a consequence of shifts in the perception of the strength of both historical and recent recruitment estimates, with low (negative recruitment deviations) recruitment previously estimated for the (approximately) 2010-2015 time period in the 2017 model shifting to higher estimated recruitment, and subsequently with lower recruitments estimated for the 2016-2020 time period. These shifts were driven primarily by updated length and age composition data. The GFSC noted that it would be helpful to better understand which recruitments in a time series actually contribute to the spawning biomass in the terminal year of the model (this was recognized as something to be discussed at the process review). Overall, the model estimates were quite stable between the 2017 benchmark assessment and the 2025 update, and there were no discernable patterns or concerns with the retrospective analysis.

At the start of 2025, the spawning output was estimated to be at 40.1% of the unfished spawning output level. The GFSC agreed that the assessment meets the TOR for an update, and agreed that the stock can and should be declared rebuilt. As in the 2017 benchmark, natural mortality represented the major source of uncertainty for the decision table, with the high state of nature (M = 0.056yr^{-1}) suggesting that the stock was well above target levels in 2025 and the low state of nature (M = 0.037yr^{-1}) suggesting that the stock was slightly above the MSST, but well below target levels.

Endorsement as the Best Scientific Information Available

The GFSC endorses the yelloweye rockfish benchmark assessment as providing the best scientific information available and suitable for informing management decisions.

Major Uncertainties and Considerations for Decision-Making

Major uncertainties are the natural mortality rate and steepness assumptions, as well as the strength of recent year classes, which are poorly estimated for the past decade. It was noted that spawning output in area 1 (CA) was substantially more depleted historically, with relative abundance slightly below the target level, whereas the relative abundance in area 2 (OR/WA) was slightly above the target level, but the differences between the two area trends were quite modest in the terminal year of the model.

Stock Category and Sigma Recommendations

The GFSC recommends that the yelloweye rockfish stock be assigned as a Category 1 stock, with the default sigma value of 0.5 for calculating the scientific uncertainty buffer. The GFSC recommendations are consistent with the STAR Panel recommendations.

Recommendation for the Next Assessment

The GFSC recommends that the next assessment for yelloweye rockfish be an update. However, it was noted that new tagging data suggests that movement rates might be greater than anticipated when the 2017 model was developed, suggesting that some reconsideration of whether an area model was the most appropriate modeling approach would be appropriate. A change to a single area model would require a benchmark assessment, if that were to be warranted based on new information.

Recommended OFLs for 2027 and 2028

The OFLs for the next management cycle are 129.3 mt for 2027 and 130.9 mt for 2028, based on the assumption that the Council chooses a P* of 0.40 (default harvest control rule) for the 2027 ACL.

Sablefish Benchmark Assessment

The 2025 benchmark sablefish stock assessment included two sub-area assessment models split at Point Sur, California (36°00′ N. lat.). The last benchmark assessment was conducted in 2019, with update assessments in 2021 and 2023.

The 2025 spawning output relative to the estimated unfished level was at 33.9%, in the precautionary zone and above the minimum stock size threshold of 25% and below the management target of 40%. This is a substantial change from the 2023 update assessment, when the stock was estimated to be at 63% of the unfished level. However, the stock trajectory is set to continue to increase sharply, as recent recruitment has been high and several strong year classes will be maturing, thereby increasing spawning biomass over the next 10 years. The top five recruitments in the modeled time period have all occurred since 2013, and the 2023 year-class is estimated to be particularly strong. Consequently, the stock is projected to be above the 40% depletion target by 2027.

The assessment model was implemented in Stock Synthesis (3.30.23) as an integrated age-structured, single area, two-sex model. The 2025 sablefish model used landings data from historical landings reconstructions, historical foreign fishery catch datasets, commercial domestic landings from PacFIN, at-sea Pacific hake fishery catches, and recreational landings from RecFIN. Gear-specific discard rates and discard mortality rates were produced from multiple sources. The catch data were assigned to six fishery fleets representing retention and discard fleets for trawl, pot, and hook-and-line gears.

The assessment used model-based indices of relative abundance estimated using a hurdle model with spatial and spatiotemporal random effects in sdmTMB based on: (1) the WCGBTS (2003 to 2024); (2) the Triennial Survey split into early (1980 to 1992) and late (1995 to 2004) periods; and (3) the NWFSC Slope Survey (1998 to 2002). The model also used an environmentally driven recruitment index, which was a composite of several oceanographic indicators, to inform the most recent five years of recruitment (2020 to 2024). The age composition data from all six fishery fleets and all four survey fleets were used in the model. Given tension between age and length

data, the assessment does not use length composition data, relying on age data accompanied by an empirical weight-at-age modelling approach.

Structural changes were also made to the model including the following:

- Refined approach to the estimation of annual recruitment deviations (the early recruitment deviations were removed).
- Removed the AFSC slope survey from the model and split the Triennial shelf survey into two indices (1980-1992 and 1995-2004).
- Replaced model-estimated retention with gear-based discard fleets.
- Updated parameters for WCGBTS selectivity, sex-aggregated M was estimated at 0.088 yr^{-1}, and h was fixed at 0.75.
- Switched to time-varying empirical weight-at-age.
- Added a new, short, environmental recruitment index and estimating recruitment deviations as simple deviations.

Major changes were made to the model since the 2023 update that had an influence on the model outcomes. Implementing retained and discard fleets to maintain separate demographics in place of using a discard curve that caused issues with convergence in the previous assessment, resulted in a more stable model. The new model started estimating recruitment deviations in 1975, as opposed to allowing the model to estimate recruitment deviations for the historical period, which changed the early model period perception of status and scale. In addition, the model included new estimates of age-at-maturity, empirical weight-at-age (2003 to 2024), and environmental recruitment (2020 to 2024). The use of empirical weight-at-age may also be affected by latitudinal trends in biology and depends on future sampling to provide the necessary data from the field. Lastly, adding new additional historical ages ($N \approx 10{,}000$) reduced stock size and created a more depleted population. Bridging analyses were conducted to show the changes to status and scale resulting from these changes.

The 2025 assessment relies on an age-based model, as the STAT removed lengths and implemented empirical weight-at-age. Ageing precision and bias was a topic of discussion given this decision since in applying the empirical weight-at-age, the ages themselves may be incorrect and ageing error is not accounted for in application of weight-at-age methods in which they are used directly without accounting for ageing error. This same approach has been taken in the Pacific hake assessment, with weight-at-age applied as an assumed value, being calculated weight-at-age up to 30 yr and assumed the same weight thereafter. The lack of accounting for ageing error is only affecting results to 30 yr since weight-at-age is fixed thereafter in the model.

There is substantial uncertainty around natural mortality, which was identified as the axis of uncertainty. Tagging has detected emigration to Canada, resulting in a net loss of biomass, which may be accounted for with an increase in M given that the model assumes a closed population.

The GFSC supports the modeling approaches chosen by the STAT and reviewed by the STAR Panel. The key challenges in the 2019 assessment included tension in age and length, considerable temporal and spatial variability in growth and size at age and unusual influential data in commercial discards. The use of discard fleets addressed concerns about estimation of the retention curve in the 2019 model. The decision to structure the age-based model with empirical weight-at-

age addressed previous tensions between age and length data, but makes the model reliant on more labor intensive age data for future assessments. During the review panel, investigation of discard mortality and removal assumptions were evaluated, which had trivial effects on the model result. The differences in life history traits north and south of 36° N were adequately addressed, given the lack of data south of 36° N.

The GFSC discussed risk table applications for sablefish and found it to be closer to Level 1 (favorable) than Level 2 (neutral) for assessment-related items. There was some concern, however, because lengths could not be fit in the model with spatially and time-varying growth. The model avoids that additional complexity by using a weight-at-age approach, making the exclusion of lengths less of a deficiency. The environmental conditions were considered neutral, the stock assessment data inputs were considered favorable supporting Level 1 (favorable), and stock assessment model fits and structural uncertainty were considered favorable, all of which support a Level 1 (favorable) designation for risk table analyses. A projection with the alternative sigma from the risk table would provide an indication of the implications of Level 1 (favorable) vs. Level 2 (neutral) assignments. The GFSC requested a model run using a sigma of 0.25 to compare Level 1 and Level 2 results. The Council will discuss risk tables at its November 2025 meeting, and having relevant information for that discussion would be beneficial.

Endorsement as the Best Scientific Information Available

The GFSC endorses the sablefish assessment as providing the best scientific information available and suitable for informing management decisions.

Major Uncertainties and Considerations for Decision-Making

The biological stock structure is likely to be at a larger scale than assumed in this assessment, with movement that is unaccounted for in the assessment. The northward shift in the center of gravity of biomass (~ 2º N) in survey data in recent years may be related to strong recruitments north of 42º N. This northward shift has implications for fisheries and there is considerable uncertainty as to whether this northward trend will continue or reverse in the future.

Life history dynamics (growth, maturity) and fisheries (particularly fixed gear) show regional differences, particularly north and south of 36º N. lat., which complicates estimation of life history parameters, as the validity of the unit stock assumption. The ageing error is considerable and no formal age validation is available, adding to uncertainty in age estimates. There are still uncertainties regarding longer-term, low frequency variability in recruitment. Historical and contemporary discard mortality rates have influence on model scaling, and additional research into gear-specific rates would be beneficial.

Stock Category and Sigma Recommendations

The GFSC recommends that the sablefish stock be assigned a Category 1b designation given the ability to estimate recruitment deviations, availability of fishery-independent indices of abundance and is based on an age structured population dynamics model, but the lack of a reliable estimate of the stock-recruitment relationship. The default sigma value of 0.5 for calculating the scientific uncertainty buffer is appropriate in this situation. The GFSC recommendations are consistent with the STAR Panel recommendations.

Recommendation for the Next Assessment

The GFSC recommends that the next assessment for sablefish be an update. A benchmark assessment would be warranted when new data and once more research has been completed.

Recommended OFLs for 2027 and 2028

The OFLs for the next management cycle are 14,935 mt for 2027 and 16,240 mt for 2028, based on the assumption that the Council chooses a P* of 0.45 (default harvest control rule) for the 2027 ABC.

Rougheye/Blackspotted Rockfish Benchmark Assessment

The 2025 benchmark assessment for rougheye and blackspotted rockfish represented an improvement on the mostly length-based 2013 assessment. It is difficult to distinguish historical catch for each species so they are assessed and managed as a complex with a Category 2 designation, although 80% of the catch is estimated to be rougheye rockfish in the assessment. These species are some of the longest lived of the *Sebastes* genus, with the maximum age estimated to be over 200 yr (captured in Alaskan waters) and a considerable number estimated to be well over 100 yr. A sex-aggregated estimate of natural mortality was used in the 2013 assessment, whereas the 2025 assessment uses a prior to estimate *M* for females and pre-specified *M* for males.

The model is sex-structured, enabling tracking of sex-specific population dynamics with growth and weight-at-length relationships estimated separately for females and males. The model started in 1892. Biological processes were parameterized using both estimated and pre-specified inputs. Natural mortality was estimated for females and set to 0.036 yr^{-1} for males, based on a likelihood profile for length and age data. Conditional age-at-length data were modeled using ages 1 to 100 yr. Steepness was fixed at 0.72, consistent with the rockfish prior. Recruitment deviations were estimated across the complete model time series.

The model included six fleets representing landings and discards from bottom trawl, non-trawl gear, mid-water trawl and at-sea hake bycatch. Discards were modeled as separate fleets to enable independent estimation of selectivity and data weighting, reflecting differences in sampling methodology (port vs. observer data), avoiding the need to estimate retention curves, which can be problematic with sparse discard data. Historical discards were assumed negligible prior to the early 2000s, consistent with observer records and the timing of introduction of rockfish trip limits. Four fishery-independent surveys were included in the model: the WCGBTS (2003 to 2024), the Triennial Survey (1980 to 2004), the AFSC Slope Survey (1997 and 1999 to 2001), and the NWFSC Slope Survey (1999 to 2002).

Length-based selectivity functions were applied to all fleets and surveys. Logistic and dome-shaped curves were considered, with time blocks where changes in fishing behavior, management, or survey design occurred. Selectivity blocks were applied to the bottom trawl (2002 and 2011), bottom trawl discard (2011), non-trawl (2011 and 2020), and the Triennial Survey (1995). Midwater trawl caught larger fish, thus logistic selectivity was retained for the mid-water trawl, at-sea hake, and final block of the non-trawl fleet. A dome-shaped selectivity function for the bottom trawl fleet to fit the biological data, which is a notable departure from the 2013 assessment,

and influenced the scale and status of the stock making it a key source of structural uncertainty. The Francis (2011) method was applied to both length and age-at-length inputs and sensitivity analyses were conducted to evaluate alternative data weighting methods, including the Dirichlet-Multinomial approach, McAllister-Ianelli harmonic mean, and unweighted models. The model was not sensitive to the removal of index data in sensitivity runs and the assessment is primarily informed by composition and catch data.

The results of the assessment are subject to a high degree of uncertainty around stock status, with scale three times the 2013 assessment. The stock is estimated to be at 87.2% of the unfished level in the 2025 assessment, in sharp contrast to 47.3% in the 2013 assessment. Survey selectivity is dome-shaped as the bottom trawl does not sample hard bottom habitat well. Natural mortality was identified as the primary axis of uncertainty with M set to 0.039 yr^{-1} for the high state of nature and 0.032 yr^{-1} for the low state of nature.

The STAR Panel found that the use of multiple, short-term selectivity blocks, particularly in the most current years, complicated diagnostics (particularly in the retrospective analysis) and projections, but was ultimately agreed on as appropriate for the base model. Other discussions during the STAR Panel review evaluated assumptions regarding historical catches, uncertainty in ageing error assumptions, and exploration of alternative windows for estimating recruitment deviations. Many of the Panel requests and discussions centered around the challenges associated with estimating the appropriate scale of the resource, as the model is highly sensitive to model assumptions and data treatment. The estimated uncertainty is also very large, and additional challenges are posed by the fact that the model represents a two-species complex, with emerging evidence for fairly substantial differences in both growth and maturity among the two species. However, the Panel also found that the model was more robust by virtue of considerably more age data to inform the model relative to the previous assessment, and the addition of considerably more information on differences in growth and maturity between the two species within the complex.

The GAP and GMT advisors identified management considerations, including high uncertainty in scale, which is both greater and seems more uncertain relative to the 2013 assessment. While the STAT and the Panel did discuss and develop a risk table for this assessment, it was also recognized that the rubric for the risk table was designed for Category 1 stocks, and there was a subsequent recommendation to not include the risk table in the final assessment document.

Endorsement as the Best Scientific Information Available

The GFSC endorses the rougheye/blackspotted rockfish stock assessment as providing the best scientific information available and suitable for informing management decisions.

Major Uncertainties and Considerations for Decision-Making

The fact that this assessment is of a two species complex, with substantial differences in both growth and maturity among the two very long-lived species, is a major uncertainty and is reflected in the Category 2 designation for this stock. The variability in scale between the previous and the current assessment is also concerning, particularly as the scale of the population estimated in this model is highly sensitive to the data. This increases the uncertainty in management decisions. The use of selectivity blocks in the base case was also considered a key uncertainty, as these can make the interpretation of some diagnostics, such as retrospective analyses, more challenging. Some

factors offset these uncertainties to some extent, including the low model estimates of the current relative fishing intensity rates, high stock status, and low population turnover which would indicate that rapid depletion of the population is unlikely. In addition, the natural refugia in deeper depths and on rocky reef habitat inaccessible to the trawl fishery may offer some reassurance or additional buffer against uncertainty. However, the magnitude of uncertainty in this assessment may justify consideration of a more risk adverse P*.

Stock Category and Sigma Recommendations

The GFSC recommends that the rougheye/blackspotted rockfish stock be assigned a Category 2d designation with the default sigma value of 1 for calculating the scientific uncertainty buffer. The GFSC recommendations are consistent with those of the STAR Panel. The estimated sigma is high at 0.66, though still lower than the default sigma of 1 for Category 2 stocks.

Recommendation for the Next Assessment

The GFSC recommends that the next assessment for rougheye/blackspotted rockfish be a benchmark or update, depending on the availability of data and estimates of attainment.

Recommended OFLs for 2027 and 2028

The OFLs for the next management cycle are 966 mt for 2027 and 954 mt for 2028, based on the assumption that the Council chooses a P* of 0.45 (default harvest control rule) for the 2027 ABC.

References

Hamel, OS and JM Cope. 2022. Development and considerations for application of a longevity-based prior for the natural mortality rate. Fisheries Research 256:106477.

Catch-Only Projections

The GFSC reviewed six catch-only projections. In each case, comparisons were made between the projected catches from the last assessment and the catch streams used in the new catch-only projection, which were provided by the Groundfish Management Team (GMT). Projected biomass from the last assessment and projected biomass from the catch-only projection were compared to ensure any differences were consistent with any differences between projected and realized catches. The GFSC found the catch only projections to be conducted appropriately, and had no technical concerns. For all of these, catch information was updated from the date of the last benchmark or update assessment through 2024, and assumed catches were set for 2025 in all runs, and in at least one run for 2026, based upon calculations and advice from the GMT.

A single projection was performed for each of black rockfish off Oregon, Bocaccio, and darkblotched rockfish. For canary rockfish, petrale sole, and shortspine thornyhead (SST), two or three projections were conducted, with alternative catch assumptions for 2026. Each of these three, along with black rockfish off Oregon, had benchmark or data-moderate (SST) assessments conducted in 2023. The last benchmark assessments for Bocaccio and darkblotched rockfish occurred in 2017.

Oregon Black Rockfish Catch-Only Projections

For black rockfish off Oregon, catches in 2023 and 2024 were approximately 75 to 80% of the assumed removals in the assessment, leading to slightly higher catch limits from 2027 forward, notably 12 mt and 10 mt (~ 3%) larger for 2027 and 2028, respectively.

Bocaccio Catch-Only Projections

For Bocaccio, the last benchmark assessment was conducted in 2017, and no updates or projections had been conducted since that year. Since catches from 2019 through 2024, and assumed removals in 2025 and 2026, were in the range of approximately 25 to 45% of the ACL, the ACLs for 2027 and 2028 increased by close to 600 mt, or over 30%, relative to the projection from the 2017 assessment.

Darkblotched Rockfish Catch-Only Projections

For darkblotched rockfish, the most recent assessment was conducted in 2017 and the most recent catch-only projection was from 2021. Even so, there was a minor modification to the 2017 catch estimate and a correction to the value put in the input file for 2019 (which was 316 mt, although the document listed the correct value of 416 mt). Actual removals were somewhat lower than assumed removals for 2021 and 2022, and on the order of 40 to 50% of the ACL for 2023 and 2024, with assumed removals for 2025 and 2026 in that same range. This leads to an increase in the ACL for 2029 and 2028 of over 50 mt (~ 7%).

Canary Rockfish Catch-Only Projections

For canary rockfish, removals were 14% and 33% below assumed removals in 2023 and 2024, and assumed removals for 2025 (and for the standard run in 2026) are about 12% below the ACL. The second projection involves calculating the ACL for 2026 within the projection, and assuming the same 88% attainment as in the first projection. The third projection is similar to the second projection, but assumes 88% attainment of the ABC (rather than the ACL) in 2026. For both the second and third projections, the ACL in 2026 increases 20 mt (~ 4%) and the assumed catches in 2026 increase by 18 (~ 3.5%) and 47 mt (~ 9%) from the standard projection, with small reductions in the ACL of 1 to 2 mt in several subsequent years relative to that standard projection.

Petrale Sole Catch-Only Projections

For petrale sole, catches in 2023 and 2024 were approximately 83% and 89% of the assumed values, respectively, with 2025 and 2026 removals assumed to be 92% of the ACL values. The standard run relies on the OFL, ABC and ACL values from the 2023 assessment for determining removals in both 2025 and 2026, whereas the second, alternative projection calculates an updated ABC and removal assumption for 2026. The increase in the removal assumptions for 2026 in the second projection relative to the standard projection is 238 mt (~ 12%), with both runs leading to an increase in the ACLs for 2027 and 2028 of about 200 mt (~ 9%) on average.

Shortspine Thornyhead Catch-Only Projections

For shortspine thornyhead, removals were 58% and 84% of projected removals in 2023 and 2024, whereas projected removals in 2025 and 2026 for the standard run are 67% of the ACLs. The second projection involves calculating the ACL for 2026 within the projection, and assuming the same 67% attainment as in the first projection. This leads to a 6 mt (~ 1%) increase in assumed removals for 2026. The third run assumes a catch about halfway between the assumed catch for

2026 in the standard run (556 mt) and 67% of the newly calculated OFL in 2026 (0.67*970 = 650 mt). This value of 604 mt can also be arrived at by assuming a Category 1 sigma. For all three runs, ACLs in 2027 and 2028 increase by 13-14 mt (~ 1.5%) over the previous projection.

Risk Tables (Benchmark Assessments Only)

The STATs presented draft risk tables for each of the benchmark assessments conducted in 2025. Of those, yellowtail rockfish (north of 40° 10' N. lat.), chilipepper rockfish, quillback rockfish (CA only), and sablefish were identified as Category 1 stocks (Table 1), which have a rubric for developing risk tables.

The GFSC discussed the levels of information provided by each risk table and made the following conclusions:

- yellowtail rockfish (north of 40° 10 N. lat.') - Level 2 (neutral)
- chilipepper rockfish - Level 1 (favorable)
- quillback rockfish (CA only) - Level 3 (unfavorable)
- sablefish - Level 1 (favorable)

Resulting sigma recommendations include an increase for quillback rockfish (CA only) from the default for Category 1 stocks (0.5 to 0.75) and a decrease from the default for Category 1 stocks (0.5 to 0.25) for chilipepper rockfish and sablefish. The sigma recommendation for yellowtail rockfish (north of 40° 10' N. lat.) remains unchanged from the default for Category 1 stocks (0.5).

Although a risk table was developed for rougheye/blackspotted rockfish, the stock was identified as Category 2e. Although the rubric for risk tables used in this cycle pertained only to Category 1 stocks, the STAT, STAR Panel, and GFSC found value in the process for this complex. A separate rubric for risk tables pertaining to Category 2 stocks is currently in development. The GFSC identified utility in combining risk table rubrics for different category designations because the process of listing and qualifying each item informed those decisions.

The GFSC identified several points of clarification for future applications of risk tables. Adding specificity to the TOR about responsibilities for development and review would help streamline the process (e.g., the STAT prepares a draft risk table; the STAT and the STAR Panel work together to assign levels to each item, column, and stock). The GFSC, STAT, and other meeting participants also identified a need to reconsider the language used to assign levels (e.g., revise “favorable” to “informative”, “unfavorable” to “uninformative”, and “neutral” to “information neutral”). There is also a need to explore variable weighting procedures for assigning column-specific levels. For instance, a Level 1 (favorable) designation for a recruitment index may outweigh a Level 3 (unfavorable) designation for catch reconstructions, resulting in a combined Level 1 rather than a combined Level 2.

Table 1. Summary of GFSC Recommendations: stock category and sigmas, future assessment type, and risk table category. Note that the "next stock assessment type" column does not reflect numerous and varied caveats that are reflected in this report, as well as the STAR Panel reports, which should be considered when future decisions are being made. Risk table categories are denoted for Category 1 stocks only. Requests for additional projections were made for stocks with favorable (sigma - 0.25) and unfavorable (sigma + 0.25) risk table categories.

Species	Stock	2025 Stock Assessment Type	Category (Sigma)		Next Stock Assessment Type	Risk Table Category
yellowtail rockfish	North of 40º 10`	Benchmark	1b	0.50	Update	2 - Neutral
chilipepper rockfish	Coastwide	Benchmark	1b	0.50	Update	1 - Favorable
quillback rockfish	California only	Benchmark	1b	0.75	Benchmark	3 - Unfavorable
sablefish	Coastwide	Benchmark	1b	0.50	Update	1 - Favorable
rougheye/blackspotted rockfish	Coastwide	Benchmark	2e	1.00	Benchmark or Update	NA
widow rockfish	Coastwide	Update			Benchmark	NA
yelloweye rockfish	Coastwide	Update			Benchmark	NA
petrale sole	Coastwide	Catch-Only Projection				NA
canary rockfish	Coastwide	Catch-Only Projection				NA
shortspine thornyhead	Coastwide	Catch-Only Projection				NA
darkblotched rockfish	Coastwide	Catch-Only Projection				NA
black rockfish	Oregon only	Catch-Only Projection				NA
Bocaccio	Coastwide	Catch-Only Projection				NA

Appendix A. Meeting Participants

SSC Groundfish Subcommittee Members in Attendance
Cheryl Barnes, Oregon State University, Newport, OR (SSC GFSC Vice Chair)
John Budrick, California Department of Fish and Wildlife, San Carlos, CA
John Field, NMFS Southwest Fisheries Science Center, Santa Cruz, CA (SSC GFSC Chair)
Chris Free, University of California Santa Barbara, Santa Barbara, CA
Owen Hamel, NMFS Northwest Fisheries Science Center, Seattle, WA
Tommy Moore, Cambridge, United Kingdom
André Punt, University of Washington, Seattle, WA
Jason Schaffler (SSC Chair), Muckleshoot Indian Tribe, Auburn, WA
Tien-Shui Tsou, Washington Department of Fish and Wildlife, Olympia, WA

Stock Assessment Team (STAT) Members in Attendance
E.J. Dick, NMFS Southwest Fisheries Science Center, Santa Cruz, CA
Fabio Caltabellotta, Washington Department of Fish and Wildlife, Montesano, WA
Julia Coates, California Department of Fish and Wildlife, Santa Barabara, CA
Jason Cope, NMFS Northwest Fisheries Science Center, Seattle, WA
Megan Feddern, NMFS Northwest Fisheries Science Center, Seattle, WA
Vlada Gertseva, NMFS Northwest Fisheries Science Center, Seattle, WA
Maurice Goodman, University of Washington, Seattle, WA
Melissa Haltuch, NMFS Alaska Fisheries Science Center, Seattle, WA
Morgan Johnston, Oregon State University, Corvallis, OR
Michael Kinneen, University of Washington, Seattle, WA
Brian Langseth, NMFS Northwest Fisheries Science Center, Seattle, WA
Melissa Monk, NMFS Southwest Fisheries Science Center, Santa Cruz, CA
Kiva Oken, NMFS Northwest Fisheries Science Center, Seattle, WA
Alberto Rovellini, University of Washington, Seattle, WA
Ian Taylor, NMFS Northwest Fisheries Science Center, Seattle, WA
Chantel Wetzel, NMFS Northwest Fisheries Science Center, Seattle, WA
Alison Whitman, Oregon Department of Fish and Wildlife, Newport, OR
Joshua Zahner, University of Alaska Fairbanks, Department of Fisheries at Lena Point

Advisors in Attendance
Merit McCrea, Groundfish Advisory Subpanel
Christian Heath, Groundfish Management Team
Marlene A. Bellman, Pacific Fishery Management Council

PFMC
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