Scientific and Statistical Committee's Groundfish Subcommittee Report on 2023 Stock Assessments

Pacific Fishery Management Council
Online Meeting

August 28-29, 2023

Overview

The Groundfish Subcommittee (GFSC) of the Scientific and Statistical Committee (SSC) met via webinar on August 28-29, 2023 to review stock assessments from the third of three stock assessment review (STAR) panels for 2023 and discuss the report resulting from the Panel, as well as a limited update of the sablefish stock assessment, and catch-based projections for widow and yelloweye rockfish. The GFSC received presentations on the stock assessments and Panel report from STAR Panel 3 Chair Dr. John Field including petrale sole and canary rockfish. Dr. Kelli Johnson of the Northwest Fisheries Science Center presented the limited update of the sablefish stock assessment. John Wallace of NWFSC presented the catch-based projections. The stock assessment team (STAT) leads were available to answer questions from the GFSC.

The GFSC commends the STATs and STAR panel reviewers for their extensive and thorough work. A list of GFSC and STAT members in attendance is provided in Appendix 1. An overview of the GFSC deliberations and recommendations are provided to help inform SSC discussions regarding endorsement of the stock assessments for use in management as the best scientific information available (BSIA), the appropriate stock assessment category and associated sigma value, as well as whether the next assessment should be a full benchmark assessment or an update of the current assessment.

Petrale Sole

The GFSC reviewed a new benchmark stock assessment for petrale sole on the US West Coast and the STAR panel report from the July 2023 review of the assessment. The 2023 petrale sole assessment modeled the population as a single stock with fisheries stratified as north (Washington and Oregon) and south (California). The earliest reported catches come from California in the late 1800s and nearly all landings are from the commercial trawl fishery. The last full assessment was in 2013 with update assessments in 2015 and 2019. There were several major structural changes to the current assessment that included combining winter and summer fisheries, removing CPUE indices, including the Triennial survey as a single index, updating Washington catch history, fixing steepness at h=0.8, and adding new biological (fecundity and maturity) information. An environmental index of recruitment was developed but could not be extended beyond 2010 due to a break in the oceanographic model used (Haltuch et al. 2020). An update to this index has been developed, but there were concerns regarding some need for additional evaluation, validation, and review prior to inclusion in the assessment.

Bridging analyses from the 2019 update assessment to the 2023 assessment resulted in a lower scale of spawning biomass but no substantive change in the trajectory of depletion. Updated catches and discards were key contributing factors to changes in allowable catch projections relative to past assessments, but fixing steepness at the flatfish prior (h=0.8), estimating natural mortality at a sex-specific prior based on maximum longevity (age-32 for females and age-29 for males), and data weighting were also influential. As in previous assessments, the Triennial trawl survey had poor fits to the index in 1980 and 2004, which could have been due to survey initiation in 1980 and changes in survey methods in 2004. A

preliminary review of fits to other flatfish and skate assessments to that survey suggest that most have poor fits (and are underfit) to the 2004 index value. By contrast, the fit to the West Coast Groundfish Bottom Trawl Survey (WCGBTS) index is among the best across all groundfish stocks examined, and this index is considered highly informative for this stock. Length compositions were generally well fit and informative. Retrospective patterns were minimal and explainable based on data availability.

The final base model was unchanged from the draft assessment and the fraction of unfished spawning output is estimated to be 33.6% in 2023, which is above the management target of 25% for flatfish stocks. The primary axis of uncertainty is female natural mortality. Spawning output is projected to decline in the future but remains above the minimum stock size threshold under all projections from the high and low states of nature. This decline is due to poor recruitment in recent years, which contrasts with the high recruitment event from 2006-2008 that resulted in rebuilding of the stock from overfished conditions.

The GFSC supports the modeling approach, agrees that the model fits the data well, and agrees with the conclusions of the 2023 petrale sole assessment. The major technical merit of this assessment was the simplified structure and highly informative index from the WCGBTS. No deficiencies were found in this assessment. While all identified research recommendations are supported, continued development and testing of the environmental index should be pursued. The GFSC recommends that the SSC endorse the 2023 stock assessment of petrale sole as providing the best scientific information available and suitable for informing management decisions. The GFSC recommends the stock assessment be designated as a category 1b assessment and further recommends that the next petrale sole assessment be an update assessment.

Canary Rockfish

The 2023 benchmark assessment for canary rockfish encompassed a single stock along the US West Coast. This is a modification from the stock assessment conducted in 2015, which was spatially-explicit and reflected distinct areas for CA, OR, and WA. The decision to shift back to a coastwide model was justified by a lack of evidence for spatial stock structure and greater parsimony. Five fleets per state and three fishery-independent indices of abundance (Triennial, West Coast bottom trawl, and rockfish pre-recruit surveys) were modeled, most with sex-specific selectivity. Natural mortality was updated to be age-invariant, being fixed at the median of the prior for males and estimated with a prior for females. Steepness was fixed at 0.72 and recruitment deviations were not estimated prior to 1960. A comprehensive bridging analysis showed only minor changes to the fraction unfished after shifting back to a coastwide model. Subsequent model changes and retuning, however, considerably altered estimates of stock status relative to the 2015 model. In particular, model results were sensitive to assumptions related to natural mortality and sigma R, the addition of sex-specific dome-shaped selectivity, and the inclusion of Triennial survey data. Retrospective analyses did not reveal any notable changes in spawning output or fraction unfished.

Relative spawning output was high from 1892 through the 1930s before declining to a depletion level that was well below the minimum stock size threshold in the late 1990s. Since then, relative spawning output has increased to 35.1%, placing it in the precautionary zone between the management target (40%) and minimum stock size threshold (25%). Natural mortality (M) was the axis of uncertainty for decision tables, with a single M for both sexes representing the low state of nature and an M ramp (increasing natural mortality with age for female canary rockfish, as modeled in the 2015 assessment) representing the high state of nature. The decision table catch projections were developed assuming a P* = 0.45.

Major uncertainties in the stock assessment were related to assumptions of how to best model natural mortality and selectivity, as well as the inability to robustly estimate the stock-recruitment relationship for canary rockfish. Data deficiencies include uncertainty in historical catches, a paucity of data during the time period of high historical removals (few length or age data prior to the 1980s), limited abundance indices (e.g., limited non-trawl surveys, short-term relative to exploitation history, too localized in space), incomplete life history information, and potential bias in age estimates. There was also limited information regarding stock structure, productivity, mechanisms for skewed sex ratios, and movement rates.

The GFSC concluded that the 2023 stock assessment represents the best scientific information available, supports a category 1b designation for canary rockfish (with default sigma of 0.5), and recommends that the next assessment be an update assessment unless new information becomes available to redefine natural mortality and/or steepness.

Sablefish Limited Update

The 2023 stock assessment update for sablefish (Agenda Item G.2 Attachment 16, September 2023) is the second update of the 2019 benchmark stock assessment, following the 2021 update. This stock was updated again due to observations of high recruitment in 2020 and 2021 and concerns that these large year classes could constrain targeted and non-targeted fisheries if unaccounted for. The primary data sources for this assessment update include fishery landings, length compositions from discarded fish and the Northwest Fisheries Science Center West Coast Groundfish Bottom Trawl Survey (WCGBTS), and age compositions from the retained catch and fishery-independent data sources. The fishery landings and lengths, the WCGBTS lengths, ages and index, as well as the environmental index were updated and extended through 2022. No new age readings were conducted for the fishery collections. Data on the discarded rates and mean observed individual body weight of the discarded catch were updated and new values were included in this analysis. Only the two most recent years, 2020–2021, of discard rates were updated and the rest remained at the values used in the 2021 update assessment. For this update, landings from the Oregon coast INPFC area and bycatch from the at-sea Pacific Hake fishery were added. Additionally, landings from 1977-1982 were split 50-50% between the US and Canada (previously 100% of the landings were assigned to the US).

Model fits to the historical surveys were similar to the last update and benchmark assessments, and updating the catches had minimal change to the model fit. The base model fit the trend in the WCGBTS well until the two most recent years of the survey, which were fit below the data points. Estimates of spawning biomass continue to have high uncertainty but remain above the management target at the 95% confidence interval. The large recruitment events in 2020 and 2021 were estimated to be larger than any other recruitment across the model period (154 and 208 million, up from 13.8 million in 2019). The spawning biomass and fraction unfished increase sharply in the model projection due to the estimated large recruitments in 2020 and 2021 maturing and entering the spawning population, resulting in future overfishing limits and acceptable biological catches for 2025-2026 that are three times higher than those set for 2023–2024.

The GFSC noted the following merits of the assessment. This update assessment used the most recent data available, and the GFSC commend the STAT team in doing so given the short amount of time they had to conduct the assessment. Uncertainties in the assessment were all well evaluated using sensitivities for alternative model configurations and likelihoods for parameters. The environmental index provided

additional support for there being high recruitment, further supporting the fishery observations and survey data.

The GFSC noted the following deficiencies and concerns in the assessment. This assessment update was prioritized due to the large recruitment events in 2020 and 2021. Due to the timing of the assessment, no age data from the fishery were included and with only two years of sampling the recent apparent strong year-classes there was greater uncertainty in the strength of these recent year-classes than for older year-classes with multiple years of observations to verify the year-class strength once fully recruited to the fishery or survey. Fishery information and anecdotal accounts regarding high bycatch of small sablefish starting in the summer of 2021 indicated that there was likely a strong cohort entering the population and this is supported by the data collected by the WCGBTS in both 2021 and 2022. However, since these young fish have only been observed in two surveys there is more uncertainty around the strength of these year classes than cohorts that have been better observed. Additionally, the environmental index indicates that there may have only been one year of high recruitment, rather than two, though this will be validated as more years of sampling the cohorts are complete.

The GFSC recommends that the SSC endorse the 2023 update assessment of sablefish as providing the best scientific information available for informing management decisions. The GFSC recommends the stock be assigned to Category 1 with a sigma of 0.5. While the estimate of spawning biomass was high, sigma was below the default value of a Category 1 assessment, and technically it was no more uncertain than the full in 2019 and 2021 update assessments, both of which were Category 1. The GFSC recommends that the next sablefish assessment be a full assessment given the uncertainty and limited observation of 1- and 2-year-olds, additional age data from the fishery, and the potential effect on density dependent parameters at high abundance. In addition to the research recommendations put forward in the 2019 and 2021 assessments, given the very high 2020 and 2021 year classes, the GFSC recommends that research around density dependent growth be prioritized.

Catch-Only Projections

The GFSC received a presentation from John Wallace (NWFSC) providing catch streams and model results from catch-only projections for widow rockfish and yelloweye rockfish. For each catch-only projection, comparisons were made between the projected catches from the last assessment (based on assumptions of full or expected attainment) and the catch streams used in the new catch-only projection, which were from the Groundfish Expanded Mortality Multi-year (GEMM) database from the West Coast Groundfish Observer Program (WCGOP) (reflecting actual attainment) or were projections provided by the Groundfish Management Team (GMT). Projected biomass from the last assessment and projected biomass from the new catch-only projection were compared to examine differences between projected and realized catches. The GFSC recommends the documents describing the catch-only projections be updated to include references to the software used to generate the catch projections and linked references to the original assessments from which the projections are derived. No technical concerns with the catch-only projections were identified by the GFSC. The GFSC recommends the SSC endorses them as the best scientific information available for use in management.

Widow rockfish Catch-Only Projection

The widow rockfish catch-only projection was based on the 2019 update assessment and used the standard approach in the Stock Synthesis software. It relied on total removals for 2017-2021 from the GEMM reports and estimates of catch for 2022 aggregated from Pacific Fisheries Information Network (PacFIN), Recreational Fisheries Information Network (RecFIN), and North Pacific (NORPAC)

Groundfish Observer database. During the meeting, it was verified that the 2022 total mortality from the GEMM report was very close to the estimate used in the projection. Projected catches for 2023-204 were provided by the GMT. Actualized catch from the GEMM and values provided by the GMT were below the previously assumed catch in all years. Scientific uncertainty buffer fractions were based on this being a category 1 assessment ($\sigma = 0.5$) and time-varying buffers and P* = 0.45 were applied. Given the small differences in actual versus assumed catch, the percent of unfished spawning biomass in 2025 only increased slightly from 75.6% to 81.1% with the updated values, and the ABC increased from 10,533 mt to 11,237 mt.

Yelloweye rockfish Catch-Only Rebuilding/Projection

The yelloweye rockfish catch-only projection was based on the 2017 rebuilding analysis and used total removals for 2017-2022 from the GEMM reports. Projected catches for 2023-2024 were provided by the GMT. For 2025 onwards, the rebuilding model projected catches were assumed equal to the estimated removals under a SPR of 65 percent. Actualized total mortality from the GEMM reports and values provided by the GMT were below the assumed catch in all years. Scientific uncertainty buffer fractions were based on this being a category 1 assessment ($\sigma = 0.5$). Legacy buffers were applied in 2019-2020 and time-varying buffers were applied beginning in 2021 and P* = 0.40 was applied. The 2023-2024 harvest specifications used in the projections align with the corrections proposed at the September 2023 Council meeting (Agenda Item G.8 Supplemental REVISED Attachment 1, September 2023). Differences between actual versus assumed catch were small and there was a corresponding small increase in the 2025 projected ABC from 76.5 to 87.2 mt. The rebuilding target (40% of unfished spawning stock biomass) is projected to be reached in 2028.

Discussion of Process Considerations

The GFSC discussed the process of scheduling stock assessment reviews, GFSC reviews, and SSC reviews during assessment years. Under the current process as described in the Terms of Reference (TOR), NMFS proposes a schedule to the PFMC for conducting and reviewing stock assessments, which seeks to balance scheduling conflicts, the data deadlines and other needs of assessment teams with timelines related to the review process.

The GFSC discussed issues surrounding assessment and review process timing. The previous GFSC meeting held on August 14 and 15, also discussed challenges with the timing of STAR panels and GFSC reviews relative to the September Council meeting. Another example is the third STAR panel and the GFSC meeting held on August 28 and 29 were too close to the September Council meeting, which limits the amount of time for STAR panel report writing, GFSC review of the STAR panel report, GFSC report writing and review by the SSC to far less than what is allotted in the TOR or reasonable to facilitate thorough review.

The GFSC plans to provide recommendations on timing of meetings for the 2025 assessment cycle well in advance of decision making on the proposed schedule. The GFSC discussed the review load for the STAR panels this year. Both the first and second panels had four models to review. Although the first panel was supposed to present less of a review burden by reviewing two length-based data-moderate models in addition to the two full copper rockfish models, the workload associated with the two data-moderate assessments was substantial, though less than full assessments. STAR panel 2 had four black rockfish models (one more than originally anticipated due to unexpected challenges associated with modeling the California stock). Having all the same species has some benefits in terms of review, as there are some similarities, but this still represents a heavy workload that was difficult to complete within the time allotted. The GFSC noted the challenge of assessing nearshore species which have

multiple models per species, resulting in a much higher workload for each species. STAR panel 3 had two species, each with a single model and was more manageable than the other STAR panels, which was helpful given the tight timeline for completion of the report and assessments.

Initially the GFSC was intended to review data-moderate assessments in lieu of a STAR panel. After the 2021 cycle, the Terms of Reference were revised to review data moderate models at STAR panels rather than subcommittee meetings, to provide a more rigorous week-long review. These assessments are still somewhat more efficient for the STAT to conduct, which allows more assessments to be conducted, but the review process and limited number of assessments that can be reviewed at STAR panels prohibits greatly increased throughput of assessments conducted in a given biennium. Consideration of alternative review methods for length-based assessments or the expanded use of a limited form of update assessment as conducted for sablefish, that can be reviewed by the GFSC to increase throughput and efficiency, should be considered in the future. Such limited updates would not utilize all data sources as some updates have approached the workload of full assessments in the past, but rather would be more streamlined changes promoting more consistency in results over time while still accounting for up-to-date information.

It was noted that the process is falling behind in conducting assessments, and that already 40% of species we have assessed are beyond their target frequency. The GFSC discussed increasing the use of limited updates to update some assessments, using, for example, indices and lengths only, as producing age data is also a limiting factor. Additionally, the question of whether some of these could be conducted and reviewed in the non-assessment years, such that they would be three years old during the management cycle, rather than two as for current new assessments and updates. This could still represent a much newer assessment in many cases.

The post-mortem/debrief meeting provides a venue to discuss ideas for dealing with throughput and efficiencies, and perhaps some analysis looking at impacts of using limited updates would be beneficial at this or another dedicated meeting. Potential tradeoffs would be of interest to the Pacific Fishery Management Council in looking forward to the next cycle and over the longer term. What flexibilities in the process, and efficiencies and improvements to each phase of the process (data production and processing, model, review) could result in a more manageable process while allowing us to keep more assessments up to date? What tools, rules, and data to include in various products could help with this?

References

Haltuch, M.A., Tolimieri, N., Lee, Q., and Jacox, M.G. 2020. Oceanographic drivers of petrale sole recruitment in the California current ecosystem. Fisheries Oceanography 29(2): 122–136. doi:https://doi.org/10.1111/fog.12459.

Appendix 1

Subcommittee Members in Attendance
Dr. John Budrick (Chair), California Department of Fish and Wildlife, San Carlos, CA
Dr. Jason Schaffler, Muckleshoot Indian Tribe, Auburn, WA
Dr. John Field, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Owen Hamel, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Kristin Marshall, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

Dr. Tien-Shui Tsou, Washington Department of Fish and Wildlife, Olympia, WA

Dr. Tommy Moore, Northwest Indian Fisheries Commission, Forks, WA

Dr. Cheryl Barnes, Oregon State University/ODFW, Newport, OR

Stock Assessment Team Members in Attendance

Dr. Ian G. Taylor (Petrale Sole), National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

Dr. Vladlena Gertseva (Petrale Sole), National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

Dr. Brian J. Langseth (Canary Rockfish), National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

Dr. Kiva L. Oken (Canary Rockfish), National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

Alison D. Whitman (Canary Rockfish), Oregon Department of Fish and Wildlife, Newport, OR

Dr. Kelli F. Johnson (Sablefish), National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

Dr. Chantel Wetzel (Sablefish), National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

John R. Wallace (Widow Rockfish and Yelloweye Rockfish), National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA