SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON FINAL STOCK ASSESSMENTS AND CATCH REPORTS

The Scientific and Statistical Committee (SSC) was briefed by the Groundfish Subcommittee regarding the stock assessment updates for arrowtooth flounder, blackgill rockfish, bocaccio and darkblotched rockfish (Agenda Item F.4, Attachments 1, 2, 3, and 4, June 2017) as well as the catch report for cowcod (Agenda Item F.4, Attachment 5, June 2017).

Cowcod Catch Report

The cowcod catch report provides updated information on the rebuilding progress of cowcod off the U.S. Pacific coast using catch data through 2016. The 2013-2016 total catches (landings plus dead discards) were estimated to be less than the annual catch limits (ACLs) in place each year as well as the annual catch target (ACT) for 2015 and 2016. While an update to the rebuilding analysis was discussed, the stock is projected to rebuild in 2019 under all catch levels previously analyzed and an updated analysis is unlikely to result in a substantial change compared to the status quo considering low recent levels of attainment.

Update Assessments

Arrowtooth Flounder

The most recent full assessment of arrowtooth flounder was conducted in 2007 and this is the first update of that assessment. Changes from the 2007 assessment include use of updated pre-2007 landings, discards, and composition data; updated abundance indices; updated natural mortality estimates; and the addition of 10 years of catch, composition, and Northwest Fisheries Science Center (NWFSC) slope-shelf survey data. The methods used in the update are consistent with the Terms of Reference (ToR) for updates and represent the best available science for use in management in 2019-2020 as a category 2 assessment.

Large recruitments that occurred in 2011-2013 coupled with declining fishing mortality have resulted in an upward trend in biomass. The assessment update estimates spawning biomass of almost 57,000 mt, with a depletion of 87 percent in 2017, which is much higher than the B_{MSY} proxy of $B_{25\%}$ for Council managed flatfish species. Biomass trajectories prior to 2007 were substantially different compared to the previous assessment. Therefore the SSC recommends that the next assessment of this stock be a full assessment.

The SSC would like to acknowledge the work of both the teachers and the students that went into the arrowtooth flounder update assessment, which was comprehensive and carefully prepared as part of an applied stock assessment course offered jointly at Oregon State University and the University of Washington.

Blackgill Rockfish
The most recent full assessment of blackgill rockfish was conducted in 2011 and this is the first update of that assessment. Changes to the model since the last assessment include a new fishery selectivity time block to account for changes in trawl fishery retention since implementation of catch-shares in 2011; updated and corrected maturity; updated fecundity relationships; updated indices of abundance; updated steepness value and recent length and age data. The model results were consistent with the 2011 assessment. The methods used in the update are consistent with the ToR for updates and represent the best available science for use in management in 2019-2020 as a category 2 assessment.

The assessment update estimates depletion in 2017 of 39.4 percent, which is just slightly below the B_{MSY} proxy of $B_{40\%}$. The SSC recommends the next assessment of blackgill rockfish be an update assessment.

Bocaccio
The last full assessment of bocaccio was conducted in 2015. There were only minor changes to the 2015 assessment. These include updated catches for the commercial and recreational fisheries, updated indices of abundance, new fishery and survey length composition data, and the recently updated priors on steepness and natural mortality. In addition, the method used to estimate the juvenile index was changed to correct a methodological error but there was little impact on the results. The methods used in the update are consistent with the ToR for updates and represent the best available science for use in management in 2019-2020 as a category 1 assessment.

The assessment update estimates a depletion in 2015 of 48.6 percent, which is above the B_{MSY} proxy of $B_{40\%}$, in large part due to recent strong recruitment events (1999, 2010 and 2013 year-classes). The SSC recommends that the next assessment of this stock be an update assessment.

Darkblotched Rockfish
The most recent full assessment of darkblotched rockfish was conducted in 2015 and this is the first update of that stock assessment. Changes to the model include revision of the historical catch estimates, new length and age data, and an updated prior on steepness. A model with parameter values resulting in a lower negative log-likelihood value indicating improved model fit was presented to the Groundfish Subcommittee after the assessment document was submitted for inclusion in the June briefing book. The SSC recommends that this better fitting model be used for management purposes. The methods used in the update are consistent with the ToR for updates and represent the best available science for use in management in 2019-2020 as a category 1 assessment.

The revised assessment update estimates depletion in 2017 of 40.03 percent, which is above the B_{MSY} proxy of $B_{40\%}$. The SSC recommends the next assessment of darkblotched rockfish be an update assessment.

Estimation of Sigma Values for Scientific Uncertainty

Although the SSC is recommending category assignments for the update assessments, the sigma values reflecting scientific uncertainty associated with each category are not being assigned at this time, pending the results of the planned review of default sigma values at a September 2017 groundfish subcommittee meeting (Agenda Item F.7.a, Supplemental SSC Report, June 2017). In addition, the default sigma value for darkblotched rockfish as a category 1 stock (0.36) is lower than that derived using values from the decision table (0.43). The higher value may be considered for use in place of the default value.

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SCIENTIFIC AND STATISTICAL COMMITTEE'S GROUNDFISH SUBCOMMITTEE REPORT ON 2017 CATCH REPORTS AND UPDATE ASSESSMENTS

The Scientific and Statistical Committee's (SSC's) Groundfish Subcommittee met in Spokane on June 7th to review one catch report and four update stock assessments. In addition, the subcommittee received a report on some recently identified errors in the California catch reconstructions used in two rockfish assessments.

Errors in California Historical Catch Estimates

Dr. John Field, Southwest Fisheries Science Center (SWFSC), reported to the SSC Groundfish Subcommittee on some errors in the California commercial historical catch reconstruction obtained from the CalCOM website that affected assessments for two rockfish species in 2015. Catch estimates for these species from prior to 1951 were inadvertently doubled and scaling errors were applied to a number of minor market categories in the 1951-1968 time period. The errors affect downloads made from approximately August 2014 to May 2017. A review of the stock assessments conducted using downloads from this time period indicated that the only affected stock assessments were for chilipepper rockfish and canary rockfish. No errors were found in the catch streams in any of the other assessments potentially affected (widow rockfish, black rockfish, China rockfish, bocaccio rockfish, aurora rockfish, or rougheye rockfish).

The Groundfish Subcommittee recommends that the assessment models for chilipepper rockfish and canary rockfish should be rerun using the corrected catch streams to revise overfishing limits (OFLs) and ACLs for 2019-2020 and a recommendation to this effect should be included in the F.7 SSC statement. Reviews of the rerun assessments could be conducted by the Groundfish Subcommittee via webinar or at the September mop-up. Authors for the current round of assessments were made aware of the errors, corrected catch data were made available to address the catch discrepancy, and the revised data were placed on CalCOM to prevent the incorrect catches being used in the assessments in progress. A disclaimer has also been added to the CalCOM website that houses the historical catches to alert other potential users about these errors.

Cowcod catch report

The Cowcod catch report provides updated information on total catch (landings plus dead discards) for 2013-2016 and compares them to the ACLs established for the stock. Total catches (landings + dead discards) were low and well below the ACLs.

Arrowtooth Flounder Update Assessment

This is the first update assessment of the 2007 full assessment for arrowtooth flounder. Key changes from the 2007 assessment include using an updated version of the Stock Synthesis model; updated pre-2007 landings, discards, and composition data; updated natural mortality estimates; and the addition of 10 years of catch, composition, and NWFSC slope-shelf survey data. The vector autoregressive spatial temporal (VAST) modeling approach was used to develop slope-shelf survey indices of abundance instead of the delta-GLMM approach used previously. Some of these data changes led to substantial differences in model results, which could indicate issues with model structure.

Spawning biomass since 2010 has been increasing steadily due to large recruitment in 2011-2013 and declining catches. At the start of 2017, spawning biomass is estimated to be almost 57 thousand mt, which is nearly 87 percent of the unfished level and well above the B_{MSY} proxy of $B_{25\%}$ for Council managed flatfish species. Recent catch reconstruction efforts have led to improved catch time-series, which has reduced the sensitivity of the 2017 model to plausible catch alternatives. As a result, the decision table in the update assessment (unlike the 2007 assessment) did not include alternative catch series because catch was no longer deemed a major source of uncertainty. Uncertainty across alternative natural mortality values was maintained. The Groundfish Subcommittee considers this an acceptable departure from strict adherence to the ToRs and recommends that future ToRs be revised to allow updates to include justifiable changes to the axis of uncertainty in decision tables.

This update assessment was conducted as a graduate course in applied stock assessment at Oregon State University (OSU) and the University of Washington, with Drs. David Sampson (OSU) and Owen Hamel (NWFSC) providing training and guidance. The Groundfish Subcommittee acknowledges the work by both the teachers and the 12 students that went into this update.

The Groundfish Subcommittee recommends that the next assessment of this stock be a full assessment due to the duration of time since the last full assessment (more than 10 years) and the identification of areas for model improvement that are outside the scope of an update assessment (e.g., conflicting age and length data series and residual patterns in the fits to length composition data and the NWFSC slope-shelf survey biomass index).

Blackgill Rockfish Update Assessment

The most recent full assessment of blackgill rockfish for the Conception and Monterey International North Pacific Fishery Commission (INPFC) areas was conducted in 2011. The current assessment represents the first update of that 2011 assessment. Changes from the 2011 assessment include using a newer version of the Stock Synthesis software (SS3 version 3.24u); a new fishery selectivity time block to account for changes in trawl fishery retention since implementation of catch-shares in 2011; updated and corrected maturity and updated fecundity relationships; updated steepness value of 0.718 (vs. 0.76) from the most recent meta-analysis; and six additional years of catch, index, and length and age data. In addition, the NWFSC bottom trawl survey index is based on the VAST modeling approach rather than the delta-GLMM approach. These changes led to model results consistent with the 2011 assessment. The natural mortality rate is unchanged. No recruitment deviations were estimated in this assessment, as was the case with the 2011 full assessment.

The assessment update estimates a depletion level in 2017 of 39.4 percent. The Groundfish Subcommittee recommends that the next assessment be an update, as most of the identified issues (e.g., ageing error) could be addressed within an update. However, the availability of data from the Cowcod Conservation Areas, reconsideration of whether it is possible to estimate recruitment deviations, and more sexed age-composition data from the fishery might justify a full assessment.

Bocaccio Rockfish Update Assessment

The most recent full assessment of bocaccio rockfish in the Conception, Monterey and Eureka INPFC regions was conducted during 2015. The current update assessment includes updated

recreational catches for 2015 and 2016, updated commercial catches for 2014 and new commercial catches for 2015 and 2016. It also includes new fishery and survey length-composition data. Unlike the previous assessment, the NWFSC bottom trawl survey index, which is extended though 2016 for the update assessment, is based on the VAST modeling approach rather than the delta-GLMM approach. The assessment framework is the same as that for the 2015 assessment, although steepness has been set to the mean of the most recent prior of 0.718 and the prior for natural mortality has been updated. The time-series of spawning output from the current assessment is very similar to that from the 2015 assessment. The 2013 year-class is estimated to be amongst the largest in the recent time-series (past 20-30 years), although it is estimated to be slightly smaller in the current assessment than in the 2015 assessment.

The approach used to update the juvenile index changed from the previous assessment to correct a methodological error, but there was little impact on the results. The approach used to compute the juvenile survey index should be examined further; an updated index based on an improved standardization methodology could be included in the next assessment, even if it is an update.

The assessment estimates a depletion level in 2017 of 48.6 percent, so the stock is now above the B_{MSY} proxy of $B_{40\%}$. The decision table does not account for uncertainty regarding the 2013 recruitment unlike the 2015 assessment. However, unlike the 2015 assessment, there is now more information on this year-class. The Groundfish Subcommittee recommends that it is not necessary to conduct an assessment of bocaccio rockfish for the next 4-6 years. The next assessment should be an update.

Darkblotched Rockfish Update Assessment

The last full assessment of darkblotched rockfish was conducted in 2015. The current assessment is an update assessment that uses a newer version of the Stock Synthesis modeling framework (SSv3.30.01.12). Changes from the 2015 assessment include an updated catch time series, new survey NWFSC slope-shelf index estimates using the VAST modeling framework, and new length and age data. The historical catch estimates were revised based on a new apportioning to species of unspecified rockfish category in Oregon, but the revised catch time-series is very similar to that used in the 2015 assessment. The NWFSC shelf-slope survey index showed strong increases in 2015 and again in 2016, much of which is a consequence of a strong 2013 year class. The value assumed for steepness (the mean of its prior) was changed from 0.773 in 2015 to 0.72, which results in a slightly downward revision in recent abundance and stock projections.

After the draft assessment document (Agenda Item F.4, Attachment 4, June 2017) was produced, a set of model runs was conducted in which input parameters were jittered and found a slightly better fitting model for a small proportion of the runs (negative log likelihood of 1911.31 as opposed to the base model negative log likelihood of 1911.54). The convergence to parameter estimates not associated with the maximum likelihood may be arising for this particular update assessment because some of the selectivity parameters are hitting their bounds. Although the differences between the model documented in the draft assessment and the best model from the jitter runs is very slight, the Groundfish Subcommittee recommended that the parameters hitting bounds be fixed at the limiting bounds and the model re-run. This work was completed after the Subcommittee meeting concluded but prior to the end of the SSC meeting. Also, the jitter analyses were redone and confirmed convergence to maximum likelihood estimates.

The assessment was conducted according the terms of reference (ToR) for updates and results show reasonable consistency with the 2015 assessment. The assessment update (from the newer revised model described in the paragraph adjacent above) estimates a depletion level in 2017 of 40.03 percent (95 percent confidence interval 21.7 percent-58.4 percent), so the stock is now above the B_{MSY} proxy of $B_{40\%}$. The Groundfish Subcommittee recommends that the next assessment of this stock be an update assessment given that last full assessment was in 2015.

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