SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON ADOPT FINAL STOCK ASSESSMENTS

The Scientific and Statistical Committee (SSC) was briefed by members of 2017 stock assessment teams and stock assessment review (STAR) panel chairs on benchmark assessments reviewed this summer. The benchmark stock assessments reviewed include Pacific ocean perch, lingcod, yelloweye rockfish, yellowtail rockfish, combined blue and deacon rockfishes, and California scorpionfish. The SSC commends the assessment authors and STAR panel reviewers for their extensive and thorough work. In addition, the SSC reviewed catch-only updates for chilipepper and canary rockfishes, which were conducted primarily to address errors in historical catch series that were introduced when these assessments were conducted in 2015. The SSC provides the following comments and recommendations regarding these assessments:

Catch-only Updates

In June 2017, the SSC's Groundfish Subcommittee (GFSC) was informed that errors had been identified in the California catch reconstructions used in the Council's 2015 stock assessments for chilipepper rockfish and canary rockfish. The Subcommittee and full SSC recommended that these assessments be rerun using the corrected as well as updated catch streams to revise overfishing limits (OFLs) and annual catch limits (ACLs) for 2019-2020. The catch-only updates involved re-applying the assessment models using revised historical catches.

Chilipepper Rockfish

The SSC received a presentation by Dr. John Field (SWFSC) of the catch-only update stock assessment for chilipepper rockfish (Agenda Item E.9, Attachment 3, September 2017). Compared to the 2015 assessment update, the revised historical catches were reduced by about 18,550 mt, representing 30 percent of the total previously used for the period 1916-1968, leaving 44,194 mt of catches during that period. In addition, the new catch-only update assessment used catches for 2014-2015 based on West Coast Groundfish Observer Program (WCGOP) Total Mortality Reports and for 2016 based on landings data from CalCOM with an adjustment to account for discarded fish. The changes in the catch series resulted in a maximum relative change of up to 10 percent in spawning output during the 1916-1968 period, but only up to 3.5 percent changes in recent (1980-2015) depletion estimates. The 2017-18 ACL and OFL estimates from the 2017 model are greater than the corresponding estimates from the 2015 model, primarily because recent catches were less than previously assumed.

The SSC considers the new catch-only update assessment for chilipepper rockfish to be the best available science and suitable to support management decision-making.

Canary Rockfish

The SSC received a presentation by Dr. James Thorson (NWFSC) of the catch-only update stock assessment for canary rockfish (Agenda Item E.9, Attachment 2, September 2017). The revisions to the historical catches of canary rockfish, which were mostly landed in Oregon and Washington, were very small relative to the changes in the chilipepper assessment. In addition

to using the corrected historical catch reconstruction for California, the catch-only update replaced previously assumed catches for 2015 with total mortality estimates from WCGOP.

During explorations of the model, the Stock Assessment Team (STAT) found a set of parameter estimates that produced a slightly better fit than the original 2015 assessment. This better fitting model was used as the base model for the catch-only update. The changes to the catch series and the better fit led to relative declines of 2 percent in the estimates of spawning biomass and depletion in 2015. The estimate of the 2018 OFL from the 2017 model is 1,596 mt, representing a 5 percent decline from the corresponding estimate of 1,677 mt in the 2015 assessment.

The SSC considers the new catch-only update assessment for canary rockfish to be the best available science and suitable to support management decision-making.

Lingcod

The last full assessment of lingcod was conducted in 2009, which divided the west coast population into northern (Washington and Oregon) and southern (California) stocks. The 2017 assessment (Agenda Item E.8, Attachment 1, September 2017) also uses this delineation by conducting separate stock assessments for each of these regions. A number of revisions were made to the data used for the current stock assessment including 1) shifting the start of the assessment to 1889, 2) splitting the commercial fleet into trawl and fixed gear components and the northern recreational fleet into Oregon and Washington components, 3) re-analysis of commercial fishery CPUE data and the Alaska Fisheries Science Center Triennial survey index using VAST software, 4) addition of three fishery-dependent and one fishery-independent catch per unit effort (CPUE) indices, 5) updating length-weight relationships and the prior on natural mortality, 6) new maturity relationship based on recent data collections, 7) re-estimating ageing error from double read age data, and 8) updating landings and composition data.

The main model structure changes from the last assessment were the addition of selectivity parameters for fleets that were split by gear or geographic area, altering the plus and minus groups for length and age composition bins, and constructing a broader set of time blocks for selectivity. Also, conditional age-at-length composition data were directly incorporated into the model.

Current spawning stock biomass is estimated to be 57.9 percent in the northern region relative to unfished spawning biomass, and has continued to increase over the last five years as a result of high recruitment in 2008 and 2013. Current spawning stock biomass is estimated to be 32.9 percent in the southern region relative to unfished, and is currently in the precautionary zone. Although spawning biomass in the southern region is estimated to have been increasing in recent years, and above the minimum stock size threshold by 2016 as a result of high recruitment in 2013, it remains a concern that recruitment is estimated to have been well below average over the last 10-15 years.

The SSC endorses the use of the 2017 north and south lingcod stock assessments as the best scientific information available for status determination and management as a category 1 assessment. While the 2009 south lingcod stock assessment was deemed a category 2 assessment, the additional eight years of data in the current assessment provided an adequate basis for a category 1 designation. The SSC recommends that the next assessment of lingcod be an update assessment.

Pacific Ocean Perch

The last full assessment of Pacific ocean perch was conducted in 2011. Similar to the 2011 assessment, the 2017 assessment (Agenda Item E.8, Attachment 3, September 2017) models the population as a single stock off of the US west coast from northern California to the Canadian border. The STAR Panel approved the assessment (Agenda Item E.8, Attachment 4, September 2017). The SSC reviewed the assessment at the August 28 meeting and again at the September Council meeting. During these reviews, the SSC, while approving most of the features of the assessment, requested further work to be reviewed by the GFSC prior to the November Council meeting.

A number of revisions were made to the data used for the current stock assessment including 1) disaggregating the one combined fleet used in 2011 to four component fleets, 2) using new historical catch reconstruction landings for Washington, 3) starting the model in 1918, 4) re-analyzing all of the fishery-independent indices using VAST, 5) dropping the fishery CPUE logbook index, 6) updating maturity and fecundity relationships, and 7) updating landings and composition data.

There remains considerable uncertainty associated with the steepness parameter, which is the main driver of the large change in status and scale between the 2011 assessment and the 2017 assessment. The assessment approved by the STAR Panel fixed steepness at 0.72 (the mean of the steepness prior), which constitutes a substantial change from 0.4 used in the previous assessment. When the 2011 assessment model is run with a steepness value of 0.72, the results also indicate a stock status above the management target.

The SSC revisited Pacific ocean perch (POP) on September 12 after receiving documentation and results from further analyses. The SSC commends Dr. Wetzel for the extensive work conducted and reported to the SSC for its August 28 meeting and September 11-12 meeting. This work allowed the SSC to better understand the differences between the 2011 and 2017 models, and to determine what additional analyses are necessary to approve at a final assessment.

The SSC found there was inadequate consideration given to the rationale for the removal of the triennial survey index from the assessment. This survey index was influential in the evaluations that ultimately led to the treatment of steepness in the 2011 assessment, and the rationale given for removal was conflict with other data sources rather than flaws in the survey itself. Therefore, the SSC requests some additional model runs to be reviewed by the GFSC prior to the November Council meeting, where the SSC will make a final recommendation.

Yelloweye Rockfish

The last full assessment of yelloweye rockfish was conducted in 2009, with an update assessment conducted in 2011. The results of the 2017 assessment (Agenda Item E.8, Attachment 5, September 2017) indicate that the stock is at 28 percent depletion and progress toward rebuilding to the 40 percent target level has continued. The base model estimates higher productivity than the previous assessment due to the higher value for steepness from the updated meta-analysis and strong recent recruitment, which result in larger yield estimates.

Yelloweye was again modeled as a single stock with shared stock-recruitment relationship, but between two rather than three assessment areas. Oregon and Washington were combined in a

single area due to difficulties separating the catch and compositional data of fish caught in one state but landed in the other, with California as a second area. A comparison to a single area assessment showed no appreciable differences in outcomes. A state-specific assessment with three areas was not evaluated, but the results from the two-area base model showed close correspondence to the results for the model for 2011.

This assessment was the first for yelloweye to combine sexes due to similar growth parameters. The assessment period was extended back to 1889 as a result of updates to the historical catch series. Indices of abundance from fishery-dependent and fishery-independent data sources were found to be uninformative (although they were retained) with the catch, age and length composition data driving the results of the assessment. Steepness was fixed at the 0.718 based on the meta-analysis for rockfish species. The previous assessment allowed natural mortality and steepness to be estimated, while this assessment fixed both of these key parameters, which allowed recruitment deviations to be estimated for this species.

The assessment was also sensitive to steepness and whether selectivity was allowed to be estimated freely. There is continued uncertainty regarding the differences in otolith reading between institutions, which has implication for estimates of natural mortality. Additional uncertainty results from uninformative indices of abundance and assumed values of steepness.

The SSC endorses this assessment, which constitutes the best available scientific information on the current status of the stock and provides a suitable basis for management decisions as a category 1 stock. The SSC recommends that the next assessment of yelloweye rockfish be an update assessment. The results of the rebuilding analysis, which will be done in accordance with the Terms of Reference and based on the approved base model, will be reviewed at the September 28 GFSC meeting.

Yellowtail Rockfish

The yellowtail rockfish stock north of Cape Mendocino (40°10' N. lat.) was most recently assessed as part of a 2013 data-moderate stock assessment that did not include any length or age composition data. The 2017 stock assessment (Agenda Item E.8, Attachment 7, September 2017) was conducted using Stock Synthesis (SS) and resulted in an estimated depletion of 75 percent of the unfished spawning output. The stock south of 40°10' N. lat. has never been assessed other than with data-poor methods (DB-SRA). Though attempts were made to assess the southern stock using stock synthesis, a southern model sufficiently robust for use in management could not be developed. Additional age and length data should be collected and developed prior to attempting another full stock assessment.

The estimate of natural mortality (M) of females for the northern model was 0.174, and that for males was 0.15. Steepness was fixed at the mean of the prior (0.718). The final base model is heavily reliant on compositional data, although fishery-independent survey indices are somewhat informative.

The SSC concluded that the assessment for the northern yellowtail rockfish stock constitutes the best available scientific information and provides a suitable basis for management decisions, as a

category 1 assessment. The SSC recommends that the next assessment of yellowtail rockfish north of Cape Mendocino be an update assessment.

Blue and Deacon Rockfish Complex

The last full assessment of blue rockfish was conducted in 2007 and covered the stock in California north of Pt. Conception. Subsequent to that assessment, deacon rockfish has been recognized as a separate species. It is not possible to assess these two species independently, since most historical and recent data are for the two species combined. In the current assessment (Agenda Item E.8, Attachment 9, September 2017), blue and deacon rockfishes (BDR) were assessed as a complex, with separate assessments conducted for Oregon and California, north of Point Conception. While genetic studies have found that, at least in recent decades, deacon rockfish are more common north of Monterey Bay, and blue rockfish more common to the south, catch and index data were separated at the Oregon/California border due to management history. The two species appear to be mixed to some degree throughout the entire range of the two areas assessed.

The California assessment includes several fishery-dependent and –independent sources, though no comprehensive survey of adults. There is a general lack of recent age data, and the assessment is sensitive to the inclusion or exclusion of age information in the form of conditional age-at-length data from relatively recent research projects.

Steepness and natural mortality were both estimated in this assessment. While estimation of steepness is unusual, especially for a species without a strong fishery-independent index, the "two-way trip" pattern of depletion history may provide more information on steepness, and the estimation of steepness and natural mortality provides for more realistic quantification of uncertainty coming out of the assessment for use in the decision table. The estimated value of steepness, 0.65, is close to the mean of the prior distribution for rockfish, 0.72. This assessment estimates that the BDR population reached a low depletion level of 15.6 percent in 2007, and had recovered nearly to the target level, being at 37.3 percent of the unfished spawning output in 2017. A strong 2013 year class appears to be entering the population.

The Oregon assessment does not display a two-way trip like the California assessment, and is based on fewer and shorter indices. Thus both steepness and natural mortality are fixed in the base model. The Oregon population of BDR is estimated to have been relatively lightly exploited, and to be at a historically low level of depletion, 68.6 percent of the unfished spawning output in 2017. The 2013 year class is estimated to be strong in Oregon waters, as in California.

The SSC endorses the use of the BDR stock assessments as the best scientific information available for status determination and management as Category 2 assessments due to BDR being a complex of two species. The sigma values derived from the decision tables for both the California and Oregon assessments are larger than the Category 2 sigma of 0.72 (being 0.783 and 0.803 respectively) and these values should be used in calculating the scientific uncertainty buffer. The SSC recommends that the next assessment of BDR be an update assessment.

The SSC recommends consideration of the potential impacts of including BDR in the minor nearshore complexes, where it currently (in 2017) composes over half of the OFL in the north

and nearly a quarter of the OFL in the south. Approaches that could be investigated include alternative complex designation and alternative calculation of ACL contributions for such dominant species within complexes.

California Scorpionfish

The last full assessment of California scorpionfish was conducted in 2005. The current assessment (Agenda Item E.8, Attachment 11, September 2017) updates catches back to 1916, uses a more disaggregated fleet structure, includes additional indices of abundance, and adds conditional age-at-length data. Indices of abundance as well as composition data were derived from 1) Publicly-Owned Treatment Works (POTW) trawl surveys, 2) the NWFSC trawl survey, 3) the Southern California Bight regional monitoring program trawl survey, and 5) the onboard observer survey for retained catch. Additional composition data was derived from a nuclear power generating station impingement survey.

The nearly sinusoidal pattern in recruitments and biomass, which were of some concern to the STAR panel, was found to be moderately correlated with water temperature (the CalCOFI temperature index used for Pacific sardine), indicating that the patterns in recruitment are at least partially driven by environmental factors.

California scorpionfish is estimated to be at a depletion level of 54.3 percent of the unfished spawning output in 2017. The 2015 year class is estimated to be the highest in over 20 years.

The SSC endorses the California scorpionfish assessment as the best scientific information available for status determination and management as a Category 1 assessment. The sigma value derived from the decision table is 0.582, larger than the Category 1 sigma of 0.36, and this larger value should be used in calculating the scientific uncertainty buffer. The SSC recommends that the next assessment of California scorpionfish be an update assessment.

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