SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON
FINAL STOCK ASSESSMENTS

The Scientific and Statistical Committee (SSC) was briefed by members of 2015 stock assessment teams and stock assessment review (STAR) panel chairs on assessments reviewed this summer. The stock assessments reviewed include black rockfish, bocaccio, China rockfish, kelp greenling off Oregon, and widow rockfish. The SSC provides the following comments and recommendations regarding these assessments.

Black Rockfish
Black rockfish was last assessed in 2007 with separate assessments north and south of Cape Falcon, OR. This year three separate assessment models were developed for black rockfish off California, Oregon, and Washington. The STAR panel-endorsed assessments for California and Washington were brought forward to the SSC for approval, but the assessment for Oregon was not endorsed.

The primary challenge for the black rockfish assessment in all three states is the absence of larger, older female black rockfish in fisheries catches, a phenomenon that has long been a challenge in developing plausible assessments for black rockfish and other species that exhibit this tendency. Past modeling approaches, and those taken during the STAR Panel week, have explored both "hiding" larger, older females (e.g., applying dome-shaped selectivity to fisheries, which often results in what are considered to be implausibly high "cryptic" biomass levels of large, old, unavailable fish) or "killing" off larger, older females (one common formulation being a ramp up in natural mortality rates with age) in order to fit the observed data. The California and Washington models addressed this issue in a novel way (compared to previous assessments) by allowing for differential natural mortality by sex. It was not possible to evaluate this approach for Oregon at the STAR Panel meeting, because a working model was not available.

The SSC recommends that the Oregon black rockfish assessment should be referred to a mop-up panel, and does not endorse the California and Washington black rockfish assessments at this time. The SSC does not anticipate that the California and Washington assessments will be re-opened for a full review at the mop-up panel. However, delaying final approval of these assessments is prudent to allow for potential changes in them that could allow consistency among all three assessments.

Bocaccio
The last full assessment of bocaccio rockfish was conducted in 2009, and was subsequently updated in 2011 and 2013. Data inputs and model structure generally followed those of the 2009 assessment, with the exceptions that age data for bocaccio were included for the first time, natural mortality was estimated rather than fixed, and the steepness of the stock-recruitment curve was set to 0.773 rather than estimated. Strong recruitment was estimated for 2010 and 2011, although it was not estimated to be as strong as it was in previous assessments. There were early indications of strong recruitment for 2013. Results were sensitive to the choice of data-weighting.

The assessment estimates current depletion (2015) at 36.8%. The stock is projected to be rebuilt in 2016 (with depletion estimated to be 45.8%), but that is dependent on the realization of the strong 2013 recruitment and will need to be confirmed by an update assessment in the next cycle.

The bocaccio assessment represents the best available science for use in developing 2017-2018 management measures as a category 1 assessment. The SSC recommends that the next assessment of this stock be an update assessment.

China Rockfish

In 2013, a data moderate assessment was conducted in Extended Depletion-Base Stock Reduction Analysis (XDB-SRA). In that assessment, two areas, north and south of Cape Mendocino, were modeled separately. The 2013 assessment indicated that the southern stock was above the B_{MSY} proxy of $B_{40\%}$, while the northern stock was found to be in the precautionary zone.

The 2015 stock assessment was conducted using SS3. The Northern area from the 2013 assessment was split into Northern and Central areas for the 2015 assessment, and models were developed for three separate areas: Washington, Oregon plus California north of Cape Mendocino, and California south of Cape Mendocino. Differences in growth, size-composition data, exploitation history, and biogeographic boundaries formed the basis to split the assessment into separate areas along the coast.

New data for the 2015 assessment included length and age compositions starting as early as the 1970s. The models included seven fishery-dependent indices of abundance (three indices for each of the Southern and Central areas, and one for the Northern area). Maturity and fecundity relationships were also updated. Steepness was fixed in all models at 0.773, and the natural mortality rate was estimated for the Northern and Southern areas and fixed at the estimated value, 0.07, for all areas

The Northern assessment modeled years from 1967 (when catch began) to 2015, whereas the other two areas covered the period 1900-2015. For the Southern area model, discard data were modeled as a separate fleet. For all models, the selectivity of landings was asymptotic, and growth was estimated. Recruitment deviations were not estimated, so recruitment is assumed to be that from the stock-recruitment curve in each area for each year.

The SSC endorses the use of the 2015 China rockfish assessment as the best scientific information available for status determination and management as a category 2 assessment. The category 2 designation is due to the lack of recruitment deviations in all three area models. The spawning stock biomass for China rockfish is estimated to be above the B_{MSY} proxy of $B_{40\%}$ in the Northern and Central areas, and in the precautionary zone (below the B_{MSY} proxy but above the B_{limit} of $B_{25\%}$) in the Southern area, while increasing in recent years. Given the expectation that China rockfish will not be assessed in the next few cycles, the SSC recommends that the next assessment of this stock be a full assessment, unless there is a compelling reason to conduct an update assessment in the next two cycles.

Kelp Greenling off Oregon
The last assessment of kelp greenling was conducted in 2005. The changes from that assessment included: the use of SS3 rather than SS2, revised fleet definitions, revised catch histories, inclusion of discards, new and updated indices of abundance, additional age and length composition data, and revised life history parameters.

The assessment assumed a single, two-sex population for waters off the Oregon coast and modeled the period 1915-2014. The model included four fleets which were defined as a combined commercial fleet (hook and line, and bottom longline) and three recreational fleets (ocean-boat, estuary-boat, and shore). Data included in the model were catches and associated length composition data, three fishery dependent CPUE series, and three series of conditional age-at-length data.

The base model estimate of 2015 spawning biomass depletion was 80% of unfished, indicating a lightly exploited stock. The 'scale' of the biomass was sensitive to the assumed value for natural mortality.

The SSC endorses the use of the 2015 kelp greenling assessment as the best scientific information available for status determination and management as a category 1 assessment. The SSC recommends that the next assessment of this stock be an update assessment.

Widow Rockfish
The last full assessment of widow rockfish was conducted in 2011. That assessment estimated that the stock had increased above the rebuilding target of $B_{40\%}$, leading to the stock being declared rebuilt. A number of revisions were made to the data used for the current stock assessment, including 1) a new method of index standardization for NWFSC trawl survey using a geo-statistical delta-GLMM model, 2) a new steepness value (0.798) based on an updated meta-analysis of steepness, 3) a prior distribution developed for the natural mortality parameter from an analysis of a maximum age of 54 years, 4) updated methods of expanding fishery length and age composition, and survey conditional age at length, and 5) new ageing error tables. For this assessment, there was more thorough investigation of available age and length data, increasing the amount of these data relative to previous assessments. In addition, Washington historical landings were reconstructed.

The changes from the last assessment include how fisheries were structured and how selectivity was modeled. The fleets were reconfigured based on fishing strategy rather than geographic area as in previous assessments. The triennial survey was considered a single time series rather than split as most other West Coast assessments.

The 2015 spawning biomass is estimated to be 75.1% of unfished spawning biomass, and has increased steadily since a low of 37.3% depletion in 1998. Increases in stock size are due to the low level of harvest and strong recruitment in 2008 and 2010.

The SSC endorses the use of the 2015 widow rockfish assessment as the best scientific information available for status determination and management as a category 1 assessment. The SSC recommends that the next assessment of this stock be an update assessment.

PFMC 09/12/15