Pre-Assessment Workshop for 2021 Stock Assessments of Lingcod and Vermilion/Sunset Rockfish

March 29, 2021

A pre-assessment workshop for upcoming lingcod and vermilion/sunset rockfish stock assessments was held virtually on March 29th, 2021. Dr. John Field of the Scientific and Statistical Committee chaired the workshop. Drs. Ian Taylor and Kelli Johnson of the Northwest Fisheries Science Center presented an overview of plans for the 2021 lingcod stock assessment. Drs. Melissa Monk and E.J. Dick presented an overview of plans for the vermilion/sunset rockfish stock assessments for southern and central/northern California. Dr. Jason Cope presented an overview of the plans for the vermilion/sunset rockfish stock assessments models off of Oregon and Washington. The last lingcod stock assessment was conducted in 2017, while the last attempt to conduct a benchmark assessment for vermilion rockfish was in 2005 (the assessment was not recommended for management). Management guidelines for the vermilion/sunset complex have been based on the Depletion-Based Stock Reduction Analysis estimates developed for the 2011 management cycle and used since.

Lingcod

The STAT stated that the 2021 lingcod assessment will largely follow the framework of the previous 2017 assessment, with a few key differences. First, rather than splitting the northern and southern stocks at the California/Oregon border, the new assessment will split the stocks at Cape Mendocino (40º 10' N latitude). This change reflects updated population genetic information (Longo et al. 2020) demonstrating that a "distinct genetic cline in lingcod is most likely a product of selection driven by change (continuous and/or discontinuous) in environmental conditions." The shift in geographic boundaries also helps to align the boundaries of the two lingcod assessments with the geographic split for IFQ regulations in this fishery. The STAT noted that including part of California in the northern stock will require some reprocessing of fishery-dependent and -independent data, particularly historical data that were aggregated at coarse resolution (e.g., port complex rather than port). The split will also make efficient and easily interpretable "bridging" between the 2017 and the upcoming assessment more challenging. Workshop participants discussed some potential strategies to handle those issues.

A second change is that the new assessment will model age composition as "conditional age at length," including both the fishery-dependent landings data and the fishery-independent survey data. This is being done to address concerns raised in the 2017 review that nonrandom and potentially biased sampling in the available age data could bias growth estimates in the assessment. There were also discussions about how to utilize age data derived from unsexed fish given the high degree of sexual dimorphism in growth and body size for lingcod. The general approach will be to partition small unsexed fish assuming a 50:50 sex ratio (as at small sizes, the sex of immature. A final additional concern about the 2021 assessment is that due to COVID-19 restrictions in 2020, several data streams (both fishery-dependent and fishery-independent data) will not be available from 2020. Those restrictions have also slowed the ageing workflow. Consequently, there will be greater-than-usual uncertainty about very recent stock status and landings.

Aside from ongoing data aggregation/sorting efforts, there are a few outstanding issues that the STAT team is still deciding how best to model in the assessment. The primary one is how best to deal with dramatic shifts in discard rates since the early 2000s. It appears that there was a drastic decline in discarding after the implementation of IFQ in 2011. Higher discard rates prior to 2011 likely reflect shifts in bag-limit changes; the STAT team is working out how to model those patterns retrospectively for the period prior to the start of observer data (particularly the 1980s and 1990, during which liberal trip limits became increasingly constraining). The utility of evaluating what data on bycatch may have been available from the Pikitch study in the late 1980s was mentioned.

In addition to those described above, topics raised in the workshop included the existence of species-specific historical landings data for lingcod prior to 1930, available from early CDFW and U.S. Bureau of Commercial Fisheries reports (e.g., Sette and Fielder 1928), which have since been provided to the STAT. The STAT did not anticipate other major changes to the model structure or major model parameters at the time of the workshop.

Vermilion/Sunset Rockfish in California

The STAT provided an overview of efforts to compile age and other life history data for the southern (south of Point Conception) and central/northern California models for vermilion and sunset rockfishes. It was noted that for nearly all data sources, including catch data, the two cryptic species are generally not separable due to the lack of broad morphological or genetic analyses. The STAT also noted that part of the logic behind the break at Point Conception to separate the two California stocks is that there appears to be more mixing of vermilion and sunset in the southern region, while in the northern region vermilion rockfish are more frequently encountered. Far more data are available in the southern area (index and compositional data) relative to the central/northern California area. Separation of the two species by depth has been noted in the south, as has strong ontogenetic movement in both regions, though both appear in kelp forests in nearshore waters as juveniles. In addition to the two species, population structure in genotyped vermilion rockfish has been identified in genetic analyses (Hyde 2008, Hyde 2009, Budrick 2016). There is broad overlap geographically and physical characteristics have not been developed to discriminate between them and all are included in the nominal rubric of "vermilion rockfish" in the historical catch or data used in indices. This prevents individual assessment of species or populations, further complicating the cryptic species identification issue.

Ongoing research by the STAT includes efforts to evaluate the extent to which growth differs by species, sex and across space, recognizing that data on species in particular for this cryptic species complex is sparse. It was also noted that this assessment represents the first large-scale effort to age vermilion rockfish, and as several aging laboratories are involved, the labs have initiated an official CARE (Center for Age Reading Experts) exchange, with each lab providing 60 fish that are subsequently aged by each lab involved in the age determination effort. The results will provide robust information on ageing error among the aging labs. The lack of genotyping of samples to discriminate definitively between species or population inhibits comparison between species and population and the resulting growth rates are reflective of sampled individuals of both species and vermilion rockfish populations selected for ageing.

For the southern model, there was discussion regarding possible new methods for index standardization of the NWFSC hook and line survey, as well as alternative approaches for how to address the expansion of that survey into the Cowcod Conservation Areas starting in 2014. Evaluation of the former is ongoing, and the most likely approach with respect to the latter will be comparable to the 2019 cowcod assessment (Dick and He, 2019), in which a single index of abundance was developed but the selectivity curve was based on a time block to account for the greater abundance of larger, older fish in the more recently sampled CCAs.

In discussing the indices to be evaluated for the Central/Northern California model, it was noted that the California Cooperative Fisheries Research Program (CCFRP) survey is limited in sampling range to approximately 20 fathoms, and thus does not cover the full range of depths. The need to robustly explore appropriate selectivity patterns to account for this constraint was discussed.

The observation that the trawl survey also encounters primarily small (presumably age 1-2 year) vermilion in this region was also discussed with respect to the possible constraints on the CCFRP survey. The trawl survey and ROV surveys indicate vermilion/sunset rockfish are common to depths of at least 80 fm, thus CCFRP will not represent a large fraction of the habitat of either. The presence of smaller/younger fish in the trawl survey may be more the result of the gear sampling over soft bottoms away from the primary rocky reef habitat of adults rather than associations with depth as mature individuals are found in the recreational and commercial catch in these shallower depths over rocky reef. If genotyped in the aforementioned future NMFS genetic research, the 1-2 year olds sampled by the trawl survey may be useful in examining differential rates of ontogenetic movement to deeper depths between species or populations of vermilion rockfish and thus their relative degree of fishing mortality given depth restrictions.

The PISCO (Partnership for Interdisciplinary Studies of Coastal Oceans) scuba survey was also discussed as a possible data source. The STAT responded that they had evaluated the PISCO database and found that vermilion/sunset rockfish juveniles were very rare in that dataset and the PISCO data was unlikely to provide useful information on trends in recruitment or abundance for these species. The unusual timing of vermilion/sunset rockfish spawning and settlement of pelagic YOY out of the water column is likely to be a contributing factor.

The STAT discussed the live fish fishery north of Point Conception with respect to the potential need to model it separately from the dead fish fishery. This had previously been discussed at the November meeting between the STAT and members of the GAP and GMT. The STAT noted that although there is some evidence of size differences between the live and dead fish fisheries, the small fraction of the live fish fishery for vermilion (approximately 2-3% of the overall fixed gear catch) has led the STAT to plan to combine live and dead fish fisheries.

The STAT noted that the data deadline for the vermilion/sunset panel is approaching rapidly (in approximately a month from the date of the workshop) and asked participants if any other data sources were anticipated. No pending data sources were identified. The STAT also asked the GMT representatives to provide 2021-2022 catch estimates prior to STAR panel.

It was noted that catches in Morro Bay have been higher in recent years, likely in response to opening deeper waters to the recreational fishery. There was discussion of the result that small changes in depth restrictions can lead to much larger changes in catches, and potentially selectivity, given the strong ontogenetic movement patterns. Time blocks may be necessary to pair with major changes in regulation and depth closures and openings.

Vermilion Rockfish in Oregon and Washington

The STAT noted that most Oregon and Washington fish in this complex are thought to be vermilion, few if any sunsets are found in northern waters, given their absence north of Point Conception, California in studies by Hyde (2009) and Budrick (2016). Throughout the two states, there seems to be a concentration of this species, with most Oregon catch being encountered in southern Oregon (~90%) and most Washington catch being encountered in northwest Washington (~97%). Consequently, the STAT envisions separate Oregon and Washington models for this stock in the two areas.

Current plans are for the Oregon model to have separate commercial and recreational fleets while the Washington model, given very minor commercial landings in that state, will include those catches with the recreational fleets. The STAT noted that Washington catches are in numbers of fish rather than weights, and that there is a somewhat unusual spike in landings during the late 1960s.

The STAT noted that they anticipate Francis weighting of age and length compositions, and that indices are unlikely in both models (although the STAT will explore the Oregon ORBS dockside index, which has low sample size but may have some potential to provide trend information). The Washington dataset has small samples sizes for length and age data. However, the STAT mentioned that the length data do indicate possibly strong incoming year classes in recent years. Natural mortality will be based on longevity estimators, fish in this region have been aged to at least 60 years, which would imply a natural mortality rate in the range of 0.09. A maturity curve has been developed for Oregon fish and that curve will be applied in the Washington model as well. Fecundity will be based on the meta-analysis developed by EJ Dick (informed by California fish).

Sources

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Appendix 1: Webinar Attendees

Stock Assessment Team Members

Dr. E.J. Dick, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Kelli Johnson, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Melissa Monk, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Ian Taylor, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

Workshop Attendees

Ms. Camille Ayrea, Oregon Department of Fish and Wildlife, Brookings, OR
Dr. John Budrick, California Department of Fish and Wildlife, SSC, Belmont, CA
Dr. Fabio Caltabellotta, Oregon State University, SSC, Corvallis, OR
Dr. Matt Cieri, Center for Independent Experts
Dr. Jason Cope, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Ms. Erica Crust, Washington Department of Fish and Wildlife, GMT, Montesano, WA
Mr. John DeVore, Pacific Fishery Management Council, Portland, OR
Dr. John Field, National Marine Fisheries Service Southwest Fisheries Science Center, SSC, Santa Cruz, CA
Ms. Sheryl Flores, Oregon Department of Fish and Wildlife, Astoria, OR
Dr. Melissa Haltuch, National Marine Fisheries Service Northwest Fisheries Science Center, SSC, Seattle, WA
Dr. Owen Hamel, National Marine Fisheries Service Northwest Fisheries Science Center, SSC, Seattle, WA
Mr. John Harms, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Jim Hastie, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Mr. Christian Heath, Oregon Department of Fish and Wildlife, Newport, OR
Mr. David Hernandez, California Department of Fish and Wildlife, Monterey, CA
Dr. Allan Hicks, International Pacific Halibut Commission, Seattle, WA
Ms. Lisa Hillier, Washington Department of Fish and Wildlife, Olympia, WA
Ms. Kristen Hinton, Washington Department of Fish and Wildlife, Montesano, WA
Mr. Bill James, Morro Bay Commercial Fishermen's Association, Salem, OR
Mr. Will Jasper, Makah Tribe, Neah Bay, WA
Mr. Greg Krutzikowsky, Oregon Department of Fish and Wildlife, CPSMT, Newport, OR
Ms. Laurel Lam, Pacific States Marine Fisheries Commission, Seattle, WA
Mr. Tom Libby, California Shellfish Co., Inc., GAP, Astoria, OR
Dr. Brian Langseth, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Ms. Mel Mandrup, California Department of Fish and Wildlife, GMT, West Sacramento, CA

Mr. Tom Marking, GAP, McKinleyville, CA
Ms. Lynn Mattes, Oregon Department of Fish and Wildlife, GMT, Newport, OR
Mr. Merit McCrea, Sportfishing Association of California, GAP, Santa Barbara, CA
Ms. Caroline McKnight, California Department of Fish and Wildlife, GMT, Monterey, CA
Dr. Krista Nichols, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Ms. Melanie Parker, California Department of Fish and Wildlife, Monterey, CA
Mr. Todd Phillips, Pacific Fishery Management Council, Portland, OR
Ms. Katie Pierson, Oregon Department of Fish and Wildlife, GMT, Newport, OR
Mr. Dan Platt, Salmon Trollers Marketing Association, GAP, Fort Bragg, CA
Dr. Leif Rasmuson, Oregon Department of Fish and Wildlife, Newport, OR
Mr. Gerry Richter, B & G Seafoods, Inc., GAP, Santa Barbara, CA
Ms. Whitney Roberts, Washington Department of Fish and Wildlife, GMT, Olympia, WA
Dr. Tanya Rogers, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Andi Stephens, National Marine Fisheries Service Northwest Fisheries Science Center, Newport, OR
Mr. Daniel Studt, National Marine Fisheries Service West Coast Region, GMT, Long Beach, CA
Mr. Mark Terwilliger, Oregon Department of Fish and Wildlife, Newport, OR
Dr. Theresa Tsou, Washington Department of Fish and Wildlife, SSC, Seattle, WA
Mr. Dan Waldeck, Pacific Whiting Conservation Cooperative, GAP, Portland, OR
Dr. Chantel Wetzel, National Marine Fisheries Service Northwest Fisheries Science Center, GMT, Seattle, WA
Dr. Will White, Oregon State University, SSC, Corvallis, OR
Ms. Ali Whitman, Oregon Department of Fish and Wildlife, Newport, OR
Mr. Louis Zimm, Sportfishing Association of California, San Diego, CA