Agenda Item E. Discussion of Biological Implications of Combining Northern and Southern Sablefish Management Areas for Trawl

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Are sablefish south of 36 degrees different than sablefish north of 36 degrees?

Sablefish (*Anopoploma fimbria*) are a highly mobile, long-lived, valuable groundfish that have high movement rates and range from Southern California to the Bering Sea (Kimura et al. 1998, Hanselman et al. 2015). While traditional stock assessment and management has taken place at the regional level, Alaska (Hanselman et al. 2016), British Columbia, and the US West Coast (Johnson 2015), and assumes that these are closed stocks, a recent genetic study shows that NE Pacific sablefish are not genetically distinct within these traditional management areas (Jasonowicz et al. 2017). The finding that sablefish are a single panmictic stock across their range encompasses the current management areas used by the PFMC. Concurrent sablefish population declines across the regions during the past few decades provide further evidence for a single sablefish population across the NE Pacific. Differences in size and maturity (Rodgveller et al., Head et al. 2014) can be due to different historical fishing patterns and environmental influences such as the availability of prey items, amount of productivity available in the system, and water temperature (warmer water generally increases metabolic demands, therefore fish will need to eat more and may be smaller). All of these environmental factors have north-south gradients. Sablefish at the southern end of the PFMC region exhibit smaller lengths and weights at age than off of the northern coast, but these differences are likely driven by this combination of environmental factors.

What, if any, biological concerns stem from the possible elimination of the management line at 36 degrees for the trawl fishery only? The management line at 36 degrees would remain for other sectors. It is expected that removing the 36 degree management line would increase harvest in what is currently the northern area by a million pounds or more (the amount of unused trawl sablefish allocation in the south plus a portion of the amount taken by vessels that have been travelling to the south to harvest trawl sablefish allocation with fixed gear).

If effort shifts between regions within the California Current are incongruent with the current estimates of distribution in each region this could result in either under- or over-harvesting in a given region. For a species that does not move much, ideally the fishery would take the catch at the same proportion of estimated biomass in each region. Sablefish are capable of being highly mobile so a miss-alignment between the spatial distribution of the stock and fisheries catch maybe of lesser concern as fish could move into areas that have been more heavily fished. However, the current understanding of movement rates for sablefish within the California Current is limited.

The estimated survey biomass in each PFMC defined area can be used to apportion catches between areas. However, the annual variability in biomass estimates in each area should be evaluated. Shifting catches between PFMC defined areas such that the catches are greater than

the proportion of the estimated biomass in each area may result in localized depletion of such areas. **Through 2009 >70% of the total landings** came from the region **between Cape Mendocino (~40.5°) and U.S**. – Canada border. **Since 2010 the landings from this region have been > 60%** of the total landings. Prior to 2010 < 5% of the total landings came from the Conception area, this proportion has increased to between 10-18% from 2010 forward. Swept area biomass estimates from the NWFSC survey from 2003 forward for the region between Cape Mendocino (~40.5°) and the U.S.-Canada border ranges from **45% to 60% of the total survey biomass.** The difference suggests that the sablefish fishery has been fishing harder in the north than would be preferred given the NWFSC survey swept area biomass estimates. However, the distribution of landings compared to biomass interact with uncertainty about movement rates for sablefish, for which there are little data available.

Cape Mendocino (~40.5°) and U.S – Canada border
Through 2009 >70% of the total landings
Since 2010 the landings from this region have been > 60%
2003 forward Swept area biomass estimates ranges from 45% to 60% of the total survey biomass

What investigations could inform the impacts of eliminating the management line at 36 degrees?

The survey data could be standardized as is done for the stock assessments and be further investigated with respect to the distribution of biomass and index trends within regions of interest to the PFMC. The PFMC SaMTAAC should specify the latitudinal breaks for survey data investigations. Additionally, the biological data from the survey can be used to provide information on latitudinal patterns in size-at-age.

The 2019 stock assessment will be able to produce forecasts exploring different alternative future allocations between the fishing fleets: trawl, long line, and pots. The catch between fleets can then be allocated to fishing regions based on the proportion of the biomass in each region of interest.

New, west coast tagging studies could provide a better understanding of movement patterns of sablefish within our region. A reanalysis of all available sablefish tagging data for the NE Pacific is also beginning and may be informative.

Are any particular management approaches for sablefish problematic?

Evidence from past tagging studies in Alaska and Canadian waters (with tag recoveries along the west coast), and genetic studies indicate sablefish populations cross state, federal, and international management boundaries despite being delineated and managed as separate stocks for policy reasons. The lack of genetic population structure suggests that the current assessment and management framework should consider a range-wide, NE Pacific stock assessment. However, sablefish are assessed relatively frequently through individual assessments done by the AFSC, NWFSC, State of Alaska, and DFO. Despite a lack of genetic population structure across their range, there are differences in sablefish life history characteristics such as growth and

maturity rates that will need to be considered. Range-wide sablefish data analyses are the subject of current research efforts, pending funding.

References

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