

## Proposal for Review of Data-moderate Assessment Approaches that are Highly Reliant on Length Data

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### **Background and Purpose**

The stock assessments which support management specifications for most PFMC groundfish species (or assemblages) fall into two categories: benchmark assessments (or subsequent update assessments or catch-only updates) and data-poor assessments. Although a number of species were assessed in 2013 using newly approved data-moderate methods, that approach, which requires the inclusion of at least one index of abundance and precludes the use of length or age data in the model, has not been employed to inform groundfish management since. Its lack of subsequent application is largely attributable to two factors: indices of abundance for many species are frequently too uncertain to be informative, and composition data are frequently found to be more informative than indices in benchmark assessments for many species, particularly rockfish.

The motivation for excluding composition data from the data-moderate approach adopted in 2012 was at least in part due to the added review burden of evaluating model fits to those data, as part of a very short, pre-Council review by the SSC's Groundfish Subcommittee. However, that is not the only means by which such models could receive their primary review. Given a less demanding set of Terms of Reference for development and review of data-moderate assessments that include composition data (and the presumption of Category 2 status), a combination of these models and traditional updates could be reviewed within the structure of a traditional STAR Panel meeting.

Data-poor assessments provide no information regarding stock status and very uncertain guidance regarding sustainable harvest levels. However, roughly one-third of the 20 highest-ranked species in the 2018 prioritization exercise (and almost half of the next 20) will remain dependent on data-poor assessments in the specifications process for 2021-22. Even if only prioritization scores related to harvest, status, and ecosystem value are included, the group of species with data-poor assessments accounts for a quarter of the top-40 species. For many of these (often nearshore) species, several hundred length measurements are collected annually from commercial and/or recreational fisheries. Most species are either sampled with a minimal collection of age structures (especially off California) or any structures that have been collected are far lower priorities for very limited age-reading resources than the species of highest importance to commercial and recreational fisheries. Additionally, some species that have previously received benchmark assessments, such as greenstriped, greenspotted, and splitnose rockfishes rank near the bottom of a list focused on fishery importance and status concerns. The Council needs a more expeditious alternative to benchmark assessments for these species, as well as others that do not meet benchmark standards for available data that allows greater use of available composition data.

A review of alternative data-moderate approaches that would include composition data would best be completed prior to the Council's initiation of the prioritization process for stocks to be assessed in 2021. If such methods are to be considered for use in the next cycle, it is imperative that analysis of alternatives be reviewed by the SSC well before final Council decisions are made in June 2020. Identifying an acceptable length-based approach for use in 2021 while not guaranteed, would help address the PFMC's desire for greater assessment throughput, as well as the call for "right-sized" assessments in NMFS's new Stock Assessment Improvement Plan.

## **Methods**

Two analytical approaches will be used to test the performance of assessment models that are heavily-reliant on fish-length data, as well as a catch time series. Simulation testing will be conducted by a contractor using both Stock Synthesis (SS) and the Length-based Integrated Mixed Effects (LIME) assessment platform developed by Dr. Merrill Rudd as part of her Ph.D. research at the University of Washington. The simulation testing she conducted as part of her dissertation research was largely focused on species with shorter lifespans than nearshore rockfish, and a shorter time series of catch and length data than are available for many of groundfish species on the west coast. This new simulation research will focus on evaluating model performance for rockfish-like species with maximum ages from 25 to 40 years, which have catch histories of 30 to 60 years in length, with 15 to 40 years of length composition data. Performance will be measured primarily via deviations from the true values of the simulated data sets.

In addition to this simulation research, a second line of analysis will focus on assessment model performance when available data are removed from a small set of existing benchmark assessments that have been endorsed by the SSC as best scientific information available for managing those stocks. Again, the performance of both the SS and LIME platforms will be evaluated for drift in point estimates and changes in model precision, relative to benchmark results. In the most parsimonious case, each of the models will include only catch and length data, though other intermediate cases of data availability will also be examined.