Columbia River Fall Chinook Ocean Abundance Forecasts:
The Salmon Technical Team (STT) reviewed proposed methodology for forecasting the pre-season ocean abundance of Columbia River Chinook stocks. Current methodology forecasts the return to the river mouth using datasets that can vary from year to year and reflect different ocean fishery impacts. These terminal run forecasts must be converted into ocean abundance forecasts for fishery management planning by the Council. The methods currently employed to perform these conversions are inconsistent and undocumented.

The Model Evaluation Workgroup (MEW) developed post-season estimates of ocean abundance from reconstructed age-specific terminal run sizes and estimates of ocean fishery exploitation rates derived from coded wire tags (CWT). Two methods of forecasting ocean abundance using simple linear regressions and log-log regressions were presented. These two proposed methods and the status quo were evaluated in a hindcasting exercise to compare their performance in forecasting ocean abundance using the metrics of root mean squared error and average percent error from post-season estimates of ocean abundance. The MEW document did not describe the methods and results with sufficient detail to permit full evaluation by the STT, but the MEW concluded that none of the three methods consistently outperformed the others.

The STT recommends that the MEW revise its report to correct errors, document the methods currently employed to convert terminal run forecasts to ocean abundance projections, and clarify the data and methods employed in its evaluation of forecasting alternatives. The MEW report does not provide a sufficient basis for changing forecasting from the methods currently employed. Therefore, the STT recommends no change in the methodology for forecasting Columbia River Chinook for the pre-season process for 2007. The STT also recommends that ocean abundance forecasts using all three methods be prepared for further evaluation.

Genetic Stock Identification (GSI) Exempted Fishing Permit (EFP) Proposal:
By combining GSI, Global Positioning System (GPS), depth, temperature, and biological data, the proposed study provides a means to gather important information regarding the timing and location of capture for individual fish. The potential for such data to serve as a basis for examining a variety of issues, such as estimation of stock compositions, detection of schooling behavior, and inferences regarding migration routes at a fine spatial and temporal scale, is promising.

However, the description of the proposed study lacks the definitive information regarding the methodology for analysis and interpretation of these data, which is necessary to evaluate the adequacy of the study design. For example, what are the specific elements to be estimated? What is the desired precision and accuracy of the statistics to be generated? What methods and assumptions are to be employed for estimating stock compositions and migration patterns? What are the error structures surrounding the collection and analysis of the data and uncertainty of parameters to be employed in the analyses?
The analysis, interpretation, and limitations of the results of GSI analysis and DNA fingerprinting and their future use in salmon fisheries management need to be carefully defined and explicitly described. Without such information, there is a serious potential for misunderstanding, misinterpretation, and misapplication of results.

Currently, salmon fishery management in the study area is based on constraining stock and age-specific impacts. GSI can provide direct estimates of the harvest of stock groups whose components do not have associated CWT tagged fractions. For example, GSI methodologies can provide an estimate of the total Sacramento River winter run Chinook ocean harvest and, when coupled with CWT, and age analysis, provide data that would allow fishery managers to differentiate the harvest of hatchery and natural winter run Chinook. However, GSI methods are not currently capable of accurately identifying all stock units currently managed by the Council. For example, GSI is currently not capable of discriminating between California Coastal Chinook (CCC) and Blue Creek Chinook, which is a tributary of the Lower Klamath River, or of discriminating between Klamath River fall Chinook (KRFC) and Klamath River spring Chinook. For purposes of current salmon fishery management, accurate data on aging must be combined with accurate assignment of individual fish to stocks of interest based on GSI data. The current management for CCC is linked to the age-4 ocean harvest rate of KRFC. In addition, brood strength and brood proportion natural are used to estimate the number of adults expected to return and spawn in natural areas of the Klamath basin. Although the collection of scale and otolith data are mentioned, the proposal’s description does not indicate the number or percentage of fish from which scales or otoliths are to be collected or the methods to be employed to “ground truth” such data. Accurate aging by scale reading, for example, should by no means be assumed (see report of the PSC Expert Panel on CWT analysis). The collection and aging of scales from all fish identified as KRFC by the GSI analysis would need to be verified by some means, such as using CWT known-age scale reads. To meet the current management conservation objectives of the PFMC, fishery monitoring will need to rely on CWT recoveries from retention fisheries and the stock composition in nonretention fisheries will be limited to the stock groupings identified by GSI analysis.

Experimental designs for the collection of tissues will need to be further developed and consider factors such as controlling potential variation among boats in catch rates or fishing power. In addition, methods need to be developed to independently evaluate the accuracy of data collected at sea. For example, the use of vessel monitoring systems (VMS) could be used to further evaluate ways to track effort and area of catch in the proposed fisheries. The VMS information could be compared to the catch location data recorded during GSI-sampled fisheries. In addition, other methods may need to be explored to evaluate such factors as the cross contamination of genetic samples or other data collection and recording errors.

Experimental design, including methods for collection and analysis of GSI, age, and other necessary data, should be evaluated within a framework that considers the error structures for assigning individual fish to specific stocks and cohorts; such a framework is not presented in the proposal. Instead of providing such a framework, the proposal calls for the collection of samples that appear to be stratified by time, area, and fishery, but are arbitrary in size. The target number of tissues and other data to be collected by study cell appears to be related solely to budgetary and logistical considerations rather than including statistical design in the sample size.
requirements. For some strata, the collection of 200 samples would provide, at best, a glimpse of contributions of particular stocks and age groups of interest; uncertainty surrounding estimates of stock-age compositions of groups that comprise a small percentage of the exploited populations in such strata would be extremely high.

Lastly, the STT comments that no cost estimates or budget allocations are attached to the proposed study. There are indications that the cost of the study as presented could easily exceed $20 million. Budget information, such as the amount proposed for compensating participating fishermen to provide samples, process and analyze samples, or develop technology and methodology, overhead, and agency contributions, would be critical for evaluation and should be fully disclosed.

The STT recommends that careful experimental design and well thought out methods for assuring data quality due to the inherent difficulties of collecting data at sea will be required for success of this project. The scope of the research should be sufficiently narrowed to maximize on the potential for success and minimize the potential for misinterpretation or misuse of the data collected.

**FRAM Documentation:**
The STT has reviewed the set of five reports prepared by the MEW (FRAM Overview, User Manual, Technical Documentation, Base Data Development, and Programmers Guide). The STT believes that these reports sufficiently document the structure, parameters, and data employed by the FRAM models for Chinook and coho fishery planning.

PFMC
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