

SALMON TECHNICAL TEAM REPORT ON SALMON METHODOLOGY REVIEW

The Salmon Technical Team (STT), the Salmon Subcommittee of the Scientific and Statistical Committee, and the Model Evaluation Workgroup met on October 21-23, 2014, in Portland to conduct the annual Methodology Review. Nine topics were discussed at the meeting.

Willapa Bay natural coho status determination criteria – Robert Kope of the National Marine Fisheries Service presented a spawner-recruit analysis of Willapa Bay natural coho salmon. This stock was added to the Fishery Management Plan (FMP) by the adoption of Amendment 16, yet has no FMP-defined management objective. It also has no identified S_{MSY} , specified ACL, or status determination criteria (SDC), though the State of Washington has a habitat-based escapement goal of 13,090 natural-origin fish. The spawner-recruit analysis produced an estimated S_{MSY} of 17,200 natural-area spawners, and a F_{MSY} of 74 percent. The STT recommends that the Pacific Fishery Management Council (Council) adopt reference points for this stock based on this analysis. These would include a MFMT (maximum fishing mortality threshold) of 74 percent, a MSST (minimum stock size threshold) of 8,600 natural-area spawners ($MSST = 0.5 * S_{MSY}$), and annual catch limit calculated on the basis of $F_{ACL} = 0.95 * F_{MSY} = 71$ percent.

Grays Harbor fall Chinook escapement goal – Pete McHugh and Kristin Ryding of Washington Department of Fish and Wildlife presented a spawner-recruit analysis for Grays Harbor fall Chinook. The analysis produced an estimated S_{MSY} of 13,326 for the Chehalis and Hump Tulips Rivers combined. This estimate is slightly lower than the current management objective of 14,600 natural-area spawners, which was adopted in 1979 and was based on available spawning habitat. The S_{MSY} estimate of 13,326 was accepted as an escapement goal by the Pacific Salmon Commission and adoption by the Council would provide consistency between the FMP and the Pacific Salmon Treaty. The data set used in the spawner-recruit analysis had relatively low contrast in spawner abundance resulting in large variance in the estimate of S_{MSY} . Despite this consideration, the STT believes the estimate of S_{MSY} is the best available science, and recommends adoption of this estimate of S_{MSY} , and associated reference points, for the salmon FMP.

Chinook FRAM base period – Larrie LaVoy of the National Marine Fisheries Service presented an update on the development of a new FRAM base-period. Work is progressing, but the new base-period will not be developed in time for the 2015 management cycle.

Coho FRAM and proposed revisions to Lower Columbia River coho harvest policy—Larrie LaVoy provided an update on the relationship between estimated exploitation rates produced from coho FRAM (Fishery Regulation Assessment Model) and the exploitation rate ceilings that are being developed for the Lower Columbia River natural (LCN) coho harvest matrix. The STT notes that with a simple weighting system the coho FRAM has the ability to produce exploitation rates estimates that are consistent with those that will be developed from the harvest policy matrix.

Method for generating age 2 abundance in Chinook FRAM - Andy Rankis of the Northwest Indian Fisheries Commission presented a method for calculating age-2 initial abundance, a necessary input for the FRAM model, based on the forecast abundance of age-3 fish. The proposed new method assumes that the age-2 year class has the same cohort strength as the age-3 cohort derived

from cohort reconstruction. The method appears to be an improvement over the current mix of ad hoc age-2 forecasts for many FRAM stocks by providing consistency in methodology. An alternative to the proposed method discussed at the methodology review entails simply using the long-term average age-2 cohort abundance. The STT notes that the proposed method, and the alternative method of using the long-term average age-2 abundance, both provide some internal consistency in the FRAM model but do not produce age-2 forecasts based on any new knowledge of cohort strength. Nevertheless, the STT recommends adoption of the proposed age-2 abundance method for stocks in cases where formal age-2 abundance forecasts are not made. The STT would however like to see further consideration given to the use of long-term average age-2 abundance as an alternative approach.

Method to use recent CWT data to adjust base period Chinook FRAM exploitation rates in terminal net fisheries – Recent coded-wire tag data indicate that the contemporary distribution of impacts on non-local stocks in Puget Sound terminal fisheries differs from the patterns reflected in the FRAM base period which spans late 1970's through early 1980's. Galen Johnson of the Northwest Indian Fisheries Commission presented a method to adjust impacts in the FRAM base period data to be more consistent with recent impact distribution patterns. The STT notes that development of a new, more contemporary FRAM base-period should eliminate this problem, as the contemporary base period will reflect recent year fishing conditions and stock impacts. The STT approves of this method with the following caveat: if this or any alternative system is used to adjust FRAM base period exploitation rates for one stock (for example, by the use of the Stock Specific Scale Factor option in FRAM), then the same adjustments must apply to all stocks in the fishery such that the total observed landed catch is accounted for after summing the individual catches by stock.

Cape Flattery Control Zone – In April of 2014, the STT applied a 25 percent reduction to the impacts on fall Chinook stocks from mid- and south Puget Sound in the non-treaty troll fishery in Areas 3 and 4 (La Push and Neah Bay). The reduction attempted to account for the change in impacts to these stocks from the closure of Chinook salmon fishing in the Cape Flattery Control Zone (CFCZ) relative to the impacts that are estimated from FRAM under base period conditions when the area was open to fishing. To further evaluate this reduction in non-treaty troll impacts owing to the closure, Pete McHugh presented a comparison of CWT recoveries for Puget Sound Chinook stocks (George Adams, Nisqually, and mid Puget Sound) between the non-treaty troll fishery and the treaty troll fishery before and after the CFCZ was implemented. Differences in impacts between the two fisheries were substantial after the CFCZ was implemented, but were small prior to the closure, suggesting that closure had a measurable reduction in impacts for these Puget Sound Chinook stocks. The average ratio of marked landed mortalities based on CWT recoveries from the non-treaty fishery (under conditions of the CFCZ closure) to FRAM predictions of this quantity (that do not account for this closure) was 0.56, though there was substantial uncertainty in this estimate. This result suggests that including an adjustment factor in FRAM that reduces non-treaty troll impacts to these stocks by 44 percent ($1 - 56 \text{ percent} = 44 \text{ percent}$) is justified. The 25 percent adjustment factor applied in 2014 and recommended in the WDFW report is a risk-averse approach that could also be considered as an interim adjustment until the new FRAM base period is implemented. The development of a new, more contemporary FRAM base-period will eliminate the need explicitly account for changes in impacts due to the CFCZ because the contemporary base period will reflect recent year impacts estimated with the CFCZ in place.

Conservation objective for southern Oregon coastal Chinook – The current conservation objective for southern Oregon coastal Chinook is 60-90 fish per mile in three standard index areas. Todd Confer of the Oregon Department of Fish and Wildlife presented an analysis aimed at updating this conservation objective and providing SDC reference points. The focus of this analysis was the estimation of a Ricker spawner-recruit relationship for Rogue River fall Chinook that included smolt survival and mean summer flow covariates. On the basis of this analysis, Oregon has adopted new management objectives for Rogue River fall Chinook, and proposes that the Council adopt their conservation objective and reference points for the Southern Oregon coastal Chinook stock in the FMP, while keeping this stock as a component of the Southern Oregon Northern California stock complex (where Klamath River fall Chinook is the indicator stock). The stock-recruit analysis resulted in a S_{MSY} point estimate of 34,992 and F_{MSY} of 54 percent. Oregon has adopted the 75th percentile of the S_{MSY} posterior distribution (36,880 natural-area spawners) as a buffered estimate of S_{MSY} , with a corresponding MSST of 18,440 natural-origin spawners ($MSST = 0.5 * 36,880$). Furthermore, Oregon recommends using the 78 percent F_{MSY} proxy for tier II stocks (stocks for which no direct estimate of F_{MSY} exists) as the MFMT. The proposed stock conservation objective is a minimum of 41,000 naturally-produced adults passing Huntley Park in the Rogue River.

Based on the analysis presented and conventions currently used in the salmon FMP, the STT recommends adoption of the following reference points for southern Oregon coastal Chinook: a S_{MSY} of 34,992 and a MFMT of 54 percent. The Oregon-proposed MSST of 18,440 is 53 percent of the S_{MSY} point estimate, which is greater than the default MSST of 50 percent of S_{MSY} , though this is not inconsistent with other stocks in the FMP. The STT also sees no issues with adopting the Oregon-proposed conservation objective.

Salmon Fishery Economic Assessment - Ed Waters presented an update on plans to replace the model currently used to calculate economic impacts of commercial ocean salmon fisheries reported in the Salmon SAFE document (FEAM), with a new model that has more current estimates of economic impacts (IOPAC). The estimates coming from IOPAC are probably a better reflection of recent economic impacts, but there will be a discontinuity in the estimates of economic impacts when the model transitions from FEAM to IOPAC.

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