

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON PACIFIC WHITING
ASSESSMENT AND HARVEST SPECIFICATION FOR 2010

The Scientific and Statistical Committee (SSC) was briefed by Dr. Steve Martell (University of British Columbia) on the model (TINSS) selected by Pacific Whiting STAR Panel as the base model, and Dr. Ian Stewart (NWFSC) on the Stock Synthesis model which updated the 2009 stock assessment. The TINSS model was thus formulated using the recommendations by the Stock Assessment Review (STAR) Panel and the Stock Synthesis (SS) model was based on that presented to the STAR Panel and not the version which was considered acceptable by the STAR Panel. Dr. Vidar Weststad presented the report of the STAR Panel.

During its deliberations, the 2010 whiting STAR Panel identified major issues with both assessments: (a) whether the age and length data from the acoustic survey are representative, (b) whether the commercial length and conditional catch-at-age data are inconsistent with the assumptions of the models, and (c) whether the 1986 acoustic survey estimate is biased because the pre- and post survey calibrations are substantially different. These issues had also been expressed by past STAR Panels and have also been reflected in past research recommendations. The 2010 whiting STAR Panel also expressed concerns with the 2009 acoustic biomass estimate because of the presence of large numbers of Humboldt squid, which has a similar acoustic signal as whiting.

The response of the STAR Panel to these concerns was to identify a simpler model which did not use data it considered questionable. This led to two new model formulations. The Panel considered both of these as equally acceptable, but adopted the TINSS model as its base model because it had MCMC results immediately available to quantify uncertainty. Catch levels were calculated for both the $F_{40\%}$ and F_{MSY} harvest strategies.

The SSC discussed three key questions arising from the deliberations of the STAR Panel: (a) whether all of the data considered to be questionable should have been omitted from the models, (b) whether the assessment should be based on TINSS or Stock Synthesis, and (c) whether the management advice should be based on the $F_{40\%}$ or F_{MSY} harvest strategies. In relation to this last question, the SSC agreed that management advice should be based on the $F_{40\%}$ harvest strategy (with a 40-10 adjustment as needed) as applied to Markov-Chain Monte Carlo (MCMC) output as was the case last year, in particular because the SSC criteria for using the F_{MSY} estimate had not been met for whiting. The recommended ABC would be the median of the posterior distribution for the catch under the 40-10 control rule, subject to the constraint that the projected spawning stock biomass in 2011 is larger than the overfished threshold of $0.25B_0$.

The SSC discussed the other two questions in considerable detail, and two alternative views emerged.

- Management advice should be based on the STAR Panel recommended TINSS model because there are no demonstrable errors of judgement or failure to follow the terms of reference.
- Management advice should be based on the initial version of the Stock Synthesis model which was presented to the STAR Panel (i.e., which includes all of the data which the STAR Panel recommended be omitted). Reasons for adopting this model

include that (a) the removal of large amounts of data used in many previous assessments should have only been done following more thorough review, (b) the model outputs, in particular the recommendations for catch levels, are sensitive to the assumptions regarding prior distributions, and (c) aspects of the TINSS model (such as its assumptions that the stock was unfished in 1966, that selectivity was constant over time, and that the US and Canada catch-at-age data can be pooled by weighting the catch-at-age data by nation by catch weights) have not been fully evaluated.

The SSC, STAT and STAR Panel found themselves in a very difficult situation this year. This is due to several long-standing issues which need to be addressed as soon as possible.

- The timing of the assessment process for whiting is problematic. Specifically, the assessment authors only received the final version of the data three days before the deadline for submitting documents to the Panel. This does not provide enough time for the two groups of assessment authors to collaborate to the extent desirable, limits exploration of the data for the most recent year, and reduces the time available for error checking. The time between the end of the STAR Panel and the briefing book deadline for the March Council meeting is very short which meant that the assessment authors did not see the draft of the STAR Panel report in sufficient time to respond whether they agreed with its final conclusions or not.
- Many of the concerns which led the STAR Panel to reject data had been identified as research recommendations by previous STAR Panels and the SSC, but had not been addressed.

The SSC agreed the ideal way forward given the issues raised during the STAR Panel and during the SSC discussion would be to hold a mop-up panel as soon as technically feasible. The SSC realizes that there may be logistical reasons why that may be very difficult, but considers a mop-up panel the only way to rectify the problems and allow the SSC to provide a unified scientific recommendation regarding the best available science for Pacific whiting. The SSC strongly encourages the Council to consider the possibility of a mop-up panel for Pacific whiting this year.

Absent a mop-up panel, management decisions will have to be based on model formulations about which the SSC has major concerns, irrespective of which model is adopted. Although it discussed the issue extensively, the SSC was unable to reach consensus regarding which model formulation reflected the best available science for Pacific whiting this year and is consequently forced to put both models forward as best available science without assigning weights to either. The resulting OY values from the two models are 186,000t (Stock Synthesis) and 550,000t (TINSS). These values are less than the corresponding values reported in the assessment documents (224,975t and 617,700t respectively) because those values would lead to predictions of stock depletion to below $0.25B_0$ in 2011. If the SS model is the correct, and a catch exceeding 186,000t is taken, the stock is predicted to drop below the overfished threshold. In contrast, if the TINSS model is correct, taking a catch of 186,000t will lead to forgone yield.

The SSC was informed that the NWFSC acoustics group is engaged in an acoustic data reconstruction project. The SSC strongly encourages this work and asks that they and DFO scientists undertake experimental work to answer key questions such as hake target strength and evaluation of the representativeness of survey biological sampling.

The SSC noted that the high abundance of Humboldt squid in 2009 may well have impacted the size of the whiting resource due to predation. The size of this effect cannot be quantified at present, but may be substantial. The Chilean whiting stock has been greatly reduced because of squid predation. The SSC recommends that an acoustic survey take place in 2010 to explore this issue as well as how to estimate whiting abundance given the presence of squid.

Finally, the SSC emphasizes the assessment of whiting is uncertain at present. The results of the two models are highly uncertain as formulated, there is uncertainty regarding which model is better, there is uncertainty regarding which data sources are best included in assessments of whiting, and there is uncertainty due to the presence of a new but voracious predator species. Some of this uncertainty could be resolved through a mop-up panel but some is inherent to Pacific whiting, although the long-term solution necessarily involves collection of appropriate additional data.

PFMC
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