

**Caribbean Fishery Management Council
Scientific and Statistical Committee
Report to the Fourth National SSC Workshop
October 4 - 6, 2011**

The Scientific and Statistical Committee (SSC) of the Caribbean Fishery Management Council (CFMC) met twice in 2011, for two days each time, to make recommendations regarding OFL and ABC to the CFMC for species/species groups (Fisheries Management Unit) not designated as undergoing overfishing or overfished.

March 2011 SSC Meeting

The SSC initially recommended that the OFL be equal to the mean of the recreational and commercial (calculated separately) average landings each Fisheries Management Unit (FMU). We recommended using different year sequences for each jurisdiction (three jurisdictions: Puerto Rico, St. Thomas/St. John District, St. Croix District). The year sequences selected were the longest sequence available with reliable data in order to incorporate the variability inherent in natural systems. The year sequence varied among jurisdictions based on when data collection at the FMU level commenced and extended through the most recent year for which reliable data were available. Recreational data were only available from Puerto Rico. MRFSS started operating in Puerto Rico in 2000 and has not successfully operated in the USVI.

The SSC recommended that $ABC = OFL$ for most FMUs. The only exception was the Acanthuridae (surgeonfishes - reef herbivores) and Pomacanthidae (angelfishes - reef spongivores). The Acanthuridae and Pomacanthidae play a significant ecological role in regulating algal and sponge populations on coral reefs. There was insufficient time to discuss an appropriate scalar for ABC for these two FMUs, so the SSC recommended that a new option be inserted in the draft amendment that would reduce the ABC by 0.50 of the OFL.

The SSC did not present their advice in pounds of landings for specific species or species groups but rather determined the method, time sequence, and scalars for calculating OFL and ABC.

During the subsequent 137th CFMC meeting, the CFMC requested that the Scientific and Statistical Committee (SSC) revisit the Overfishing Limit (OFL) and Allowable Biological Catch (ABC) levels that the SSC approved in their March meeting. The CFMC requested that the SSC provide justification for using a different time series of total landings for all FMUs not addressed in the 2010 amendment and asked the SSC to address the application of a single rule for all FMUs. The CFMC also requested that the SSC present their recommendations in pounds of landings. Additionally, the CFMC asked the SSC to consider an OFL higher than average landings for healthy stocks.

May 2011 SSC Meeting

The SSC considered the concerns raised by Regional Administrator Crabtree about the use of average catch to set Overfishing Levels (OFL). RA Crabtree's concern was communicated as follows:

If the you believe a stock is healthy with no signs of overfishing, but you then set the OFL at average catch, aren't you then saying that overfishing has been occurring on average about half the time? Isn't that inconsistent with the starting premise that the stock is healthy? So if a stock healthy, shouldn't the OFL be a level above average catch?

The SSC responded by noting that setting OFL equal to average catch over a period of time does not mean that overfishing occurred about half the time. The concepts of MSY and overfishing need to be interpreted in a stochastic context. MSY is commonly interpreted as the long term average catch (also referred to as MAY - Maximum Average Yield) that results from fishing at a rate (F_{msy}) that corresponds to the maximum long term average productivity. When fishing at this rate, the stock is expected to fluctuate resulting in a catch different from MSY (either higher or lower) each year. Catches greater than MSY are not overfishing so long as F equals F_{msy} .

It is well known that MAY, resulting from a constant fishing mortality strategy of F_{msy} , is higher than the maximum constant catch (MCY, constant catch strategy) that can be taken from a stock (e.g., Sissenwine 1978). However, managing by a constant fishing mortality strategy requires information on stock size and fishing mortality so that catch can be adjusted annually. When average catch is used to estimate OFL, this information is usually lacking, thus requiring a constant catch strategy. Therefore, OFL should be lower than average catch during a period when F equaled F_{msy} . When an SSC estimates OFL equal to average catch, it is implicitly assuming F during the catch averaging period is enough lower than F_{msy} that average catch is less than or equal MCY. Another implication is that the catch under a constant TAC strategy is likely to be lower than the average catch during a period when F equaled F_{msy} when overfishing was not occurring. This is an inherent consequence of TAC management when the TAC cannot be adjusted to achieve a desired fishing mortality rate.

RA Crabtree also pointed out that the Gulf of Mexico Council's SSC has been working on the following:

Based on expert evaluation of the best scientific information available, recent historical landings are without trend, landings are small relative to stock biomass, or the stock is unlikely to undergo overfishing if future landings are equal to or moderately higher than the mean of recent landings..... Set the overfishing limit equal to the mean of recent landings plus two standard deviations.

The CFMC SSC noted that the conditions for applying this approach (i.e., landings without trend, landings small relative to stock size, stock unlikely to undergo overfishing) were not generally applicable to Caribbean stocks because of insufficient information. Furthermore, the CFMC SSC was not aware of a scientific basis for assuming that OFL occurs at a "catch equal the average plus two standard deviations." This corresponds to assuming that a catch that occurred rarely (about 2.5% of the time) during the averaging period could have been taken as a constant catch without overfishing. Why should this be true in general?

Given that only two days were scheduled for the May meeting, the SSC was only able to revisit the OFL and ABC for Puerto Rico. Puerto Rico was addressed first because there was concern that the early years of landings may be inflated because part of the Puerto Rican fleet fished throughout the Caribbean until 1988. Also, the expansion factors prior to 1988 were unknown.

The SSC based the OFL for recreational landings on the median of the 2000-2009 recreational time series (all the available data) for all the FMUs, with the exception of surgeonfish, tilefish, and angelfish. These three FMUs are comprised of species not targeted in Puerto Rico and as a result the median of the recreational landings was zero. The OFL for the three excepted FMUs was based on the maximum landings recorded over the time period.

The SSC selected the median of the annual commercial landings for the time sequence 1988 to 2009 for all FMUs except for the three FMUs referenced above. For these FMUs, the SSC based the commercial OFL values on maximum recreational landings recorded times two. These values were compared with the landings in St. Thomas/St. John where these taxa are targeted to ensure that they were reasonable.

The median was chosen for both the recreational and commercial datasets because it is more robust to errors in measurement. It is also less sensitive to outliers such as the 2005 peak in the commercial landings data and the outliers in the recreational data due to the high annual variability in the landings estimates.

To calculate the OFL, the SSC used the ORCS Working Group approach (Berkson et al. 2011). The first step employs an evidence-based scoring system to determine if a stock is lightly, moderately or heavily exploited. Of the nine attributes in the ORCS report, the SSC scored six. Information for the other three was either not available or duplicative of other attributes. All stocks scored between 1.5 and 2.5 and, therefore, were classified as moderately exploited. For stocks classified as moderately exploited, the OFL is defined as the product of a scalar (1.0) and a catch statistic (see above).

The next step, according to the ORCS method, is for the Council to decide on a scalar to multiply by the OFL to get ABC. The scalar multiplier is to reflect the Council's risk tolerance for overfishing (the lower the value, the more risk averse). The ORCS Working Group method gives three unique scalars to illustrate low, moderate, and high risk tolerances. However, the CFMC decided to use scalars to calculate the ACL for the FMUs based on $OFL = ABC$. The scalar chosen was 0.90, with the exception of surgeonfish and angelfish, which were given a scalar of 0.75 because of their ecological importance.

The CFMC had issues with the fact that different SSCs used different procedures for determining ABC. The CFMC was especially concerned because the resulting OFL of the Caribbean SSC was the median or average of the annual landings/catch when the SSCs of other Councils had calculated an OFL higher than some central tendency of landings or did not determine an OFL at all and based ABC on average landings/catch. The CFMC was concerned because the FMUs under consideration had not been determined to be overfished or undergoing overfishing. If the SSC's OFL is exceeded for any of these FMUs then the FMU will be considered to be overfished and action must be taken. If there is no determination of OFL, then these FMUs cannot be designated as overfished.

The CFMC also felt that the spiny lobster fishery was healthy, primarily because of the management measures in place, and wanted the SSC to review their determination of OFL and ABC for that fishery.

Finally, attached is a local newspaper report, indicating that fishers are fairly happy with the end results of this process.

Comments

The two day meetings have been too short to adequately address the issues before the SSC. The chair and other SSC members requested at least three days for the second meeting. However, apparently there was insufficient funding available at the time that the meeting was scheduled to allow an extension of the meeting.

References Cited

Berkson, et al. 2011. Calculating Acceptable Biological Catch for Stocks that have Reliable Catch Data Only (Only Reliable Catch Stocks - ORCS. NOAA Tech. Memo. NMFS-SEFSC-616. 44 pp.

Sissenwine, M.P. 1978. Is MSY an adequate foundation for optimum yield? Fisheries 3(6):22-42.