

Suriname Stock Assessment Update

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An updated stock assessment is currently underway for Suriname seabob. The objective of this assessment is to apply the same model used for Guyana in 2013, which will make use of the available size composition data. This assessment, which started late 2015, is taking longer than expected.

The general view of the Suriname management unit was that it is less heavily exploited than the Guyana management unit. There are fewer vessels operating, catch rates are generally higher and the seabob have a slightly higher weight. Therefore our view (CRFM Scientific Working Group and the Suriname SWG) was that the current harvest strategy was highly precautionary. The incentive for updating the stock assessment was to see whether and by how much the harvest rate might be increased, taking into account the better data and monitoring now available.

The model has been fitted using the same software used for Guyana (AD Model Builder). Because all that was required was formatting the data for loading into the software, this assessment could be conducted rapidly. In practice, the assessment found problems, which has resulted in redevelopment of the model in different software. Redevelopment is underway. In summary, the issues were:

- The assessment does not suggest the stock is “under-exploited” (or “over-exploited”). With more recent low catch rates, the assessment has not indicated strong arguments for increasing the number of licences, so urgency to complete the assessment has decreased.
- Unlike the Guyana assessment, the model had trouble fitting individual recruitment deviations, despite using a penalised likelihood. This is likely due to over-parameterisation of the model, with increased chance of this happening with longer time series.
- The diagnostics for the best fit were not good, indicating a poor fit to the size composition data in particular. This suggests the model requires more work, given the aliasing and over-parameterisation.
- The AD Model Builder Markov chain Monte Carlo (MCMC) did not properly converge for Guyana assessment. This is perhaps not surprising given the aliasing that is likely occurring between parameters. This led to the Guyana past uncertainty being underestimated (see powerpoint projections). The uncertainty was added back into the projections testing the HCR because a log-recruitment standard deviation was assumed. However, this is unsatisfactory, so an attempt is being made to develop the software to carry out the MCMC efficiently.
- The CRFM Scientific Working Group no longer meets regularly, so it may take longer to get review and subsequent guidance on the assessment.

The software being used to develop the model is STAN (mc-stan.org) in R (package `rstan`). This is a Bayesian approach that carries out an MCMC, which, based on my experience in other fisheries, should converge. This should allow a number of enhancements, such as treating recruitment as a “random effect” rather than trying to estimate them using maximum likelihood. It is unlikely the assessment will be completed before the July 2016. Debugging STAN models appears to be time consuming.

The model and data will be the same as those used for Guyana, hence information on the Guyana assessment. The basis for the model structure is the same and has been reviewed. Clearly however, the new model for Suriname will need to go through the same review process.

One of the issues I am keen to address for the HCR is the time step. For a short lived species, an annual time step may not be responsive enough. The Guyana assessment suggested that the effort limit appears to be adequate as this naturally responds within a year to changes in abundance (catch limits would not work so well). However, the HCR may be improved if reassessed monthly so that the

response is more rapid. This is something that we would look at, because I believe Suriname government scientists would be able to implement an HCR on a monthly basis.