

Suggested assumptions to be used for projections of the 2018 updated stock assessment models in under alternate future TACs

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Abstract

This document lists suggested assumptions with regards to future recruitment, future somatic growth rate, future poaching levels etc. These assumptions will be used when projecting the 2018 updated stock assessment forwards under alternate future TACs.

The first task will be to update each of the five super-area assessment of the west coast fishery to include all the most recent data. These models will take into account the TAC allocations made for the 2017¹ season. Projections will thus begin for the 2018 season.

The simulation framework for examining the implications of alternate future projections will be to project the resource forwards to the start of the 2021 season (at least – a matter that will require some discussion) under a number of different assumptions regarding future recruitment, somatic growth, past and future poaching, and current resource abundance levels. Each scenario will be afforded a probability (relative weight), and the simulation process will be conducted 1000 times drawing at random different combinations of the various assumptions in proportion to their assigned probabilities. Median, 5th and 95th percentiles will be calculated from the final 1000 set of results.

Previous projection prescriptions

Baseline future scenarios, which result as combinations of uncertainties regarding future recruitment, future somatic growth, historic poaching, future poaching and current abundance have been specified in the past. The following are the various possible options for each scenario, with the associated probabilities (or relative weights, WT) agreed at the last occasion.

Median Future recruitment	WT
• FRM: Geometric Mean of $R_{75}, R_{80}, R_{85}, R_{90}, R_{95}, R_{98}, R_{01}, R_{04}$	0.60
• FRH: Maximum of $R_{75}, R_{80}, R_{85}, R_{90}, R_{95}, R_{98}, R_{01}, R_{04}$	0.30

¹¹ The split season is indexed by the first year, thus the 2017/18 season is referenced by 2017.

- FRL: Minimum of $R_{75}, R_{80}, R_{85}, R_{90}, R_{95}, R_{98}, R_{01}, R_{04}$ 0.10

Note however that on the last occasion the FRL option excluded certain extremely low estimates which were R_{01} and R_{04} for super-area A12 and R_{80} for A7. [Decisions regarding such exclusions will be revised given the 2018 updated assessment results.]

It has yet to be decided if in the assessment models will extend the series of recruitment estimates given further data i.e. should R_{08} (or R_{07}) become an estimable parameter – this will depend on the updated assessment results.

Future recruitment

For FRM future R_y : where $y = (2008?), 2010, 2015$ and 2020 ; linearity between each of these years (and between 2008 and 2010).

Stochastic: R_y randomly selected from $\bar{R} e^{\varepsilon_y}$, where,

$$\ln \bar{R} = \frac{1}{8} (\ln R_{75} \dots \ln R_{04})$$

$$\sigma = \text{SD of } (\ln R_{75}, \dots, \ln R_{04})$$

$$\varepsilon_y \sim N(0, \sigma^2)$$

or for FRH and FRL, the \bar{R} is replaced by either the maximum or minimum R amount $R_{75}, R_{80}, R_{85}, R_{90}, R_{95}, R_{98}, R_{01}, R_{04}$ (with the exceptions noted above - and the possibility of now including R_{08}).

Future Somatic growth (2017+)

- | | |
|---|-----------|
| | WT |
| • FSGL: = the 1989-2016 average | 0.80 |
| • FSGM: ↑ linearly to the 1968-2016 average by 2020 | 0.20 |

[Values for years subsequent to 2013 value, which was the most recent used in the previous assessment, are now available.]

[The above applied previously to the growth rates for super-areas A34, A56, A7 and A8+. The somatic growth rate for Area 12 is assumed to remain constant in the future at the 1989-2016 average level for all scenarios.]

Current Abundance levels

- For the RC assessment model R_{2004} was previously an estimable parameter, although it was found to be estimated with very low precision. The ALTL and ALTH models correspond exactly to the RC model, except for R_{2004} which is fixed at the (approximate) upper and lower 25%-iles of this distribution as follows:

$$\ln R_{2004}^{ALTH} = \ln \hat{R}_{2004}^{RC} + \sigma\alpha$$

and

$$\ln R_{2004}^{ALTL} = \ln \hat{R}_{2004}^{RC} - \sigma\alpha$$

where σ is from equation (1) below, and the α value (0.741²) corresponds to the 25%iles of a t -distribution with the appropriate number of degrees of freedom.

$$\ln \bar{R} = \frac{1}{8} \sum_{y=1975}^{2004} \ln R_y \tag{1}$$

$$\sigma^2 = \frac{1}{7} \sum_{y=1975}^{2004} (\ln \bar{R} - \ln R_y)^2$$

WT

- RC: Best Estimate of R_{2004} 0.50
- ALTL: Estimated lower 25%ile for R_{2004} 0.25
- ALTH: Estimated upper 25%ile for R_{2004} 0.25

R₂₀₀₄ will be replaced by R₂₀₀₈ should R₂₀₀₈ prove to be a satisfactorily estimable parameter).

Historical Poaching

WT

- HP1: Total historic poaching levels 1990 to 2008 are 500 MT annually 0.65
- HP2: Total historic poaching levels 1990 to 2008 are 250 MT annually 0.35

Details of HP1 and HP2 will be updated and extended in the light of further discussions on estimation of historical poaching levels. To ease computations, the number of options developed should be kept reasonably low.

² This would change is the R2008 is added to the number of estimable parameters

Future poaching scenarios

For the previous assessment, these were related to the % change in the poaching level for each super-area between 2008 and 2012. Poaching for 2013+ was assumed to remain at the 2012 level. The six scenarios to cover different options (with different weights) defined were:

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Weighted Average
Weighting	40	10	20	20	5	5	100
4-yr % change for A3-6	-50	-50	-50	0	0	0	-35%
4-yr % change for A8+	+75	+25	+125	+75	+25	+125	+80
% change in total amount poached	+50	+10	+90	+60	+20	+100	+57

The task team updating the poaching estimates will also need to propose an update to these specifications

Note: Unless strong evidence to the contrary is offered, the super-srea breakdowns for future poaching levels will be taken to be unchanged from previous assumptions, which were:

A12 = 1%

A34 = 2.5 %

A56 = 2.5%

A7 = 14%

A8+ = 80%

Future legal catch scenarios

The future breakdown of legal catches by super-area and inshore/offshore needs to be specified. It is proposed that this be assumed to remain fixed and as for the 2017 season.