Recommendations on rock lobster TACs for Tristan rock lobster *Jasus tristani*, Nightingale, Inaccessible and Gough islands for the 2022/23[1] season

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Executive Summary

OMPs are the agreed basis to recommend rock lobster TACs for all four islands of the Tristan da Cunha Group. The application of these OMPs using the most recent CPUE and survey data (and Vessel CPUE data in the case of Tristan) for input into the various OMPs result in the following TAC recommendations:

- The OMP for **Tristan** recommends a TAC for 2022 at **121 MT** An amount equal to 0.545 MT overcatch must be deducted, thus **final TAC = 121-0.545 MT = 120 MT** (2021 TAC 120 MT).
- The OMP for **Nightingale** recommends a TAC for 2022 at **95 MT**. An amount equal to 0.621 MT overcatch must also be deducted, thus **final TAC = 95-0.621=94 MT** (2021 TAC 93 MT).
- The OMP for **Inaccessible** recommends a TAC for 2022 at **106 MT** (2021 TAC 101 MT).
- The OMP for **Gough** recommends a TAC for 2022 at **105 MT+5MT rollover=110 MT in total.** (2021 TAC = 100 MT+5 MT rollover, less 12.5 MT as 12.5 MT of Gough quota was caught in advance of the Gough restoration program during the 2019 season).

If an overcatch of more than 0.5 MT is taken at an island in a given season, that amount is to be taken off the TAC allocated for the following season. Thus a 0.545 MT overcatch at Tristan and a 0.648 MT overcatch at Nightingale for the 2021 season must be removed from the allocated TACs for the 2021 season.

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[1] The convention used here is that the split season (e.g. 2016/17) is referred to as the "2016" season.

Introduction

New OMPs for Tristan and Nightingale were developed in 2020 (Johnston and Butterworth (2020)) and for Gough and Inaccessible in 2021 (Johnston 2021b, c). OMPs have now been adopted for all four islands in the Tristan group for the purpose of scientific recommendations for TACs. All OMPs have the same form, as set out below:

$$TAC_{y+1} = TAC_y + \alpha(I_y^{rec} - I^{tar})$$

where

I_y^{rec} is the average of the GLM standardized CPUE over the last three years (*y*-2, *y*-1,*y*),

I^{tar} is the CPUE target index, and

α is a tuning parameter – the larger the α value, the more "responsive" the OMP is to changes in the catch rate in the future.

A rule to control the inter-annual TAC variation is also applied. The baseline % TAC change relative to the previous year ("max V%") is restricted to a maximum of either max V% up and max V% down:

If $TAC_{y+1} < (1 - \max V\% \text{ down})TAC_y$ then $TAC_{y+1} = (1 - \max V\% \text{ down}) TAC_y$

If $TAC_{y+1} > (\max V\% \text{ up}) TAC_y$ then $TAC_{y+1} = (\max V\% \text{ up}) TAC_y$

Furthermore a maximum TAC (ceiling) and/or a minimum TAC (floor) may be imposed, where the latter is also subject to Exceptional Circumstances (EC) rules where if I_y^{rec} drops below Ilim, the ECs apply and TAC decrease constrains are overridden.

Tristan

The current Tristan OMP has:

J^{tar} the CPUE target index of 1.0,

α is 25,

max V%   5% up and 5% down,

Jlim   0.7 kg/trap,

TAC ceiling   NA, and

TAC Floor   120 MT.

Tristan TAC for 2022

The updated standardised CPUE, biomass survey and Vessel CPUE are reported in Johnston and Butterworth (2022a-c). Each data series is renormalised so that the average over 2010-2012 is 1.0. Table 1a reports the input data from all three sources.

The calculation of the recommended 2022 TAC for Tristan is as follows:

The combined J_{2021}^{rec} value:

$$J_{2021}^{rec} = \frac{w_1 I_{2021}^{rec,comm} + w_2 I_{2021}^{rec,Edin} + w_3 I_{2021}^{rec,survey}}{w_1 + w_2 + w_3} \quad \text{i.e. used all three indices}$$

$$= \frac{0.569 * 1.084 + 0.046 * 1.475 + 0.384 * 0.910}{1}$$

= 1.034

Note: No Edinburgh vessel nor survey data are available for the 2020 season. As described in Johnston (2021), missing data values are handled as follows:

"Calculate the I_y^{rec} value for each series ($I_y^{rec,comm}$, $I_y^{rec,Edin}$ and $I_y^{rec,survey}$) as the average of the normalized values over the years within the last three years (*y*-2, *y*-1, *y*) for which data are available, if only one or two years' data are available".

$$TAC_{2022} = TAC_{2021} + \alpha(J_{2021}^{rec} - J^{tar})$$

$$= TAC_{2021} + 25(J_{2021}^{rec} - 1.0)$$

$$= 120 + 25(1.034 - 1.0)$$

$$= 121 \; MT$$

The final TAC recommended for Tristan for the 2022 season is **121 MT.**

Nightingale

The current Nightingale OMP has:

I^{tar} the CPUE target index of 5.0 kg/trap,

α   is 5,

max V%   5% up and 5% down,

Ilim   3.0 kg/trap,

TAC ceiling   95 MT and,

TAC floor   NA.

Nightingale TAC for 2022

The updated standardized CPUE for Nightingale is reported in Johnston and Butterworth (2022d). The calculation of the 2022 TAC for Nightingale is as follows:

$$TAC_{2022} = TAC_{2021} + \alpha(I^{rec}_{2021} - I^{tar})$$

$$= TAC_{2021} + 5(I^{rec}_{2021} - 5.0)$$

$$= 93 + 5(9.600 - 5.0)$$

$$= 116 \ MT$$

This TAC value is greater (25% greater) than the maximum 5% increase from the previous TAC (93 MT); thus this TAC is adjusted to equal a 5% increase over the 93 MT, which is **98** MT.

The I^{rec}_{2021} value of 9.600 is not below the metarule threshold Ilim value of 3.0 kg/trap, so the metarule is not invoked.

Given that 98 MT is above the TAC ceiling value of 95 MT, the final TAC is **95 MT.**

Gough

The current OMP (OMP-2021) has:

I^{tar} the CPUE target index of 5.5 kg/trap,

α   is 4,

max V%   5% up and 5% down,

Ilim   3 kg/trap,

Gough TAC for 2022

The updated standardised CPUE are reported in Johnston and Butterworth (2022d). The biomass survey data are renomalised so that the average over 2010-2012 is equivalent to that of the commercial CPUE data (for 2010-2012). Table 1b reports the input data from both the commercial CPUE and biomass survey.

The calculation of the recommended 2021 TAC for Gough is as follows:

The combined I^{rec}_{2021} value:

$$I^{rec}_{2021} = \frac{w_1 I^{rec,comm}_{2021} + w_2 I^{rec,survey}_{2021}}{w_1 + w_2} \quad \text{i.e. used both indices}$$

$$= \frac{44 * 7.504 + 13 * 8.035}{57}$$

= 7.626

Note: No survey data are available for the 2020 season. As described in Johnston (2021a), missing data values are handled as described for Gough.

$$TAC_{2022} = TAC_{2021} + \alpha(I^{rec}_{2021} - I^{tar})$$

$$= TAC_{2021} + 4(I^{rec}_{2021} - 5.5)$$

$$= 100 + 4(7.626 - 5.5)$$

$$= 109 \; MT$$

This TAC value is greater (8.5% greater) than the maximum 5% increase from the previous TAC (100 MT); thus this TAC is adjusted to equal a 5% increase over the 100 MT, which is **105** MT.

The I_{2021}^{rec} value of 7.63 is above the threshold Ilim value of 3.0 (thus ECs are not invoked). Accordingly the final TAC recommended for Gough for the 2021 season is **105 MT.**

A value of **5 MT** will be added to this TAC for 2022 (and in 2023) as part of an agreed rollover scheme to make up for lost TAC due to the sinking of the Geo Searcher in 2020 and a part of the TAC having being left in the water during the 2020 season.

Inaccessible

The Inaccessible OMP-2021 accepted has:

I^{tar}	the CPUE target index of 5.0 kg/trap,
α	is 2.5,
max V%	5% up and 5% down,
Ilim	3.0 kg/trap.

The updated standardised CPUE are reported in Johnston and Butterworth (2022d). The biomass survey data are renormalized so that the average over 2010-2012 is equivalent to that of the commercial CPUE data (for 2010-2012). Table 1b reports the input data from both the commercial CPUE and biomass survey.

Inaccessible TAC for 2022

The calculation of the recommended 2022 TAC for Inaccessible is as follows:

The combined I_{2021}^{rec} value:

$$I_{2021}^{rec} = \frac{w_1 I_{2021}^{rec,comm} + w_2 I_{2021}^{rec,survey}}{w_1 + w_2} \quad \text{i.e. used both indices}$$

$$= \frac{29 * 8.44 + 16 * 3.835}{45}$$

= 6.80

Note: No survey data are available for the 2020 season. As described in Johnston (2021a), missing data values are handled as described for Gough.

$$TAC_{2022} = TAC_{2021} + \alpha(I_{2021}^{rec} - I^{tar})$$

$$= TAC_{2021} + 2.5(I_{2021}^{rec} - 5.0)$$

$$= 101 + 2.5(6.80 - 5.0)$$

$$= 106 \; MT$$

This is within the 5% increase threshold.

The I_{2021}^{rec} value of 6.80 is above the threshold Ilim value of 3.0 (thus ECs are not invoked). Accordingly the final TAC recommended for Gough for the 2021 season is **106 MT (a 4.5% increase).**

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Table 1a: The updated Tristan (2021) GLMM powerboat CPUE, Vessel and Biomass survey series for to be used for the J_{2021}^{rec} calculations.

	2021 GLMM powerboat CPUE		Vessel GLM CPUE	Biomass series	
	Pre-nomalisation	Re-normalised	Re-normalised	Pre-nomalisation	Re-normalised
2019	1.122	0.882	0.920	21.26	0.896
2020	1.459	1.146	-	-	-
2021	1.558	1.224	2.03	21.94	0.924
Average J_{2021}^{rec}		**1.084**	**1.475**	21.60	**0.910**

Table 1b: The updated Gough and Inaccessible (2021) GLMM powerboat CPUE and Biomass survey series for to be used for the I_{2021}^{rec} calculations. Values input to the TAC computations are shown bolded and in red.

	Gough			Inaccessible		
	Commercial CPUE	Biomass survey pre-normalised	Biomass survey Re-normalised	Commercial CPUE	Biomass survey pre-normalised	Biomass survey Re-normalised
2019	5.112	10.96	6.68	6.36	10.16	3.05
2020	6.212	-	-	9.73	-	-
2021	11.190	15.42	9.39	9.23	15.40	4.62
Average I_{2021}^{rec}	**7.504**	13.19	**8.04**	**8.44**	12.78	**3.84**