

# RECOMMENDATIONS ON ROCK LOBSTER TACs FOR THE TRISTAN GROUP OF ISLANDS FOR THE 2016/17<sup>1</sup> SEASON

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## Executive Summary

OMPs have recently been accepted as the basis to recommend TACs for Tristan, Inaccessible and Gough islands. Given that for Inaccessible and Gough the recent catch rates continue to be above the associated OMP's target catch rate, the OMPs indicate increases to the TACs for both islands for the 2016 season:

Inaccessible: 77 MT to **81 MT**

Gough: 105 MT to **110 MT**

High catch rates (relative to pre-OLIVA) continue at Nightingale with some moderate recent decline. The reasons for these high levels remain unconfirmed, though there are some indications that they reflect high recruitment around 2005. However, the possible negative impact on recruitment in 2011 as a consequence of the OLIVA oil spill may still be to be felt in the fishery, as those recruits have still to reach catchable size. Nevertheless projections are very positive in the longer term even with a future TAC of 75 MT, so that an increased initial TAC for the 2016 season of 70 MT season is recommended. The similar precautionary approach that has been implemented for the previous two years should be followed, i.e. set the TAC at 70 MT when this season starts, with an increase to **75 MT** to be considered in November based on decision rules that take the 2016 biomass survey and initial nominal CPUE results into account. An OMP for Nightingale will be developed for use in setting the 2017/18 TAC.

The updated OMP for Tristan sets the TAC for 2016 at **120 MT**.

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<sup>1</sup> The convention used here is that the split season (eg 2016/17) is referred to as the "2016" season.

## Inaccessible and Gough

### Introduction

OMPs have recently been developed and agreed upon for both Inaccessible and Gough islands, and used to set the TACs at these islands for the first time for the 2014 season and again for the following 2015 season. Johnston and Butterworth (2014) provides details of these OMPs. For Inaccessible the “CMP3+metarule 2” is the final agreed OMP, and for Gough the “CMP20+metarule1”. Both these OMPs are target-based, with the TAC setting formula being of the form:

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

where

$I_y^{rec}$  is the average of the GLMM standardized CPUE over the last three seasons ( $y-2, y-1, y$ ),

$I^{tar}$  is the CPUE target (4 for Inaccessible and 4.5 initially for Gough, dropping to 2.8 in 2017), and

$\alpha$  is the tuning parameter (2.5 for Inaccessible and 10 for Gough).

A rule to control the inter-season TAC variation is also applied. Normally the percentage TAC change relative to the previous season is restricted to a maximum of either up 5% down 5%, i.e.:

$$\text{If } TAC_{y+1} < 0.95TAC_y \quad \text{then } TAC_{y+1} = 0.95TAC_y \quad (2)$$

$$\text{If } TAC_{y+1} > 1.05TAC_y \quad \text{then } TAC_{y+1} = 1.05TAC_y \quad (3)$$

However, in addition, an Exceptional Circumstances metarule for each of Inaccessible and Gough may be applied under certain circumstances, where the 5% TAC decrease constraint is increased to as much as 20% if the (catch rate) index drops below a threshold level. This metarule allows for the TAC to be reduced further than the usual maximum 5% decrease, as shown in Figure 1. For Inaccessible,  $\alpha$  is set at 4 kg/trap, and for Gough  $\alpha$  is set at 1.5 kg/trap.

GLMM analyses including the most recent (2015) season's CPUE longline data have recently been completed (Johnston, Butterworth and Brandao 2016). These analyses provide the input data used in setting the TACs for the 2016 season for Inaccessible and Gough. Table 1 reports the values used in the calculation of the  $I_y^{rec}$  values.

### *Inaccessible TAC for 2016*

The calculation of the 2016 TAC for Inaccessible is as follows:

$$TAC_{2016} = TAC_{2015} + \alpha(I_{2015}^{rec} - I^{tar})$$

$$TAC_{2016} = TAC_{2015} + 2.5(I_{2015}^{rec} - 4)$$

$$TAC_{2016} = 77 + 2.5(6.147 - 4)$$

$$TAC_{2016} = 82.37 \text{ MT}$$

This TAC value is greater than the maximum 5% deviation from the previous TAC (77 MT), thus the final TAC recommended for Inaccessible for the 2015 season is  $77 \times 1.05 = 80.85$  rounded to **81 MT**. The  $I_{2015}^{rec}$  value of 6.147 is not below the metarule threshold level (4 kg/trap), so that the final TAC recommended for Inaccessible for 2016 is **81 MT**.

### *Gough TAC for 2016*

The calculation of the 2016 TAC for Gough is similar, and as follows:

$$TAC_{2016} = TAC_{2015} + \alpha(I_{2015}^{rec} - I^{tar})$$

$$TAC_{2016} = TAC_{2015} + 10(I_{2015}^{rec} - 3.36)$$

$$TAC_{2016} = 105 + 10(5.815 - 3.36)$$

$$TAC_{2016} = 129.55 \text{ MT}$$

This TAC value is greater than the maximum 5% increase from the previous TAC (105 MT); thus this TAC is adjusted to equal a 5% increase over the 105 MT, which is 110 MT. The  $I_{2015}^{rec}$  value of 5.815 is not

below the metarule threshold level (1.5 kg/trap), so that the final TAC recommended for Gough for 2016 is **110 MT**.

## **Nightingale**

### *Introduction*

In providing the previous two year's TAC advice for Nightingale, it was pointed out that the situation at Nightingale was unclear given the unexpectedly high CPUE that had been experienced over the immediately preceding seasons. The need to check how these CPUEs might change over the immediate future before adjusting the TAC was stressed. The hope was that the reasons for these high values would become more evident and hence allow a reliable assessment to be conducted. For 2013, the advice given was to set a PUCL (Precautionary Upper Catch Limit) of 40 MT, which was to be increased during the season on the basis of a comparison of the catch rates achieved to those from immediately before the OLIVA incident. Specific rules were pre-set to govern the increase to be permitted. In the event that the catch rates achieved were such as allowed to maximum increase permitted by those rules, which was to 65 MT.

The initial TAC for 2014 and 2015 was set at 65 MT increased to 70 MT, given the continued high catch rates during those seasons.

### *Nightingale TAC for 2016*

Table 2 and Figure 2 compare the nominal catch rates achieved at Nightingale over the last three seasons with those immediately before the OLIVA incident (March 2011), as well as with the biomass survey abundance indices since 2009 and the GLMM standardized CPUE which include the most recent seasons. As was seen in the 2012-2014 seasons, the 2015 CPUE is much higher than was the case before the incident and the survey result (Leg1) is also higher. The reasons for this remain unclear, though may be a consequence of especially high recruitment around 2005. Given the continued very high catch rates, there would hardly be any justification for a 2016 season TAC of less than 70 MT. On

the other hand, if the OLIVA oil spill did indeed impact recruitment negatively, that impact may still be to be felt in the fishery because of the time needed for those lobsters to grow to catchable size. The biomass survey index values for Nightingale for the recent seasons are also high (Johnston and Butterworth 2016b). Furthermore, the Nightingale assessment has recently been updated (Johnston and Butterworth 2016c). Using the updated assessment, projections at both future constant catches (CC) of 70 MT and 75 MT have been examined. Results (see Figure 3) show that that neither of these two possible TACs would pose any threat to the sustainability of the Nightingale resource, with fast recovery in the longer term indicated in both cases.

Given that recent CPUE values are well above the five year average of 5.2 kg/trap over the period immediately preceding the OLIVA incident, considered together with recent high survey results and the updated assessment, it is recommended that the initial TAC is set at 70 MT (for precautionary reasons) and that the CPUEs are monitored on a monthly basis. In November if catch rates are above the average of the three years prior to the OLIVA incident, and the biomass survey index remains high, then the TAC should be increased to 75 MT.

An OMP for Nightingale will be developed for use in setting the 2017/18 TAC.

## **Tristan**

### *Introduction*

An updated OMP for the Tristan da Cunha island fishery has recently been proposed (see Johnston and Butterworth 2016d). This OMP continues to be a target-based OMP with the target (Itar) being the average of the 2010-2012 GLM standardized CPUE values (1.257 kg/trap/day). A new rule is that a TAC “floor” of 120 tons is set, BUT there is a lower limit (Ilim) in the observed recent standardized CPUE 3-yr average below which this 120t floor rule is over-ruled on the basis of Exceptional Circumstances (ECs) having occurred. This updated OMP is described in detail in Johnston and Butterworth 2016d. Essentially the EC rule comes into play once the recent 3-yr CPUE level drops below 0.8 kg/trap/day.

### *Tristan TAC for 2016*

The calculation of the 2016 TAC for Tristan is as follows:

$$TAC_{2016} = TAC_{2015} + \alpha(I_{2015}^{rec} - I^{tar})$$

$$TAC_{2016} = TAC_{2015} + 25(I_{2015}^{rec} - 1.257)$$

$$TAC_{2016} = 120 + 25(0.903 - 1.257)$$

$$TAC_{2016} = 111.15 \text{ MT}$$

This TAC value is lower than the “floor” of 120, and the  $I_{2015}^{rec}$  value is above the threshold  $I_{lim}$  value of 0.80 (thus ECs are not invoked). Accordingly the final TAC recommended for Tristan for the 2016 season is **120 MT**.

### **References**

Johnston, S.J. and D.S. Butterworth. 2014. Initial OMP candidates for the Inaccessible and Gough rock lobster fisheries. MARAM document, MARAM/TRISTAN/2014/FEB/03.

Johnston, S.J., Brandao, A. and D.S. Butterworth. 2016a. Updated 2016 GLMM-standardised lobster CPUE from the Tristan da Cunha group of islands. MARAM document, MARAM/TRISTAN/2016/MAY/09.

Johnston, S.J. 2016b. Biomass survey results for Nightingale which include the recent February 2016 Leg 2 survey results. MARAM/TRISTAN/2016/APR/06.

Johnston, S.J., and Butterworth, D.S. 2016c. Updated 2016 Nightingale rock lobster assessment. MARAM document, MARAM/TRISTAN/2016/JUN/10.

Johnston, S.J. and Butterworth, D.S. 2016d. Initial results in the development of a new OMP 2016 for Tristan da Cunha island rock lobster. MARAM/TRISTAN/2016/MAY/07.

Table 1: The updated (2015) GLMM CPUE (kg/trap) series for Inaccessible, Gough and GLM CPUE for Tristan to be used for the  $I_{2015}^{rec}$  calculations.

Season	Inaccessible	Gough	Tristan
2013	5.606	5.819	1.034
2014	7.255	4.825	0.746
2015	5.580	7.011	0.930
<b>Average</b> ( $I_{2015}^{rec}$ )	<b>6.147</b>	<b>5.815</b>	<b>0.903</b>

Table 2: Recent nominal CPUE and 2016 updated GLMM CPUE values for the longline fishery and biomass survey (for both Leg1 and Leg2) results for Nightingale.

Season	Nominal longline CPUE	2016 GLMM CPUE	Biomass survey (Leg1) indices	Biomass survey (Leg2) indices
2008	4.827	3.779		8.17
2009	4.237	3.803	16.31	20.28
2010	4.862	3.537	14.00	5.11
2011*	-	-	4.63	8.60
2012	9.62	-	18.10	14.47
2013	13.42	12.937	23.50	
2014	10.94	10.694	30.92	
2015	8.630	9.311	24.00	14.07

\*Oliva incident occurred March 2011

Table 3: The Nightingale monthly nominal CPUE's (in kg/trap) during previous years.

	2008	2009	2010	2008-10 average	2013	2014	2015
September	3.18	4.52	4.00	3.90	14.24	8.42	7.42
October	4.39	3.24	4.21	3.95	11.88	10.68	-
November	4.05	4.95	2.56	3.85	15.23	18.12 (Dec)	9.75

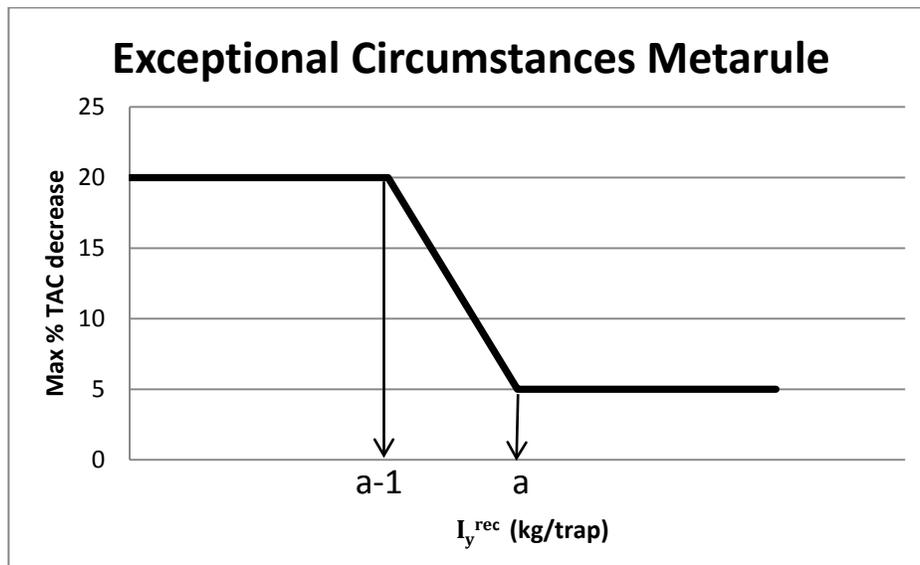
Figure 1: The Exceptional Circumstances metarule implemented for Inaccessible and Gough; the values of the parameter  $a$  are respectively 4 and 1.5.

Figure 2: Recent nominal CPUE and 2016 updated GLMM CPUE values for the longline fishery and biomass survey results (Leg1 and Leg2) for Nightingale.

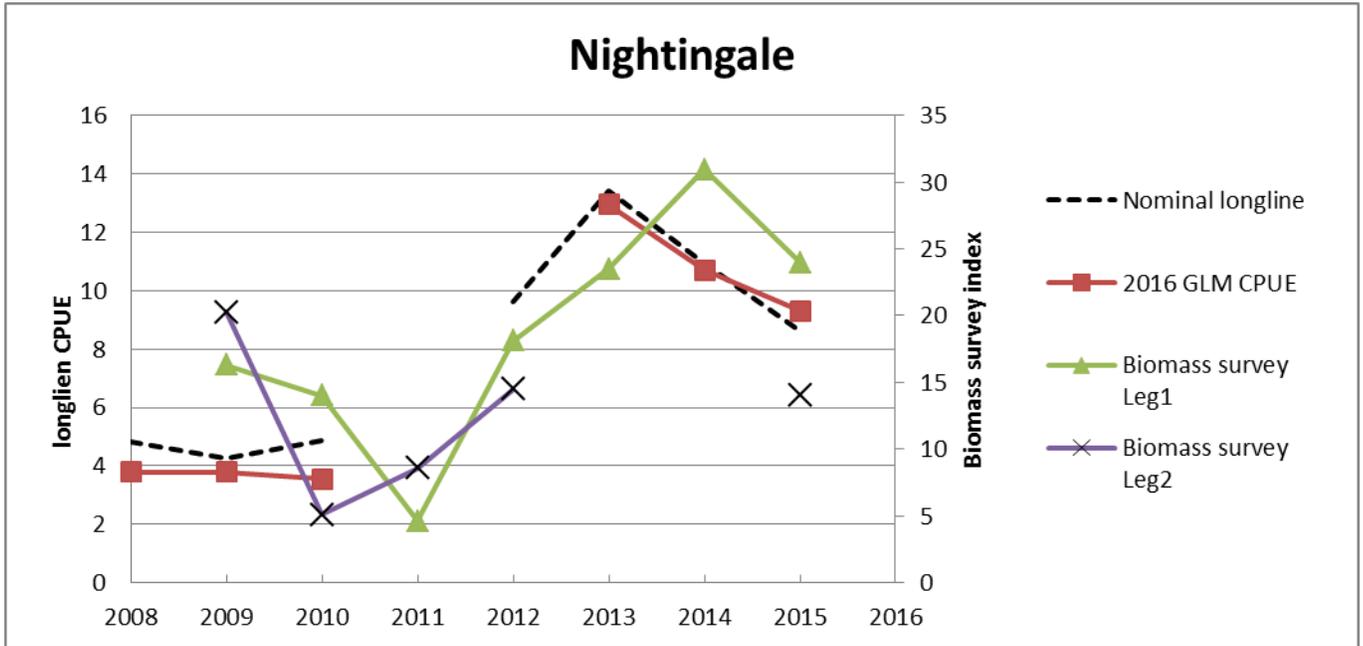


Figure 3: **RC** projections of the Nightingale resource into the future for levels of constant catch  $CC=70$  MT and  $CC= 75$  MT (see MARAM/TRISTAN/2016/JUN/10). The top plot shows the different catch levels (compared to levels since 1990), the middle plot shows the past and predicted catch rates (CR), and the bottom plot shows the  $Bsp/K$  ratio.

