Recommended TAC 2011 for the South Coast Rock Lobster Resource using re-tuned OMP 2010

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Introduction

Re-tuned OMP 2010 (Johnston and Butterworth 2010) is used here to calculate the TAC for the South Coast Rock Lobster resource for the 2011 season. (Note the convention that 2010 is used to refer to the 2010/2011 season.)

Note that re-tuned OMP-2010:

1. has a 5% maximum TAC change constraint, and
2. has a median anticipated recovery expressed in terms of B^{sp} (2025/2006) of 1.20 under operating Model 3 (MARAM Time Varying Selectivity).

TAC 2011 recommendation from re-tuned OMP 2010

Table 1 and Figure 1 report the recently updated CPUE series for the South Coast rock lobster (Glazer 2011). These input CPUE values are used in conjunction with re-tuned OMP 2010 (Johnston and Butterworth 2010) to produce a TAC recommendation for the 2011 season of **323 MT**. Appendix 1 provides the detailed calculation of TAC 2011.

The recommended TAC is slightly less (5 MT less) than the current TAC of 328 MT. The OMP reduces the TAC both because of the slight net downward trend in CPUE over the last five years when a weighted average is taken over the three Areas, and because the average CPUE over the last three seasons is less than the average over 2003 to 2005.

References

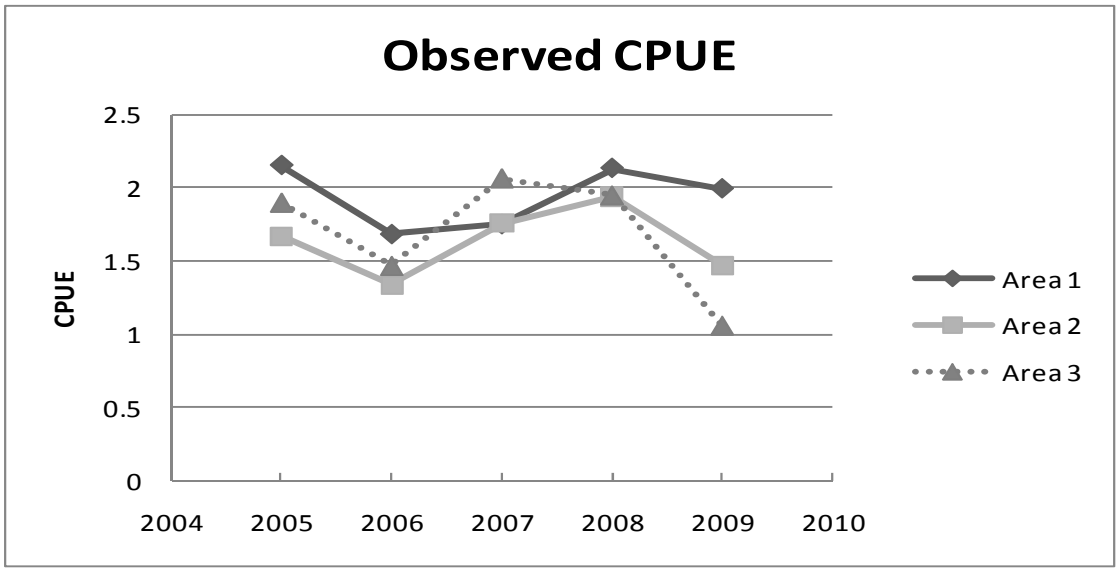
Glazer, J.P. 2011. A generalized linear model applied to the South Coast rock lobster CPUE data to obtain area-specific indices of abundance. MCM document, MCM/2011/MAY/SWG-SCRL/02.

Johnston, S.J., and Butterworth, D.S. 2010. Re-tuning of OMP-2008 using updated 2010 Operating Models for the South Coast Rock Lobster Resource to provide OMP-2010. Fisheries/2010/AUG/SWG-SCRL/12.

Table 1: CPUE input data into OMP-201- (Glazer 2010), and the slope s^A_{2009} of the associated log-linear regressions.

Season	Area 1	Area 2	Area 3
2005	2.148	1.668	1.898
2006	1.685	1.336	1.468
2007	1.752	1.755	2.064
2008	2.129	1.940	1.948
2009	1.993	1.468	1.062
slope	0.0084	0.0118	-0.0878

Figure 1: CPUE input data into OMP-2011 (Glazer 2011).



Appendix 1: Detailed calculation of the re-tuned TAC for 2011 using OMP-2010

Johnston and Butterworth (2010) provides the details of OMP-2010. The key OMP equations are reproduced below, and show how the TAC recommendation for 2010 is calculated.

TAC setting algorithm
The algorithm used to set the total TAC for the South Coast Rock Lobster fishery is:

$$TAC_{y+1} = TAC_y[1+\alpha(s_y - \delta)]h(r_y) \qquad \text{(A1)}$$

where

the value of α is set at 3.0;

s_y^A is the slope parameter from a regression of $\ln CPUE_y^A$ against year *y* over the last five years of available data (2005-2009) for each area *A*, and

$$s_y = \sum_{A=1}^{3} w^A s_y^A \qquad \text{(A2)}$$

where $w^A = \dfrac{\dfrac{1}{\sigma_S^{A^2}}}{\sum_{A'=1}^{3}(\dfrac{1}{\sigma_S^{A'^2}})}$ (A3)

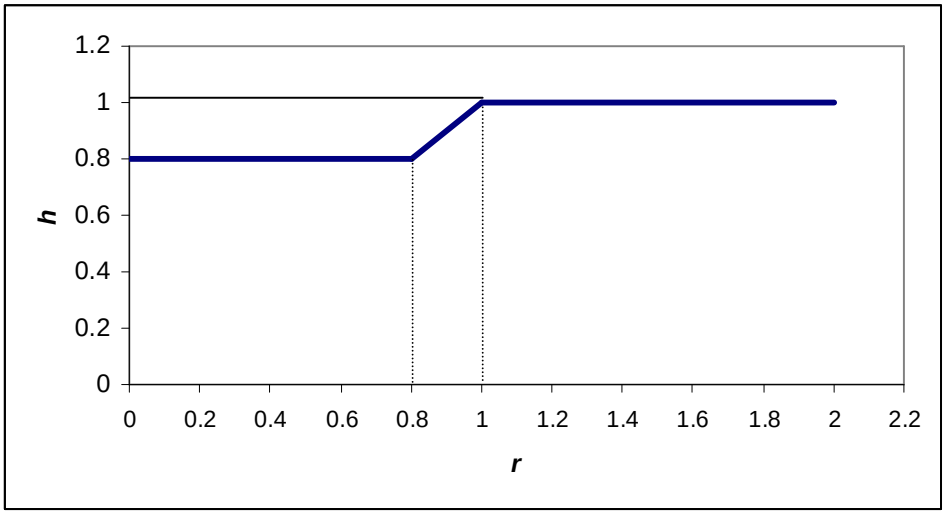
and σ_S^A is the standard error of the regression estimate of s_y^A which is bounded below at 0.15.

δ is a control parameter value and is tuned to be equal to -0.029 for re-tuned OMP-2010.

Also:

$$\begin{aligned} h(r) &= 0.8 \quad \text{for} \quad r \le 0.8 \\ &= r \quad \text{for} \quad 0.8 \le r \le 1.0 \\ &= 1.0 \quad \text{for} \quad r \ge 1.0 \end{aligned} \qquad \text{(A4)}$$

i.e.:



where *r* is the ratio of recent CPUE to that at the time the OMP commences:

$$\overline{\overline{CPUE}}_{init} = \frac{1}{3}\sum_{y'=2003}^{2005}\sum_{A=1}^{3}\lambda_A CPUE_{y'}^{A} \qquad \text{(A5)}$$

$$\overline{\overline{CPUE}}_{y} = \frac{1}{3}\sum_{y'=y-3}^{y-1}\sum_{A=1}^{3}\lambda_A CPUE_{y'}^{A} \qquad \text{(A6)}$$

$$r_y = \frac{\overline{\overline{CPUE}}_{y}}{\overline{\overline{CPUE}}_{init}} \qquad \text{(A7)}$$

where

$\lambda_1 = 0.08$

$\lambda_2 = 0.87$

$\lambda_3 = 0.05$.

Implementation

From regressions applied to the data in Tables 1, the σ values of Eqn (A3) which are bounded below by 0.15 are:

$\sigma_S^1 = 0.150$

$\sigma_S^2 = 0.168$

$\sigma_S^3 = 0.276$

The average slope is then:

$$s_{2009} = \sum_{A=1}^{3} w^A s_y^A = 0.4789*(0.0084) + 0.3793*(0.0118) + 0.1419*(-0.0879)$$
$$= -0.00398$$

Further:

$$r_{2010} = \frac{\overline{CPUE}_{2010}}{\overline{CPUE}_{init}} = \frac{1.7385}{1.9011} = 0.9145 \quad \ldots\ldots\ldots\ldots \quad \text{using Eqn (A7)}$$

and hence $h(r) = 0.9145$ …….... using Eqn (A4)

Thus before any inter-annual constraints:

$$\begin{aligned} TAC_{2011} &= TAC_{2010}[1+3(-0.00398-(-0.029))](0.9145) \\ &= 328[1+3(-0.00398-(-0.029))](0.9145) \quad \text{using Eqn (A1)} \\ &= 322.5 \text{ MT} \end{aligned}$$

Inter-annual TAC constraint

A rule to restrict the inter-annual TAC variation to no more than 5% up or down from year to year is applied, i.e.:

$$\begin{aligned} &\text{if } TAC_{y+1} > 1.05\,TAC_y \qquad TAC_{y+1} = 1.05\,TAC_y \qquad (A8) \\ &\text{if } TAC_{y+1} < 0.95\,TAC_y \qquad TAC_{y+1} = 0.95\,TAC_y \end{aligned}$$

Thus as $TAC_{2011} / TAC_{2009} = 322.5/328 = 0.983$, this does not call for the inter-annual TAC variation constraint to be implemented.