Current and past OMPs for West Coast Rock Lobster – what are appropriate management targets?

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This document provides a short review of past OMPs that have been developed to set annual TACs for the west coast rock lobster fishery. A new OMP will shortly be developed for the fishery which will be used to set TACs (and their spatial/user-group breakdown) for the 2011/2012+ seasons. This will be the fifth OMP developed for this fishery. A summary of previous OMPs and their associated management targets is given below.

1. Previous West Coast Rock Lobster OMPs

OMP 1997

- Best assessment – area-aggregated: $B_{75}(1996)/K = 0.057$ where B_{75} applies to *males and females* combined
- Management endorsed a re-building strategy
- Re-building targets of 20%-50% above the $B_{75}(1996)$ level over a 10 year period were considered
- 1997 TAC levels of 10%-20% above the 1996 level were considered
- Final OMP recommended by the SFAC[1] to the Minister was the least conservative of the 12 candidate OMPs
    - 20% biomass recovery 1996-2006 period
    - TAC 1997=20% over 1996 TAC
    - 15% inter-annual TAC constraint

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[1] SFAC was the Sea Fisheries Advisory Council which at that time was the body which advised the responsible Minister.

OMP 2000

- Updated assessment – area aggregated: $B_{75}(2000)/K$ =0.057
- BUT current best assessment showed the current absolute biomass to be some 50% larger than previous assessment (although at similar levels relative to pristine). [The new assessment followed re-evaluation of much of the input data and considerable improvement to the assessment methodology, including taking into account the resource East of Hangklip.]
- The CAF[2] selected an OMP with a lesser target re-building level:
  - ➢ 14% biomass recovery 1996 -2006 period (i.e. target dropped by 8%)
  - ➢ 6% increase in 2000 TAC compared with 1999 TAC
  - ➢ 15% inter-annual catch constraint

OMP 2003

- Updated area-aggregated assessments – now had two alternate operating models (RC1 and RC2)
- $B_{75}(2003)/K$ =0.079 for the preferred RC1
- Recovery targets: Discussion of this choice took place in the context that the 2006 recovery targets set under the previous OMPs had already been reached
  - ➢ $B_{75}(2003)/B_{75}(1996)$=1.53 for RC1 and = 1.01 for RC2
- Final OMP which was recommended by the Scientific Working Group and adopted by the minister was made by integrating over many scenarios and considering median expected recovery and the 80% probability envelopes:
  - ➢ $B_{75}(2013)/B_{75}(2003)$=1.15 (0.67; 2.50) for RC1
  - ➢ $B_{75}(2013)/B_{75}(2003)$=0.97 (0.59; 1.94) for RC2
  - ➢ 10% inter-annual TAC change constraint

OMP 2007

- Super-area disaggregated assessment (5 different super-areas) with the OMP based on disaggregating for these strata on a basis of the international review panel recommendation which arose from different resource trends in the different super-areas.

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[2] CAF is the Consultative Advisory Forum, an advisory body which effectively replaced the SFAC when the current Marine Living Resources Act was introduced. This body has however been dormant for almost the last decade.

- Considered B_{75}^m (i.e. *male* component of resource only rather than both sexes because the male component dominates the catch and the larger sized lobsters in the population because males grow faster, and population dynamics parameters are not as well estimated for the female component for which numerous assumptions are needed in the absence of data).
- Super-area combined B_{75}^m(2006/1996)=0.90 compared to 1997 target of 1.20 and 2000 target of 1.14. Note that this assessment was much more pessimistic than that on which OMP 2003 had been based. This was a consequence of a period of poor recruitment over the turn of the century which only became apparent after 2003 through substantial drops in CPUE indices of abundance.
- Super-area combined B_{75}^m(2006)/K=0.03
- Management target: to re-build B_{75}^m by 20% over next 10 years, i.e. essentially to return this component of the resource to its 1996 level by 2016
- Final OMP recommended by the Scientific Working group and adopted by the Minister:
  - ➢ combined over all five areas, B_{75}^m(2016/2006)=1.206
  - ➢ 10% inter annual TAC constraint for 2007 and 2008, then for 2009+ the downward constraint could vary between 10%-20% depending on somatic growth.

2. Comparison of past Operating Model biomass estimates

In order to simulation test alternative OMPs, an underlying "Operating Model" (OM) of the resource is developed. This OM reflects the underlying population dynamics and associated fishery and is developed by fitting the OM to all the available data from the resource and fishery.

Figures 1a and b show the estimated area-aggregated trends of resource size (B_{75}) for the four base case different Operating Models that have been developed over time, and used for simulation-testing of the various OMPs. Figure 1a shows absolute biomass and Figure 1b shows biomass relative to pristine. Note the 2006 assessment biomass refers to the male only portion of the stock, but this does not really confound comparison as the female portion is relatively small – see Figure 1c.

3. Retrospective look at intended recovery targets, and actual recovery targets

It is of interest to examine the 2007 OMP predicted trajectories for both TAC and B_{75}^m and the actual subsequent TAC values, and the newly updated 2010 updated assessment values for B_{75}^m (these results are for the "original variant" of this assessment, which models selectivity as for the 2006 assessment that underlay OMP 2007). Figure 2a reports these values for TAC, and Figure 2b reports the B_{75}^m trajectories.

Somatic Growth rate

The most recent somatic growth rate estimates for 70mm male lobsters (OLRAC, 2010) are shown in Figure 3.

Reference

OLRAC, 2010. Updated male somatic growth rate estimates for input into the OMP for West Coast rock lobster. MCM/2010/JUL/SWG/WCRL07.

Figure 1a: B_{75} trends as estimated by four previous assessments used to provide based case operating models for the OMP testing at the time (note the 1997-2003 biomass refers to male+female, the 2006 assessment refers to male only).
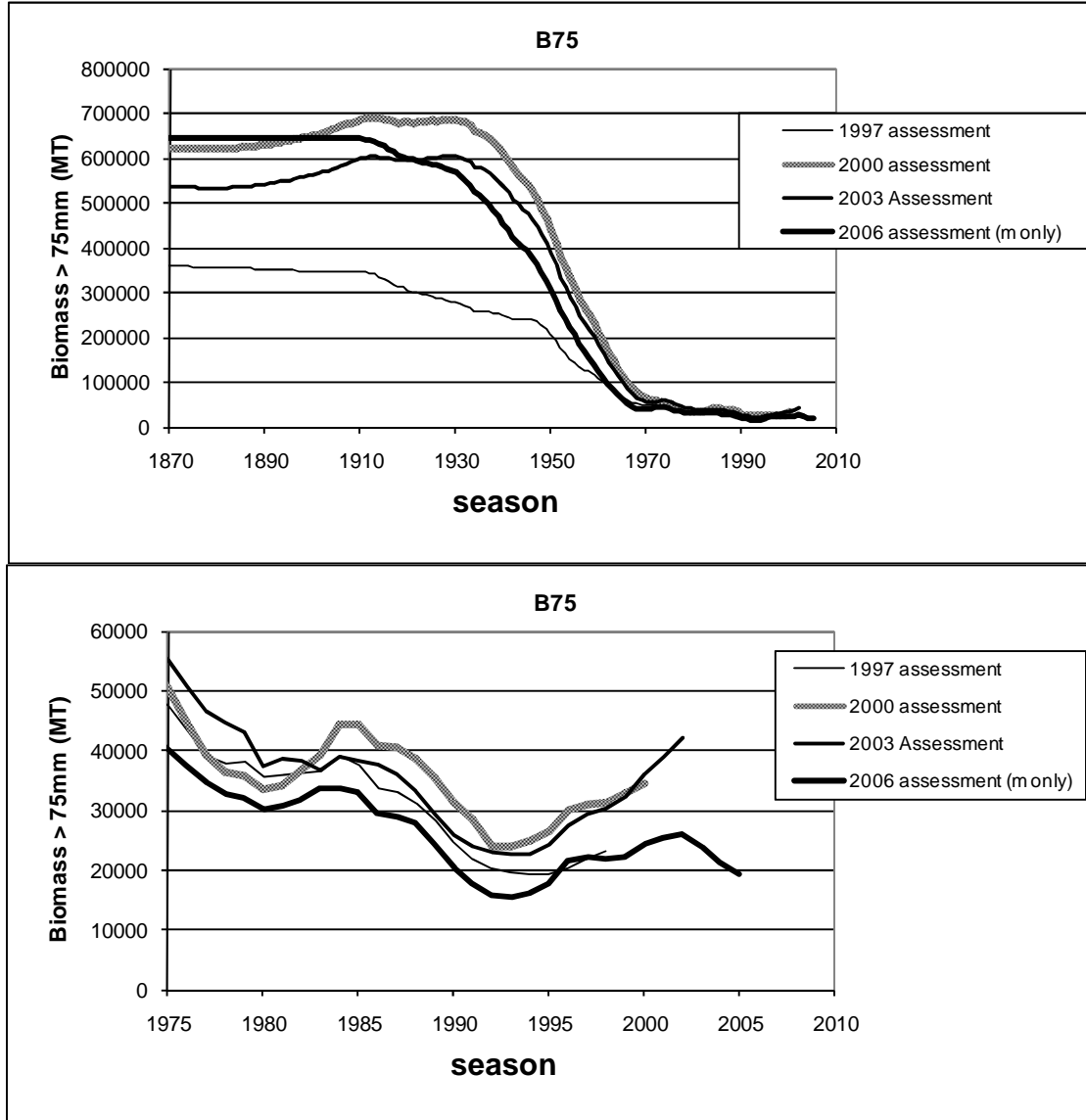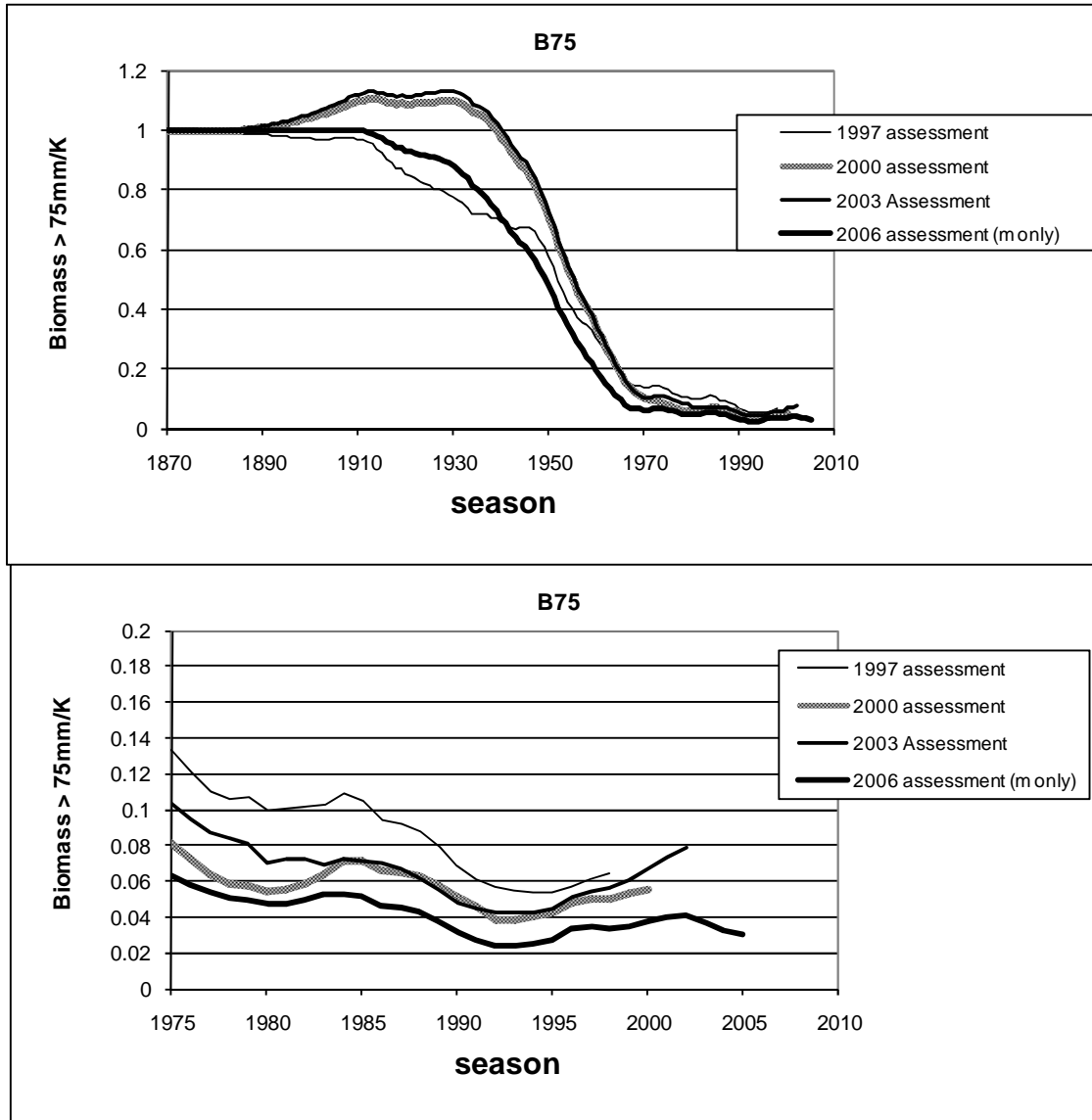
Figure 1b: B_{75}/K trends as estimated by four previous assessments used to provide based case operating models for the OMP testing at the time (note the 1997-2003 biomass refers to male+female, the 2006 assessment refers to male only).

Figure 1c: The 2006 assessment estimates of combined super-area B^{75}(male+female) versus the B_{75}^{m}(male only).
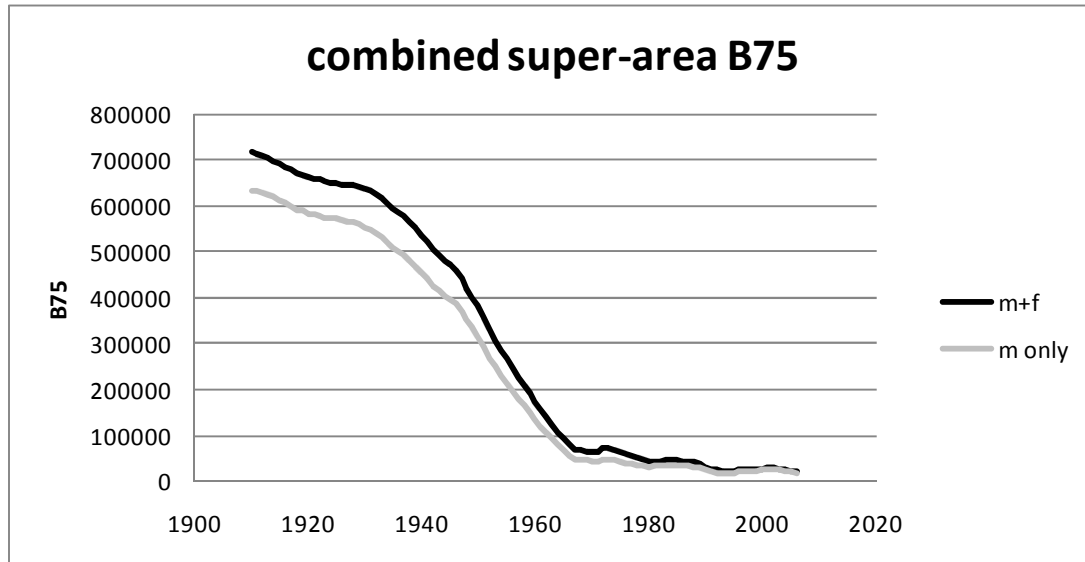
Figure 2a: The Commercial TAC projections for the current OMP 2007 (the median shown as a grey line with circles, the white shading shows the 50%-iles, the dark grey shading shows the 75%-iles and the light grey shading shows the 95%-iles). The black squares show the subsequent actual TAC values that eventuated from application of OMP 2007.
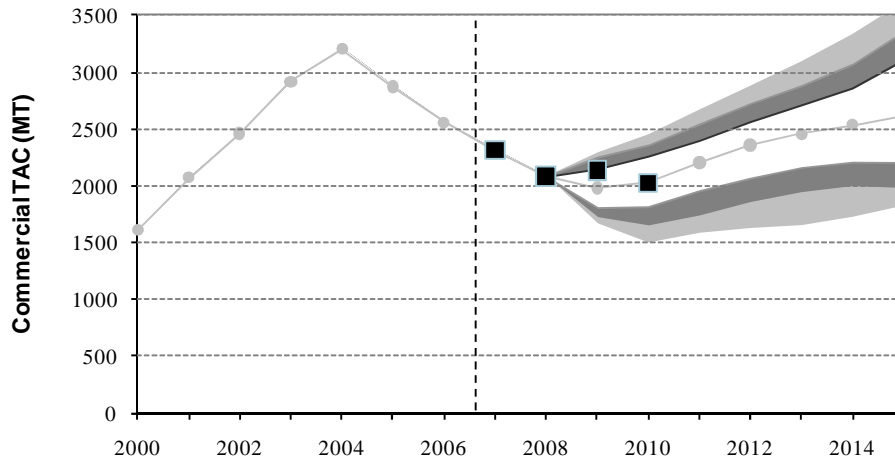

Figure 2b: The B_{75}^m projections for the current OMP 2007 (shown as thin black line with vertical lines showing the 95% probability envelopes). The black squares show the new updated 2010 operating model (original variant) values summed over the five super-areas.
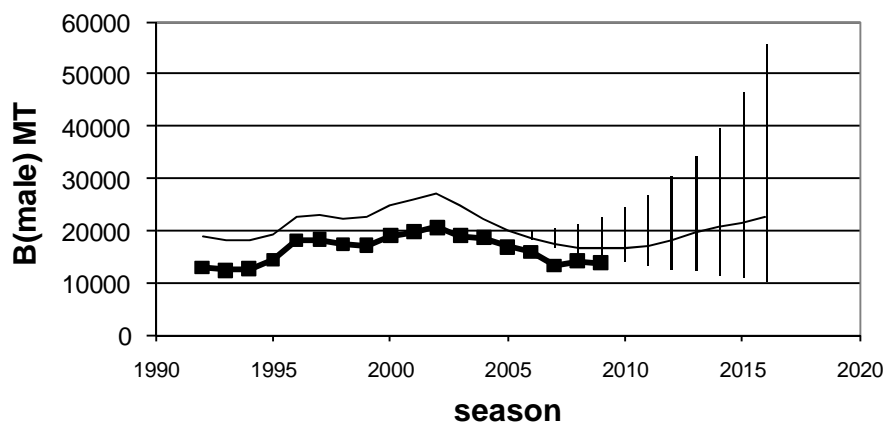
Figure 3a: Annual average somatic growth rate values for a 70mm CL male lobster (OLRAC, 2010).
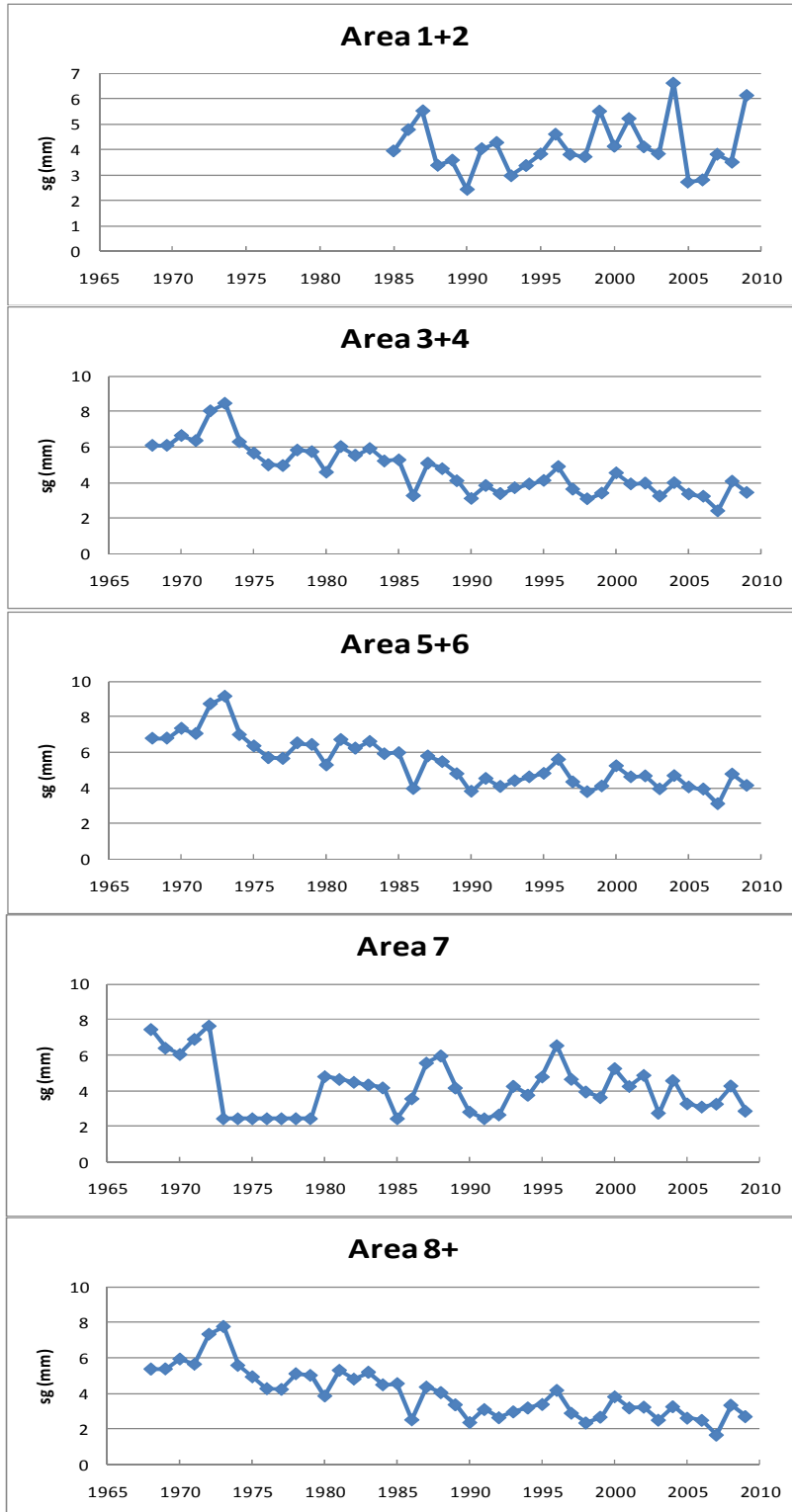
Figure 3b: Annual average somatic growth rate values for a 70mm CL male averaged over 5-year periods.