

Report of the Task Group to Advise on Appropriate Options to be Considered for Recent Changes in Poaching Levels for West Coast Rock Lobster

D S Butterworth, J Gaylard, A Brandao and S.J. Johnston

At previous meetings of the WCRL Scientific Working Group (SWG), it was decided to analyse data received from the DAFF Compliance Section on confiscations (and abandonments), together with policing effort, on a spatially disaggregated basis because of indications of a differential extent of policing effort increase in more northerly regions. However different GLM models put forward to estimate increases in CPUPE (confiscations per unit policing effort) as an index of the level of poaching gave rather different results, and a Task Group was requested to consolidate these and make suggestions for a way forward to facilitate further deliberations in the SWG.

The Task Group considered two sets of updated spatially disaggregated (areas 3 to 6 (A3-6) and area 8+ (A8+)) GLM analyses, the summarised results of which are reported in Brandao *et al.* (2011) and OLRAC-SPS (2011). The specific output required from the Task Group was suggestions of how poaching levels per super area as assumed historically had changed recently, specifically in the form of a linear increase over the two-year period from the 2008/2009 to the 2010/2011 seasons. The historical proportions are set out in Table 1¹, and these are considered to apply to a total amount of poaching for the 2008/2009 season of either 500 MT or 250 MT.

The Task Group's suggestions are most easily explained through reference to the various GLM models as set out in Table 1 of OLRAC-SPS (2011). The first key point for decision was whether to extract monthly patterns in assessing annual trends on a basis that was common to both A3-6 and A8+, or differed between them. This is important, as estimated trends in poaching levels can change sign depending on which of these two approaches is selected. The Task Group favoured the approach of estimating separate monthly factors for the two areas, as differences in values for the two sets of factors were statistically significant.

¹ These are the proportions used previously, and in the conditioning of the baseline operating models for the testing of the revised OMP. There is insufficient time at this stage to implement any change to this conditioning. Subsequent computations in this document relating to changes to tonnages poached from various areas, or to changes in the amount poached over all areas, are based on these proportions. However, during the course of recent discussions in the SWG, alternatives for these proportions have at times been advanced. There are differing views in the Task Group as to whether increases in amounts poached should be based on one of these alternatives, or only on the Table 1 past proportions as agreed for use in conditioning the operating model.

Remaining differences reflect primarily difference in estimates of the trend in confiscations as evaluated under different statistical models (policing effort trend estimates tend to be much more robust under such different models). Here plots of residuals for model-predictions for confiscations, or confiscations per unit policing effort, in relation to the predictions themselves were inspected for homoscedasticity, as plots evidencing heteroscedasticity suggest model choices for which estimates will be less precisely determined.. On this basis the Tweedie model (Model 4) was selected as best for A8+, and the lognormal for A3-6. Table 2 shows these selections, together with the 2-year change in poaching level that they imply. These changes, and others reported in the Table, were rounded to the nearest 50% given the evident high variability of estimates between models and the poor precision of these estimates.

Table 2 also includes alternatives to these “best” selections, chosen to reflect the range of plausible estimates so that subsequent OMP simulation testing exercises appropriately span the evident uncertainties in these estimates. For A8+, these were provided by the lognormal (Models 2 and 3) and overdispersed Poisson (model 5) approaches. For A3-6, estimates of change were rather more stable across the various statistical distribution models, but given both that a common month factor across areas in the analyses changed the direction of the poaching trend, and also to incorporate a status-quo option as the data series for A3-6 is short (3 years compared to 4 for A8+), it was decided to include 0% change as an alternative.

Table 3 lists six options for combining these best and alternative estimates for two-year changes across the two areas. For application in the trials, the SWG will need to assign weights to these different options. The Table includes some suggestions for such weights, though it should be stressed that these do not reflect views held firmly by the Task Group, but rather are offered as a baseline from which to initiate discussions. The broad basis for the weights listed is to give the greatest weight to an option where both changes reflected “best” estimates, and the next highest weight to cases where one of the two changes was a “best” estimate. The Table also includes the proportional change to the overall amount poached using the assumed historical proportions of poaching per super-area as set out in Table 1. Note that for these computations the results for A3-6 have been assumed to apply also to super areas A1-2 and A7 – in the latter case because any poaching in that super area is likely to occur in the vicinity of Dassen Island, which is closer to A5-6 than to A8. The average shown incorporates weighting percentage changes across options by taking their relative weights into account.

Table 4 repeats this process for a lesser number of options. It excludes cases of negative trend in A3-6 on the assumption that the SWG may prefer to treat the poaching level for this area as unchanged on the basis either of argued implausibly of any decrease or of the short (3-year) time series of data available to estimate any trend.

Table 5 illustrates results in terms of the changed poaching levels which are implied in absolute terms (MT). Only the one option (the combination of the two “best” estimates for change in each area) is shown, and results are listed for both a 500 MT and a 250 MT selection for the 2008 level of overall poaching.

Decisions required

In taking this report forward, the SWG needs to make ordered decisions at three levels:

- 1) Are options based on changes estimated under the assumption of common monthly patterns in poaching statistics across A3-6 and A8+ to be excluded, as suggested by the Task Group for reasons recorded above (and thus excluding the possibility of an increase in poaching in A3-6)?
- 2) Should options reflecting a recent decrease in poaching in A3-6 be excluded (i.e. work from the basis of Table 4 rather than Table 3)?
- 3) Whichever of Tables 3 or 4 is selected as the basis to proceed, what final weights are to be accorded to the options listed in the Table selected?

References

Brandão, A, Johnston, S. and Butterworth, D. 2011. Further trends in policing effort and the number of confiscations for West Coast rock lobster on a super-area basis. FISHERIES/2011/AUG/SWG-WCRL/48.

OLRAC-SPS. 2011. Summary of results from a selection of approaches for estimation of the trend in West Coast rock lobster poaching 2008-2011. FISHERIES/2011/AUG/SWG-WCRL/51.

Table 1. Current proportional allocation of poaching amongst super-areas.

Super area	Percentage allocation
A1-2	1.0
A3-4	2.5
A5-6	2.5
A7	14.0
A8	80.0

Table 2. Estimates of extent of two-year poaching increase (to apply from 2008 to 2010).
References are to models in OLRAC-SPS (2011), with values rounded to multiples of 50%.

Area	Best estimate	Alternatives
A3-6	-50% (Models 2, 3)	0%*
A8+	+50% (Model 4)	0% (Models 2, 3); +100% (Model 5)

* Though Model 1 gives +30%, for reasons given in the text a maximum value of 0% is used here.

Table 3. Options and weightings. The percentage change in the total amount poached is calculated by taking the A3-6 change to apply to Super areas 1-7 (20% of past poaching) and the A8+ change to apply to super area 8 (80% of past poaching).

Two year percentage change assumed	A3-6	-50	-50	-50	0	0	0	Average
	A8+	+50	0	+100	+50	0	+100	
Suggested percentage weighting		30	20	20	20	5	5	100
Percentage change in total amount poached		+30	-10	+70	+40	0	+80	+33

Table 4. Alternative to Table 3 which ignores the possibility that there has been a decrease in A3-6, setting this to no change.

Two year percentage change assumed	A3-6 A8+	0 +50	0 0	0 +100	Average
Suggested percentage weighting		50	25	25	
Percentage change in total amount poached		+40	0	+80	+40

Table 5a. Poaching tonnages associated with the “Best Estimates” of poaching increase reported in Table 2. Results are shown for an historic total poaching tonnage of 500 MT.

	2008 (and prior)	2009	2010+
Area 1+2	5	3.75	2.5
Area 3+4	12.5	9.38	6.25
Area 5+6	12.5	9.38	6.25
Area 7	70	52.5	35
Area 8+	400	500	600
Total	500	575	650

Table 5b. As for a) except here for an historic total poaching tonnage of 250 MT.

	2008 (and prior)	2009	2010+
Area 1+2	2.5	1.88	1.25
Area 3+4	6.25	4.69	3.13
Area 5+6	6.25	4.69	3.13
Area 7	35	26.25	17.5
Area 8+	200	250	300
Total	250	287.5	325