A PROPOSAL FOR A TAC RECOMMENDATION FOR WEST COAST ROCK LOBSTER FOR THE 2013/14 Season

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The current situation and a proposal

- Resource monitoring data for WCRL for the past season have been such that "Exceptional Circumstances" under the low abundance rule of the OMP have been triggered for Super-Area 7 (see Appendix 1).

- In line with the OMP provisions, the WCRL SWG initiated an immediate OMP review, commencing with updated assessments. These updates took account of recent catches and revisions of poaching level estimates.

- These assessments have revealed that the status of the resource in Super- Area 7 is alarmingly low. See Table 1 (from FISHERIES/2013/AUG/SWG-WCRL/24).

- The WCRL SWG has already agreed to recommend that Super-Area 7 be closed to all lobster fishing, with two exceptions to maintain a resource monitoring capability:
    a) the regular annual FIMS survey, and
    b) a program of experimental fishing by the industry under DAFF's supervision to be able to continue the commercial trap CPUE index; this fishing will take 20 tons only for each of the months of December to March, which contribute to the calculation of this index.

- This agreement means an immediate decrease in Super-Area 7 commercial catch from the current 259 tons to 80 tons, i.e. an effective TAC decrease of 179 tons.

- In line with the OMP provisions (Appendix 1), assessment projections include consideration of a "shift" of some catch to Area 5+6. Only this Super-Area can be considered for this, as it is the only one for which the updated assessment reflects a recent increase in abundance of some reasonable extent.

- A revision of the OMP has been attempted, but in the very short time available, this has proved impossible. The particular difficulty is that the OMP involves a complex algorithm to annually shift the offshore commercial TAC amongst the Super-Areas to try to maintain similar recovery in each in the face of differing recruitment variations amongst the Super-Areas. Super-Area 7 played an important role in this process. However, given now the radically changed situation in Super-Area 7,

it has become evident that this algorithm needs complete revision, and that will be a lengthy process which cannot be completed before TAC advice is needed for the 2013/14 season.

- A further complication is that with Super-Area 7 so depleted, it is not clear what assumptions are best made for future recruitment in that Super-Area, particularly as some stock-recruitment effect might now be expected to come into play, so that reliable projections cannot be developed. Rather the situation in that Super-Area needs to be monitored with no increase in catch (above the experimental 80 tons) allowed until this monitoring provides clear evidence of substantial recovery. There are also similar (though rather less serious) concerns about the reliability of longer-term projections of recruitment for the other Super-Areas, prior at least until time allows more thorough analyses than have been possible to date. Hence projections have not been taken beyond 2017, after which they become much more dependent on assumptions about future recruitment levels.

- In these circumstances, the interim approach proposed for providing TAC advice for each Super-Area (other than Super-Area 7) for the 2013/14 season (only) is to ascertain, in terms of the updated assessments, what constant catch in each area if continued would achieve the same resource status in that area in 2017 as had been predicted under the current OMP. Appendix 2 outlines the agreed updated simulation scenarios which have been used to produce these results.

- The results are shown in Table 2 and Figure 1.

- The information in Table 2 shows the seriousness for the recovery plan of the changed situation in Super-Area 7, as this was the Super-Area forecast to show the greatest recovery. Taken together, the remaining Super-Areas achieved only 22% rather than 35% recovery by 2021, and only 4% by 2017. This is primarily because of the situation in the currently most abundant Super-Area, Area 8, where recent catches have been too high, and for which a decrease in abundance was forecast for the first few years of the recovery period before a later turn-around.

- A faster recovery in Super-Area 8 would be desirable, particularly given the now very poor situation in Super-Area 7, but this would require substantial further TAC cuts with negative socio-economic implications. In the circumstances, the TACs proposed in Table 2 are considered to be the maximum that could be recommended at this time that also remain within the intent of the overall recovery plan and the provisions of Appendix 1 below.

- It is important to stress that the TACs proposed here are for a single season only. The use of constant catch projections is an interim device to inform on levels of recovery in median terms. But this approach leads to much wider probability intervals, reflecting much higher resource risk, than does a feedback control OMP, as is evident from the lower 5%-ile probability envelopes for the constant catch projections in Figure 1. Recommendations for TACs for 2014/15 would again be made in terms of a complete recovery plan (OMP) – the OMP was in any case due for the normal four-yearly revision for completion next year.

Sector-allocation of the proposed 294 ton TAC decrease

Although the OMP specifies allocation procedures by sector and Super-Area under normal circumstances, it does not do so when Exceptional Circumstances provisions come into play because of the wide variety of circumstances that might then apply. The recommendation on this allocation will therefore be one for the WCRL Management Working Group. However certain factors pertinent to that allocation merit mention at this stage:

- Under normal circumstances, the maximum TAC decrease to which the Offshore Commercial sector would be subject is 10%, i.e. 150 tons.

- The balance of the proposed decrease of 140 tons might either be deducted from the Offshore Commercial sector only, or distributed amongst all sectors, presumably pro-rata to their current TACs, or some intermediate option.

- Even under a 294 overall TAC decrease, the thresholds under which Nearshore Commercial, Recreational and Subsistence (IR) allocations would decrease under the buffering provisions of the OMP under normal operation would not yet have been reached.
- The matter on how the estimated overcatch of 50 tons last season by the Subsistence (IR) sector is to be handled in future allocations awaits final decision.

Update

Table 3 summarises recent TAC recommendations and final allocations. The OMP recommended for the 2012/13 season was not accepted, with the Global TAC being maintained at the value for the 2011/12 season. Earlier this year it had been understood that allocations by Sector and Super-Area for 2012/13 had also been identical to those in 2011/12, but later it was discovered that changes had been made. The original version of this document attempted to ascertain and incorporate these changes, but through misunderstandings some small errors occurred. These errors have now been corrected in Tables 2 and 3 of this document.

Table 3 of this document has, for the convenience of readers, now been extended to show also the recommendations agreed by the WCRL SWG which differ slightly from the proposal initially made in this document.

Table 1: Summary statistics for the combined RC1 (65% weight) and RC2 (35% weight) resource trends in each Super-Area and the resource combined as a whole (from FISHERIES/2013/AUG/SWG-WCRL 24).

Super-area	**B75m(2012)/K**	**B75m(2012)/B75m(2006)**
A1+2	0.008	0.835
A3+4	0.026	0.977
A5+6	0.027	1.420
A7	0.002	0.089
A8	0.045	0.916
Total resource	0.026	0.925

Table 2: A comparison of projections under the OMP as calculated in January 2013 with those from the updated assessment under continuation of the catch levels proposed for the 2013/14 season. TAC values shown are in tons.

	JAN OMP		**Interim measures given EC**			
Super-Area	TAC future=JAN OMP		Constant future TACs to match B(17/06)			
	B(21/06)	B(17/06)	B(17/06)	"Global"* TAC 2012/13	Proposed "Global"* TAC 2013/14	"Global"* TAC difference between 2012/13 and proposed 2013/14
A12	1.26	1.10	0.96	34.46	34.46	0
A34	1.28	1.22	1.20	249.24	249.24	0
A56	1.62	1.45	1.47	146.81	216.81	+70
A7	1.98	1.56	-	258.64	80	-178.64
A8+	0.98	0.79	0.79	1552.43	1367.43[#]	-185
T (all 5 areas)	**1.35**	1.15	-	2241.58	1947.94	-293.64
T (excl A7)	1.22	1.04	1.06	1982.94	1867.94	-115

*"Global" refers to offshore + nearshore + interim relief (i.e. recreational not included)

[#] The SWG recommended that the A8 offshore TAC should be reduced by 150 MT instead of 185 MT

Table 3: Summary of OMP recommendations and final TAC allocations (in tons) for the last two seasons, the proposed 2013 TACs and the SWG final TAC recommendation.

	2011 season	OMP-2011 TACs recommended for 2012 season	Final TACs for 2012 season	Initial Proposed TACs for 2013 season	Final SWG Recommended TACs for 2013 season
Global T[#]	**2425.78 (6.11%)**	**2276.31 (-6.16%)**	**2424.58 (0%)**	**2130.95 (-12.11%)**	**2165.95 (-10.67%)**
Global A1+2	36.13	40.06	38.12	38.12	38.12
Global A3+4	222.36	256.55	272.12	272.12	272.12
Global A5+6	176.93	167.86	169.69	239.69	239.69
Global A7	308.10	265.96	258.64	80	80
Global A8+	1682.26	1545.88	1686.02	1501.02	1536.02
Offshore T	**1540.65 (0.81%)**	**1390.83 (-9.72%)**	**1540.70 (0%)**	**1247.06 (-19.06%)**	**1282.06 (-16.78%)**
Offshore A1+2	0	0	0	0	0
Offshore A3+4	74.96	109.09	124.95	124.95	124.95
Offshore A5+6	60	60	60	130	130
Offshore A7	300.78	258.64	258.64	80	80
Offshore A8+	1104.91	963.10	1097.11	912.11	947.11[@]
Nearshore T	**451 (0%)**	**451 (0%)**	**450.71 (0%)**	**450.71 (0%)**	**450.71 (0%)**
Nearshore A1+2	24.17	24.17	19.76	19.76	19.76
Nearshore A3+4	72.48	72.48	72.52	72.52	72.52
Nearshore A5+6	32.20	32.20	32.20	32.20	32.20
Nearshore A7	0	0	0	0	0
Nearshore A8+	322.15	322.15	326.23	326.23	326.23
Subsistence T	**251.48 (25.5%)**	**251.48 (0%)**	**250.17 (-0.01%)**	**250.17 (0%)**	**250.17 (0%)**
Subsistence A1+2	8.30	12.22	14.70	14.7	14.7
Subsistence A3+4	52.06	52.11	51.77	51.77	51.77
Subsistence A5+6	61.86	52.79	54.61	54.61	54.61
Subsistence A7	0	0	0	0	0
Subsistence A8+	129.00	134.37	129.00	129.00	129.00
Recreational T [$]	**183 (71.0%)**	**183 (0%)**	**183 (0%)**	**183 (0%)**	**183 (0%)**
Recreational A1+2	3.66	3.66	3.66	3.66	3.66
Recreational A1+2	22.88	22.88	22.88	22.88	22.88
Recreational A1+2	22.88	22.88	22.88	22.88	22.88
Recreational A1+2	7.32	7.32	7.32	0.00[&]	0.00[&]
Recreational A1+2	126.27	126.27	126.27	133.59	133.59

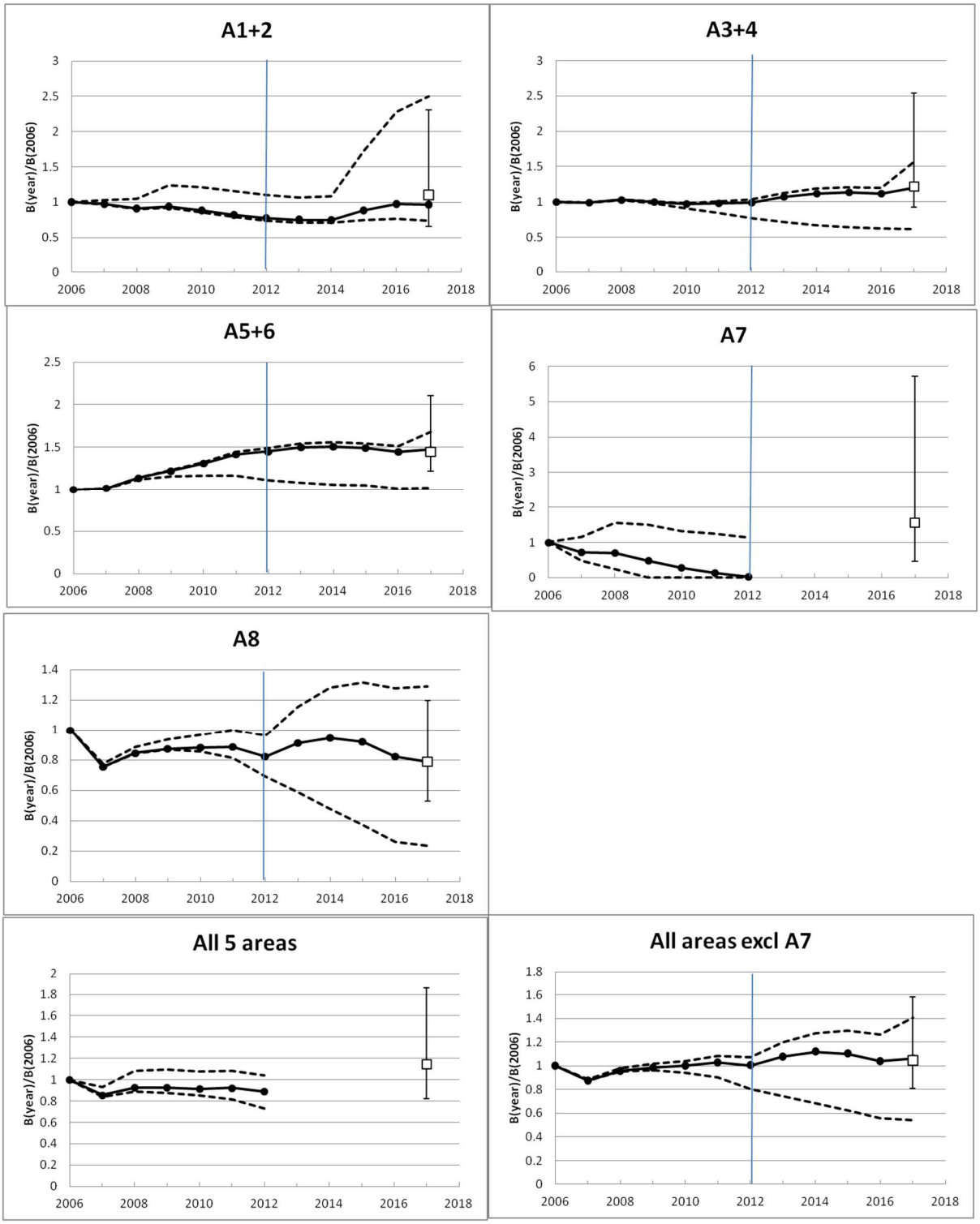
[#] Global T refers to offshore+nearshore+inter relief+recreational.

[&] A7 recreation amount is set to zero and moved to A8+.

[@] The SWG recommended that the A8 offshore TAC should be reduced by 150 MT instead of by 185 MT, with the further 35 MT reduction delayed for incorporation in the TAC recommendations for future seasons.

[$] The recreational breakdown by Super-Area is nominal and as agreed based upon data providing previous catch patterns.

Figure 1: Biomass recovery trajectories for each Super-Area and for the resource as a whole (all 5 Super-Areas) and for the resource excluding Super-Area 7. Male biomass (above 75mm CL) relative to the 2006 levels are shown. The solid line shows the median expected values under the proposed TACs for 2013/14 continued into the future, with the dashed lines showing the 90% PI (probability interval) envelopes. The open square shows the median expected value under the current OMP, as evaluated in January 2013. The error bars on that also indicate the 90% PIs.



Appendix 1

Extract from WCRL OMP concerning Low Abundance Rule

$J_{area,y}$ is an index of recent resource performance for that super-area, relative to recent (2005-2009) levels, which is calculated for each super-area using the resource indices available for that super-area. The equations used for calculating $J_{area,y}$ are given below.

If $J_{area,y} < X_{crit}^{area}$ then a specific EC is invoked for that super-area and year (*y*), and all catches are set to zero in that super-area for that year and for the remaining years to 2020.

The idea underlying the "Low Abundance rule" is not to imply that this complete closure would occur in practice. Rather, what would then need to happen is an early OMP review with shifting of effort by some combination of the nearshore commercial and interim relief/subsistence sectors to other super-areas. The reason underlying the presentation of calculation results in this extreme form is to demonstrate that if the situation became "so bad" in a super-area, it remains possible to achieve some reasonable extent of recovery by appreciable reductions in future catches from that super-area.

The values of X_{crit}^{area} to be used are:

X_{crit}^{A1+2} =0.7

X_{crit}^{A3+4} =0.85

X_{crit}^{A5+6} =0.7

X_{crit}^{A7} =0.8

X_{crit}^{A8+} =0.7

Appendix 2

OMP review simulation framework

Future Scenarios

Future scenarios, which result as combinations of uncertainties regarding future recruitment, future somatic growth, historic poaching, future poaching and current abundance are defined. The following are the various possible options for each scenario:

Median Future recruitment **WT**

- FRM: Geometric Mean of $R_{75}, R_{80}, R_{85}, R_{90}, R_{95}, R_{98}, R_{01}, R_{04}$ 0.60
- FRH: Maximum of $R_{75}, R_{80}, R_{85}, R_{90}, R_{95}, R_{98}, R_{01}, R_{04}$ 0.30
- FRL: Minimum of $R_{75}, R_{80}, R_{85}, R_{90}, R_{95}, R_{98}, R_{01}, R_{04}$ 0.10

Note however that the FRL excludes certain extreme estimates which are A12 R_{00}, A34 R_{98}, A56 R_{90}, A7 R_{95} and R_{04}.

Future recruitment (for FRM)

Future R_y: where y = 2010, 2015 and 2020; linearity between each of these years (and between 2008 and 2010).

Stochastic: R_y randomly selected from $\overline{R}\ e^{\varepsilon_y}$, where,

$$\ln \overline{R} = \frac{1}{8}\left(\ln R_{75} \ldots \ln R_{04}\right)$$

σ = SD of $\left(\ln R_{75}, \ldots \ln R_{04}\right)$

$$\varepsilon_y \sim N(0, \sigma^2)$$

or FRH and FRL, the $\overline{R}$ was replaced by either the maximum or minimum R between $R_{75}, R_{80}, R_{85}, R_{90}, R_{95}, R_{98}, R_{01}, R_{04}$ (with the exceptions noted above).

Future Somatic growth (2013+)

WT

- FSGL: = the 1989-2012 average 0.80
- FSGM: ↑ linearly to 1968-2012 ave over 10 yrs 0.20

[The above applied to the growth rates for Areas 3+4, 5+6, 7 and 8+. The somatic growth rate for Area 1-2 is assumed to remain constant in the future at the 1989-2009 average level for all scenarios.]

Current Abundance levels

- The two alternate models (Alt1 and Alt2) are virtually identical to each RC model, except with regards to the R_{2004} value. For the RC model R_{2004} is an estimable parameter, although it is found to be estimated with very low precision. Alt1 and Alt2 models correspond almost exactly to the RC best fit parameter values except for R_{2004} which is fixed at the (approximate) upper and lower 25%iles of this distribution as follows:

  $$\ln R_{2004}^{alt1} = \ln \hat{R}_{2004}^{RC} + \sigma\alpha \quad (1)$$

  and

  $$\ln R_{2004}^{alt2} = \ln \hat{R}_{2004}^{RC} - \sigma\alpha \quad (2)$$

  where σ is from equation (4) below, and the α value (0.741) corresponds to the 25%iles of a *t*-distribution with the appropriate number of degrees of freedom.

  $$\ln \overline{R} = \frac{1}{8} \sum_{y=1975}^{2004} \ln R_y \quad (3)$$

  $$\sigma^2 = \frac{1}{7} \sum_{y=1975}^{2004} \left(\ln \overline{R} - \ln R_y \right)^2 \quad (4)$$

	WT
• RC: Best Estimate of R_{2004}	0.50
• ALTL: Estimated lower 12.5%ile for R_{2004}	0.25
• ALTH: Estimated upper 12.5%ile for R_{2004}	0.25

Historic Poaching

	WT
• HP1: Total historic poaching levels from 1990 to 2008 are 500 MT	0.65
• HP2: Total historic poaching levels from 1990 to 2008 are 250 MT	0.35

Future poaching scenarios – relate to the % change in the poaching level for each super-area between 2008 and 2012. Poaching for 2013+ is assumed to remain at the 2012 level.

The six scenarios to cover different options (with different weights) defined are:

	Scenario 1	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**	**Scenario6**	**Weighted Average**
Weighting	40	10	20	20	5	5	100
4-yr % change for A3-6	-50	-50	-50	0	0	0	-35%
4-yr % change for A8+	+75	+25	+125	+75	+25	+125	+80
% change in total amount poached	+50	+10	+90	+60	+20	+100	+57

Note: The Super-Area breakdowns of future poaching levels are assumed to be unchanged and are:

Super-area 1+2 = 1%

Super-area 3+4 = 2.5 %

Super-area 5+6 = 2.5%

Super-area 7 = 20%

Super-area 8+ = 80%