

Further 2018 west coast rock lobster assessment and associated biomass projections results

S.J. Johnston and D.S. Butterworth

MARAM (Marine Resource Assessment and Management Group)
Department of Mathematics and Applied Mathematics
University of Cape Town
Rondebosch, 7701

Summary

This document provides results requested at the WCRL SWG meeting on Friday 24 August. First negative log-likelihoods are provided for the base case and two sensitivity poaching scenario assessment model fits. Then results are provided for a two-step TAC reduction programme for the BC poaching scenario, ranging from zero TAC (maximum recovery) projection to a scenario where the resource is at its 2006 target level by 2030 (sustainable but no recovery). Appendix 1 provides summary results for similar one- and three-step TAC reduction programmes.

Results

Assessments

Table 1 below provides values for the negative log-likelihoods for the 2018 assessments for the three poaching scenarios.

Table 1: $-\ln L$ values for the NEW (2018) assessments for different poaching scenarios (BC, SEN1 and SEN2)

	BC poaching	SEN1 poaching	SEN2 poaching
$-\ln L$ total	-69.38	-68.59	-64.90
$-\ln L$ Trap CPUE	-38.93	-38.93	-37.19
$-\ln L$ Hoop CPUE	-38.17	-38.73	-36.53
$-\ln L$ FIMS CPUE	-14.17	-13.05	-13.29

This indicates that the BC poaching model is marginally preferred over SEN1 (mainly through a better fit to the FIMS data), and more so over SEN2 (mainly as a result of better fits to the trap and hoop CPUE data).

Projections

Projections reported in this document are for the BC poaching scenario, and assume virtually the same proportional splits amongst the Super-areas as was the case for the projections made in 2016.

For the two-step TAC reduction programme, results are provided for four options:

- The highest TACs compatible with sustainability, defined by $B(2030)$ equal to the target $B(2006)$ abundance for male lobster above 75 mm carapace length.
- A “7% recovery” recovery scenario, defined by $B(2025) = 1.07 * B(2006)$
- A “10% recovery” recovery scenario, defined by $B(2025) = 1.10 * B(2006)$
- A maximal recovery zero future TAC scenario, for which $B(2025) = 1.13 * B(2006)$

Table 1 provides the TACs and recovery levels corresponding to these options, both for the resource as a whole and by Super-area. Figure 1a shows these results graphically for the resource as a whole, while Figure 1b shows them disaggregated to the Super-area level.

Appendix 1 shows a subset of these results for each of a one-step and a three-step process. Table 2 summaries TACs across each of the one-, two- and three-step processes.

Finally, a projection assuming continuation of current 1924 MT TAC is shown in Appendix 2.

Further results for a different proportional split of the TAC amongst the Super-areas will be provided in a following document.

Two step down phasing of TAC

Table 1a: **2 Year Step down** set of annual TAC values for the total resource

Management Objective		Total 2018	Total 2019+
TAC that flattens at B(2006) level by 2030	0% recovery (maximum sustainable catches)	1174	424
B(2025/2006)=1.07	7% recovery	1084	244
B(2025/2006)=1.10	10% recovery	1034	144
TAC = zero	13% recovery (maximum possible)	0	0

Table 1b: **2 Year Step down** set of annual TAC values for each Super-area.

Management Objective	A12 2018/2019+	A34 2018/2019+	A56 2018/2019+	A7 2018/2019+	A8 2018/2019+
TAC that flattens at B(2006) level by 2030	28/10	139/50	93/35	139/50	776/280
B(2025/2006)=1.07	26/6	128/29	86/19	128/29	717/161
B(2025/2006)=1.10	25/4	122/17	82/11	122/17	683/99
TAC = zero	0/0	0/0	0/0	0/0	0/0

Table 1c: **2 year step down** options – B75m(2025/2006) summary statistics.

B75m(2025/2006)	TAC that flattens at B(2006) level by 2030 TAC=1174/424 MT	B(2025/2006)=1.07 TAC=1084/244 MT	B(2025/2006)=1.10 TAC=1034/144 MT	TAC=0
A1+2	0.913	0.925	0.932	0.951
A3+4	0.922	0.948	0.963	0.971
A5+6	2.646	2.698	2.723	2.767
A7	0.885	0.930	0.955	0.995
A8	0.792	0.873	0.912	0.960
Total	1.018	1.071	1.100	1.132

Table 1d **2 year step down** options – B75m(2030/2006) summary statistics.

B75m(2030/2006)	TAC that flattens at B(2006) level by 2030 TAC=1174/424 MT	B(2025/2006)=1.07 TAC=1084/244 MT	B(2025/2006)=1.10 TAC=1034/144 MT	TAC=0
A1+2	0.894	0.912	0.922	0.945
A3+4	0.943	0.982	1.004	1.027
A5+6	2.814	2.894	2.931	2.993
A7	1.109	1.163	1.194	1.238
A8	0.635	0.757	0.820	0.905
Total	1.000	1.078	1.119	1.176

Table 2: Comparison of catches for the 1, 2 and 3 step options. One step gives TACs for 2018+, the two step options gives TACs for 2018, 2019+, and the three step options give TACs for 2018, 2019 and 2020+

Management Objective	Total	A12	A34	A56	A7	A8
One step	455 MT	10.9	54.0	36.0	54.0	301
	350 MT	8.4	41.3	27.7	41.3	231
	Total TAC=0 MT	0.0	0.0	0.0	0.0	0.0
Two step	TAC that flattens at B(2006) level by 2030 TACs [1174/424]	28/10	139/50	93/35	139/50	776/280
	B(2025/2006)=1.07 TACs [1084/244]	26/6	128/29	86/19	128/29	717/161
	B(2025/2006)=1.10 TACs [1034/144]	25/4	122/17	82/11	122/17	683/99
	TAC = 0 [0/0]	0/0	0/0	0/0	0/0	0/0
Three step	TAC that flattens at B(2006) level by 2030 TACs [1414/904/394]	34/22/9	167/107/47	112/71/31	167/107/47	935/597/260
	B(2025/2006)=1.07 TACs [1324/724/124]	32/17/3	156/85/15	105/57/10	156/85/15	875/479/82
	TAC=0 [0/0/0]	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0

Figure 1a: Comparison of the B75m trajectories for the 2-step down scenario.

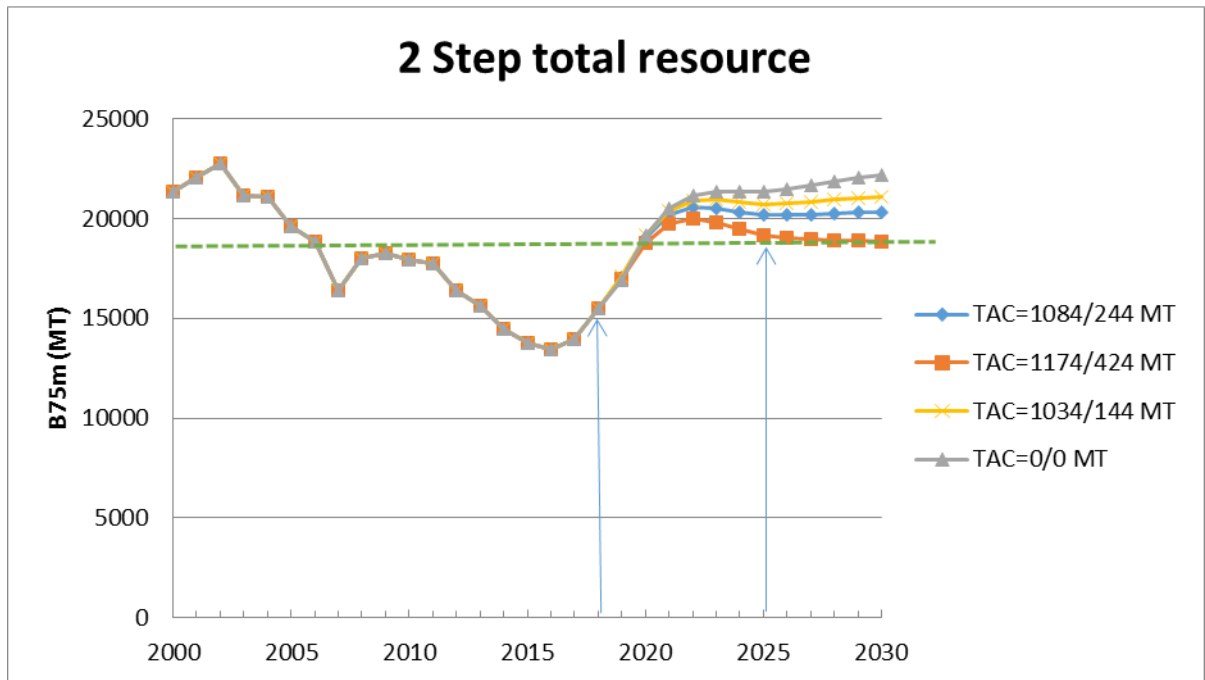
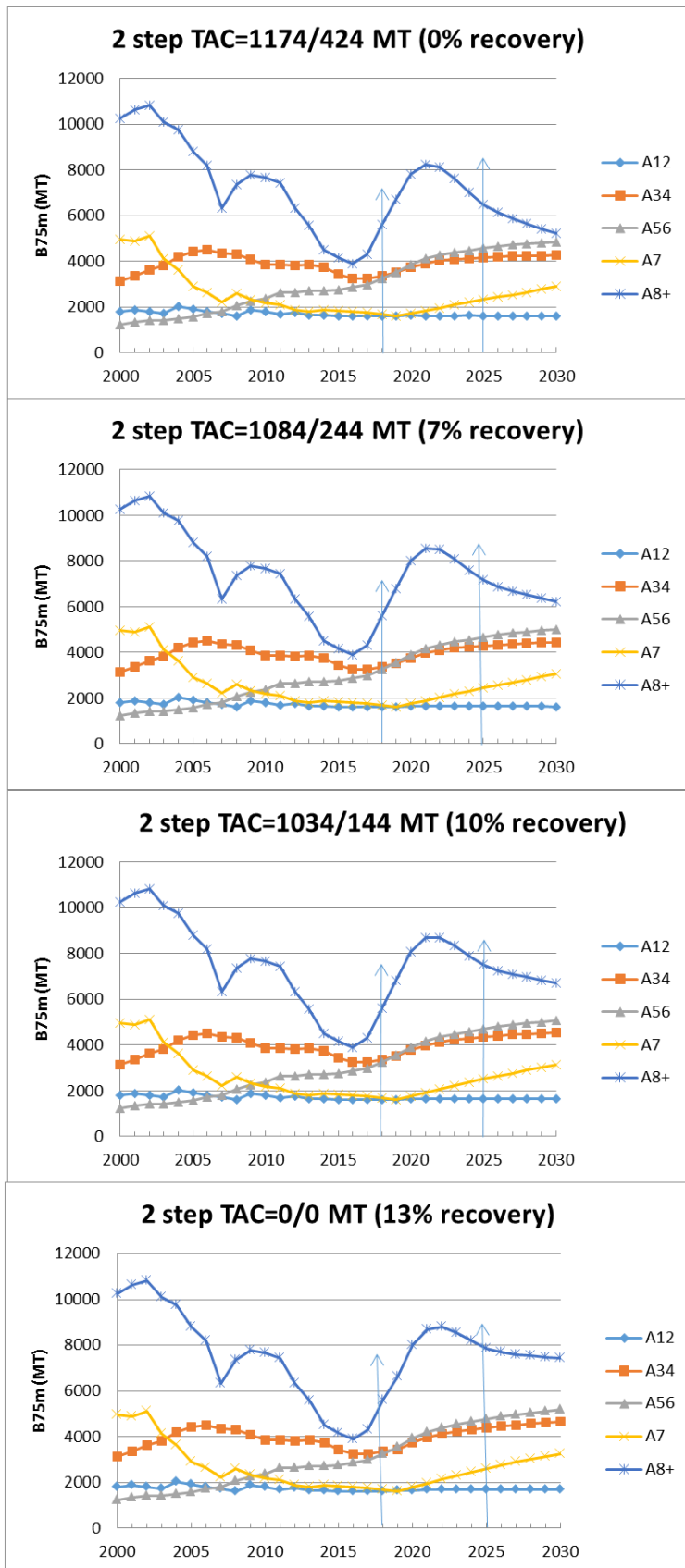


Figure 1b: The Super-area B75m trajectories for the 2-step down management targets.



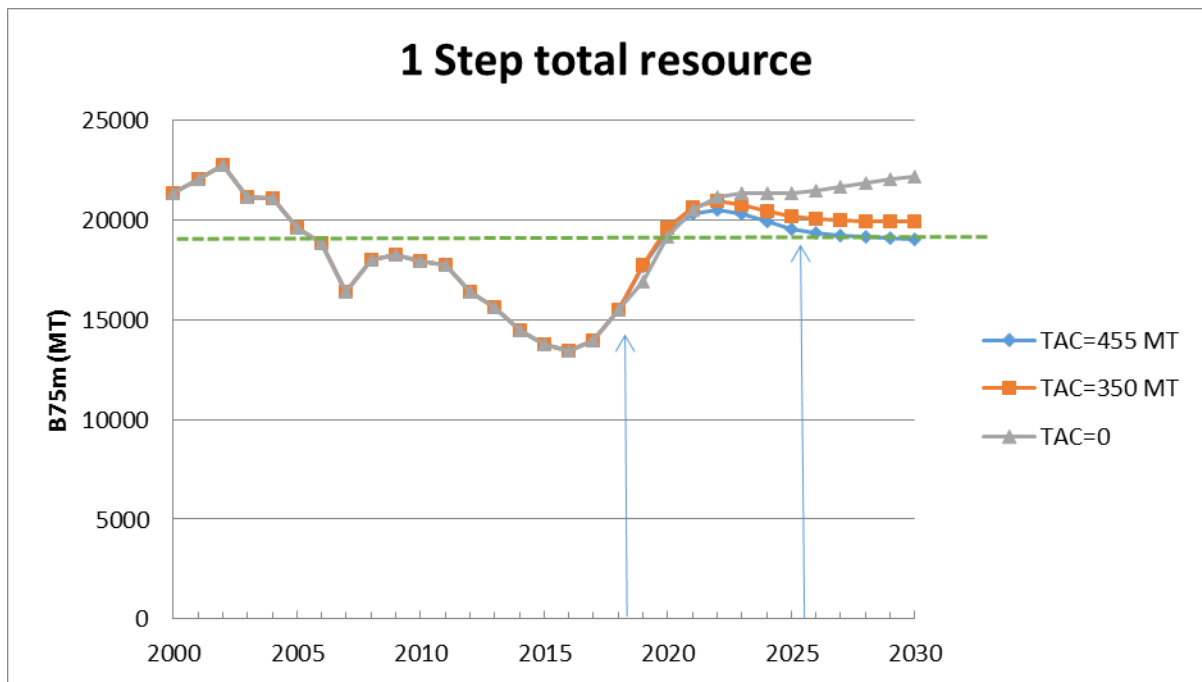
Appendix 1

One step down of TAC

Table A1a: **1 Year Step down** set of annual TAC values for each Super-area. The totals over all five super-areas are given in the first column. These TACs would all apply from 2018+.

Management Objective	Total	A12	A34	A56	A7	A8
TAC that flattens at B(2006) level by 2030	430 MT	10.3	50.7	34.0	50.7	284
B(2025/2006)=1.07	350 MT	8.4	41.3	27.7	41.3	231
TAC = zero	Total CC=0 MT	0.0	0.0	0.0	0.0	0.0

Figure A1a: Comparison of the B75m trajectories for the 1-step down scenario.

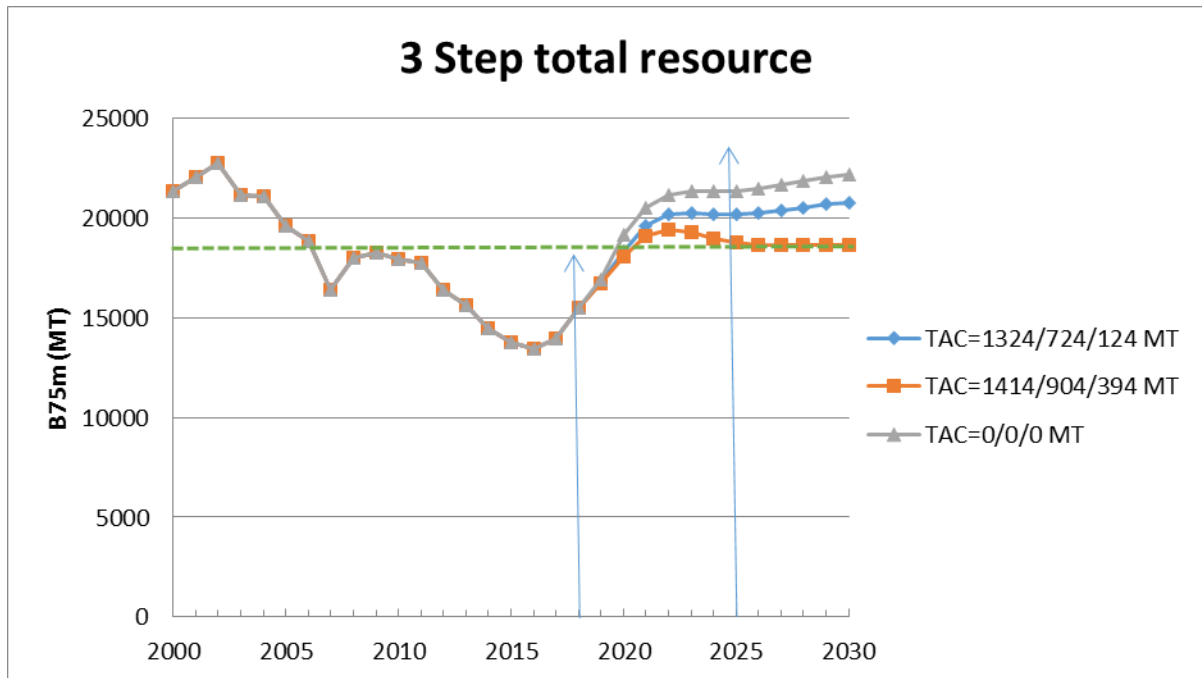


Three step down phasing of TAC

Table A1b: 3 Year Step down set of annual TAC values for the total resource

Management Objective	Total 2018	Total 2019	Total 2020
TAC that flattens at B(2006) level by 2030	1414	904	394
B(2025/2006)=1.07	1324	724	124
TAC = zero	0	0	0

Figure A1b: Comparison of the three trajectories for the 3-step down scenario.



Appendix 2

Table A2: Current TAC of 1924 MT retained

Management Objective	Total	A12	A34	A56	A7	A8
Current 1924 MT	1924	46	227	153	227	1272

Figure A2: Plot of B75m trajectory assuming a future TAC of 1924 MT is maintained. The dashed line showing the biomass level in 2006.

