The effect of no future surveys on projections under the current OMP for the South African hake resource

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The effects of no future surveys on projections under the current OMP for the South African hake resource have been investigated by simulation. Projections of median catch and lower 2.5%ile *M. paradoxus* spawning biomass trajectories under the current OMP are compared for a series of scenarios:

A. no future surveys are assumed to take place from 2010 onwards, and an undetected increase in catchability (ranging from 0% to 10% per annum) related to CPUE is assumed (same for all CPUE series).

B. future surveys are assumed to take place as normally, and an undetected increase in catchability (ranging from 0% to 10% per annum) related to CPUE is assumed (same for all CPUE series).

Results and Discussion

Three summary statistics are given in Table 1 for each of the scenarios described above. The two risk statistics selected here are the lower 2.5%iles for *M. paradoxus* spawning biomass relative to B_{MSY} in 2020 and 2027, while the statistic related to catch is taken as the median of the 2011-2020 average catch. Fig. 1 plots the catch (median) and *M. paradoxus* spawning biomass trajectories (lower 2.5%ile, relative to B_{MSY}) for each of the scenarios.

These results show that while surveys cannot entirely correct for bias in the CPUE, they do ameliorate the effect, and adequately so for a bias of up to 2% p.a. Importantly though, if this were happening in practice, the fact that the two indices (CPUE and surveys) were showing different trends would become evident in the OMP revision process, allowing remedial action to be taken. However without the survey index, the potential to realise that there was a problem would be lost.

Table 1: Summary statistics for projections under the current OMP. For the left-hand table, future surveys are assumed to take place as planned, while for the right-hand table, no surveys are assumed from 2010 onwards. The percentages p.a. refer to an undetected increase in catchability related to CPUE. Results under the Reference Set (i.e. with survey and no undetected increase in catchability) are shown in bold.

With future surveys

	Lower 2.5-ile $M.\ paradoxus$ B^{sp}_{2020}/B_{MSY}	Lower 2.5-ile $M.\ paradoxus$ B^{sp}_{2027}/B_{MSY}	Median avC: 2011-2020
0% p.a.	**0.72**	**0.86**	**132.0**
2% p.a.	0.66	0.70	136.3
4% p.a.	0.61	0.56	140.1
6% p.a.	0.55	0.41	143.8
8% p.a.	0.50	0.32	147.2
10% p.a.	0.44	0.27	150.7

Without future surveys

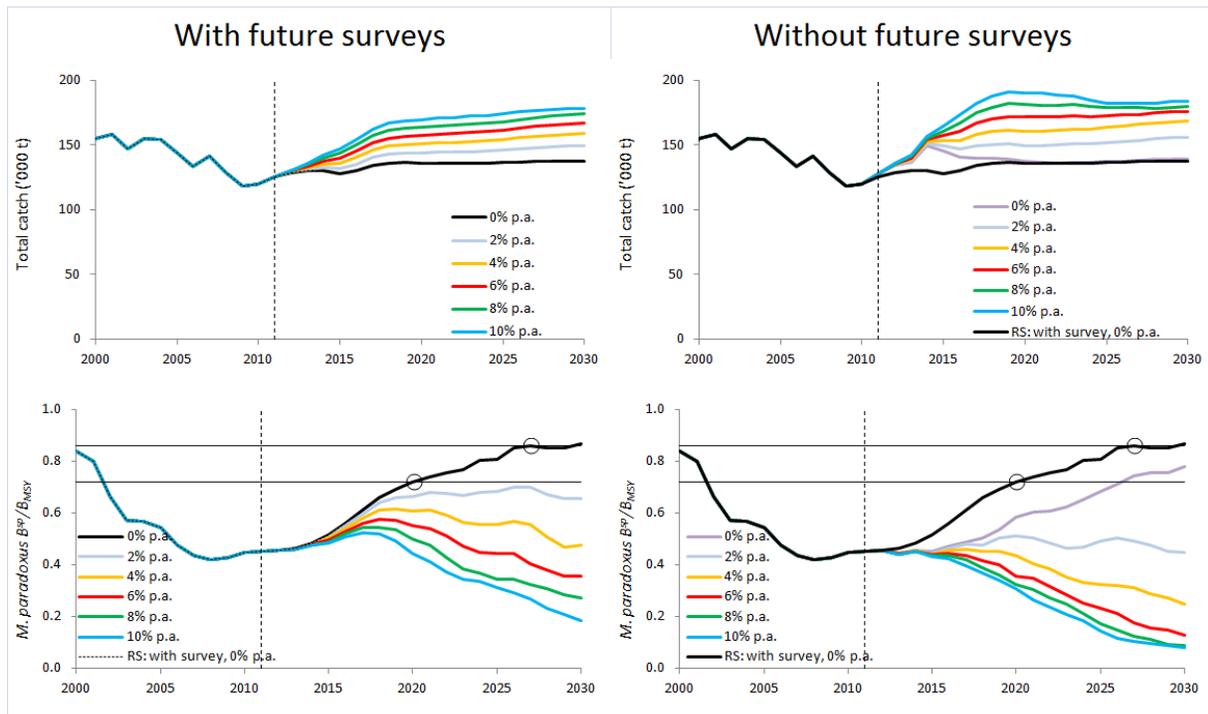|	Lower 2.5-ile $M.\ paradoxus$ B^{sp}_{2020}/B_{MSY}	Lower 2.5-ile $M.\ paradoxus$ B^{sp}_{2027}/B_{MSY}	Median avC: 2011-2020
0% p.a.	0.58	0.74	139.3
2% p.a.	0.51	0.49	145.0
4% p.a.	0.44	0.31	150.3
6% p.a.	0.36	0.17	155.6
8% p.a.	0.32	0.12	160.4
10% p.a.	0.31	0.10	165.2

Fig. 1: Projected trajectories of median catch (top row) and lower 2.5%-ile *M. paradoxus* spawning biomass (relative to B_{MSY}) under the current OMP. For the left-hand plots, future surveys are assumed to take place as planned, while for the right-hand plots, no surveys are assumed from 2010 onwards. The percentages p.a. refer to an undetected increase in catchability related to CPUE. The horizontal lines show the 2020 and 2027 spawning biomass level under the Reference Set (i.e. with survey and no undetected increase in catchability).