"Straw2" OMP-08 under Alternative Recruitment Scenarios

C.L.Cunningham[*] and D.S. Butterworth[*]

The OMP under development is tuned using an underlying operating model based on the updated assessments. Serial correlation in both sardine and anchovy recruitment is therefore taken into account (with a 1-year memory) in alignment with that seen historically. For sardine this serial correlation was estimated for the "non-peak" years of 1984-1999,2005-2006.

Given concerns that sardine recruitment may remain low for the near future, two robustness tests have been run on "Straw2" OMP-08. In the first test the serial correlation in November 2007 (producing recruitment in May 2008) and November 2008 (producing recruitment in May 2009) is increased for sardine. Given a below average recruitment in May 2007, this increases the chance of poor recruitment in the coming two years. In the second, more pessimistic, case the recruitment in November 2007 and 2008 was set equal to that in November 2006.

Results

Figure 1 shows the trade-off curve for "Straw2" OMP-08, tuned to a sardine risk of < 0.18 and an anchovy risk of < 0.25. The median November recruitment is plotted in Figure 2 for the base case operating model and the two robustness tests. As the same historic assessment model is used in each case, the values up to November 2006 are identical, while recruitment in November 2007 and 2008 is worse under the two robustness tests compared to the base case scenario. An increase in the median November recruitment is seen over time due to the lessening impact (through serial correlation) of current (below average) recruitment on recruitment as time progresses with the underlying hockey-stick stock recruit curve. The 90% probability interval for November recruitment increases with time, as demonstrated for the base case scenario in Figure 3.

Some key summary outputs are given in Table 1 for this "Straw2" OMP-08 under the base case operating model and under the two robustness tests considered here. The risk for sardine increases to a 50% chance of dropping below the 1991-1994 average biomass in the next 20 years under the most pessimistic scenario, although the probability of dropping below the exceptional circumstances threshold of 250 000t remains low at 7%. This probability of exceptional circumstances being declared within the next 3 years increases from

---

[*] MARAM (Marine Resource Assessment and Management Group), Department of Mathematics and Applied Mathematics, University of Cape Town, Rondebosch, 7701, South Africa. Email: c.l.cunningham@telkomsa.net, doug.butterworth@uct.ac.za.

1% for the base case to 6% for the most pessimistic scenario. As expected, the average sardine catch decreases with decreasing sardine recruitment.

Table 1. Summary statistics under "Straw2" OMP-08 assuming i) the base case operating model, ii) greater serial correlation between sardine recruitment in November 2006, 2007 and 2008 and iii) recruitment in November 2007 and 2008 equal to that in November 2006. Catch is given in thousands of tons.

|	Base Case	Higher serial correlation in 2007 and 2008	Recruitment in Nov 2007 and 2008 = Nov 2006
Beta:	0.11158	0.11158	0.11158
Sardine risk	0.179	0.251	0.500
Anchovy risk	0.199	0.204	0.202
Average Directed Sardine Catch (07-26)	206	190	169
Average Directed Sardine Catch (08-10)	136	127	114
Average Anchovy Catch (07-26)	171	167	168
Average Anchovy Catch (08-10)	200	194	198
Probability of Anchovy Exceptional circumstances occurring (07-26)	14.4%	14.5%	14.8%
Probability of Sardine Exceptional Circumstances occurring (07-26)	3.0%	4.9%	7.4%
Probability of Sardine Exceptional Circumstances occurring (08-10)	1.2%	2.3%	6.0%
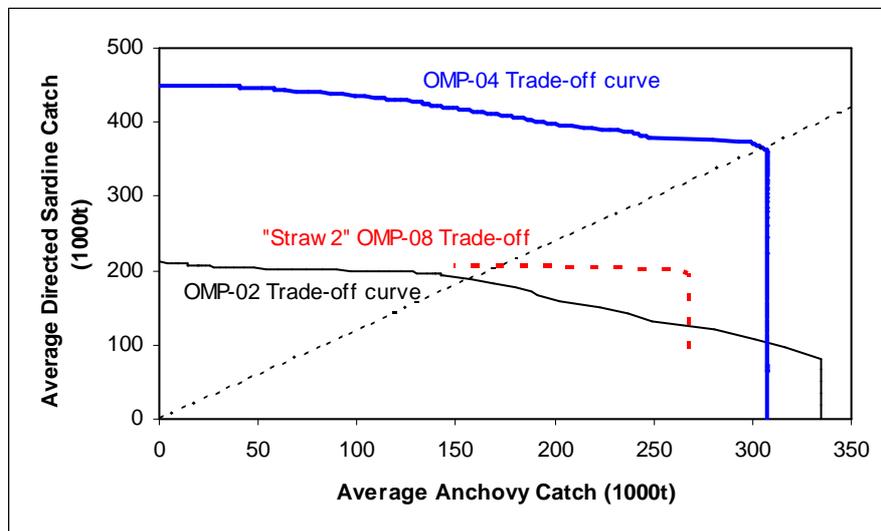
Figure 1: The trade-off curves for OMP-02, OMP-04 and "Straw2" OMP-08. The trade-off curve for "Straw2" OMP-08 is determined by points satisfying sardine risk<0.18 and anchovy risk<0.25.
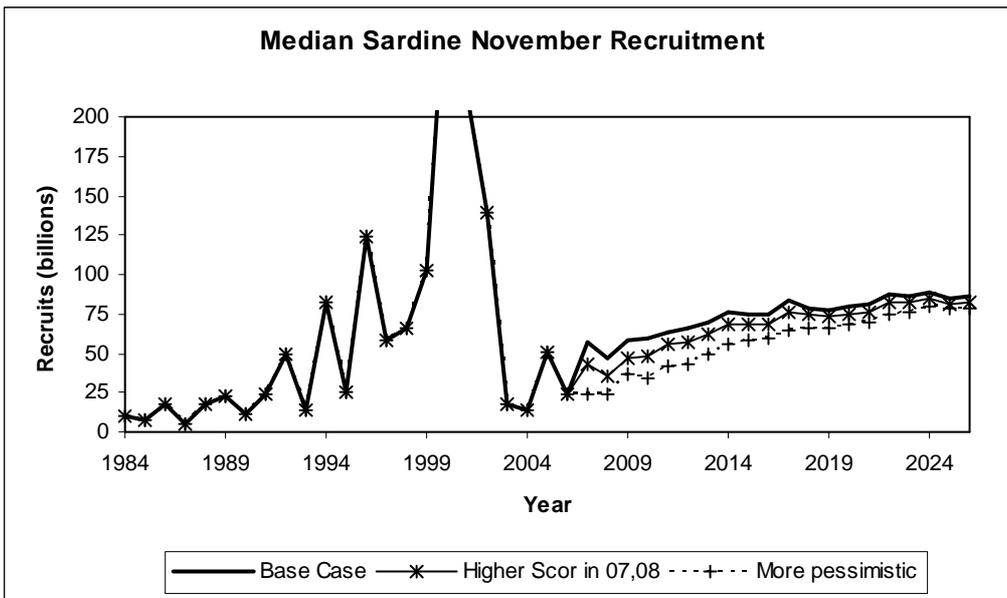
Figure 2: Median sardine November recruitment under "Straw2" OMP-08 assuming i) the base case operating model, ii) greater serial correlation between sardine recruitment in November 2006, 2007 and 2008 and iii) recruitment in November 2007 and 2008 equal to that in November 2006.
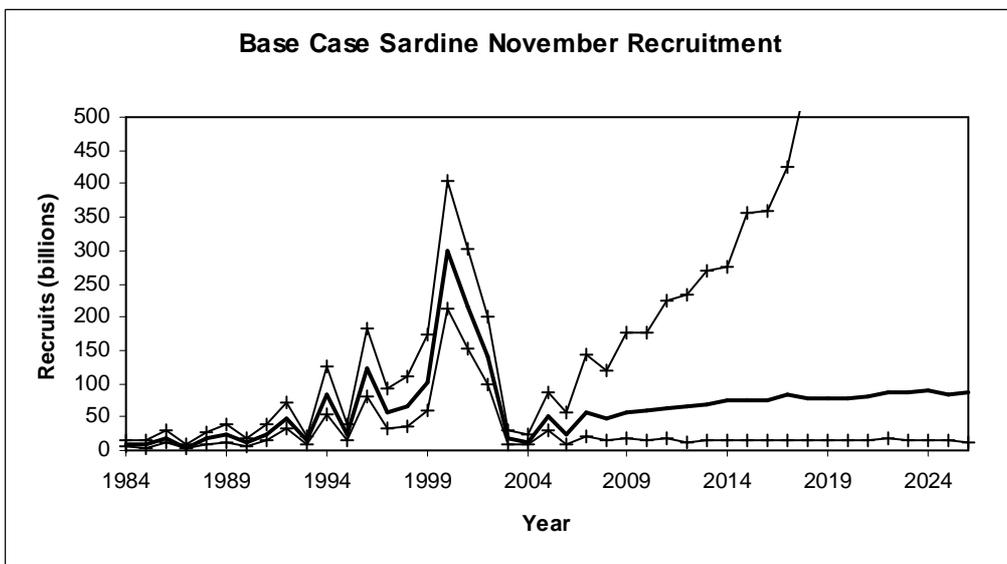

Figure 3: The median and 90% probability intervals for sardine November recruitment under the base case scenario.