Additional Sensitivity Analysis of empirical Harvest Control Rule (eHCR) for TRL

CSIRO, Dec 2016

Summary MSE statistics for the Final eHCR (FinalPre) which uses a maximum annual Recommended Biological Catch (RBC) cap of 1000t, compared with a sensitivity test which fixes the maximum annual RBC cap at 800t (SensFinal_800) (Figs. 1-2). Note that the simulated catch in a year can still exceed the RBC and hence the specified cap because the simulations account for implementation errors. When the cap is 1000t, it seldom constrains the RBC (because the RBC is typically less than this amount), but the 800t cap does constrain the RBC in very good years, and this has an overall effect of slightly decreasing the average catch over time. This can be seen from the slight downward trend in the right-hand catch plot compared with the stable catch trend in the left-hand catch plot of Fig. 1, as well as in the scatter plot of the 800_cap scenario versus the 1000_cap scenario (Fig. 3). The performance of the two alternative caps is very similar in most respects, with similar risk of depletion below the limit reference point as well as risk of closure (Fig. 1-2). Whereas the median risk of depletion below reference point 0.48K is the same for both scenarios, the upper confidence limit is slightly higher for the 800_cap scenario. This seems counter-intuitive given that the latter has overall slightly lower catches, particularly in high years (Fig. 3A), but dampening the variability in this way means that in a few years the lower catches are also not as low as in the 1000_cap scenario and the spawning biomass ends up being slightly less for some years than in the 1000_cap scenario (Fig. 3B).

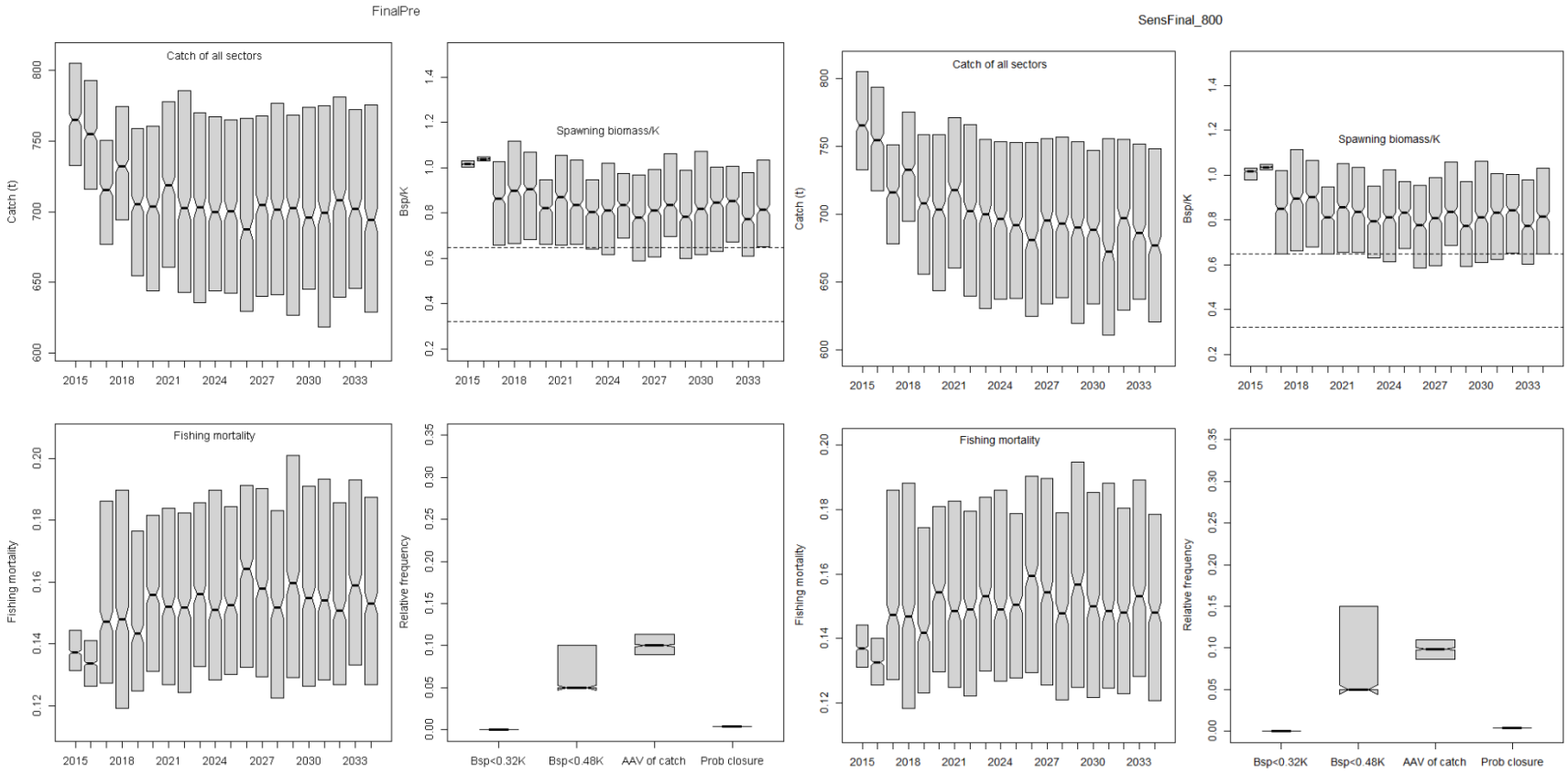

Fig. 1. Summary statistics for the base-case HCR with 1000t maximum RBC cap compared with a sensitivity test with 800t maximum cap.

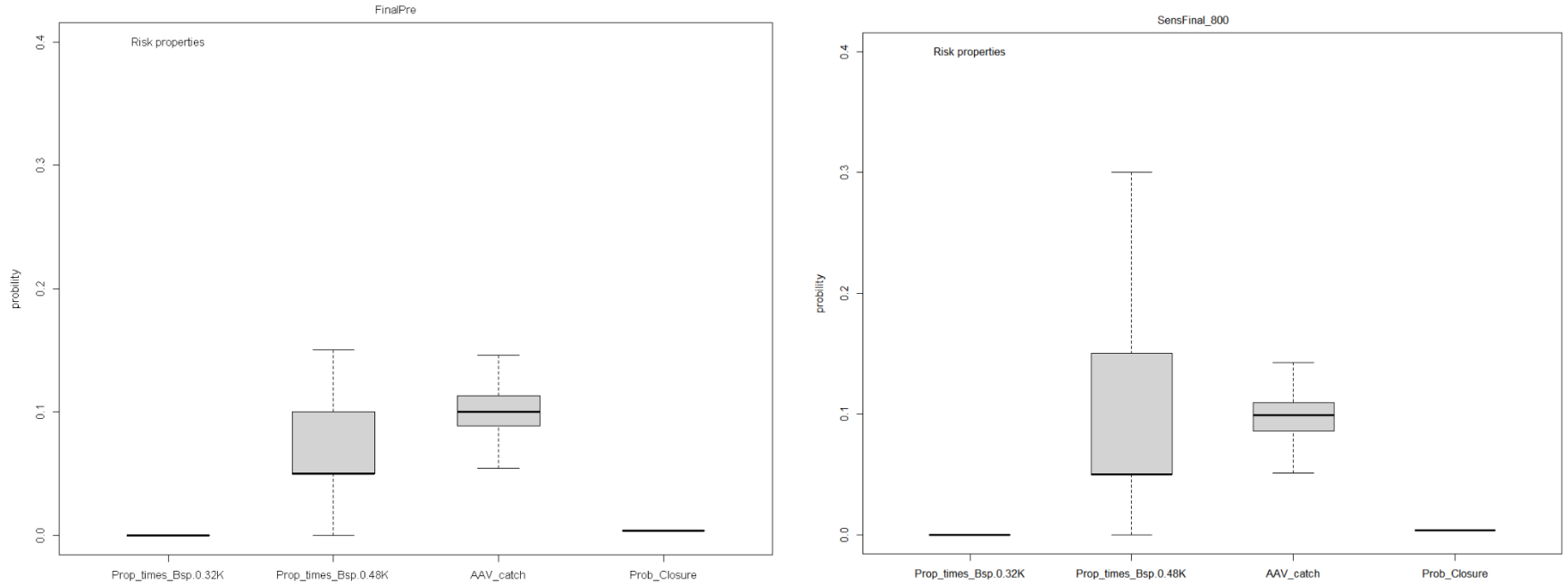

Fig. 2. Summary risk statistics for the base-case HCR with 1000t maximum RBC cap compared with a sensitivity test with 800t maximum cap.

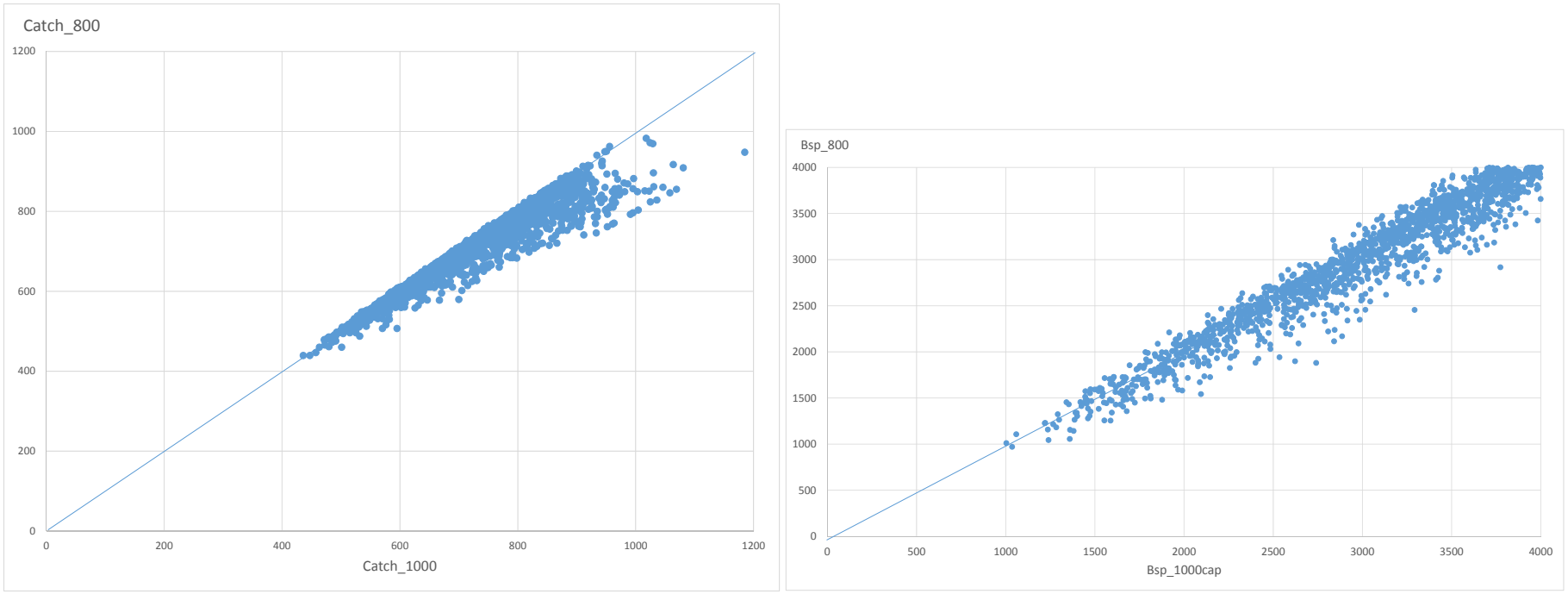

Fig. 3. Scatter plots of (A) catch and (B) spawning biomass for a sensitivity test with 800t maximum cap (vertical axis) versus the base-case HCR with 1000t maximum RBC cap (horizontal axis), shown for Operating Model 2 (with different steepness – because this resulted in the biggest difference between the two scenarios). Note that the biomass plot has been truncated at 4000t to magnify the differences. The solid line shows exact correspondence.