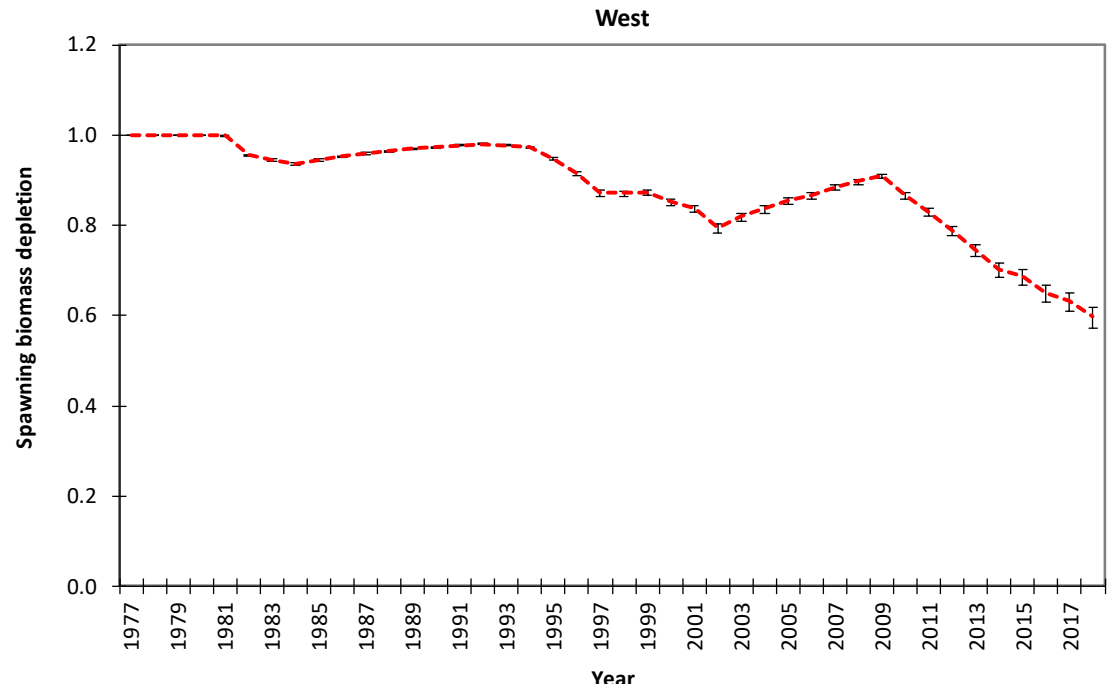
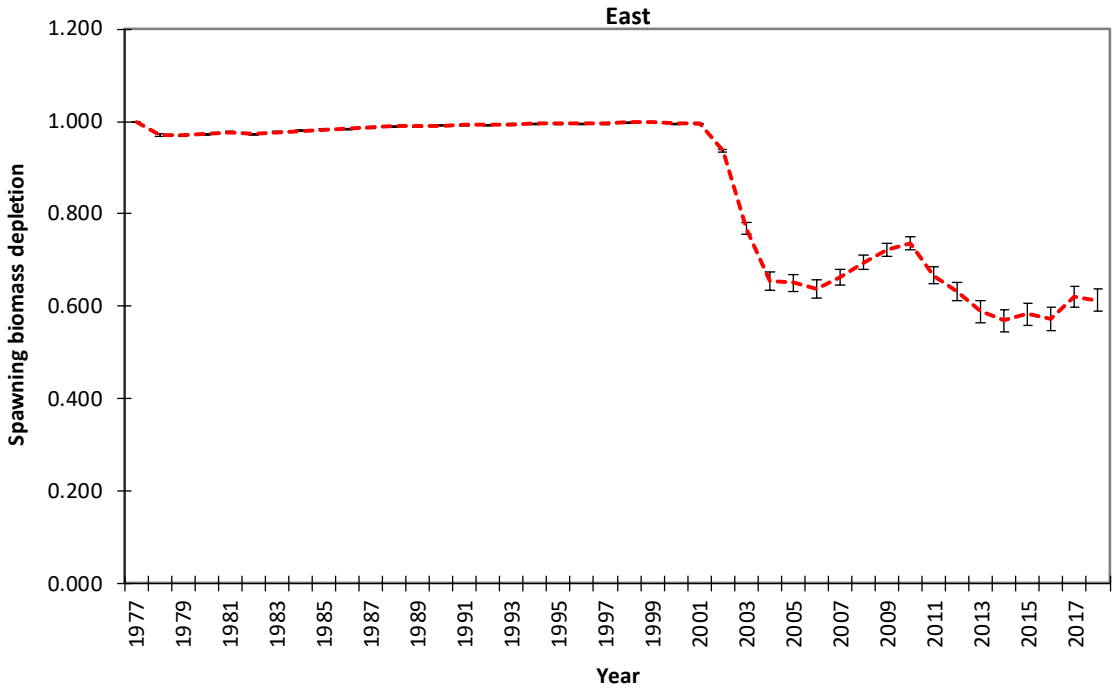
CPUE issues

- **Suggestion for future improvements on CPUE data collection:**
  - At the moment, the resolution of CPUE data for S1 and S2 is aggregation by day. Considerable information is lost by aggregating in this way. Preferably tow-by-tow data should be reported.
  - Presently the covariate available for effort is number of tows or hours trawled (this not available for S1). For other definitions of effort to be considered in defining CPUE, more information needs to be collected to make this possible (e.g. if area-swept better reflects fishery effort)
- **Base case fit residual standard deviation (σ) and weights for CPUE indices:**

Series	σ		Relative weight	
	West	East	West	East
S1	0.981	0.243	0.168	0.911
S2	0.465	—	0.749	
S3	1.399	0.779	0.083	0.089





Spawning biomass depletion for the **West** (top) and **East** (bottom) areas for the Base case together with **95% confidence intervals**

Conclusion on the precision of estimates

The formal statistical precision of results appears very high (CVs ~ 2%).

This, however, is quite misleading, and reflects a consequence of necessary model simplicity given the limited data, rather than reality.

With length distribution data for one year only, there is no basis to estimate the variations about the stock-recruitment relationship that would be present in reality; these, if estimable, would lead to much larger CVs.

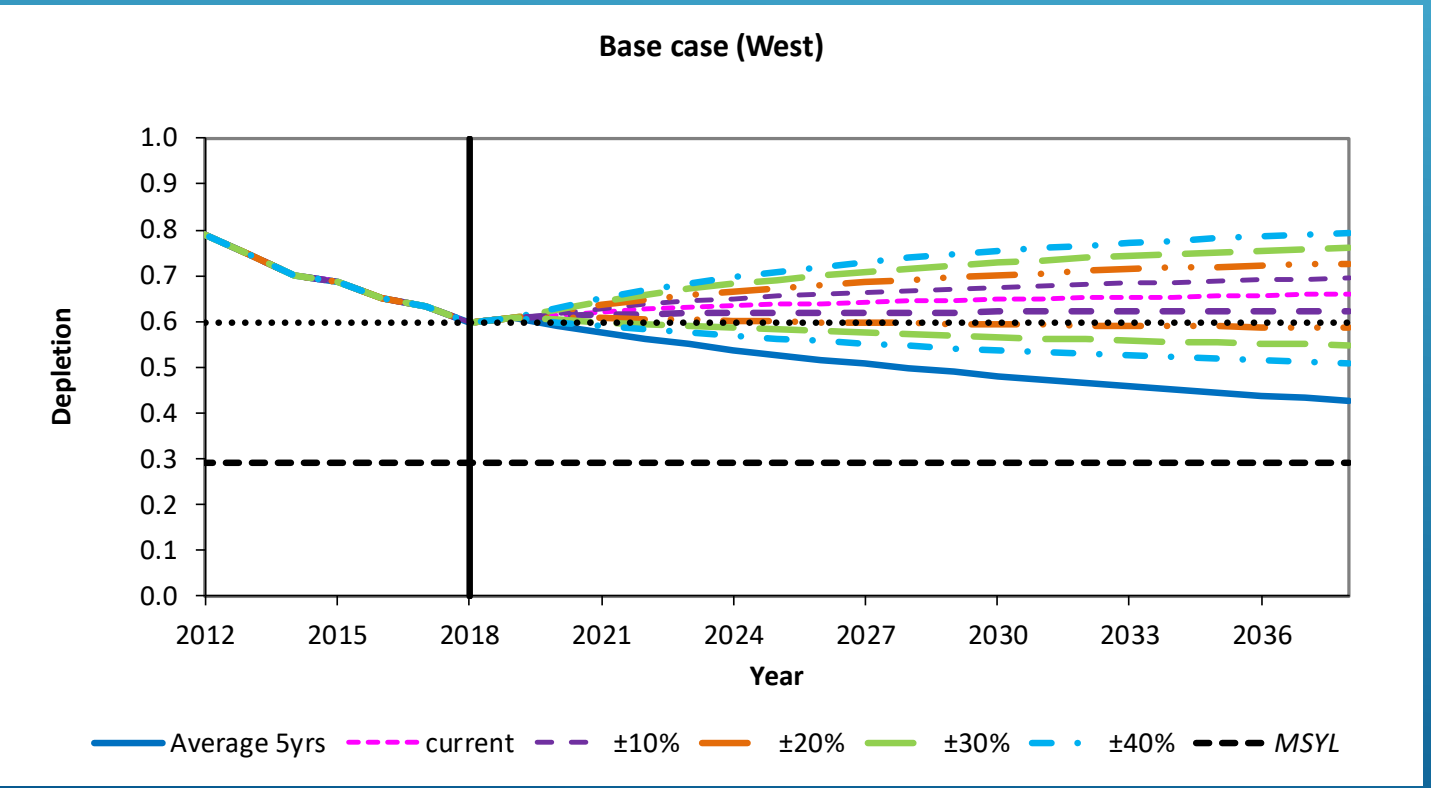
Furthermore, the constraint of a deterministic model severely restricts the range alternative possible inferences possible from the length distribution data, which could be impacted by short term variations in recruitment or by selectivity doming.

Hence, realistic estimation of the statistical precision of quantities such as current spawning biomass depletion is not possible.

Actual projection catches reported and average over the last 5 years

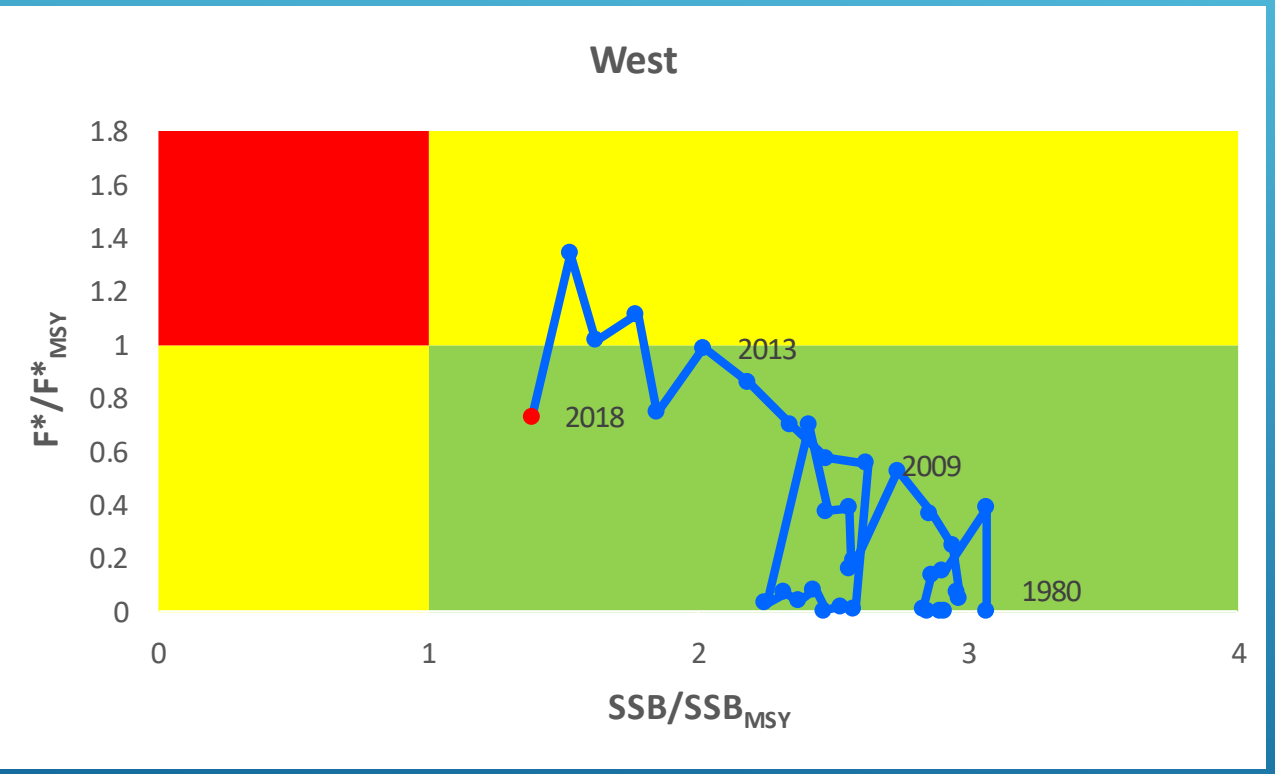
	West	East
-40% current	1 294	595
-30% current	1 509	694
-20% current	1 725	794
-10% current	1 940	893
current	2 157	992
+10% current	2 372	1 091
+20% current	2 587	1 190
+30% current	2 803	1 290
+40% current	3 018	1 389
Average over last 5 years	**3 436**	706

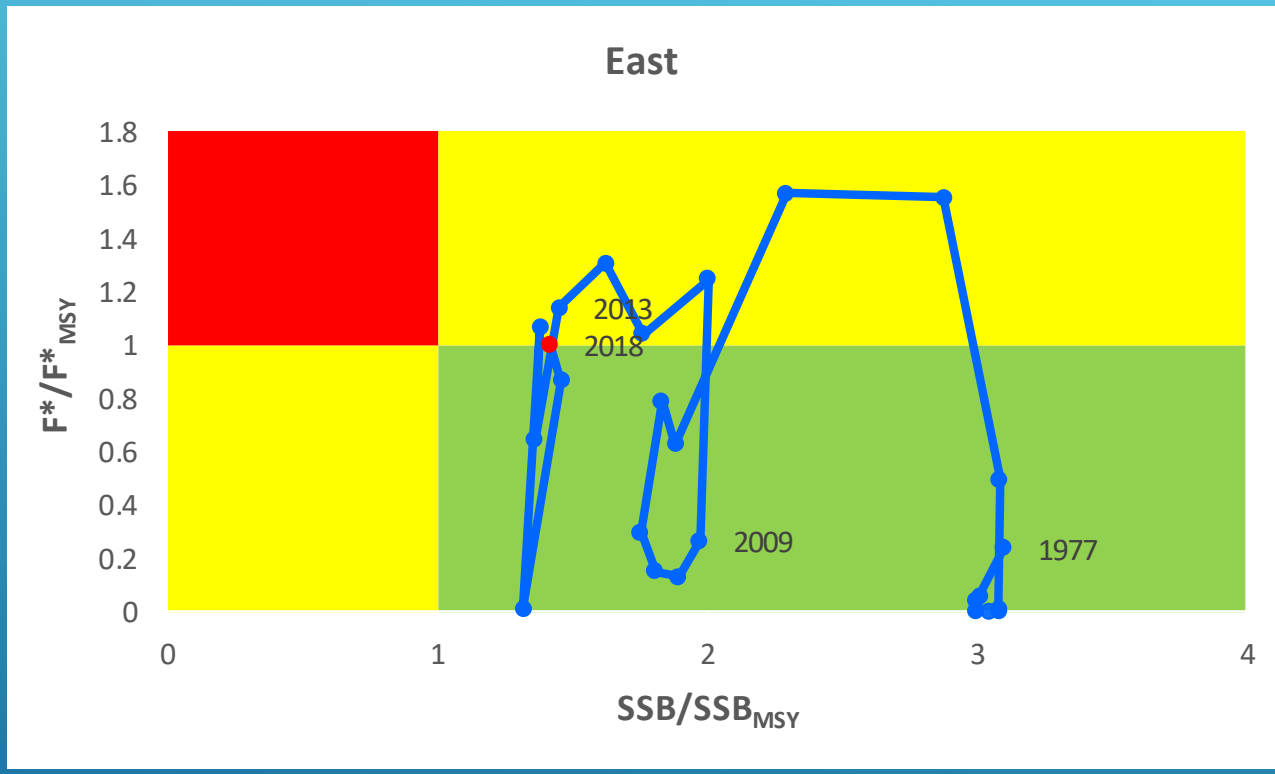
Spawning biomass depletion projections for the Base case under future annual catches of 2 157 tonnes (as for 2018) for the West (top) and 992 tonnes for the East (bottom), as well as for several variants of these catches: ±10%, ±20%, ±30% and ±40%. A projection under future annual catches of the average over the last 5 years (3 436 tonnes) is also shown.

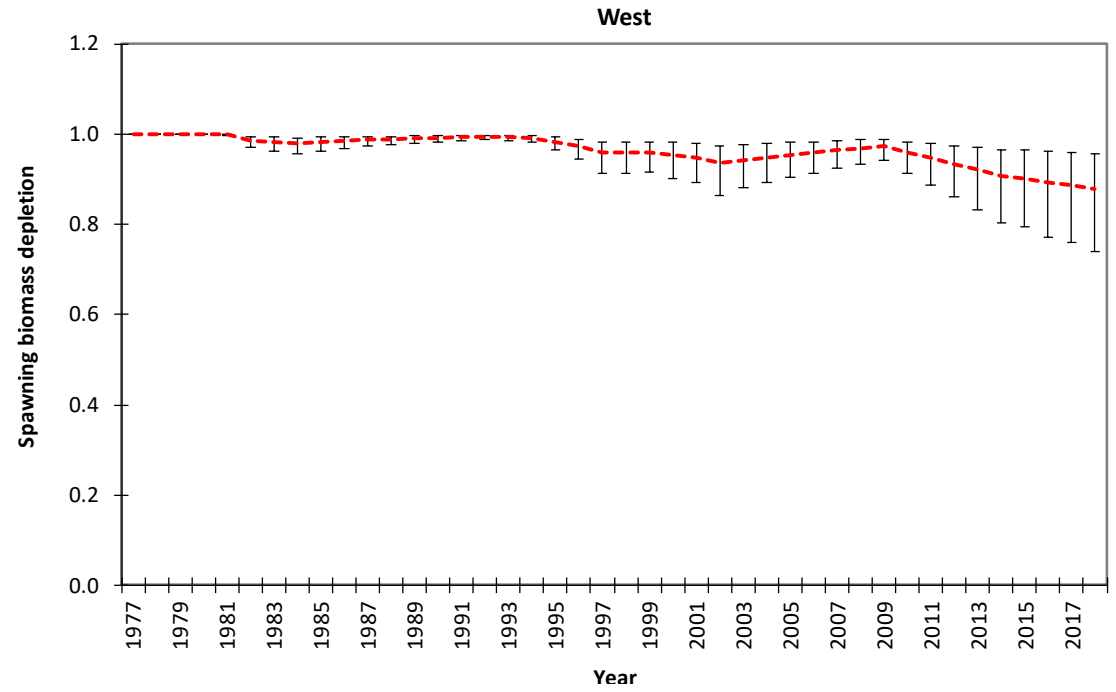


The dotted horizontal lines show the current (2018) depletion values for this assessment model and the dashed horizontal line shows the *MSYL* values.

Kobe plots for *M* = 0.15 for the West and East areas







Spawning biomass depletion for the **West** (top) and **East** (bottom) areas for the alternative growth (**Santamaria's**) sensitivity together with 95% confidence intervals