

Exploratory scenarios in a4a for southern megrims (*Lepidorhombus whiffiagonis* and *L.boscai*) in divisions 8.c and 9.a using available abundance indices

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The objective of this working document is to present different configurations of the assessment model combining the available abundance indices as decided in the data compilation meeting. The indices that were already part of the previous model and some new indices developed for this benchmark have been used.

Once the indices were selected, different options were studied during the benchmark to choose the most appropriate one with the best fit. All the considered configurations are listed in this document.

Scenarios to consider the different abundance indices

Lepidorhombus boscii 8c9a a4a scenarios (in red new indices):

<i>L. boscii</i>	Commercial indices			Survey indices	
	SP-LCGOTBDEF1 LPUE 1986-1999	SP-LCGOTBDEF2 LPUE 2000-2020	OAB_INDEX CPUE (biomass) 2003-2020	ESP Demersales 1988-2020	PT Crustacean 1997-2018
FIT 1: Base Case as WGBIE 2021 (old maturity ogive)	X	X		X	
FIT 2: Commercial indices from bottom trawl fleets and surveys	X	X		X	X
FIT 3: Commercial indices based on-board data and surveys			X	X	X
FIT 4: Only Surveys				X	X
FIT 5: All indices overlapping commercial LPUEs and commercial CPUE	X	X	X	X	X
FIT 6: All indices with no overlapping	X		X	X	X

Table with AIC, BIC and Mohn's Rho values of the different fits:

	AIC	BIC	Mohn's Rho (Retro_F)	Mohn's Rho (Retro_SSB)	Mohn's Rho (Retro_R)
FIT 1: Base Case as WGBIE 2021 (old maturity ogive)	904.0	1384.6	-0.14	0.13	-0.18
FIT 2: Commercial indices from bottom trawl fleets and surveys	1193.0	1710.9	-0.04	0.02	-0.15
FIT 3: Commercial indices based on-board data and surveys	1089.9	1562.0	-0.10	0.06	-0.09
FIT 4: Only Surveys	1073.5	1533.7	-0.04	0.01	-0.16
FIT 5 All indices overlapping commercial LPUEs and commercial CPUE	1211.4	1750.5	-0.12	0.09	-0.08
FIT 6 All indices with no overlapping	1157.9	1661.7	-0.10	0.06	-0.10

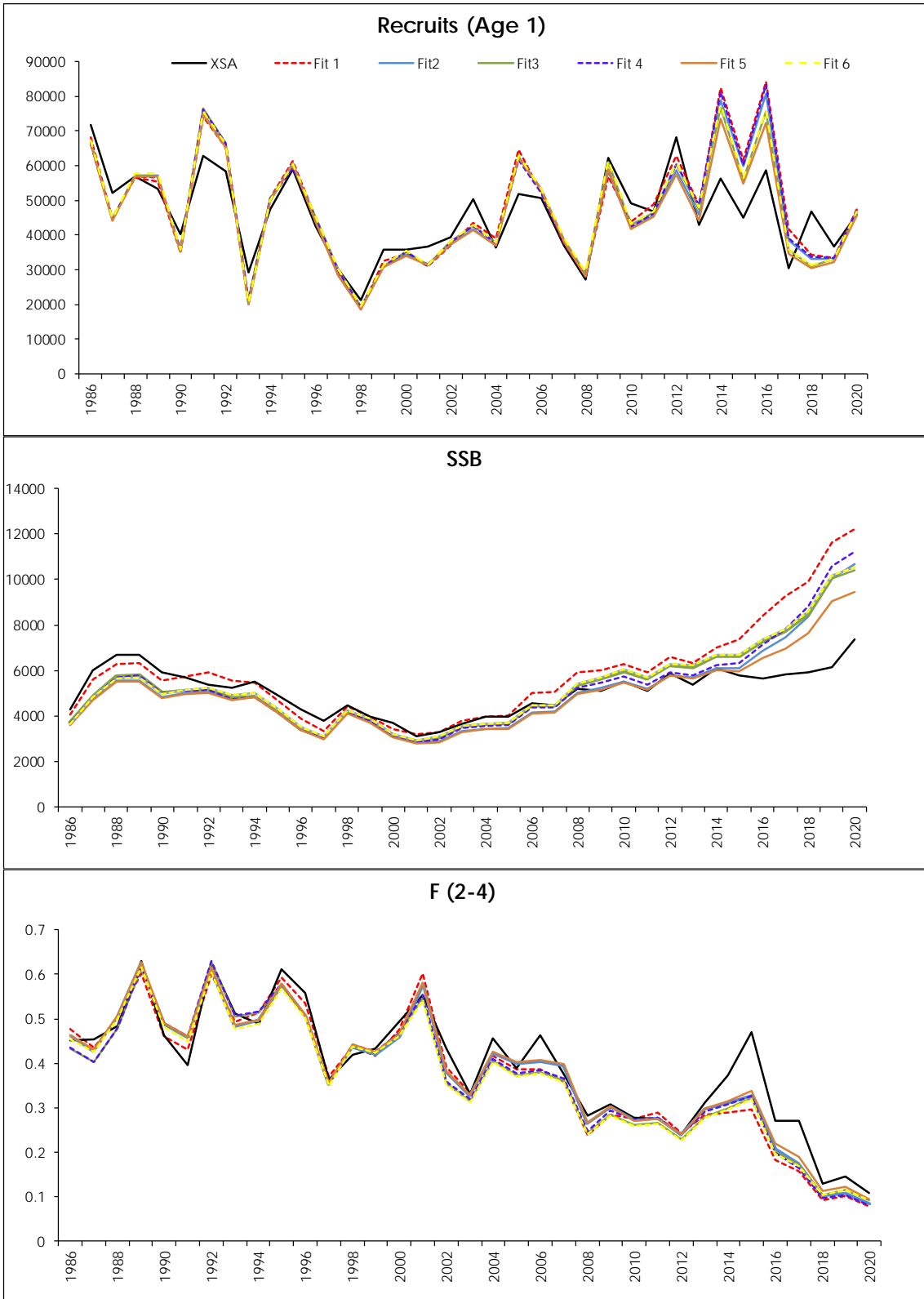


Figure 1. XSA (WGBIE2021) results and a4a fits results comparison.

Fit 1

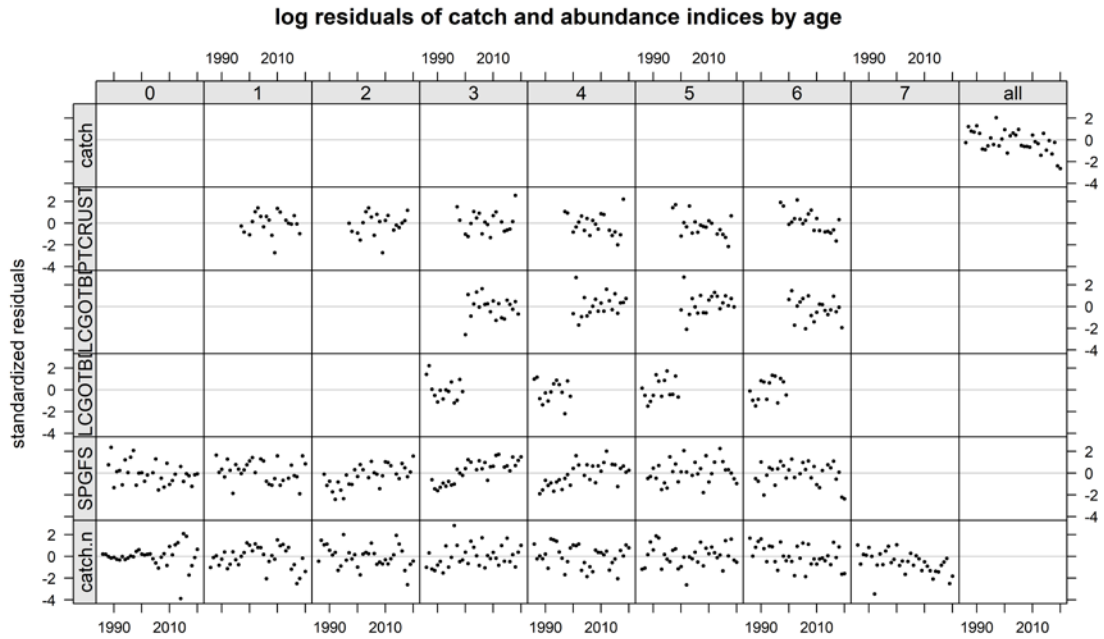


Figure 2. Log residuals of catch and abundance indices by age

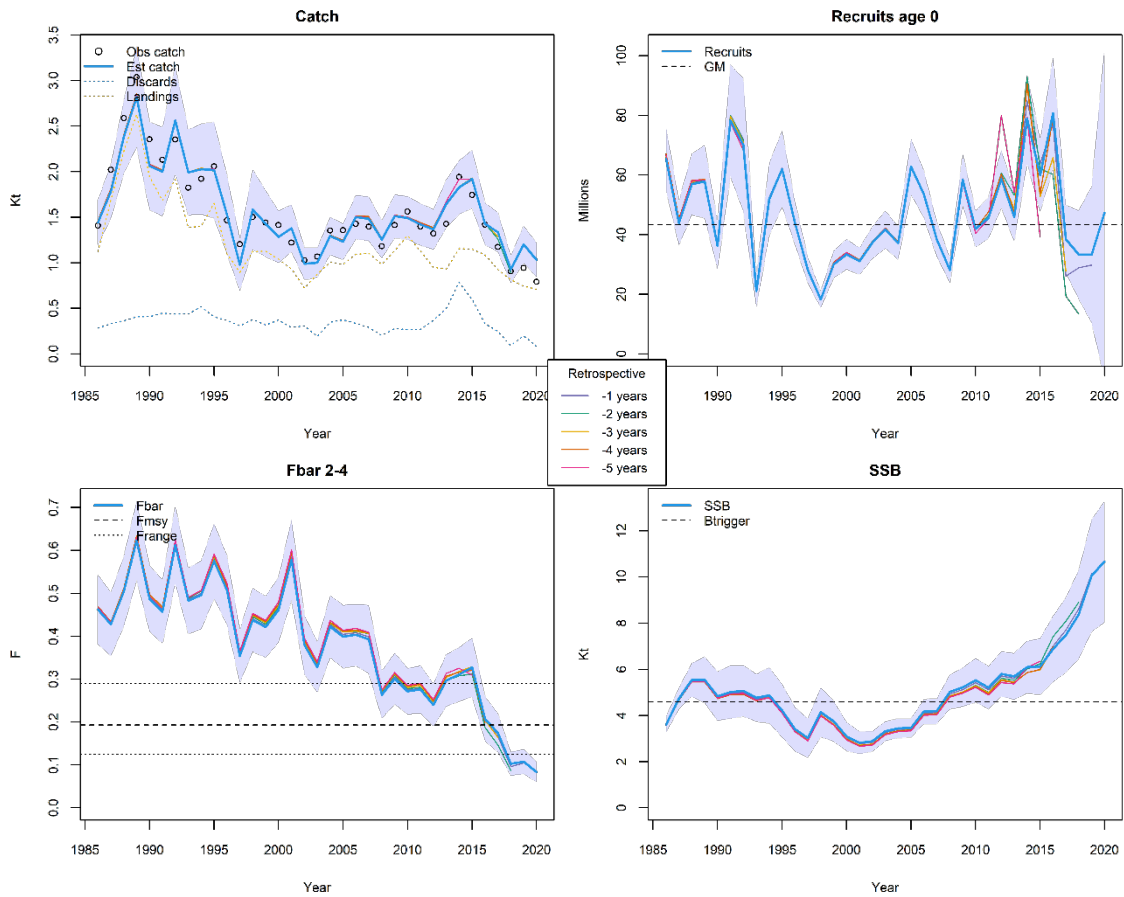


Figure 3. Summary of assessment outputs and retrospective pattern plots over the last 6 years

Fit 2

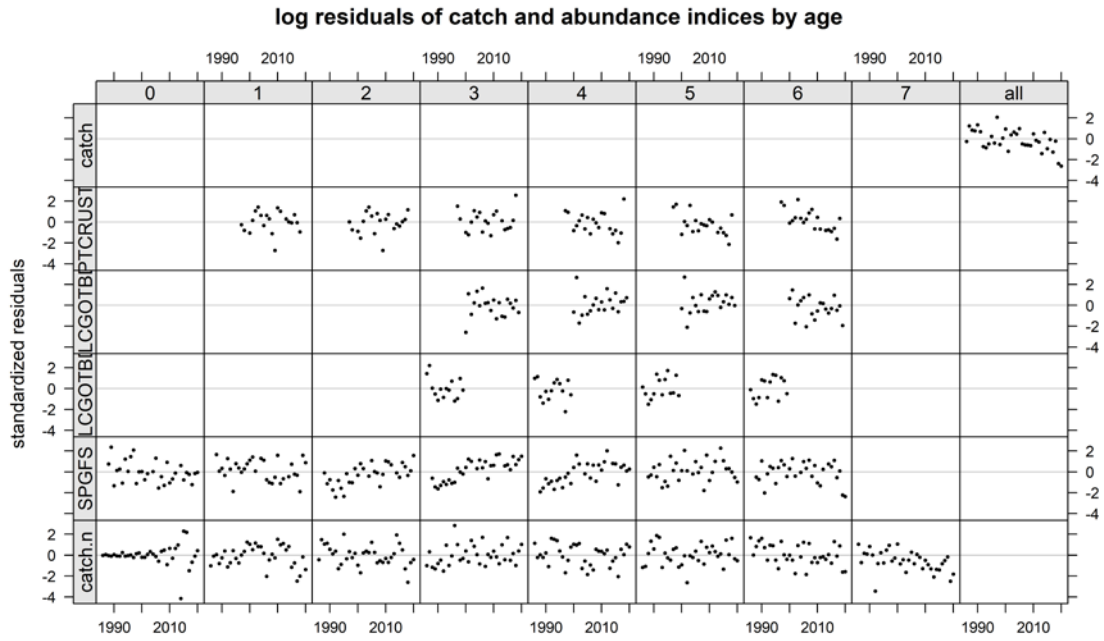


Figure 4. Log residuals of catch and abundance indices by age

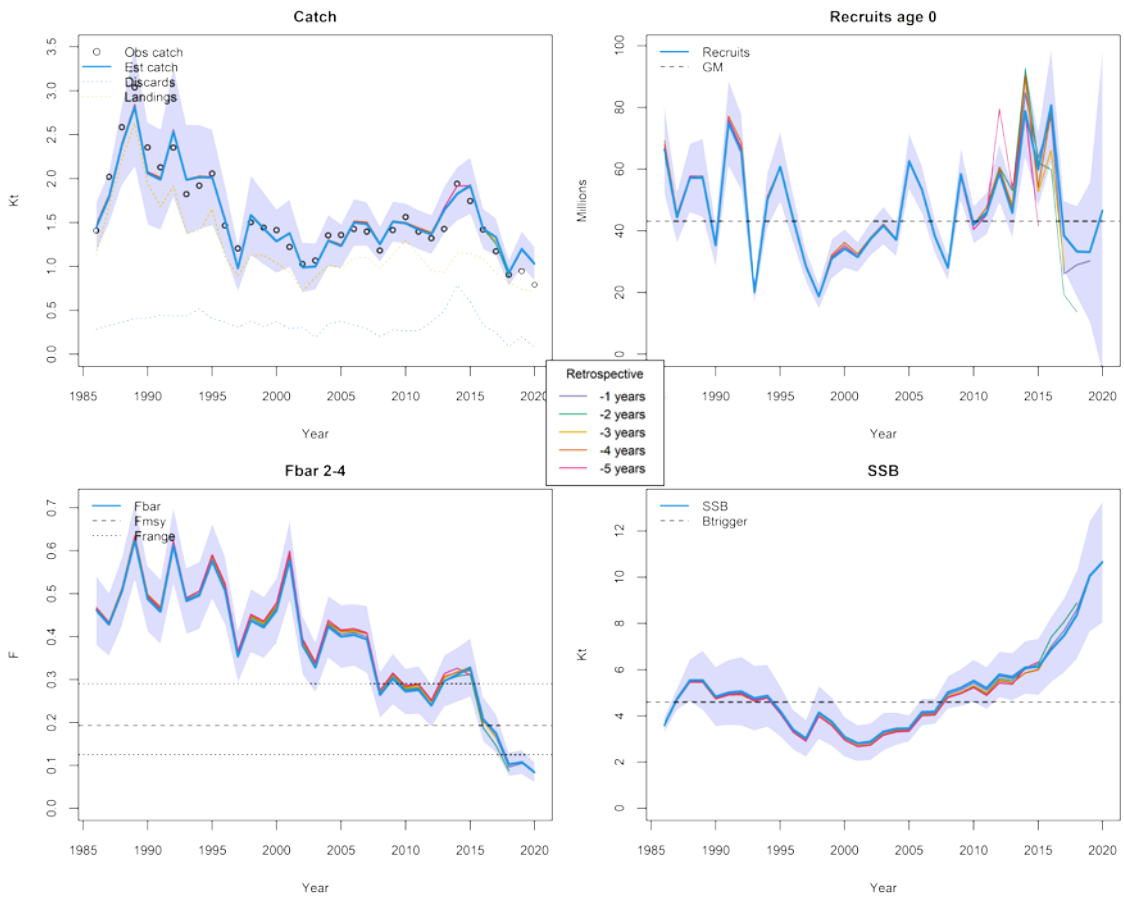


Figure 5. Summary of assessment outputs and retrospective pattern plots over the last 6 years

Fit 3

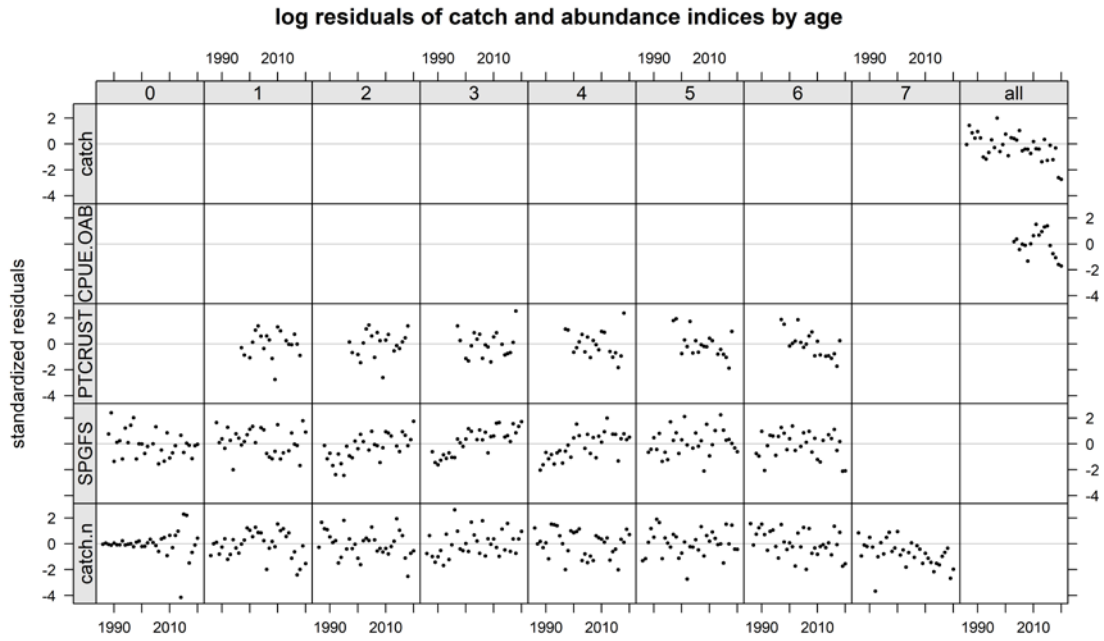


Figure 6. Log residuals of catch and abundance indices by age

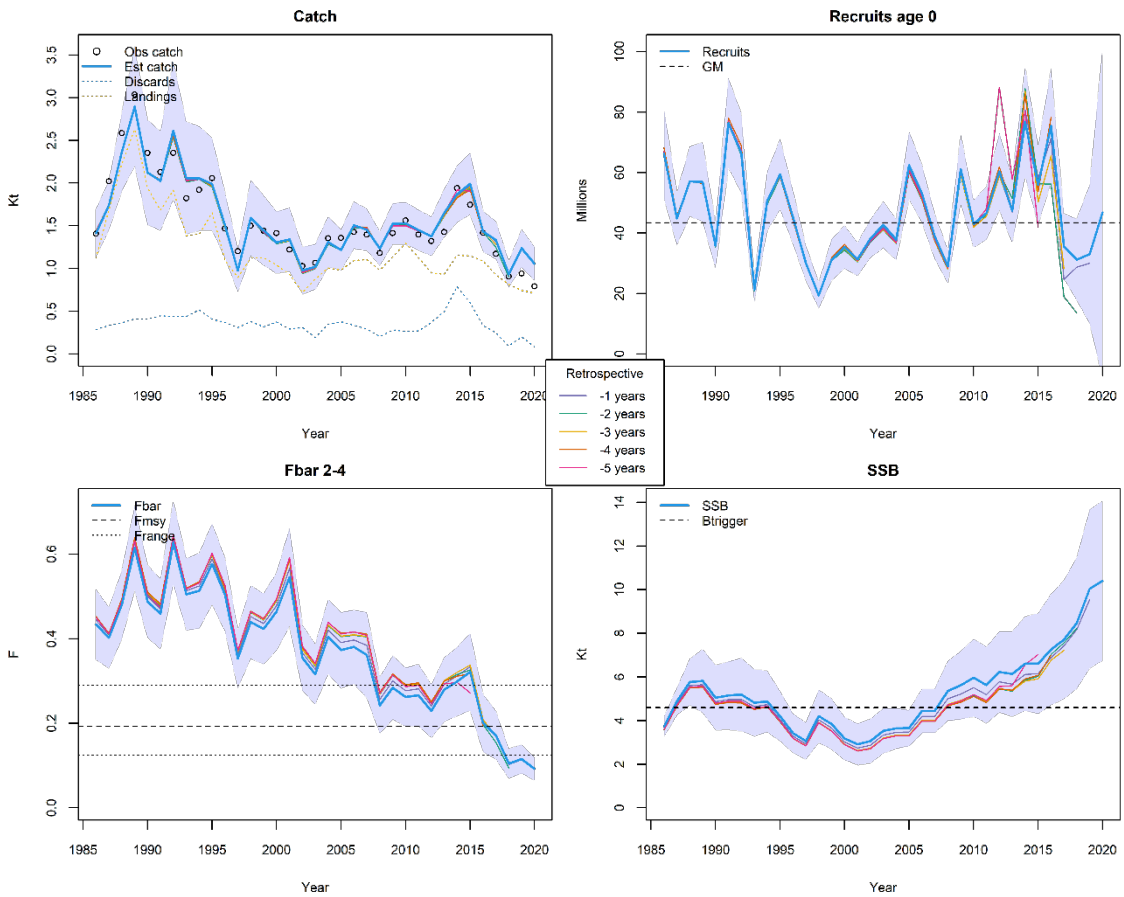


Figure 7. Summary of assessment outputs and retrospective pattern plots over the last 6 years

Fit 4

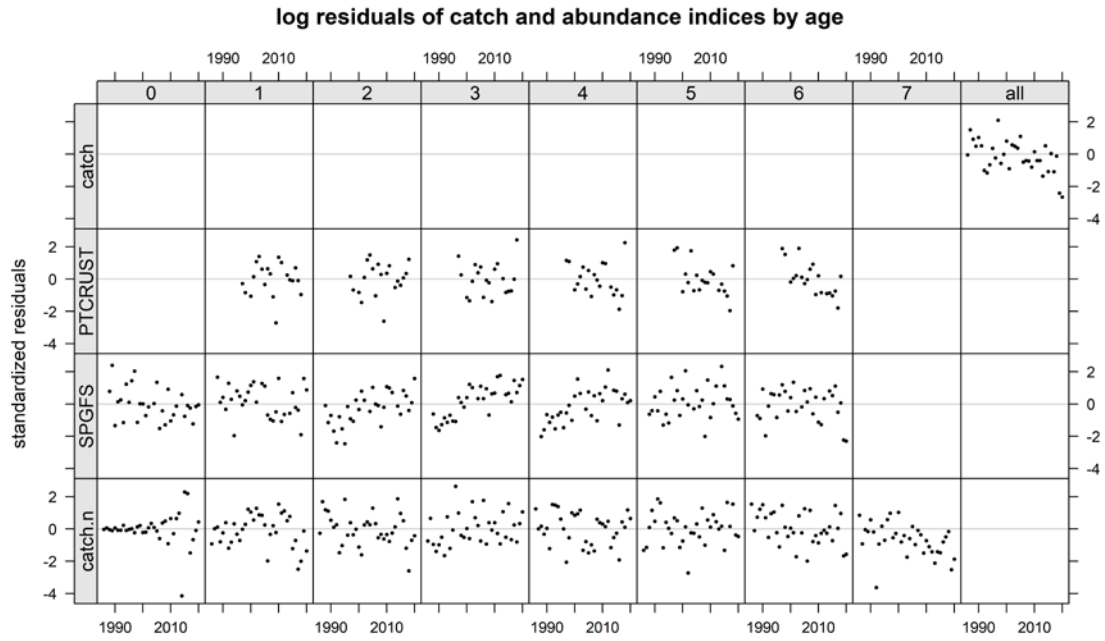


Figure 8. Log residuals of catch and abundance indices by age

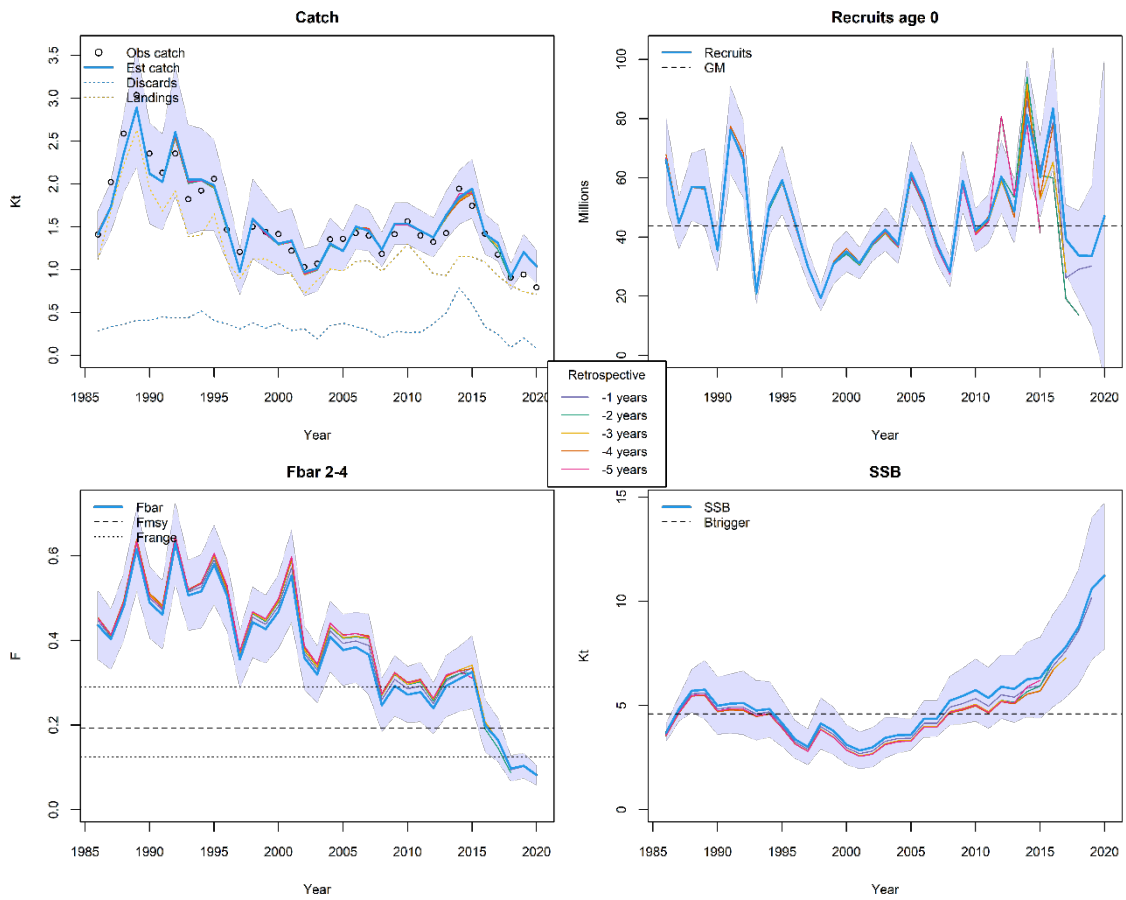


Figure 9. Summary of assessment outputs and retrospective pattern plots over the last 6 years

Fit 5

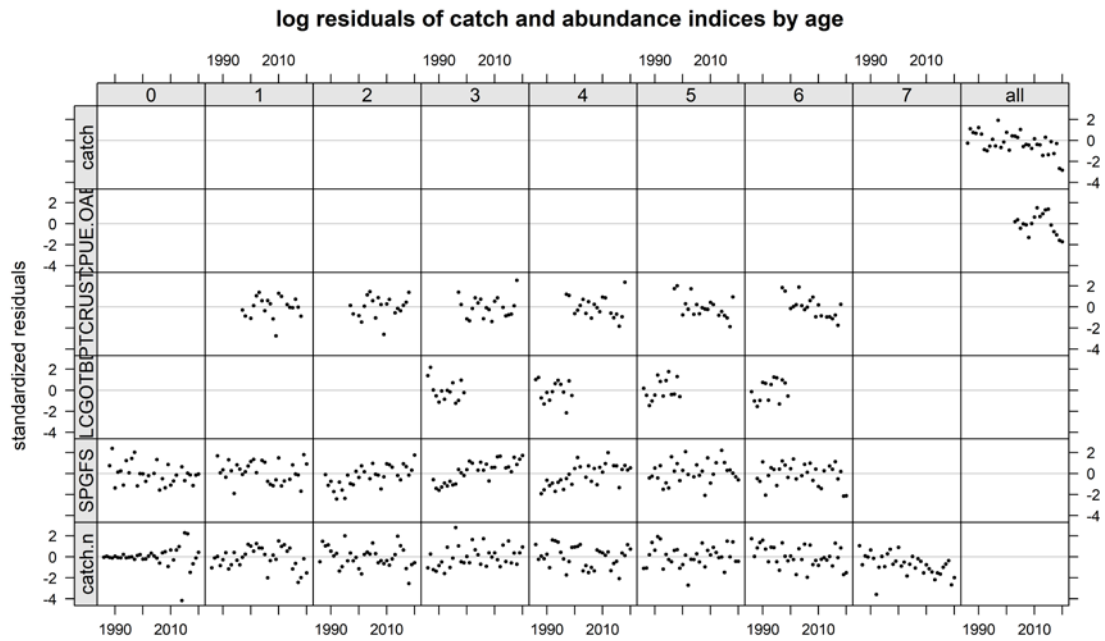


Figure 10. Log residuals of catch and abundance indices by age

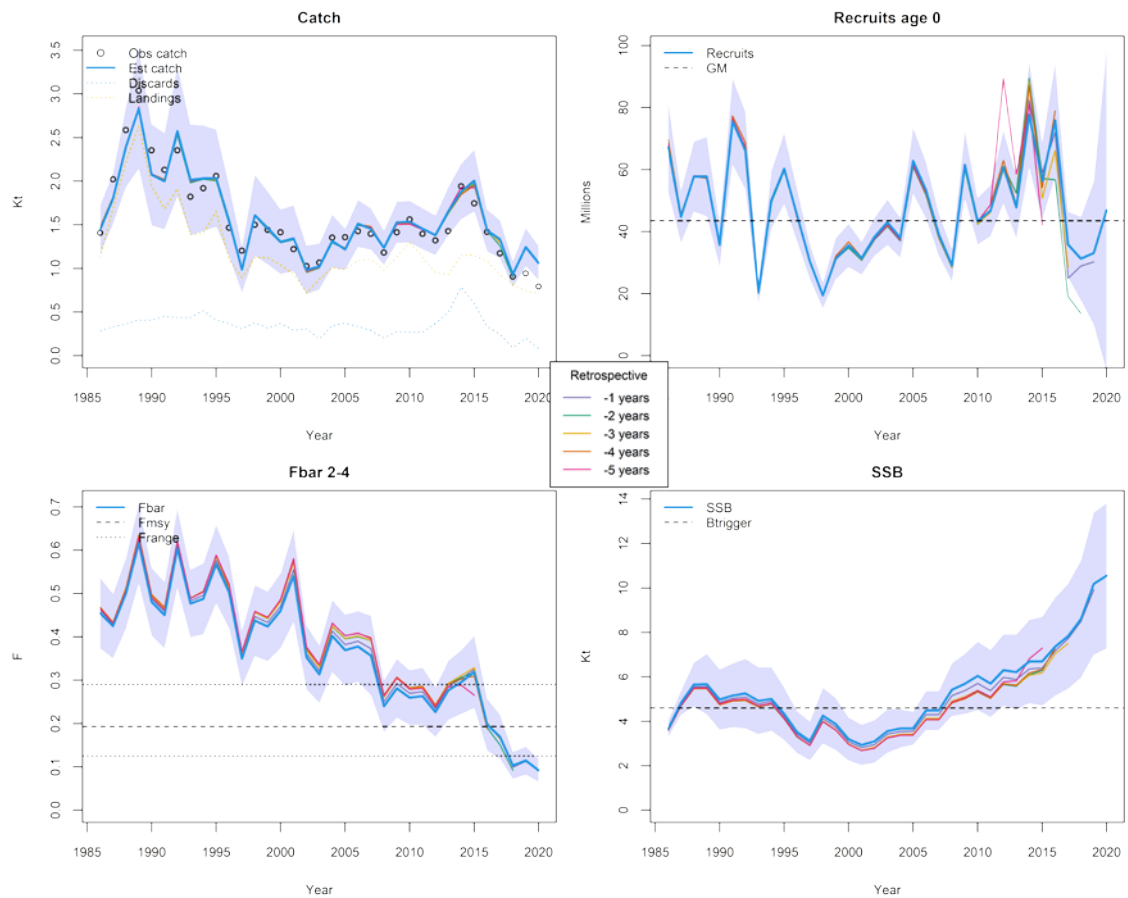


Figure 11. Summary of assessment outputs and retrospective pattern plots over the last 6 years

Fit 6

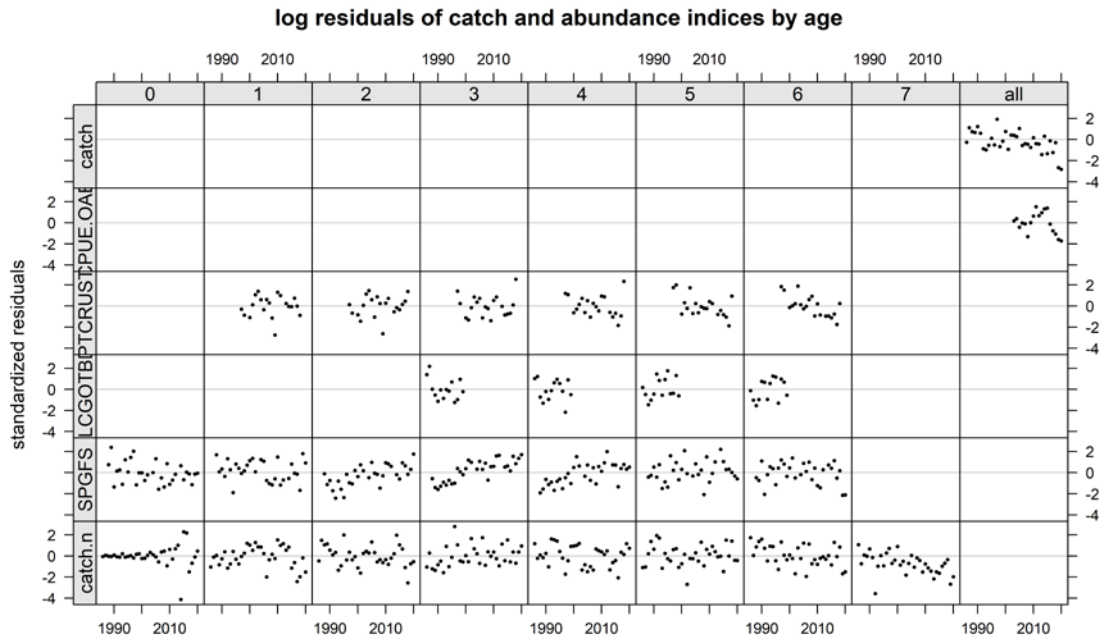


Figure 12. Log residuals of catch and abundance indices by age

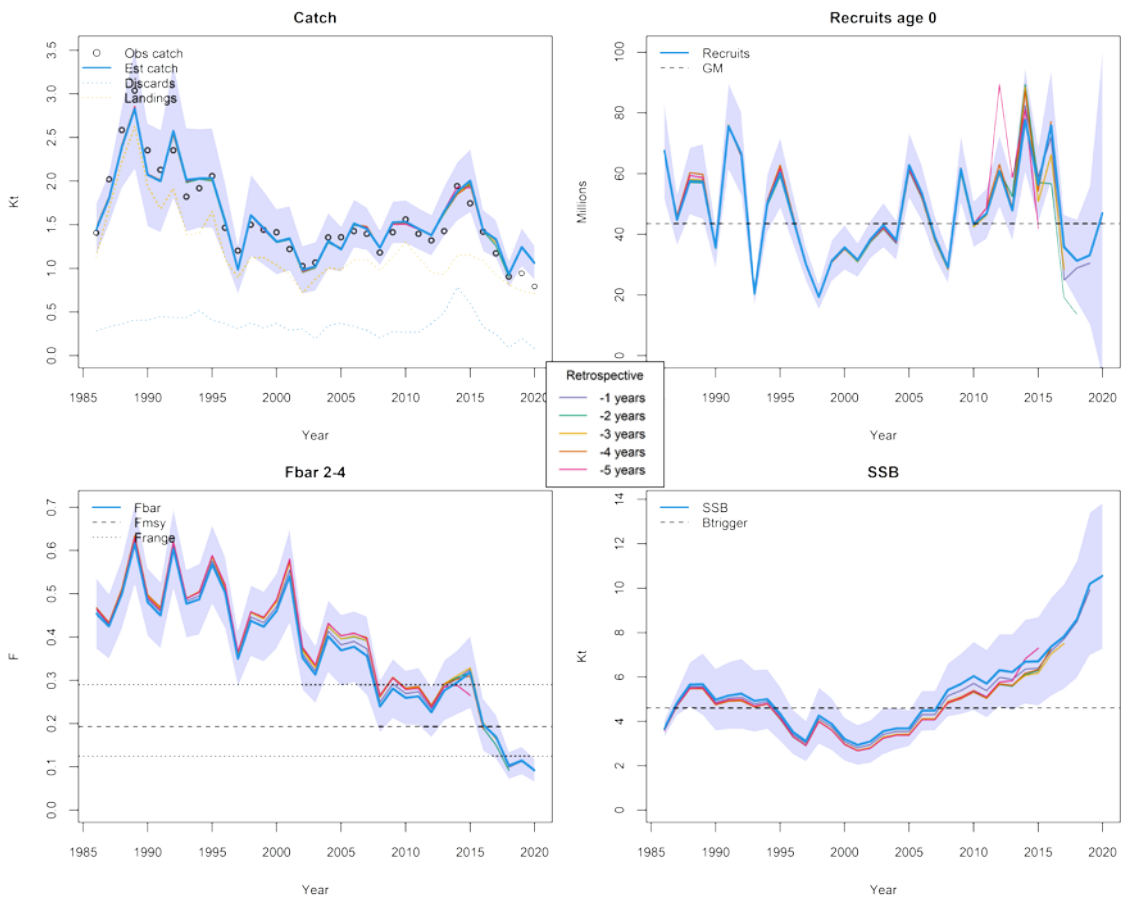


Figure 13. Summary of assessment outputs and retrospective pattern plots over the last 6 years

Lepidorhombus whiffiagonis 8c9a a4a scenarios (in red new indices):

<i>L. whiffiagonis</i>	Commercial indices			Survey index
	SP-LCGOTBDEF LPUE 1986-2020	SP-AVSOTBDEF LPUE 1986-2020	OAB_INDEX CPUE (biomass) 2003-2020	ESP Demersales 1990-2020
FIT 1: Base Case as WGBIE 2021 (old maturity ogive)	X	X		X
FIT 2: Commercial indices from bottom trawl fleets and survey	X	X		X
FIT 3: Commercial indices based on-board data and survey			X	X
FIT 4: Only Survey				X
FIT 5 All indices overlapping commercial LPUEs and commercial CPUE	X	X	X	X
FIT 6 All indices with no overlapping	X	X	X	X

Table with AIC, BIC and Mohn's Rho values of the different fits:

	AIC	BIC	Mohn's Rho (Retro_F)	Mohn's Rho (Retro_SSB)	Mohn's Rho (Retro_R)
XSA WG2021			-0.02	-0.32	0.34
FIT 1: Base Case as WGBIE 2021 (old maturity ogive)	1162.6	1598.6	-0.212	0.434	0.844
FIT 2: Commercial indices from bottom trawl fleets and survey	1185.8	1621.8	-0.233	0.404	0.759
FIT 3: Commercial indices based on-board data and survey	736.2	1096.5	-0.287	0.448	0.678
FIT 4: Only Survey	705.3	1053.7	-0.234	0.357	0.522
FIT 5 All indices overlapping commercial LPUEs and commercial CPUE	1205.2	1652.7	-0.275	0.408	0.906
FIT 6 All indices with no overlapping	943.3	1370.0	-0.295	0.412	0.729

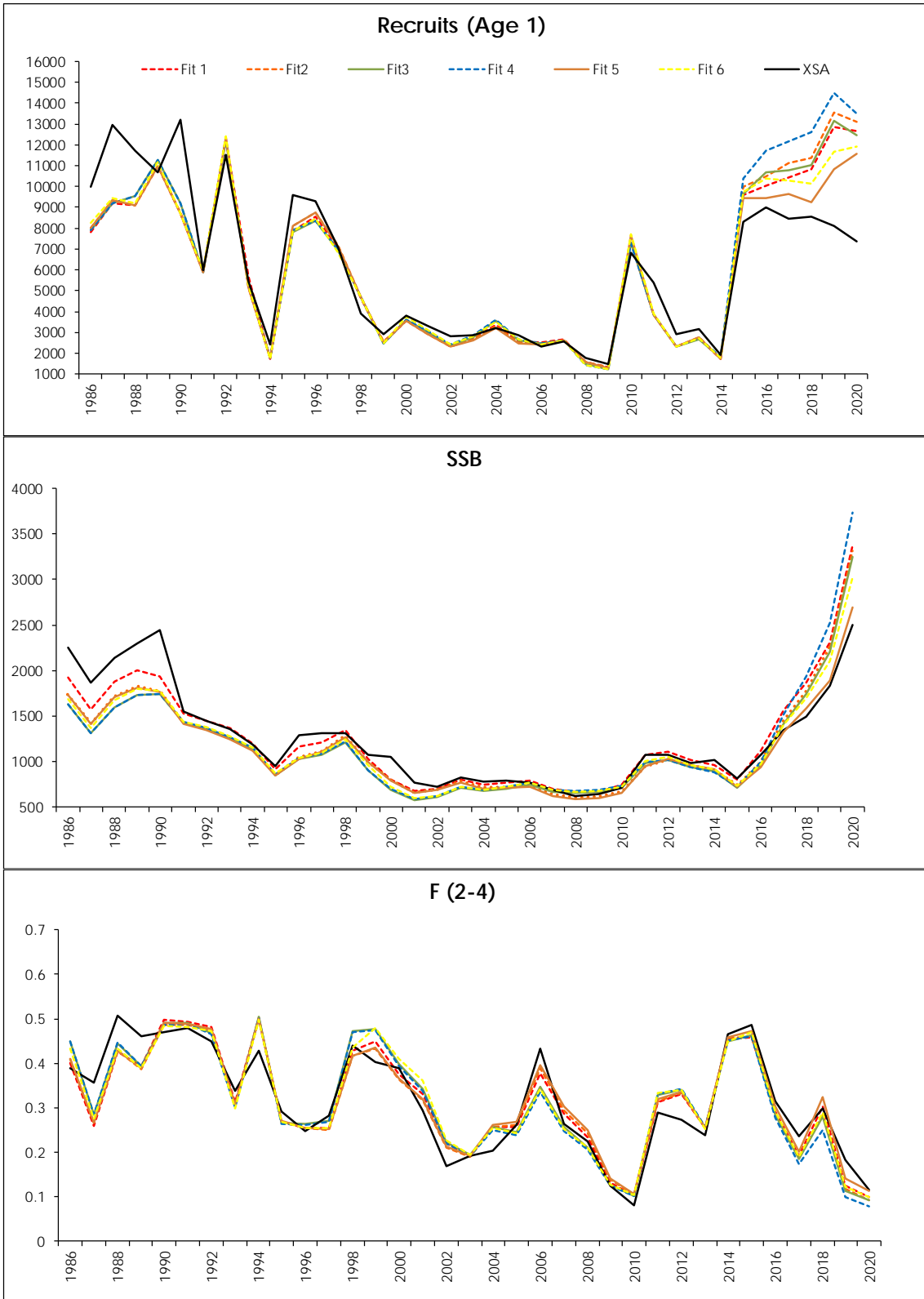


Figure 14. XSA (WGBIE2021) results and a4a fits results comparison.

Fit 1

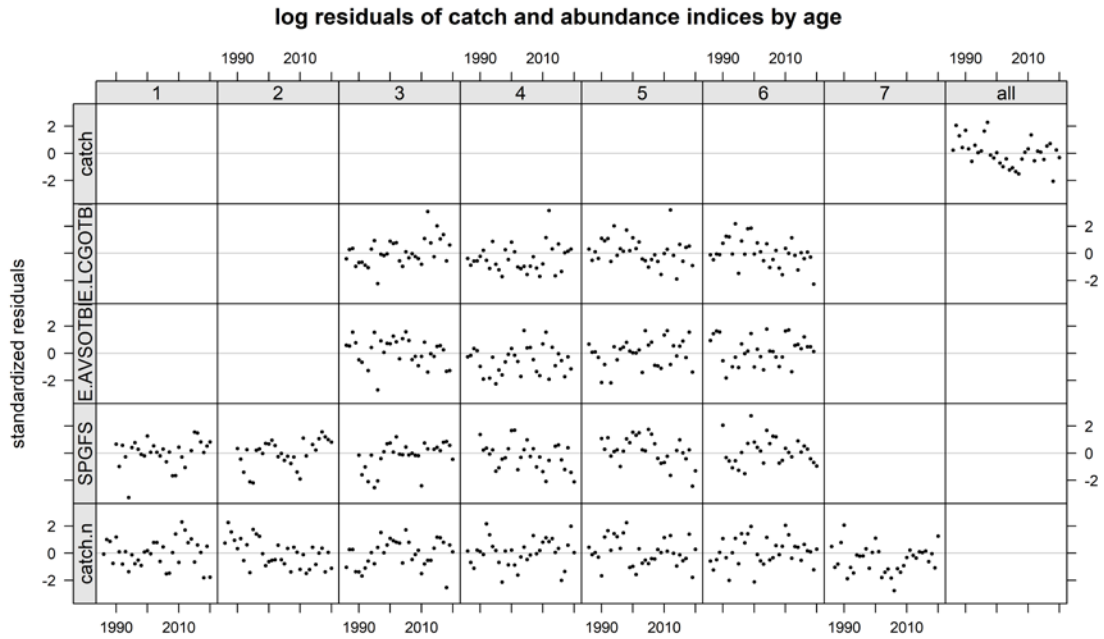


Figure 15. Log residuals of catch and abundance indices by age

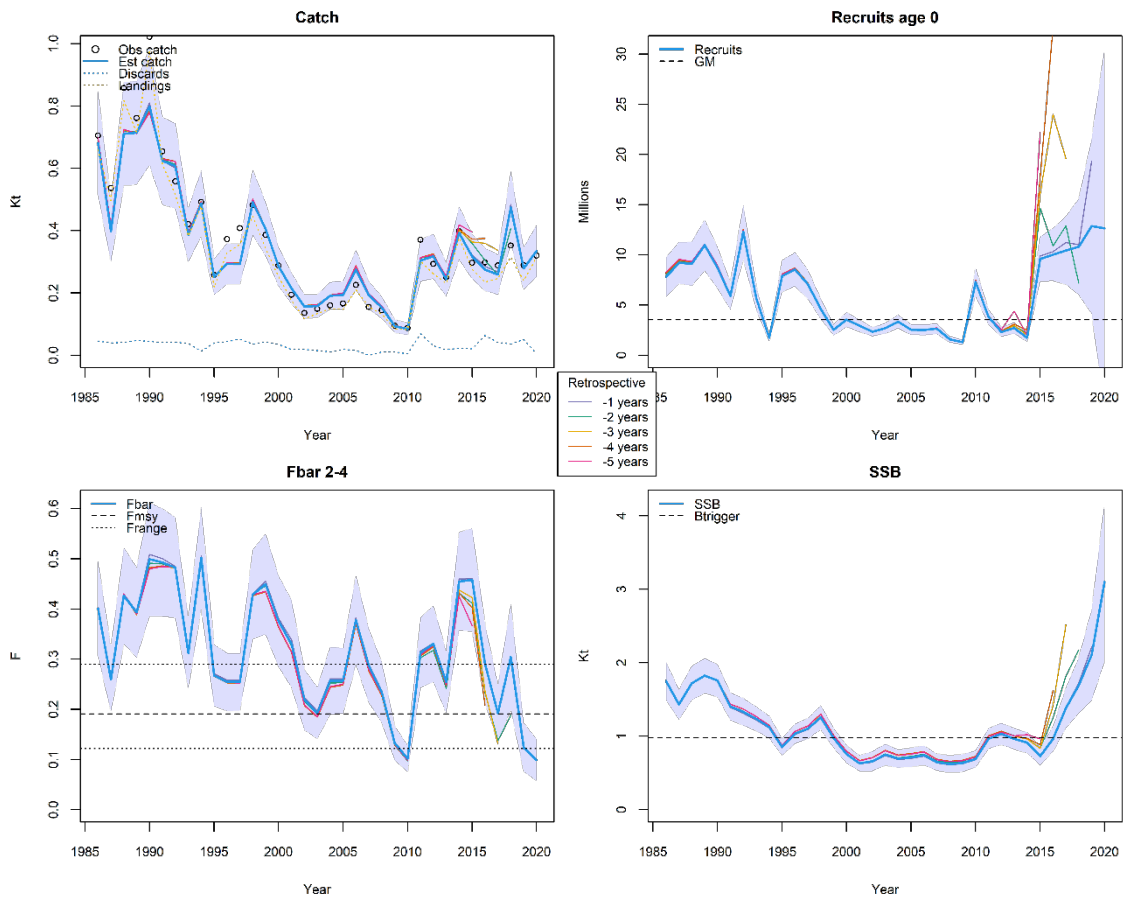


Figure 16. Summary of assessment outputs and retrospective pattern plots over the last 6 years

Fit 2

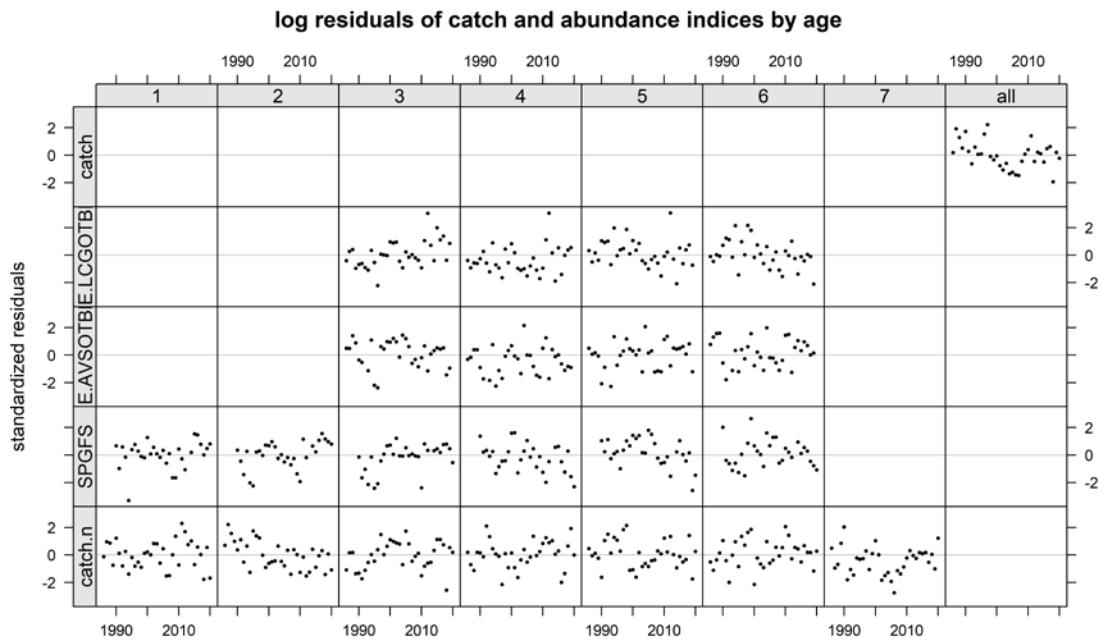


Figure 17. Log residuals of catch and abundance indices by age

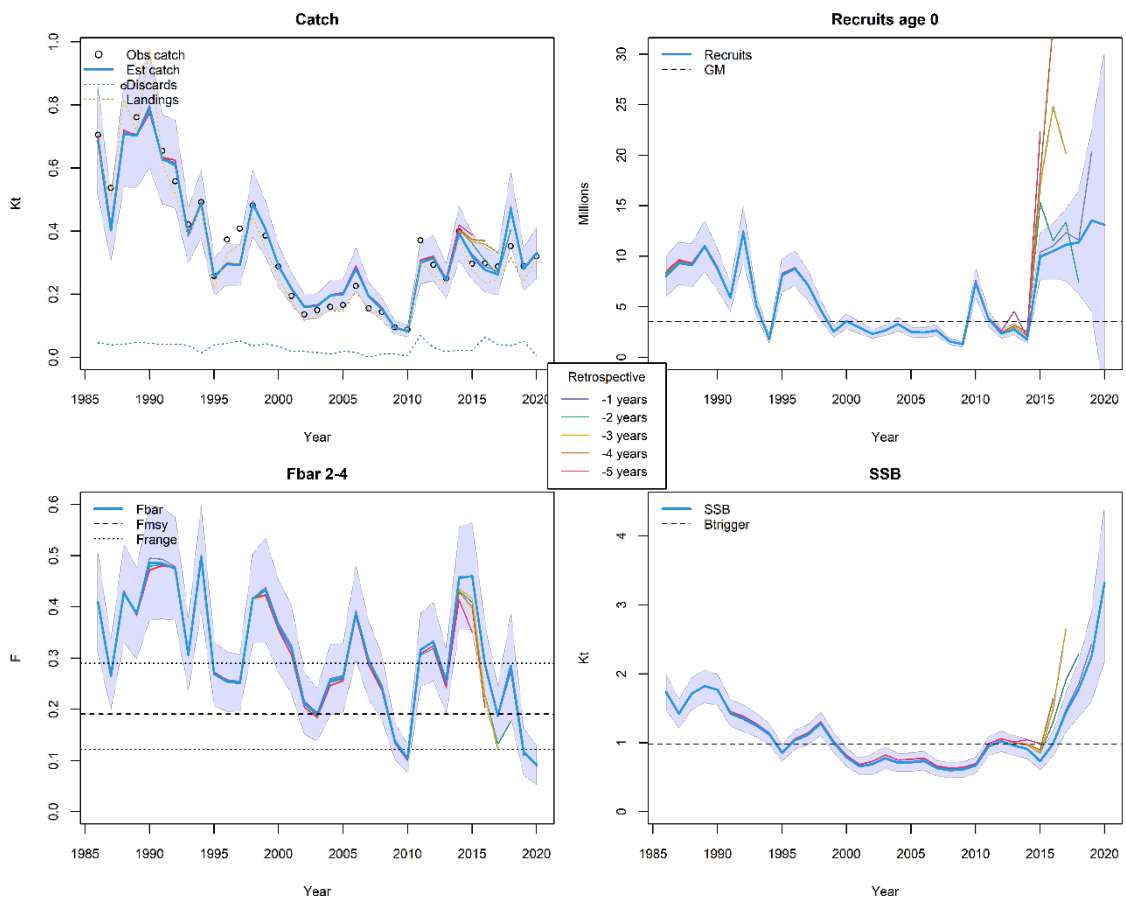


Figure 18. Summary of assessment outputs and retrospective pattern plots over the last 6 years

Fit3

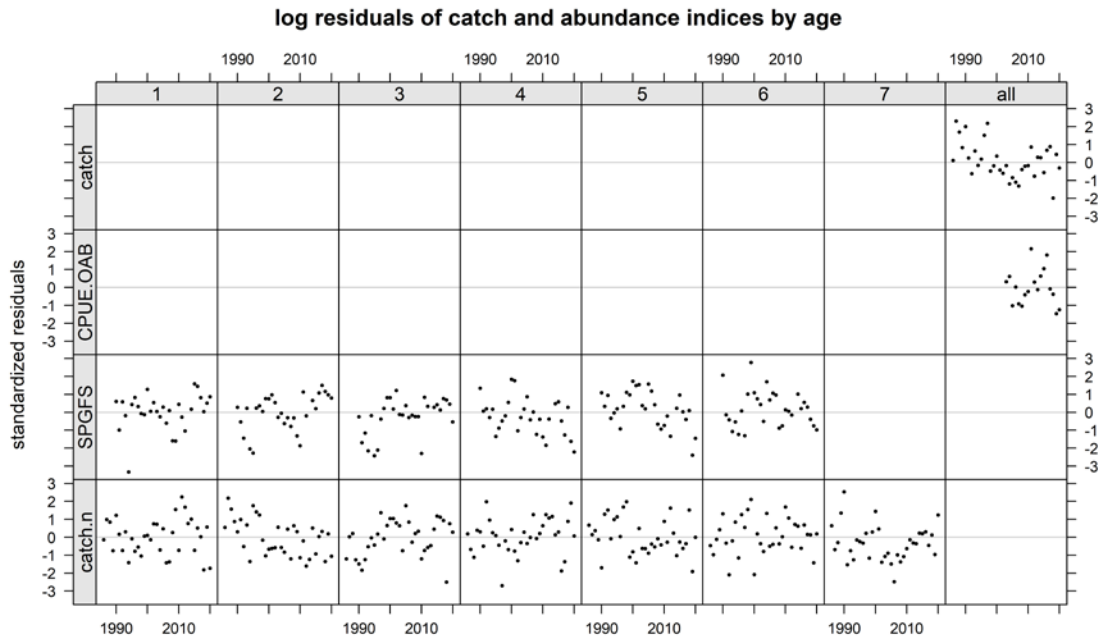


Figure 19. Log residuals of catch and abundance indices by age

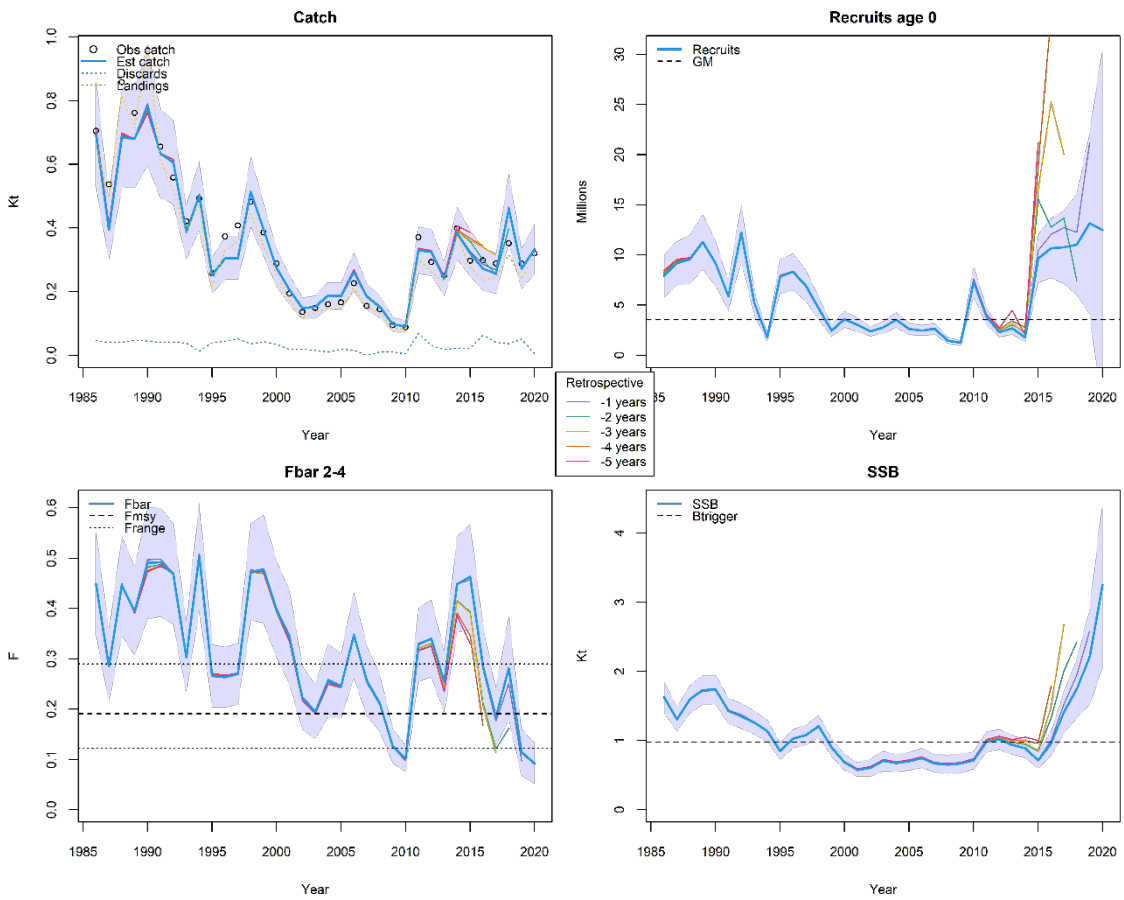


Figure 20. Summary of assessment outputs and retrospective pattern plots over the last 6 years

Fit 4

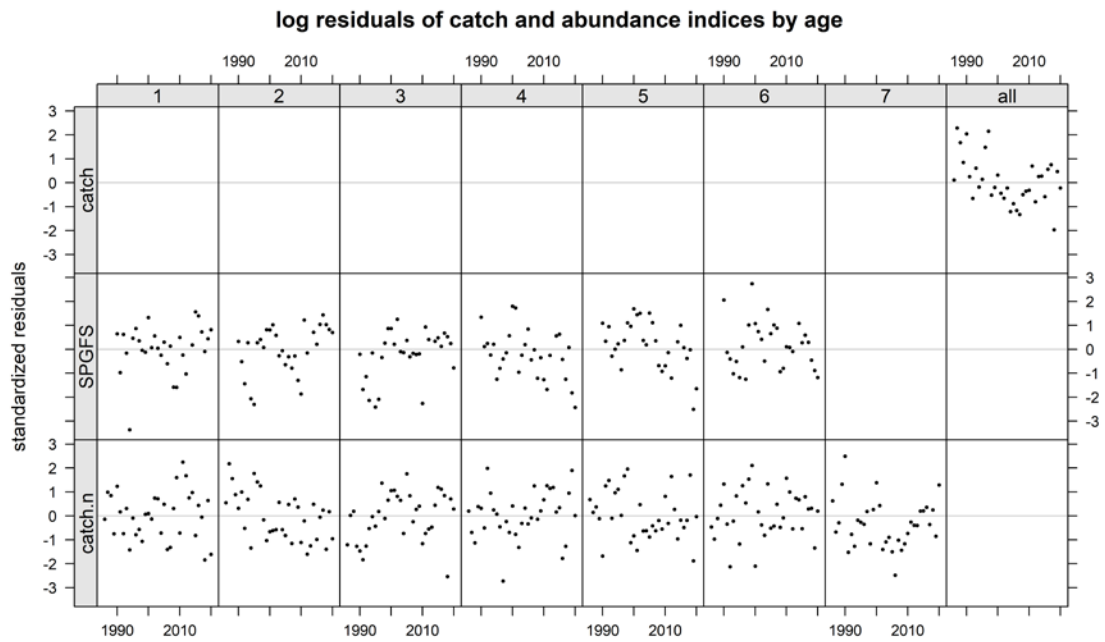


Figure 21. Log residuals of catch and abundance indices by age

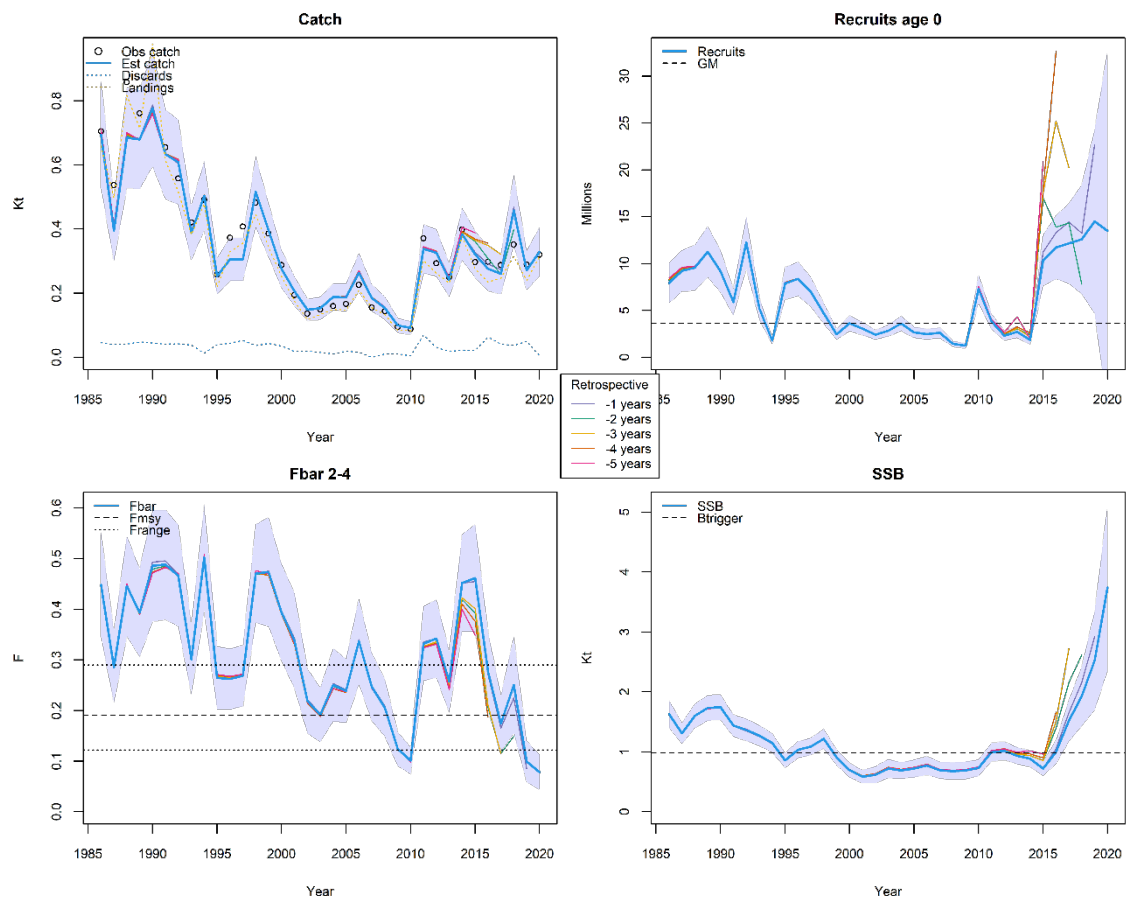


Figure 22. Summary of assessment outputs and retrospective pattern plots over the last 6 years

Fit 5

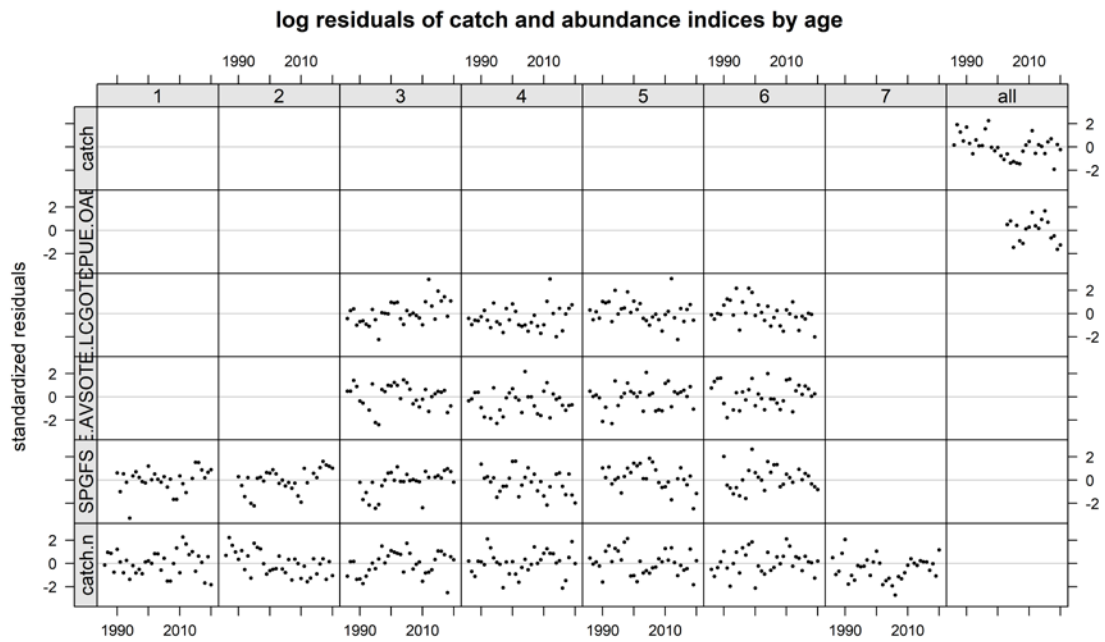


Figure 23. Log residuals of catch and abundance indices by age

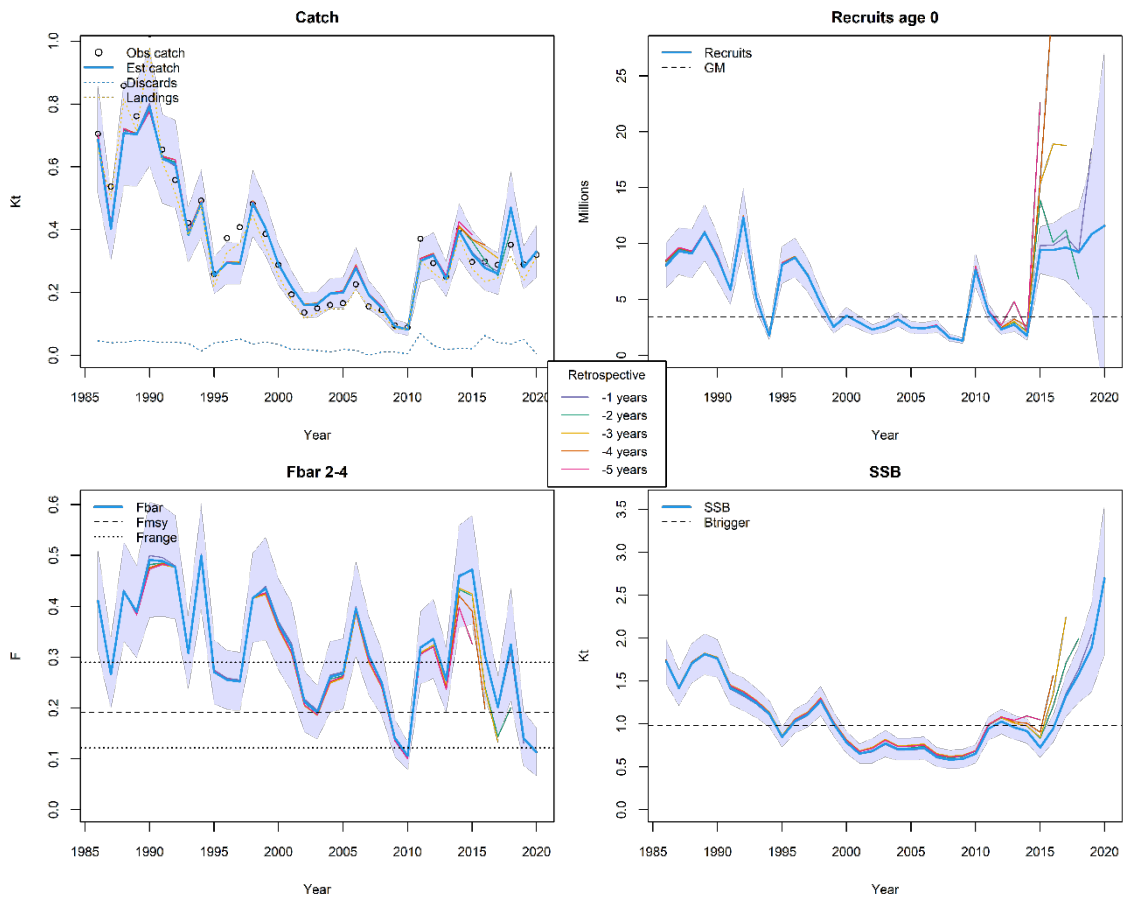


Figure 24. Summary of assessment outputs and retrospective pattern plots over the last 6 years

Fit 6

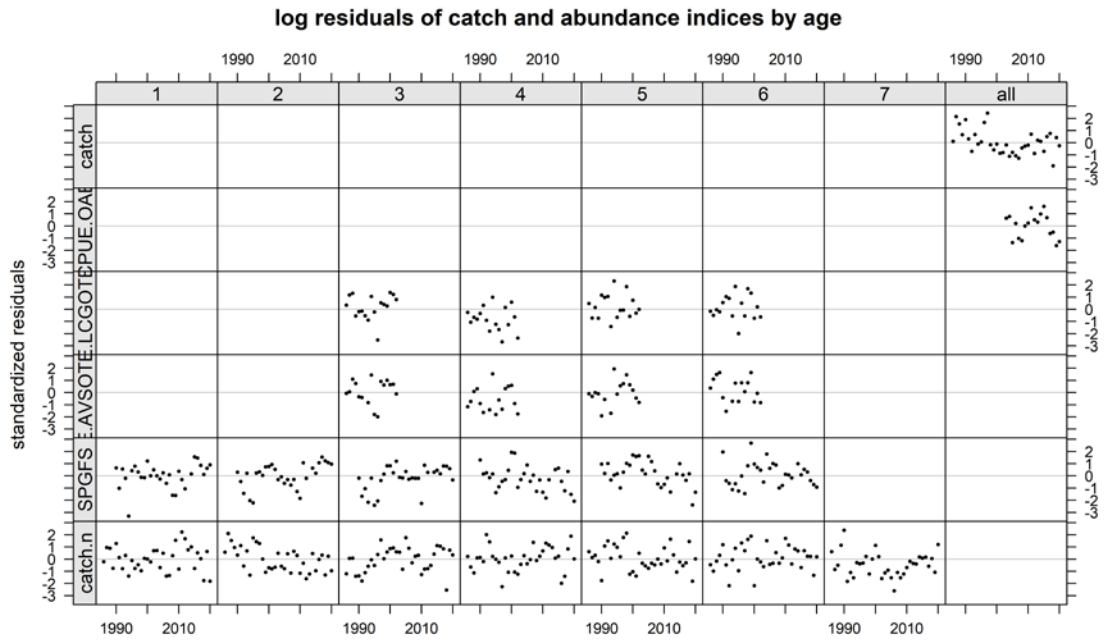


Figure 25. Log residuals of catch and abundance indices by age

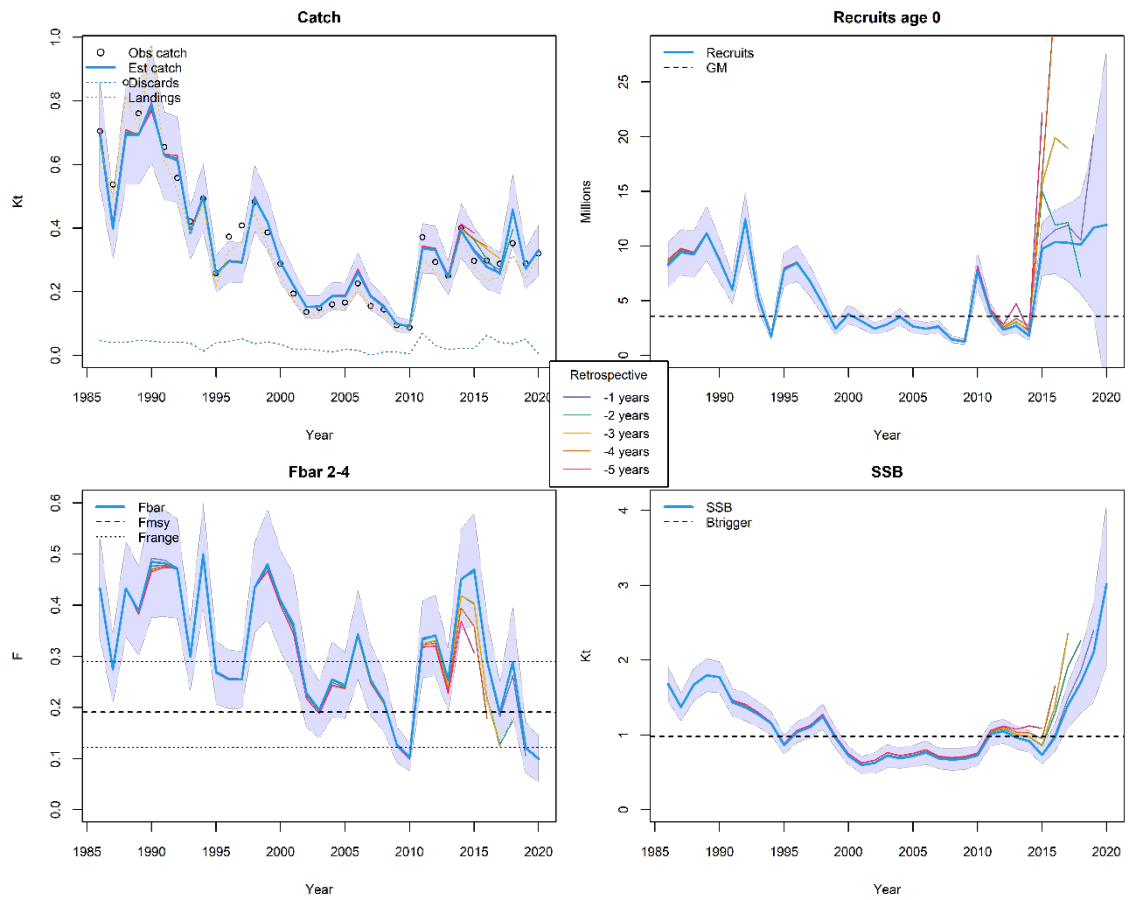


Figure 26. Summary of assessment outputs and retrospective pattern plots over the last 6 years

Comments about the exploratory scenarios in a4a for southern megrims using available abundance indices:

Figure 1 and 14 show all a4a fits have similar results and all of them do not much differ from XSA results. All a4a fits have been done with the new maturity ogive except fi1 and also the XSA model was run with the old one.

In *Lepidorhombus boscii*, all the fits continue presenting improvable residuals for age 0 in catch. In *L. whiffiagonis* this issue is not observed.

Commercial LPUEs from Spanish fishing ports have been calculated with the effort in fishing days, to avoid the possible inexact HP data. They cover all the time series, give information for the whole year and have been used in the XSA model.

The scientific surveys indices are good. The Spanish survey covers all the time series, is a good index for the recruitment and has been used in the XSA model. The Portuguese survey for *L. boscii* (this survey is not useful for *L. whiffiagonis* due to its distribution) is shorter and its continuity is being considered. They are giving information of only a part of the year.

The on-board observer biomass standardized index is based on scientific data from fishing trips in the metier where these species are caught. The time series is shorter. The information is for the whole year. This index is new for this benchmark.

To select the appropriate indices, we must take into account what information we can lose by choosing one or the other. It is also necessary to consider if the possible information also has associated errors or if it is redundant. On the other hand, choosing only one can be risky, if a year fails the model would be without a tuning index.

In any case, the configuration of the model has to be refined and reviewed by an expert to solve the minor problems that the different scenarios have presented, regardless of which ones are selected for the assessment of these stocks.

Benchmark Selected tuning indices and alternative runs

Studied configurations for the selected option of using only the survey abundance index are presented.

Lepidorhombus whiffiagonis

	AIC	BIC	Mohn's Rho (Retro_F)	Mohn's Rho (Retro_SSB)	Mohn's Rho (Retro_R)
Only Survey	705.3	1053.7	-0.234	0.357	0.522
Only Survey without smoother at age 1	703.7	1044.1	-0.223	0.328	0.531

Only surveys

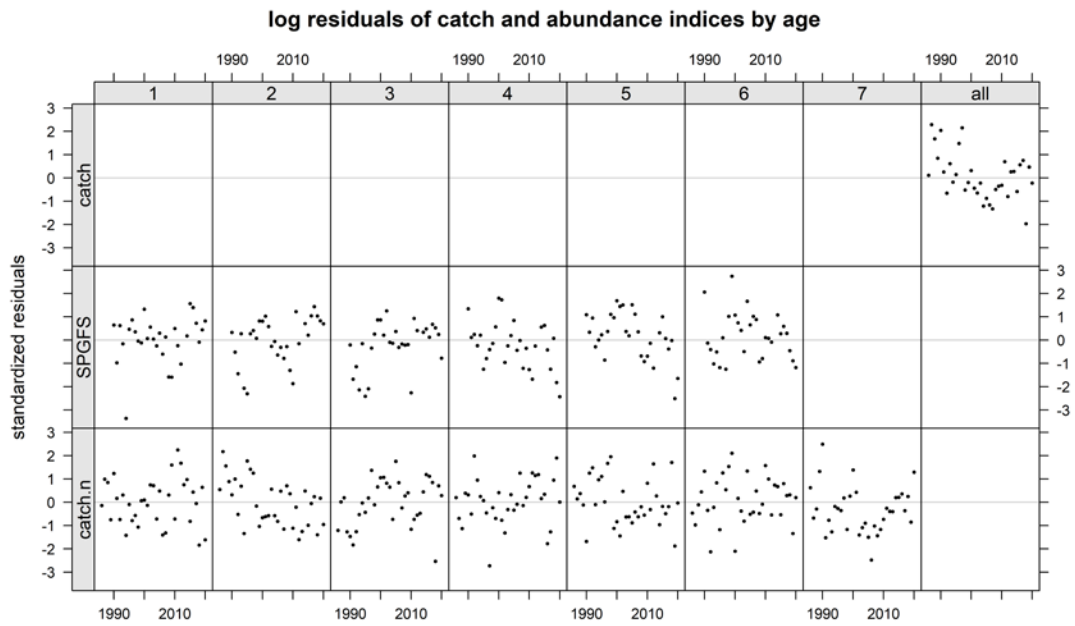


Figure 27. Log residuals of catch and abundance indices by age

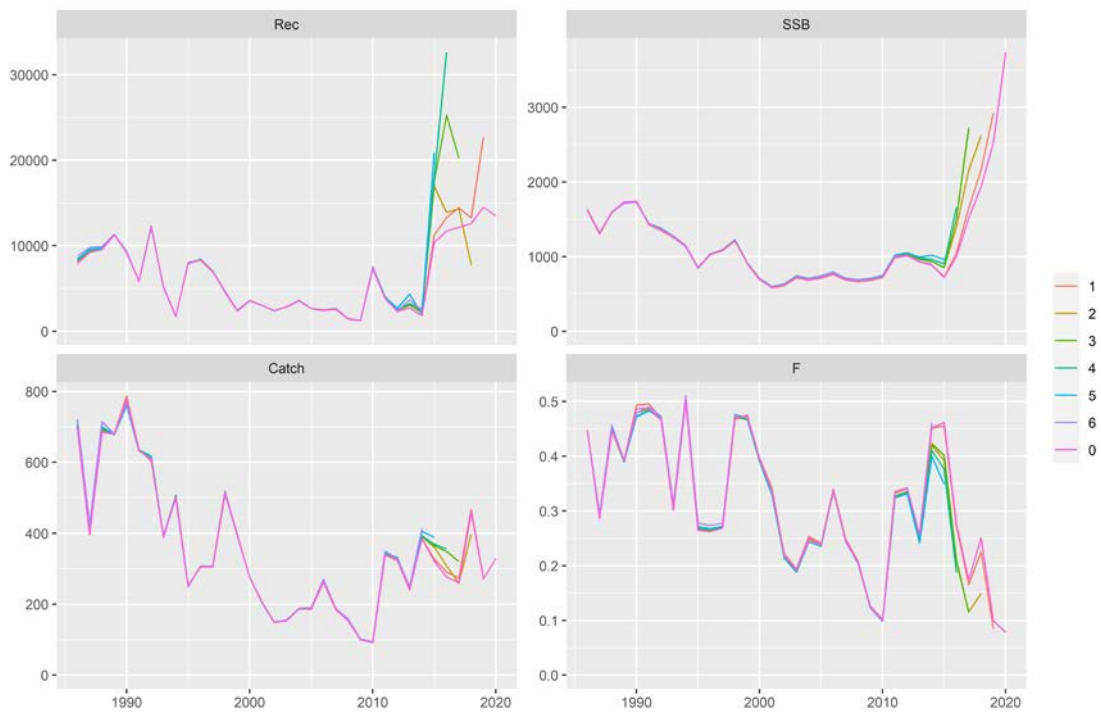


Figure 28. Retrospective pattern plots over the last 6 years

Only surveys without smoother at age 1 (selected one)

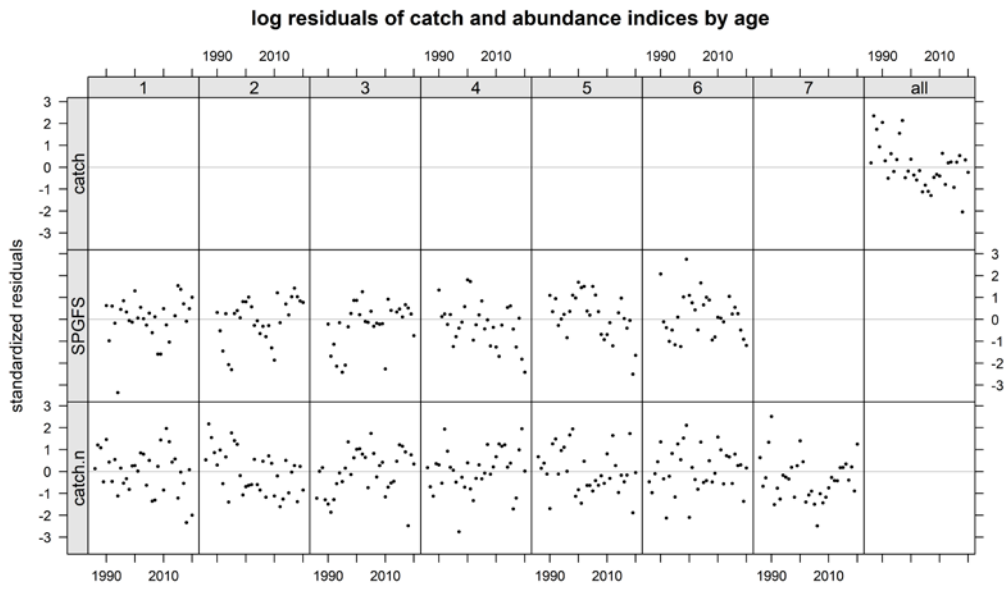


Figure 29. Log residuals of catch and abundance indices by age

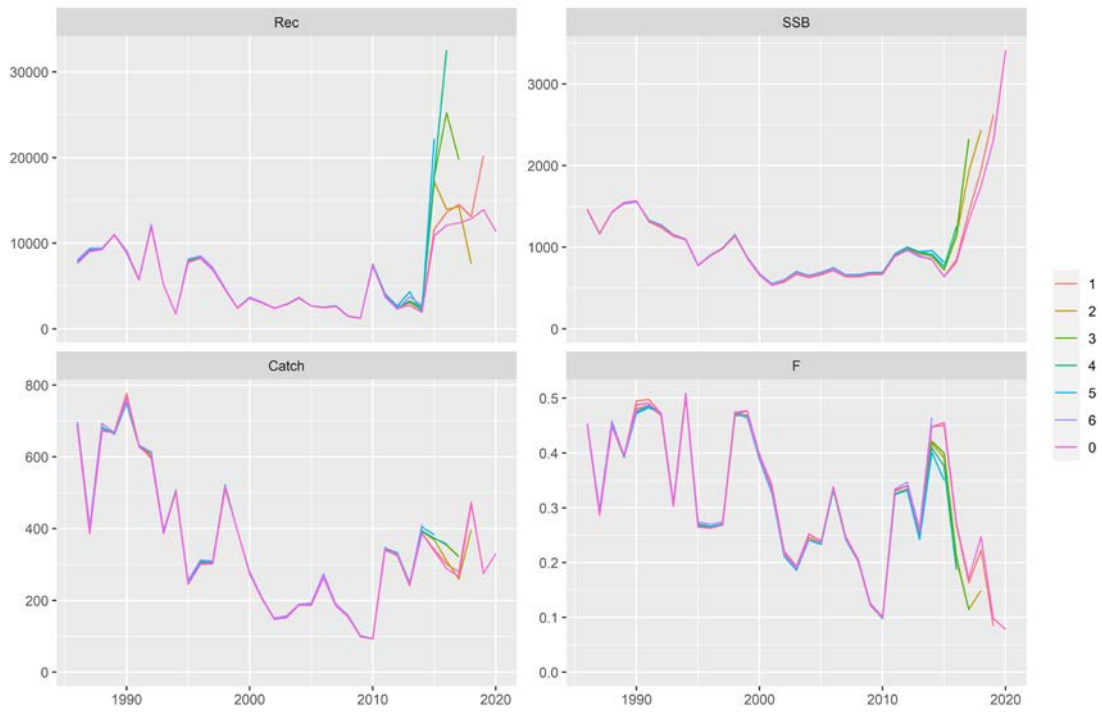


Figure 30. Retrospective pattern plots over the last 6 years

Lepidorhombus boscii

	AIC	BIC	Mohn's Rho	Mohn's Rho	Mohn's Rho
			(Retro_F)	(Retro_SSB)	(Retro_R)
Only Surveys	1122.9	1530.0	-0.07	0.05	-0.24
Only Surveys increasing knots	1065.7	1596.7	-0.06	0.02	-0.08
Only Surveys without smoother in age 0	1127.4	1552.1	-0.04	0.01	-0.25
Only Surveys without smoother in age 0 and NA in a period in age 0	1038.1	1443.2	-0.07	0.05	-0.21

Only Surveys

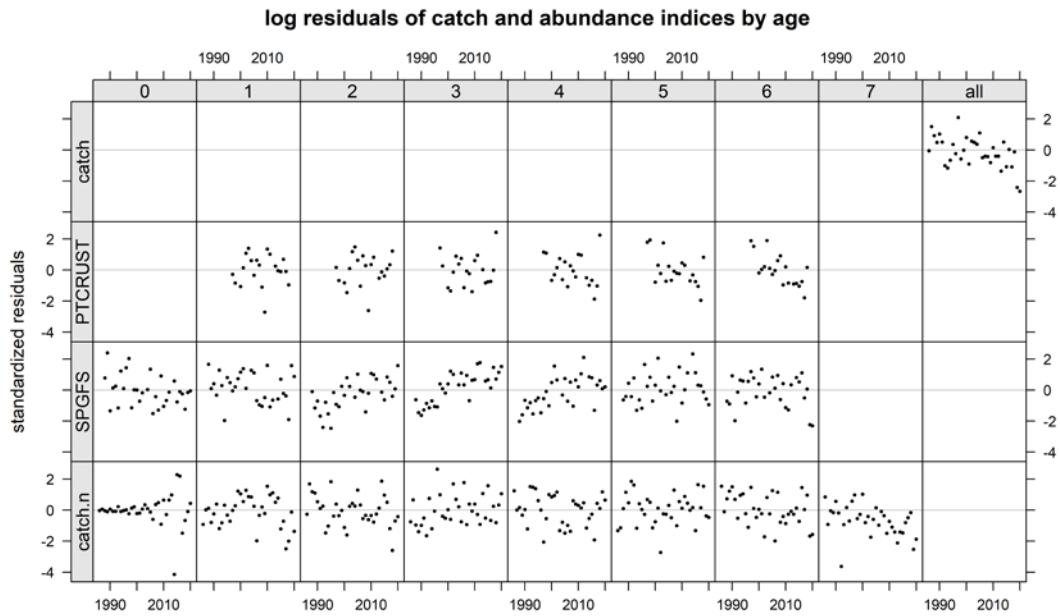


Figure 31. Log residuals of catch and abundance indices by age

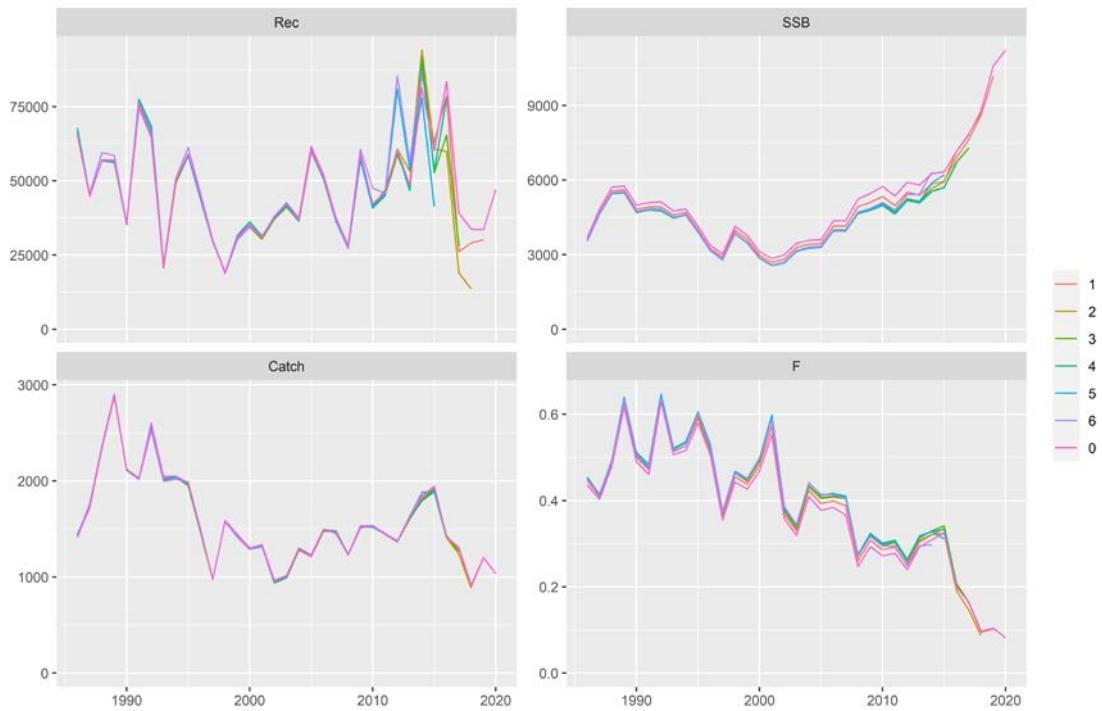


Figure 32. Retrospective pattern plots over the last 6 years

Only Surveys increasing knots

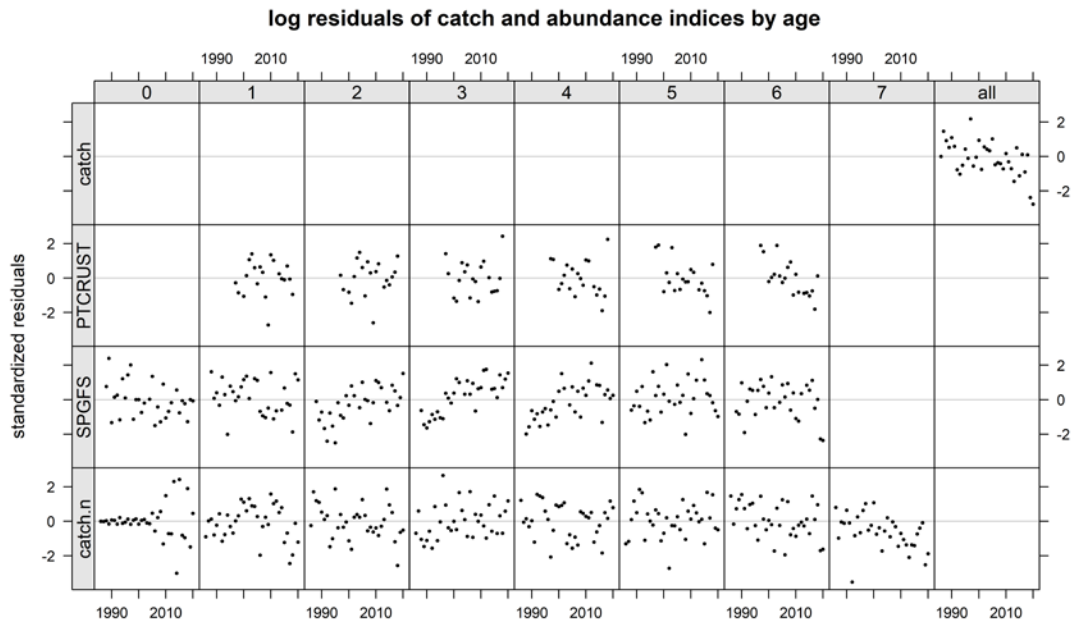


Figure 33. Log residuals of catch and abundance indices by age

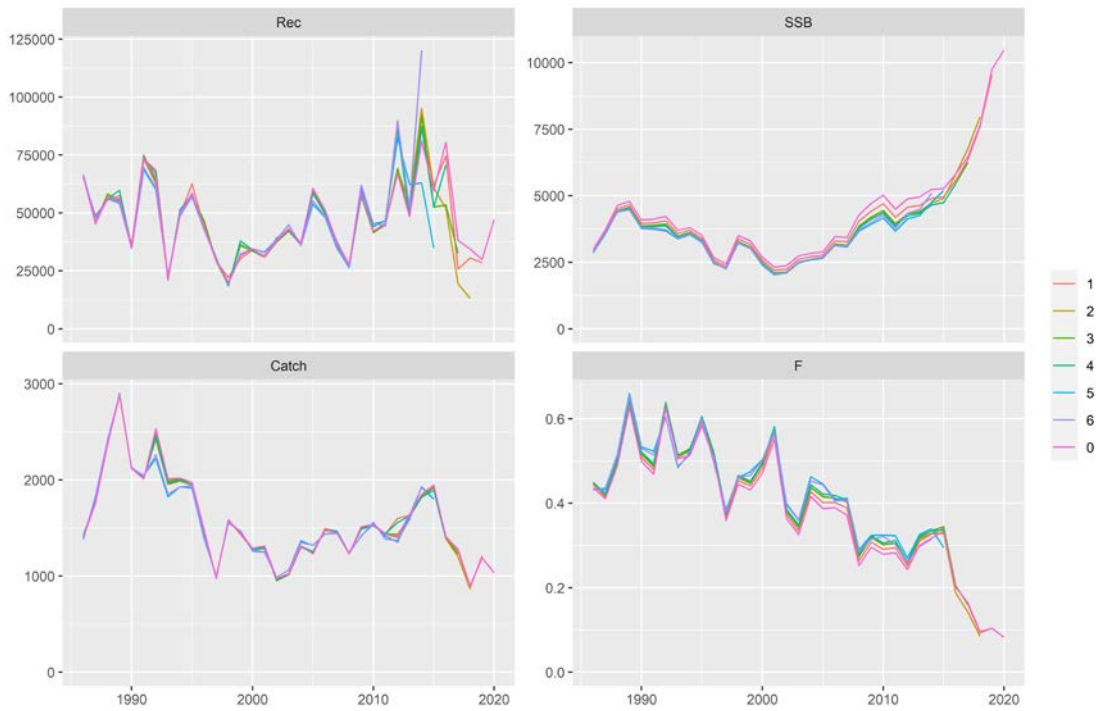


Figure 34. Retrospective pattern plots over the last 6 years

Only Surveys without smoother in age 0

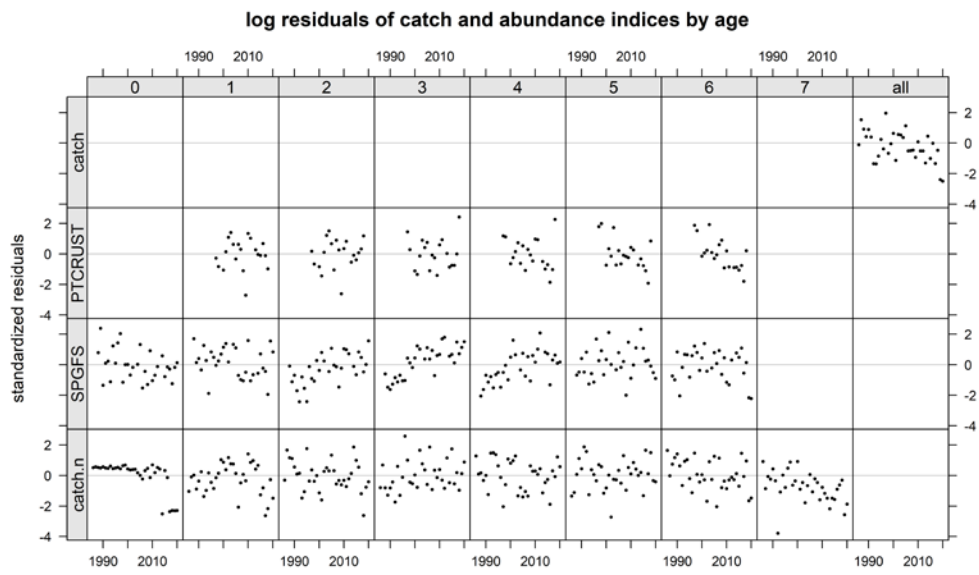


Figure 35. Log residuals of catch and abundance indices by age

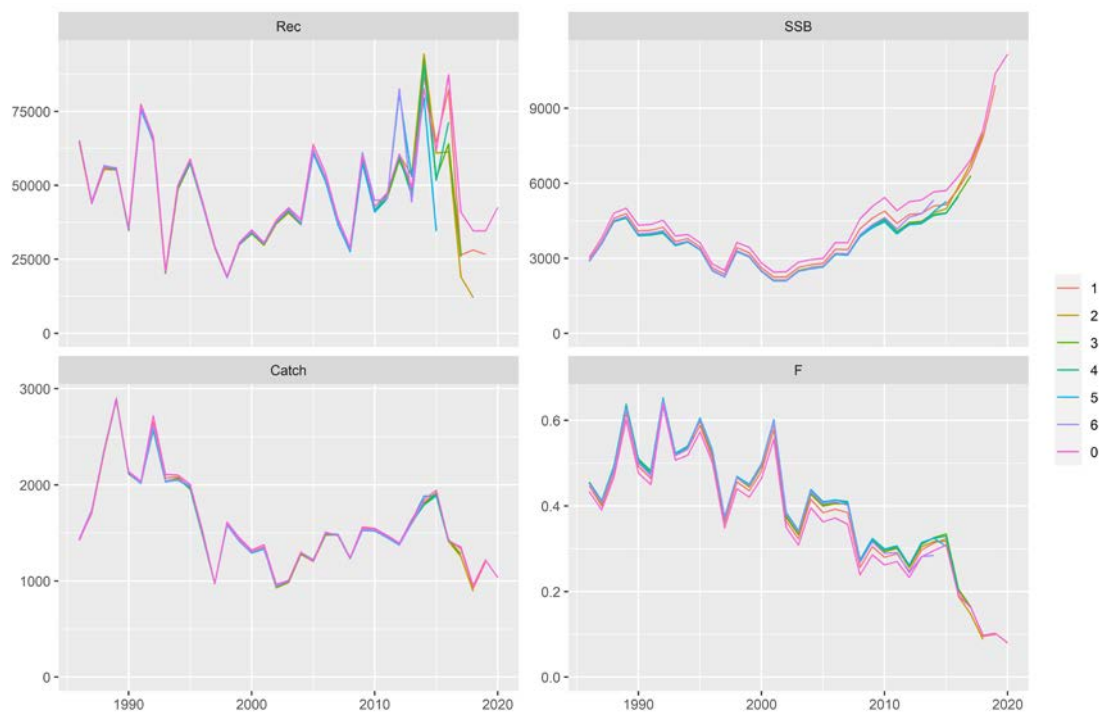


Figure 36. Retrospective pattern plots over the last 6 years

Only Surveys without smoother in age 0 and NA in a period in age 0 (selected one)

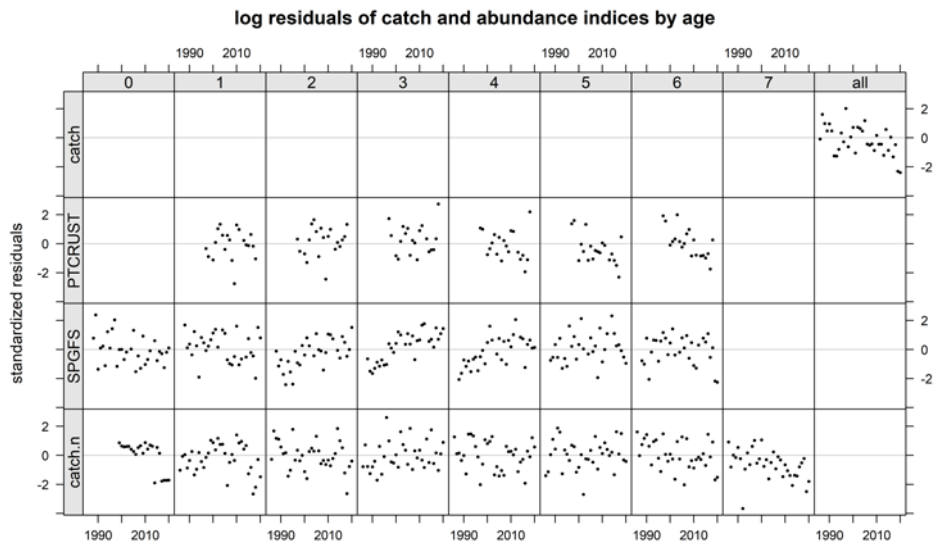


Figure 37. Log residuals of catch and abundance indices by age

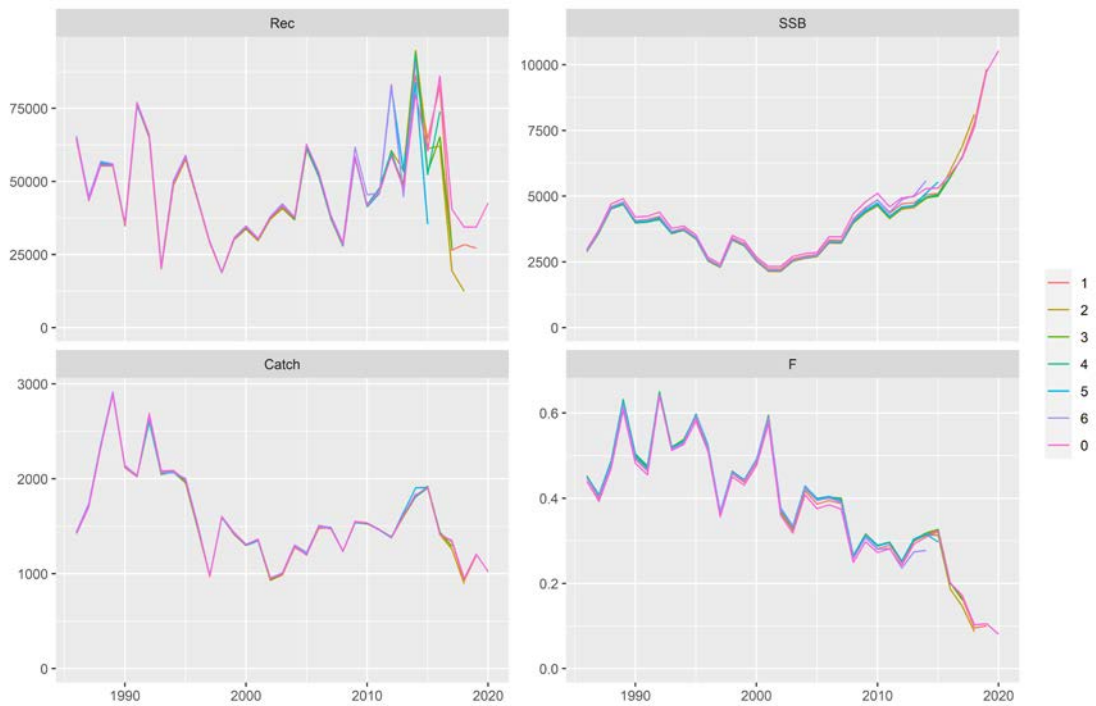


Figure 38. Retrospective pattern plots over the last 6 years