INTER-AMERICAN TROPICAL TUNA COMMISSION

2nd REVIEW OF THE STOCK ASSESSMENT OF BIGEYE TUNA IN THE EASTERN PACIFIC OCEAN

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CONVERSION OF BET 2017 BASE CASE ASSESSMENT FROM STOCK SYNTHESIS VERSION 3.23B TO VERSION 3.3

Juan L. Valero

1. BACKGROUND

Stock Synthesis (SS) version v.3.30 constitutes the most substantial change in SS during the last decade of development. SS v.3.30 was designed specifically to provide more precise temporal control of growth, expected values for data, and recruitment. These changes resulted in a large number of new features that necessitated substantial changes to the input formats. Two versions of SS have been developed to assist with converting older SS versions to v.3.30. Older versions have to be at least in the v.3.24 family. A transition executable, ss_trans.exe, reads SS v.3.24 input files and produces SS v.3.30 formatted versions of those input files. Although this program can convert nearly every feature in v.3.24, some features need to be converted by hand line by line.

2. APPROACH

The EPO Bigeye Tuna 2017 Base Case Assessment was conducted using SS v.3.23b (November, 2011). The model was re-run using SS v.3.24 to attempt using the transition executable. The conversion to v.3.30 (v3.30.08.04, December 2017) was not completed successfully by the transition executable, so the conversion to v.3.30 was checked and converted by hand line by line. There were a number of issues that were corrected, including a reformatting of the conditional age-at-length data input format. No changes in assumptions or model configurations from the base case were made during the conversion.

3. MODEL COMPARISON

Comparisons of results from previous SS versions with results from the newest version of SS (v.3.24) were performed to evaluate model changes. The difference in the total negative log-likelihood and the ratio relative to the 3.23b quantities were compared between the versions of SS (Table 1 and Table 2). Additionally, the estimated spawning biomass (or output) trajectories were plotted for comparison (Figs. 1, 2, 3, 4, 5). Estimated trajectories, negative log-likelihoods along with management-related quantities are very similar between SS versions.

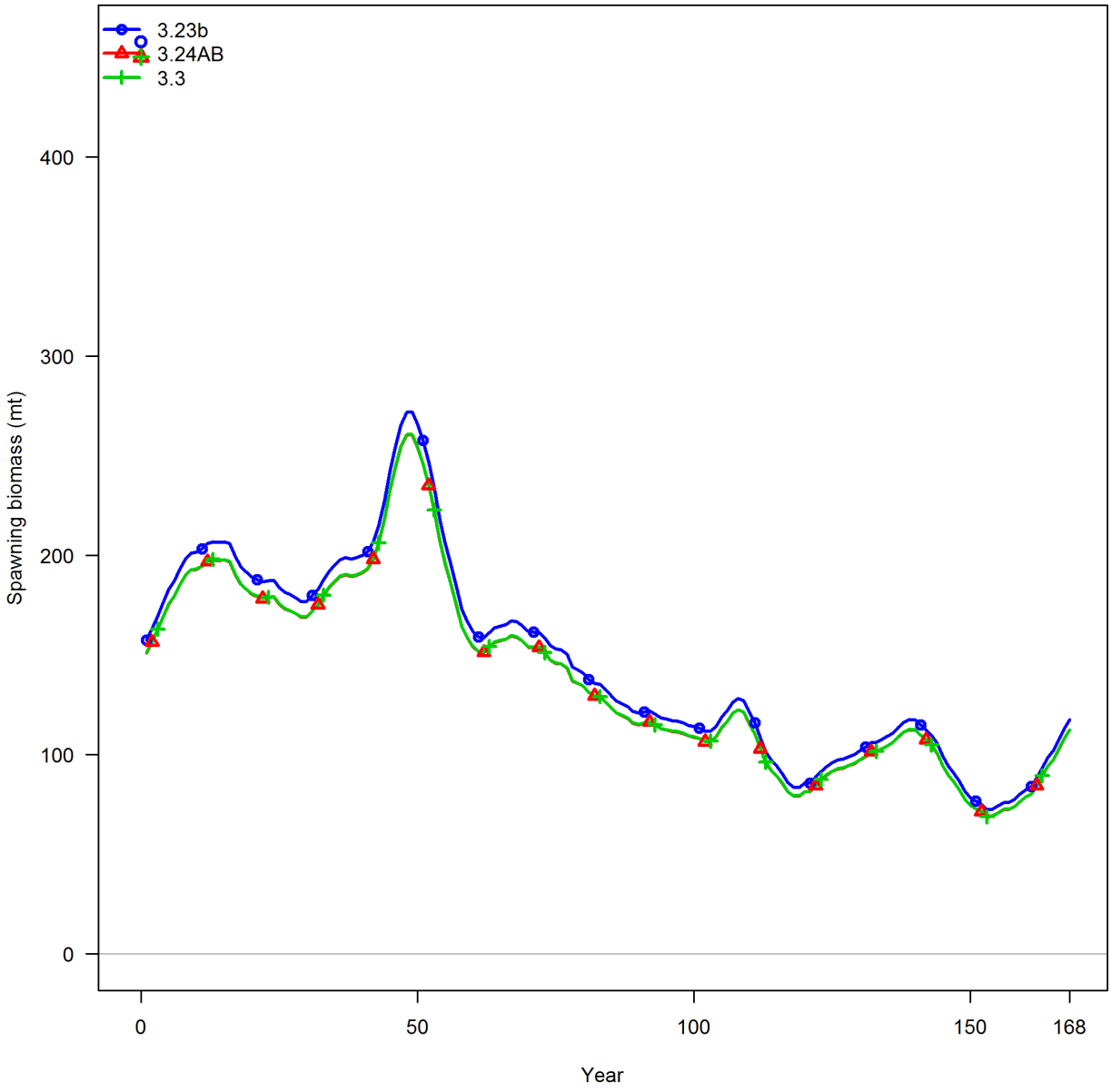

Figure 1. Spawning biomass time-series estimated by different SS versions.

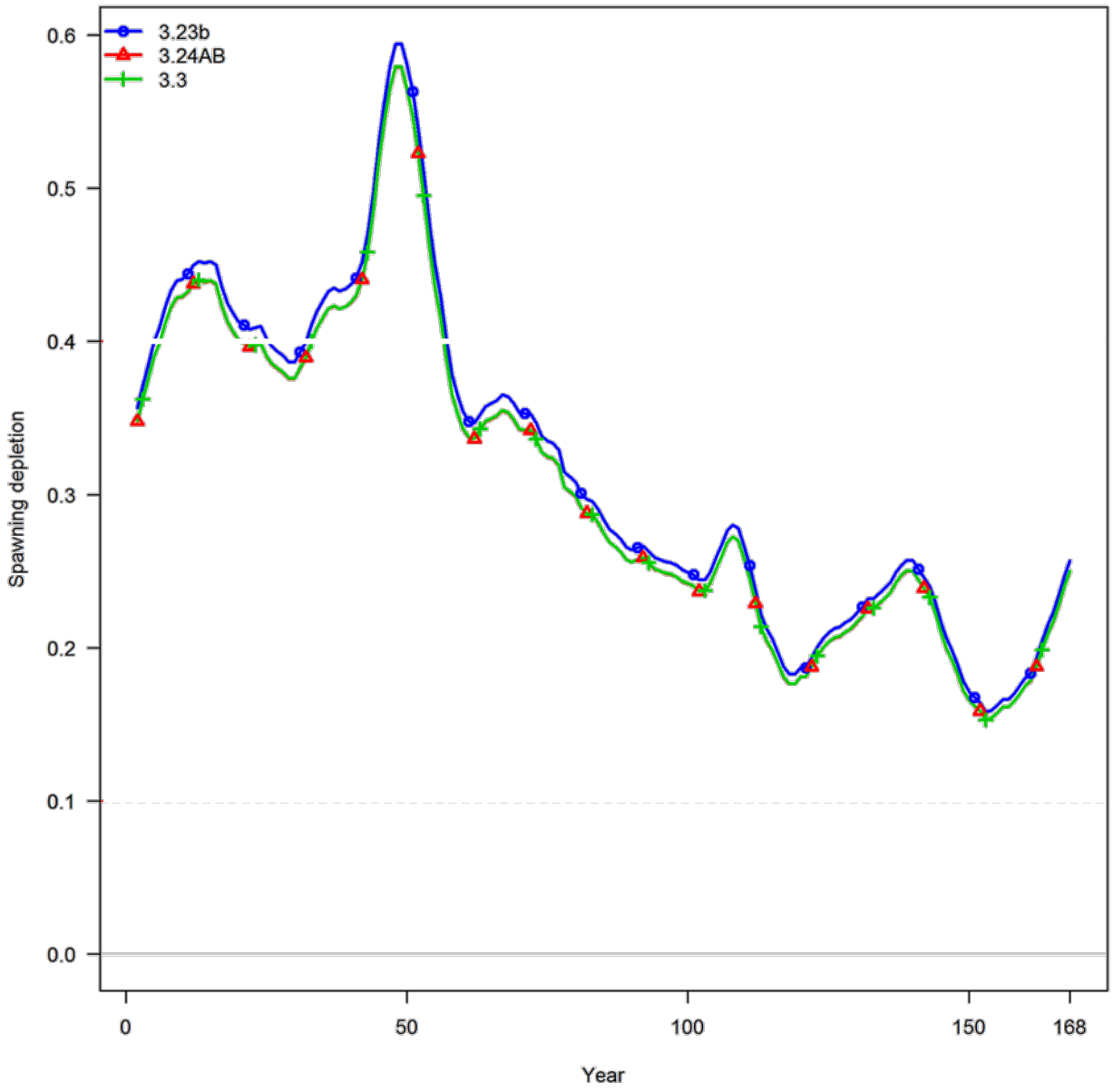

Figure 2. Spawning depletion time-series estimated by different SS versions.

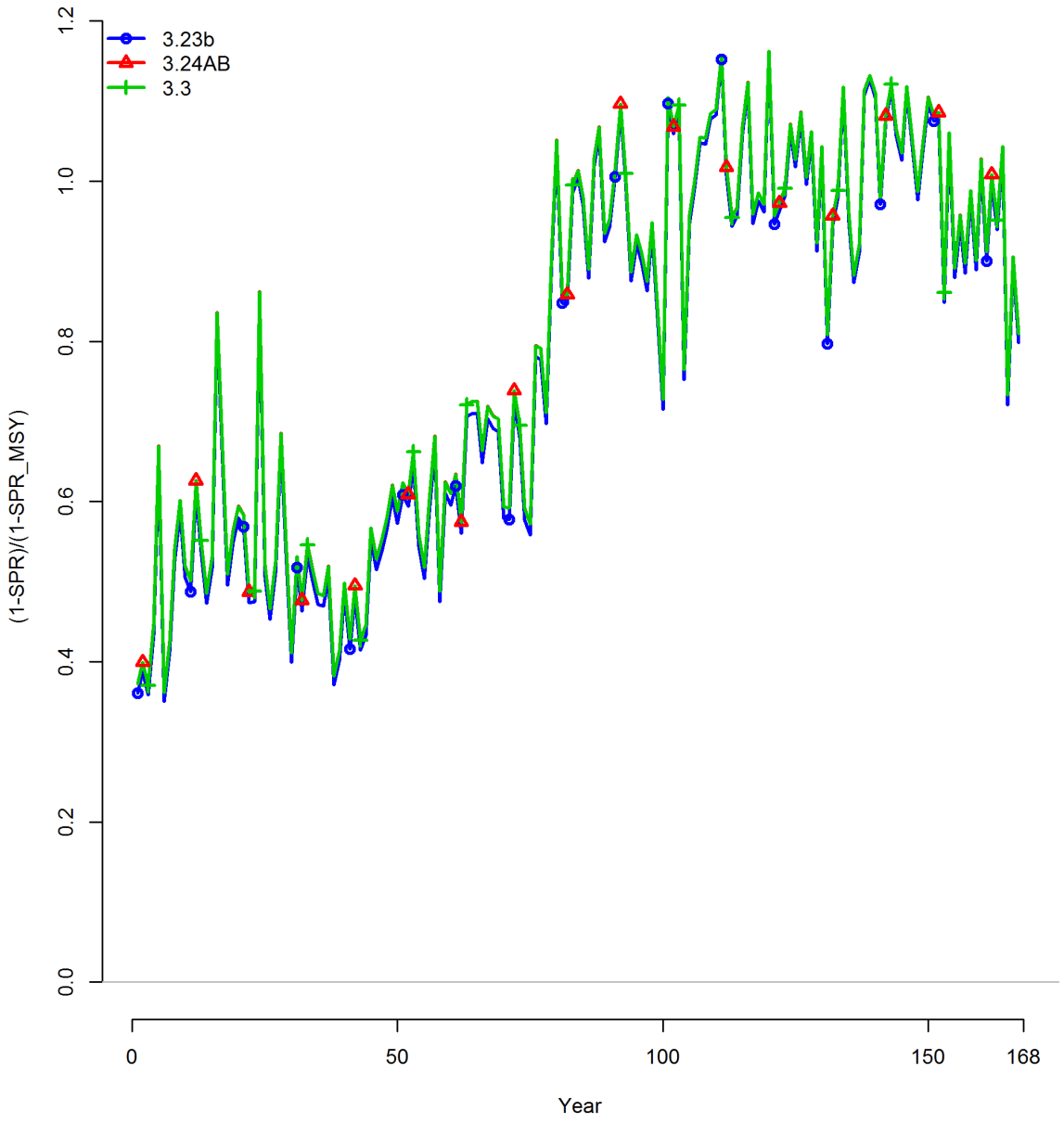

Figure 3. Relative SPR time-series estimated by different SS versions.

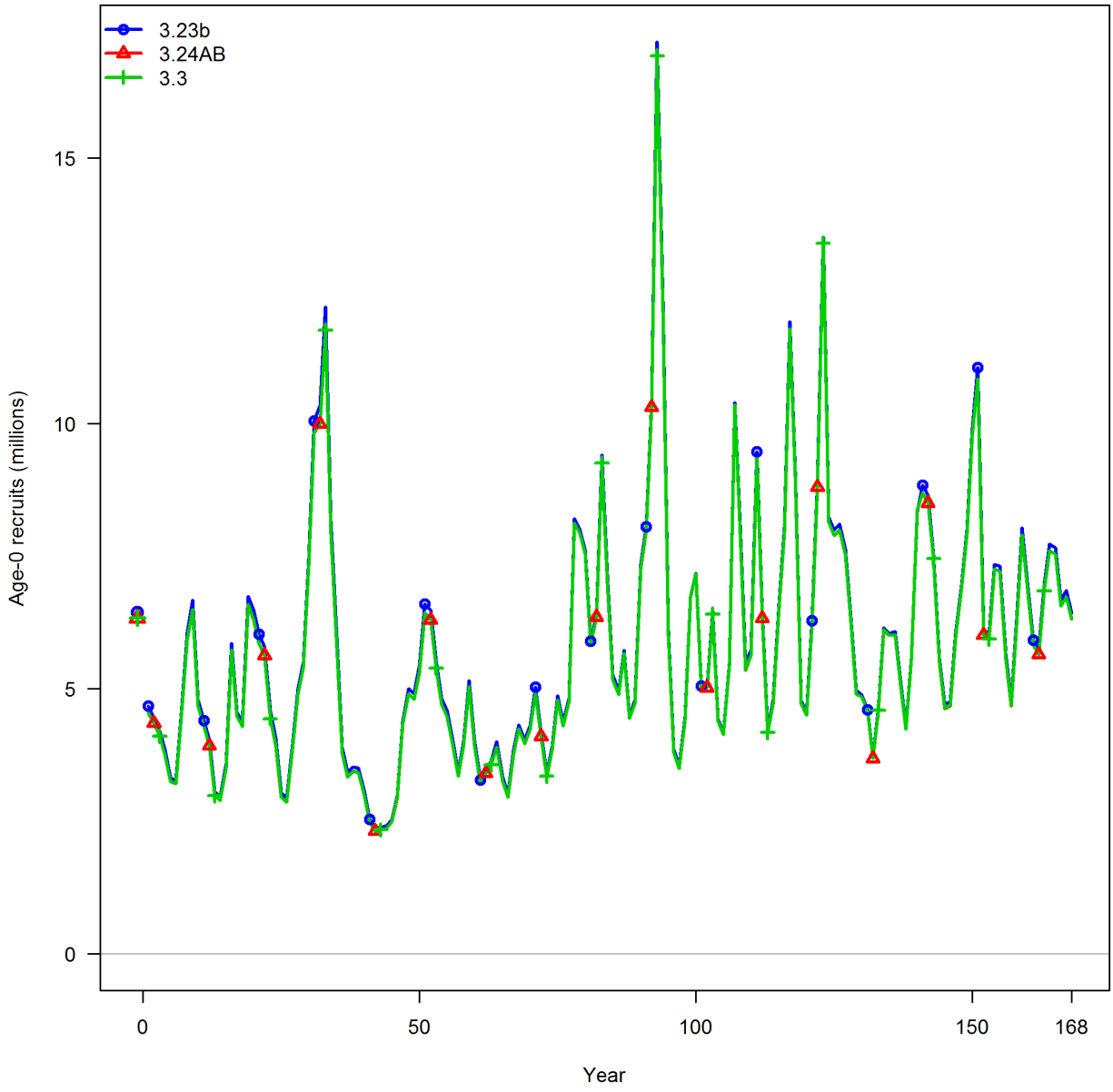

Figure 4. Age-0 recruitment estimated by different SS versions.

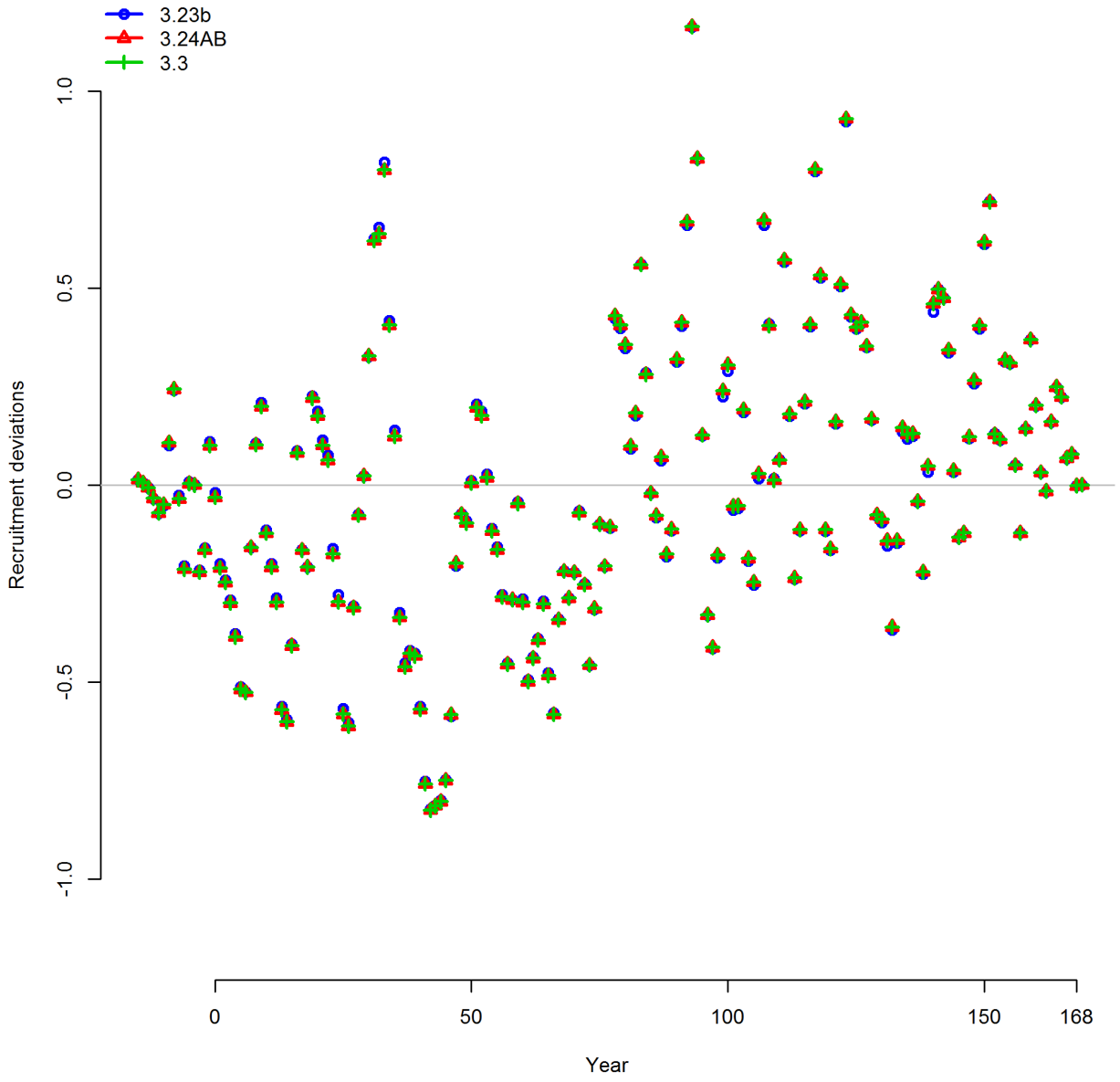

Figure 5. Recruitment deviation time-series estimated by different SS versions.

Table 1. Estimates of management-related quantities for the 2017 BET base Case Stock Assessment from different Stock Synthesis versions

	Absolute values			Relative to 3.23b		
	3.23b	**3.24AB**	**3.3**	**3.23b**	**3.24AB**	**3.3**
$FmultScale	0.16371	0.16676	0.166695	1	1.018629	1.018229
msy	106201	105590	105599	1	0.994	0.994
Bmsy	391298	386183	386253	1	0.987	0.987
Smsy	96360	94808	94829	1	0.984	0.984
Bmsy/Bzero	0.26	0.26	0.26	1	1.000	1.000
Smsy/Szero	0.21	0.21	0.21	1	1.000	1.000
Crecent/msy	0.89	0.9	0.9	1	1.011	1.011
Brecent/Bmsy	1.18	1.15	1.15	1	0.975	0.975
Srecent/Smsy	1.23	1.2	1.2	1	0.976	0.976
Fmultiplier	1.15	1.12	1.12	1	0.974	0.974

Table 2. Comparison of the difference in the total negative log-likelihood and the ratio relative to 3.23b model estimates for the 2017 BET base Case Stock Assessment from different Stock Synthesis versions

	Absolute values			Relative to 3.23b		
	3.23b	**3.24AB**	**3.3**	**3.23b**	**3.24AB**	**3.3**
TOTAL_like	108.6	108.724	108.697	0	0.124	0.097
Catch_like	2.11E-05	1.47E-09	1.47E-09	0	-2.1E-05	-2.1E-05
Equil_catch_like	0	0	0	0	0	0
Survey_like	-397.996	-398.29	-398.285	0	-0.294	-0.289
Length_comp_like	559.288	559.206	559.182	0	-0.082	-0.106
Age_comp_like	0	0	0	0	0	0
Parm_priors_like	0	0	0	0	0	0
SPB_Virgin_thousand_mt	457.599	449.829	449.992	1	0.98302	0.983376
Bratio_168	0.25688	0.24999	0.25013	1	0.973178	0.973723
F_168	1.29411	1.32499	1.32424	1	1.023862	1.023282
SPRratio_168	1.0769	1.08546	1.08525	1	1.007949	1.007754
Recr_168_millions	6.42684	6.31627	6.31849	1	0.982796	0.983141
Recr_Virgin_millions	6.43746	6.32815	6.33034	1	0.98302	0.98336