Summary of results for LLSIm BUM by trip, with 5% observer coverage including observed catch in totals April 17 2022 for Blue marlin (Makaira nigricans),

2022-09-28

Table 1. Input data summary for each year. Columns are the observed bycatch, observed effort, observed sample units (trips), observed mean CPUE and standard error of CPUE, count of outliers defined as data points more than 8 SD from the mean, observed positive sample units, fraction positive, total trips from the logbooks, total effort, fraction of effort observed, fraction of sample units observed, and estimates of total bycatch and its standard error from a simple ratio estimator stratified only by year

Year	Eff	Units	OCat	OEff	OUnit	CPUE	CPse	Out	Pos	OCatS	OEffS	Cov	PFrac	EFrac	UFrac	Cat
2011	54272	1096	191	2996	53	0.08	0.01	0	37	5	54	168	0.70	0.06	0.05	3459
2012	55771	1079	127	2857	55	0.05	0.01	0	40	2	40	13	0.73	0.05	0.05	2479
2013	47228	920	95	1877	44	0.04	0.01	0	20	6	31	136	0.45	0.04	0.05	2390
2014	45602	867	73	2238	45	0.02	0.01	0	18	3	36	60	0.40	0.05	0.05	1487
2015	40476	836	52	1761	37	0.02	0.01	0	15	3	28	40	0.41	0.04	0.04	1195
2016	38227	783	79	1871	39	0.05	0.02	0	24	3	28	15	0.62	0.05	0.05	1614
2017	42997	850	90	2007	43	0.04	0.01	0	20	5	23	43	0.47	0.05	0.05	1928
2018	44844	929	89	1991	46	0.04	0.01	0	31	3	34	103	0.67	0.04	0.05	2004

Table 2. Formula of BIC best model, along whether models were fit successfully. A dash (-) means the model converged. Failure to converge may be from data (not all years had a positive observation for delta models), fit (models did not converge) or CV (bycatch estimates had very large CVs). If cross-validation was done, mean RMSE and mean ME across folds is shown (near zero is better).

model	formula	RMSE	ME	Failure
TMBnormal	area + 1 + Year	NA	NA	-

Table 3. DHARMa residual tests, where significant P values may indicate poor model specification. Tests are a Kolmogorov-Smirnov(KS) test on whether the scaled residuals are uniform, a dispersion test based on comparing the ratio of the observed and simulated residuals (>1 is overdispersed), a zero inflation test based on the ratio of observed to expected zeros, and the number of outliers, defined as data points outside the range of the simulations

	TMBnormal
KS.D	0.21
KS.p	0.00
Dispersion.ratio	1.00
Dispersion.p	1.00
ZeroInf.ratio	Inf
ZeroInf.p	0.00
Outlier	9.00
Outlier.p	0.00

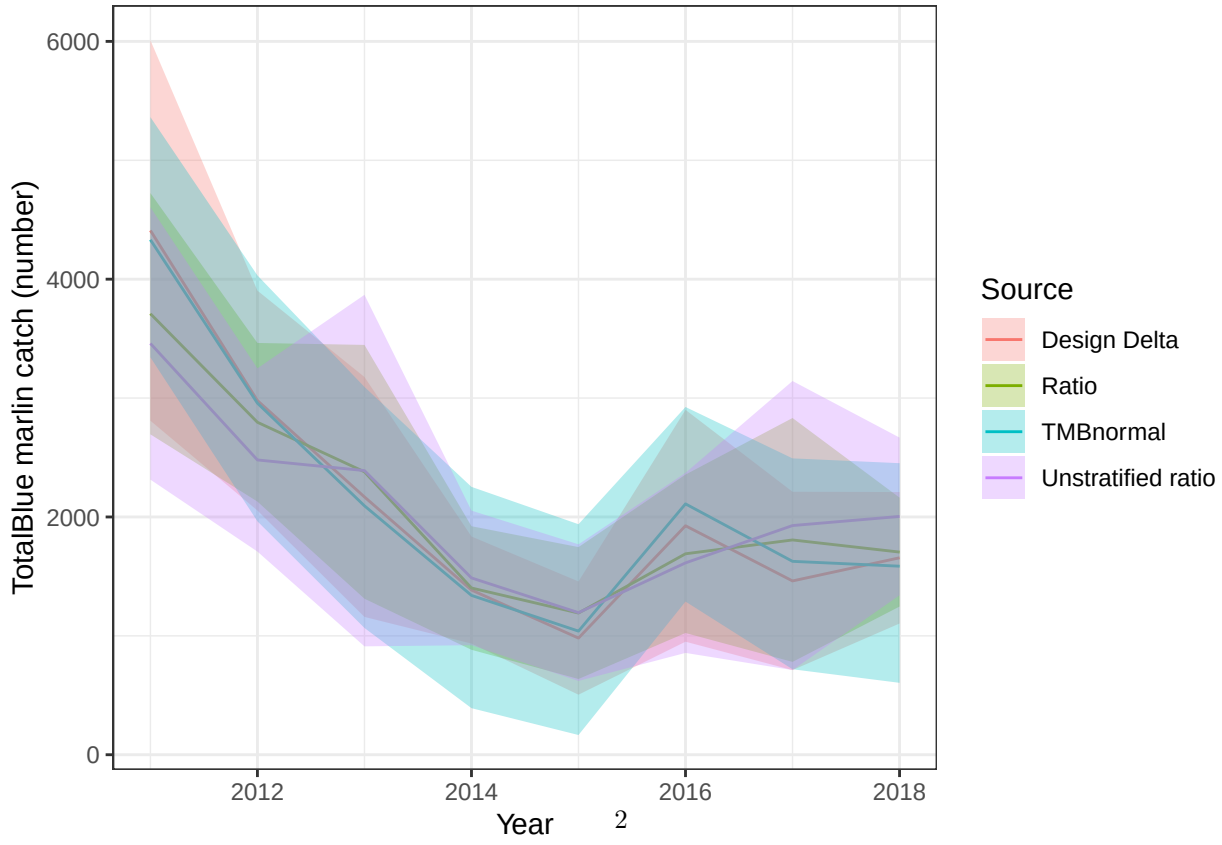

Figure 1. Total bycatch estimates for all valid models and desgin-based methods, for Blue marlin, with 95% confidence interval calculated by Monte Carlo simulation. Catches are predicted for unobserved effort and added to the observed catches.

Figure 2. Abundance indices from all valid models for Blue marlin, plus and minus one standard error.

Table 4. Model selection table for TMBnormal. Weights are calculated based on BIC.

	cond..Int..	disp..Int..	cond.area.	cond.Year.	AICc	AIC	BIC	df	logLik	selectCriteria	delta	weight
1	0.10	+	+	+	-872.1	-872.7	-833.8	10	446.4	-833.8	0.0	1
0	0.08	+	NA	+	-844.5	-845.0	-810.0	9	431.5	-810.0	23.8	0

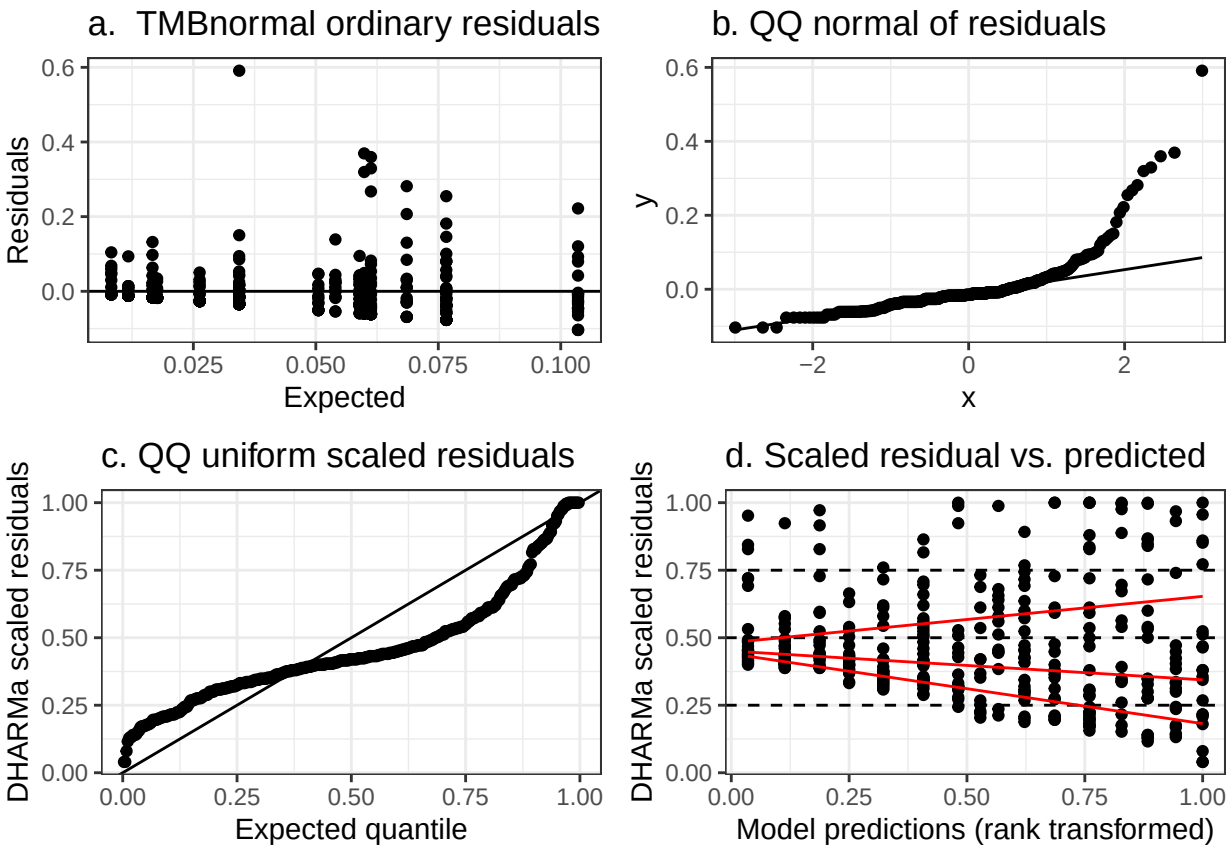

Figure 3. Residuals for the BIC best model for TMBnormal, showing the ordinary residuals (a,b) and DHARMa scaled residuals (c,d).

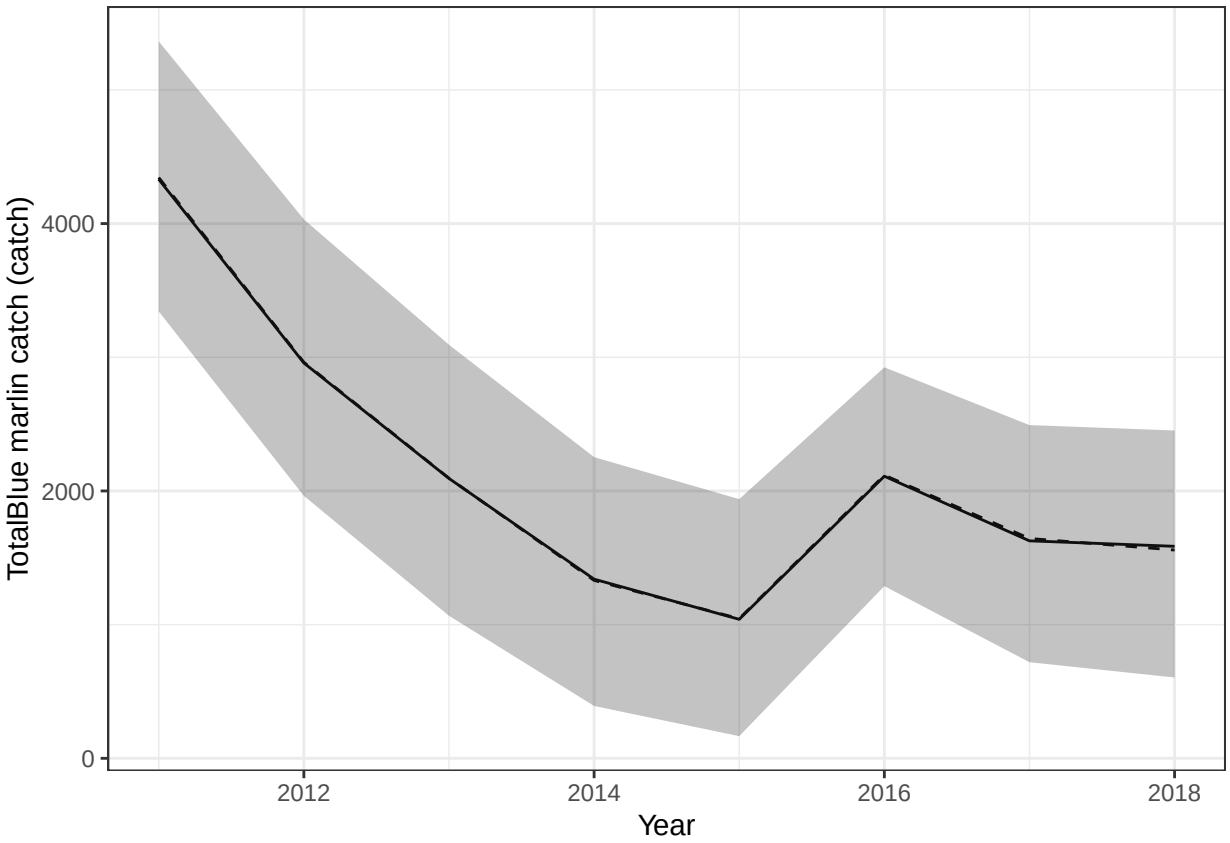

Figure 4. Estimated total bycatch from TMBnormal, with 95% confidence interval calculated by Monte Carlo simulation. Catches are predicted for unobserved effort and added to the observed catches. Solid line is the best estimate and dashed line is the mean across simulations.

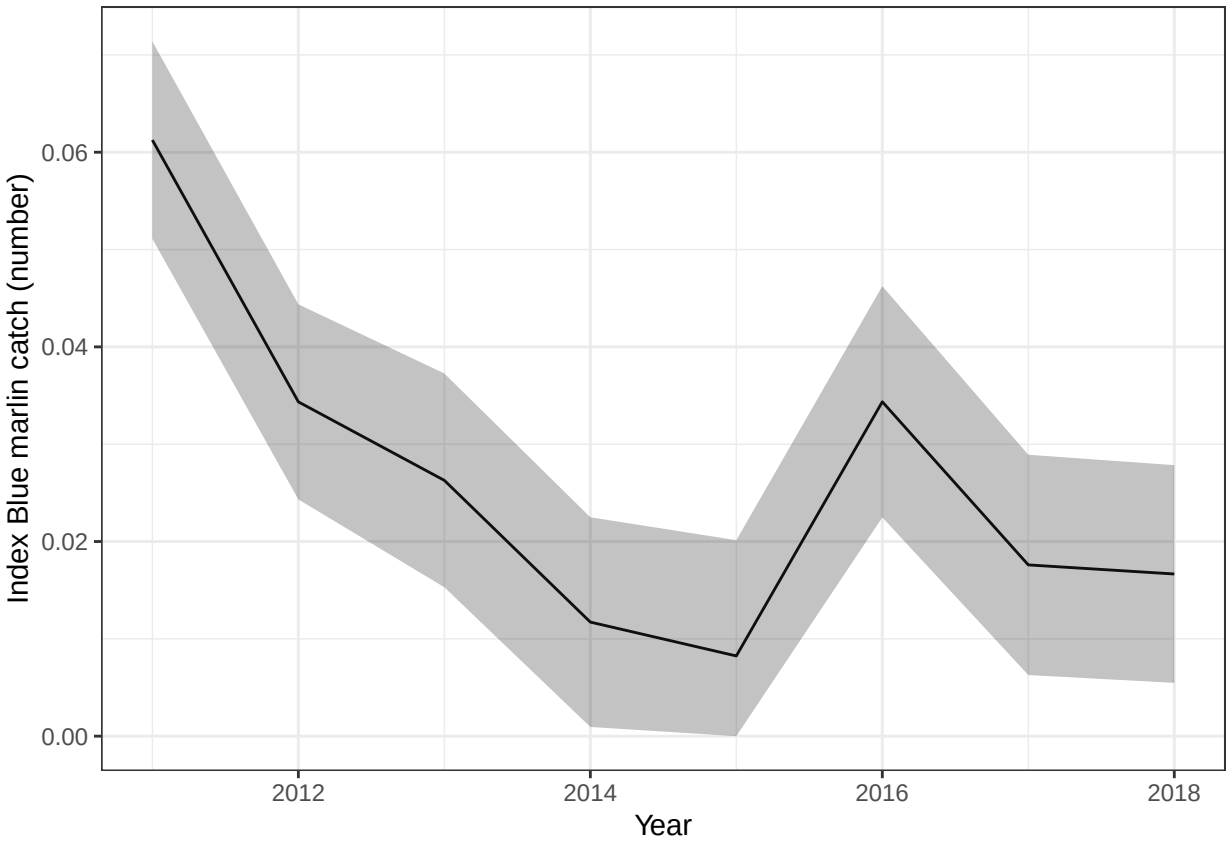

Figure 5. Estimated relative index from TMBnormal plus and minus one standard error.