Table S1: Time series used to fit the model, their sources of information and environmental drivers. For biomass from CMEMS: Copernicus Marine Environmental Service (2006-2021), MEDITS: bottom trawl surveys (2006-2021 with gaps in 2007, 2009-2012, 2015, 2017) and literature. For catch from ELSTAT: Hellenic Statistical Authority and GFCM: General Fisheries Commission for the Mediterranean (2006-2021).

Functional Group	Relative biomass	Catch	Environmental driver
1. Phytoplankton	CMEMS	-	Net PP forcing (producer)
7. Jellyfish	-	-	SST foraging response
8. Shelf crabs	MEDITS	ELSTAT/GFCM	SST foraging response
10. Shrimps	MEDITS	ELSTAT/GFCM	SST foraging response
11. Lobsters	MEDITS	ELSTAT/GFCM	SST foraging response
12. Norway lobster	MEDITS	ELSTAT/GFCM	SST foraging response
13. Octopus and cuttlefish	MEDITS	ELSTAT/GFCM	SST foraging response
14. Squids	MEDITS	ELSTAT/GFCM	SST foraging response
15. European anchovy	Tsagarakis et al. 2022	ELSTAT/GFCM	SST foraging response/forcing (consumer)
16. European pilchard	Tsagarakis et al. 2022	ELSTAT/GFCM	SST foraging response/forcing (consumer)
17. Other small pelagics	MEDITS	ELSTAT/GFCM	SST foraging response
18. Picarels and bogue	MEDITS	ELSTAT/GFCM	SST foraging response
19. Mackerels	MEDITS	ELSTAT/GFCM	SST foraging response/forcing (consumer)
20. Horse mackerels	MEDITS	ELSTAT/GFCM	SST foraging response/forcing (consumer)
21. Medium pelagics	-	ELSTAT/GFCM	SST foraging response
22. Large pelagics	-	ELSTAT/GFCM	SST foraging response
23. Anglerfish	MEDITS	ELSTAT/GFCM	SST foraging response
24. Flatfishes	MEDITS	ELSTAT/GFCM	SST foraging response
25. European hake	MEDITS	ELSTAT/GFCM	SST foraging response
26. Other gadiforms	MEDITS	ELSTAT/GFCM	SST foraging response
27. Gurnards	MEDITS	ELSTAT/GFCM	SST foraging response
28. Red mullets	MEDITS	ELSTAT/GFCM	SST foraging response
29. Rockfish	MEDITS	ELSTAT/GFCM	SST foraging response
30. Small demersals 1	MEDITS	ELSTAT/GFCM	SST foraging response
31. Small demersals 2	MEDITS	ELSTAT/GFCM	SST foraging response
32. Small demersals 3	MEDITS	ELSTAT/GFCM	SST foraging response
33. Medium-large demersals 1	MEDITS	ELSTAT/GFCM	SST foraging response
34. Medium-large demersals 2	MEDITS	ELSTAT/GFCM	SST foraging response
37. Rays and skates	MEDITS	ELSTAT/GFCM	SST foraging response
38. Sharks	MEDITS	ELSTAT/GFCM	SST foraging response
39.Sea turtles	-	-	SST foraging response
41.Dolphins	-	-	SST foraging response
42.Monk seal	-	-	SST foraging response

Table S2: Calibration of the trophic interactions of the ECOSIM model in the form of vulnerabilities by a predator-based fitting. Vulnerabilities of 35 from 41 available predators were estimated by the model routines (the vulnerabilities that remained with the set value are given in *italics*), with a vulnerability maximum value cap designated at 100.

Functional group	vulnerability	Functional group	vulnerability
2. Micro/Mesozooplankton	1.12	23. Anglerfish	1
3. Macrozooplankton	1	24. Flatfishes	2.655
4. Benthic invertebrates	100	25. European hake	1
5. Polychaetes	100	26. Other gadiforms	1.025
6. Benthic small crustaceans	1	27. Gurnards	1.933
7. Jellyfish	1	28. Red mullets	1
8. Shelf crabs	1	29. Rockfish	52.4
9. Slope crabs	*2*	30. Small demersals 1	1
10. Shrimps	1	31. Small demersals 2	1
11. Lobsters	*2*	*32. Small demersals 3*	*2*
12. Norway lobster	1	33. Medium-large demersals 1	1.156
13. Octopus and cuttlefish	100	34. Medium-large demersals 2	100
14. Squids	2.001	35. Planktivorous deep sea fish	100
15. European anchovy	1	36. Piscivorous deep sea fish	1
16. European pilchard	1	37. Rays and skates	100
17. Other small pelagics	1	38. Sharks	100
18. Picarels and bogue	1	*39. Sea turtles*	*2*
19. Mackerels	1.921	*40. Seabirds*	*2*
20. Horse mackerels	1.061	41. Dolphins	1
21. Medium pelagics	2.564	*42. Monk seal*	*2*
22. Large pelagics	1		

Table S3: Sea surface temperature (SST; °C) tolerance (minimum-maximum), preference (10^{th}- 90^{th} percentiles), and optimum values for 35 functional groups with available data, from the AquaMaps database. For multispecies groups, weighted averages were calculated for each parameter. Temperature environmental responses were applied in ECOSIM using a segmented Gaussian distribution, with each segment having distinct standard deviation values on the left and right sides (SD left and SD right) as done in Bentley et al. (2017).

Functional Group	Min	10^{th}	90^{th}	Max	Weighted Opt.	SD left	SD right
7. Jellyfish	9.79	15.11	25.43	28.96	20.27	3.50	2.90
8. Shelf crabs	8.98	14.80	22.76	27.54	18.78	3.27	2.92
9. Slope crabs	8.18	14.25	23.36	28.67	18.81	3.54	3.29
10. Shrimps	8.10	14.88	24.80	29.54	19.84	3.91	3.23
11. Lobsters	9.89	15.63	22.86	27.88	19.25	3.12	2.88
12. Norway lobster	3.95	10.03	19.44	22.14	14.74	3.60	2.47
13. Octopus and cuttlefish	9.70	15.71	25.11	29.02	20.41	3.57	2.87
14. Squids	7.30	13.59	24.56	28.18	19.07	3.92	3.04
15. European anchovy	7.25	10.19	26.32	30.52	18.25	3.67	4.09
16. European pilchard	-1.13	10.32	20.26	24.75	15.29	5.47	3.15
17. Other small pelagics	8.82	13.29	22.72	27.93	18.00	3.06	3.31
18. Picarels and bogue	12.03	16.77	23.61	26.00	20.19	2.72	1.94
19. Mackerels	6.70	12.26	23.51	27.04	17.88	3.73	3.05
20. Horse mackerels	5.71	9.36	18.72	26.51	14.04	2.78	4.16
21. Medium pelagics	5.47	18.05	28.03	32.23	23.04	5.86	3.06
22. Large pelagics	1.91	14.48	27.69	31.89	21.09	6.39	3.60
23. Anglerfish	3.43	10.37	19.61	26.41	14.99	3.86	3.81
24. Flatfishes	8.81	14.41	22.84	27.28	18.63	3.27	2.88
25. European hake	7.00	10.08	23.00	24.51	16.54	3.18	2.66
26. Other gadiforms	5.26	10.90	19.02	24.09	14.96	3.23	3.04
27. Gurnards	8.48	14.09	23.66	27.73	18.87	3.46	2.95
28. Red mullets	2.51	10.59	20.97	26.05	15.78	4.42	3.42
29. Rockfish	10.48	16.37	24.69	28.08	20.53	3.35	2.52
30. Small demersals 1	9.32	14.41	22.40	26.49	18.41	3.03	2.69
31. Small demersals 2	11.92	16.92	23.27	27.07	20.09	2.72	2.33
32. Small demersals 3	8.97	15.06	22.68	27.23	18.87	3.30	2.79
33. Medium-large demersals 1	10.08	16.82	24.72	28.88	20.77	3.56	2.70
34. Medium-large demersals 2	9.03	14.64	23.77	29.07	19.20	3.39	3.29
35. Planktivorous deep sea fish	5.91	12.96	23.69	28.62	18.33	4.14	3.43
36. Piscivorous deep sea fish	5.58	13.83	25.14	29.46	19.49	4.64	3.32
37. Rays and skates	8.18	14.01	23.44	27.93	18.73	3.52	3.07
38. Sharks	5.85	13.29	24.94	30.07	19.12	4.42	3.65
39. Sea turtles	4.91	16.17	28.54	32.74	22.36	5.82	3.46
41. Dolphins	-1.32	10.91	24.76	29.90	17.84	6.38	4.02
42. Monk seal	13.90	16.24	22.59	24.57	19.42	1.84	1.72

Table S4: The input parameters that were varied with the Monte Carlo approach, where the mean values corresponded to the original baseline values imported into the ECOPATH model. The Coefficient of Variation (CV) was used to specify the range of samples (mean ± 2*CV) for each variable, based on their pedigree index, that Monte Carlo could modify using normal distributions, in order to perceive alternate configurations.

Functional Group	Biomass		P/B		Q/B		Catch	
	CV	Mean	CV	Mean	CV	Mean	CV	Mean
1. Phytoplankton	0.05	2.40	0.30	120.21			0.25	
2. Micro/Mesozooplankton	0.40	1.00	0.30	28.38	0.30	81.01	0.25	
3. Macrozooplankton	0.40	0.20	0.30	20.26	0.30	57.49	0.25	
4. Benthic invertebrates	0.40	2.14	0.30	1.90	0.30	5.84	0.25	0.03
5. Polychaetes	0.40	1.24	0.30	2.85	0.30	15.41	0.25	
6. Benthic small crustaceans	0.40	0.27	0.30	9.29	0.30	56.11	0.25	
7. Jellyfish	0.40	0.26	0.30	15.75	0.30	23.84	0.25	
8. Shelf crabs	0.05	0.07	0.30	2.85	0.30	12.58	0.25	0.00
9. Slope crabs	0.05	0.00	0.30	1.49	0.30	8.20	0.25	
10. Shrimps	0.05	0.40	0.30	3.48	0.30	8.32	0.25	0.04
11. Lobsters	0.05	0.01	0.30	2.47	0.30	7.21	0.25	0.00
12. Norway lobster	0.05	0.01	0.30	1.35	0.30	4.87	0.25	0.00
13. Octopus and cuttlefish	0.05	0.40	0.30	2.55	0.30	5.88	0.25	0.05
14. Squids	0.05	0.56	0.30	2.79	0.30	23.97	0.25	0.02
15. European anchovy	0.05	1.77	0.20	2.81	0.15	9.10	0.25	0.13
16. European pilchard	0.05	1.98	0.20	2.54	0.15	24.80	0.25	0.11
17. Other small pelagics	0.05	1.04	0.20	1.35	0.15	14.14	0.25	0.06
18. Picarels and bogue	0.05	0.71	0.20	1.84	0.15	9.03	0.25	0.07
19. Mackerels	0.05	0.09	0.20	2.15	0.15	5.75	0.25	0.03
20. Horse mackerels	0.05	0.21	0.20	1.02	0.15	7.65	0.25	0.03
21. Medium pelagics	0.05	0.23	0.20	0.70	0.15	7.17	0.25	0.02
22. Large pelagics	0.05	0.05	0.20	0.25	0.15	4.75	0.25	0.01
23. Anglerfish	0.05	0.15	0.20	0.66	0.15	3.45	0.25	0.00
24. Flatfishes	0.05	0.06	0.20	0.72	0.15	9.05	0.25	0.01
25. European hake	0.05	0.51	0.20	1.23	0.15	4.00	0.25	0.03
26. Other gadiforms	0.05	0.56	0.20	0.41	0.15	6.18	0.25	0.02
27. Gurnards	0.05	0.13	0.20	0.50	0.15	8.40	0.25	0.00
28. Red mullets	0.05	0.07	0.20	1.81	0.15	7.60	0.25	0.03
29. Rockfish	0.05	0.04	0.20	0.44	0.15	6.60	0.25	0.00
30. Small demersals 1	0.05	0.09	0.20	1.23	0.15	10.20	0.25	0.01
31. Small demersals 2	0.05	0.14	0.20	0.61	0.15	8.98	0.25	0.02
32. Small demersals 3	0.05	0.04	0.20	0.29	0.15	11.23	0.25	0.01
33. Medium-large demersals 1	0.05	0.06	0.20	0.56	0.15	6.24	0.25	0.01
34. Medium-large demersals 2	0.05	0.06	0.20	0.96	0.15	4.48	0.25	0.02
35. Planktivorous deep sea fish	0.05	0.46	0.20	0.34	0.15	16.85	0.25	0.00
36. Piscivorous deep sea fish	0.05	0.20	0.20	0.25	0.15	6.84	0.25	0.00
37. Rays and skates	0.05	0.13	0.20	0.24	0.15	4.20	0.25	0.00
38. Sharks	0.05	0.19	0.20	0.08	0.15	4.20	0.25	0.00
39. Sea turtles	0.40	0.01	0.30	0.16	0.30	2.74	0.25	0.00
40. Seabirds	0.40	0.00	0.30	5.05	0.30	99.22	0.25	0.00
41. Dolphins	0.40	0.00	0.30	0.08	0.30	12.97	0.25	0.00
42. Monk seal	0.40	0.00	0.30	0.12	0.30	12.13	0.25	0.00

Table S5: Sum of squares (SS) for all functional groups from the ECOSIM simulations after the fit to time series process for biomass (B) and catch (C), along with the aggregated total of both.

Functional Group	SS (B)	SS (C)	SS Total
1. Phytoplankton	0.00	0.00	0.00
2. Micro/Mesozooplankton	0.00	0.00	0.00
3. Macrozooplankton	0.00	0.00	0.00
4. Benthic invertebrates	0.00	0.00	0.00
5. Polychaetes	0.00	0.00	0.00
6. Benthic small crustaceans	0.00	0.00	0.00
7. Jellyfish	0.00	0.00	0.00
8. Shelf crabs	2.56	18.18	20.74
9. Slope crabs	5.20	0.00	5.20
10. Shrimps	0.50	1.18	1.68
11. Lobsters	4.04	2.01	6.05
12. Norway lobster	1.10	2.43	3.53
13. Octopus and cuttlefish	0.74	1.11	1.85
14. Squids	1.25	0.31	1.56
15. European anchovy	1.52	1.30	2.82
16. European pilchard	1.75	3.01	4.76
17. Other small pelagics	8.88	0.50	9.38
18. Picarels and bogue	0.80	0.56	1.36
19. Mackerels	12.75	0.42	13.17
20. Horse mackerels	3.79	1.52	5.31
21. Medium pelagics	0.00	0.31	0.31
22. Large pelagics	0.00	2.75	2.75
23. Anglerfish	0.95	0.21	1.16
24. Flatfishes	0.70	1.31	2.01
25. European hake	0.89	0.26	1.15
26. Other gadiforms	2.33	0.27	2.60
27. Gurnards	1.59	0.71	2.30
28. Red mullets	2.68	0.42	3.10
29. Rockfish	0.21	0.31	0.52
30. Small demersals 1	2.77	0.38	3.15
31. Small demersals 2	2.30	0.74	3.04
32. Small demersals 3	3.61	0.57	4.18
33. Medium-large demersals 1	1.03	1.37	2.40
34. Medium-large demersals 2	1.82	0.07	1.89
35. Planktivorous deep sea fish	2.79	0.00	2.79
36. Piscivorous deep sea fish	102.60	0.00	102.60
37. Rays and skates	1.79	0.54	2.33
38. Sharks	0.44	0.60	1.04
39. Sea turtles	0.00	0.00	0.00
40. Seabirds	0.00	0.00	0.00
41. Dolphins	0.00	0.00	0.00
42. Monk seal	0.00	0.00	0.00
43. Discards	0.00	0.00	0.00
44. Detritus	0.00	0.00	0.00
Total	173.38	43.34	216.72

Table S6: Rho and p-values of the Spearman's rank correlation of the selected ECOIND indicators over time. Bold numbers indicate non-significant correlations (p-values>0.005).

Scenarios	TB	D/P_B	Kem Q	Shannon	TC	D/P_C	FIB	MTL_C	MBR_B
rho-value									
Sc0	–0.278	–0.570	0.956	–0.425	–0.719	–0.950	–0.806	0.799	–0.997
Sc1	–0.312	–0.665	0.855	–0.344	–0.892	–0.951	–0.930	0.955	–0.997
Sc2	–0.333	–0.718	0.910	–0.163	–0.949	–0.859	–0.961	0.968	–0.997
Sc3	–0.341	–0.746	0.978	0.075	–0.959	–0.664	–0.967	0.971	–0.997
Sc4	–0.327	–0.742	0.879	–0.803	–0.744	–0.943	–0.922	0.964	–0.997
Sc5	–0.120	–0.534	0.479	–0.807	–0.684	–0.864	–0.899	0.964	–0.997
Sc6	–0.336	–0.762	0.548	–0.755	–0.959	–0.945	–0.967	0.970	–0.997
Sc7	–0.135	–0.562	0.479	–0.799	–0.903	–0.929	–0.952	0.965	–0.997
Sc8	–0.331	–0.747	0.894	–0.790	–0.904	–0.948	–0.959	0.965	–0.997
Sc9	–0.155	–0.648	0.127	–0.761	–0.959	–0.934	–0.961	0.970	–0.997
p-value									
Sc0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc3	0.000	0.000	0.000	**0.084**	0.000	0.000	0.000	0.000	0.000
Sc4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc5	**0.006**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc7	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc9	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000

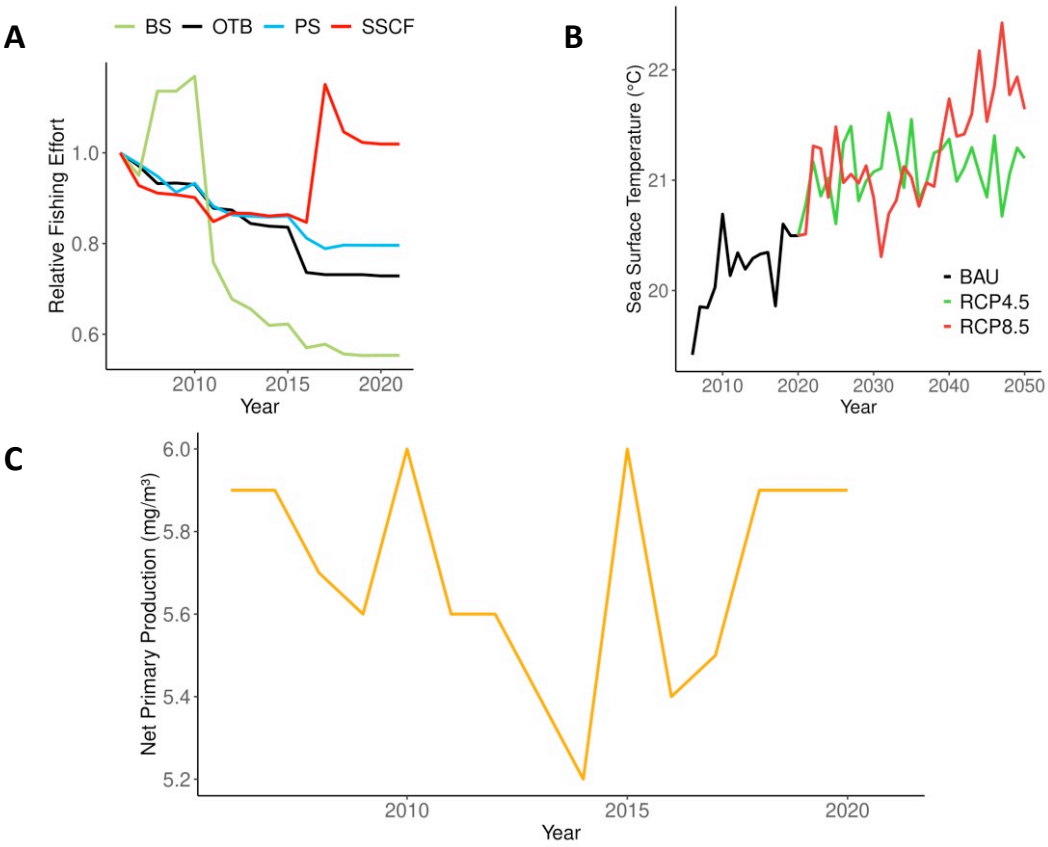

Figure S1: Ecosystem stressors and drivers of the Aegean Sea used in the calibration and projection periods, including (A) relative fishing effort by fleet (BS: beach-seiners, OTB: otter-bottom trawlers, PS: purse-seiners, SSCF: small-scale coastal fisheries), (B) sea surface temperature (SST) and (C) net primary production.

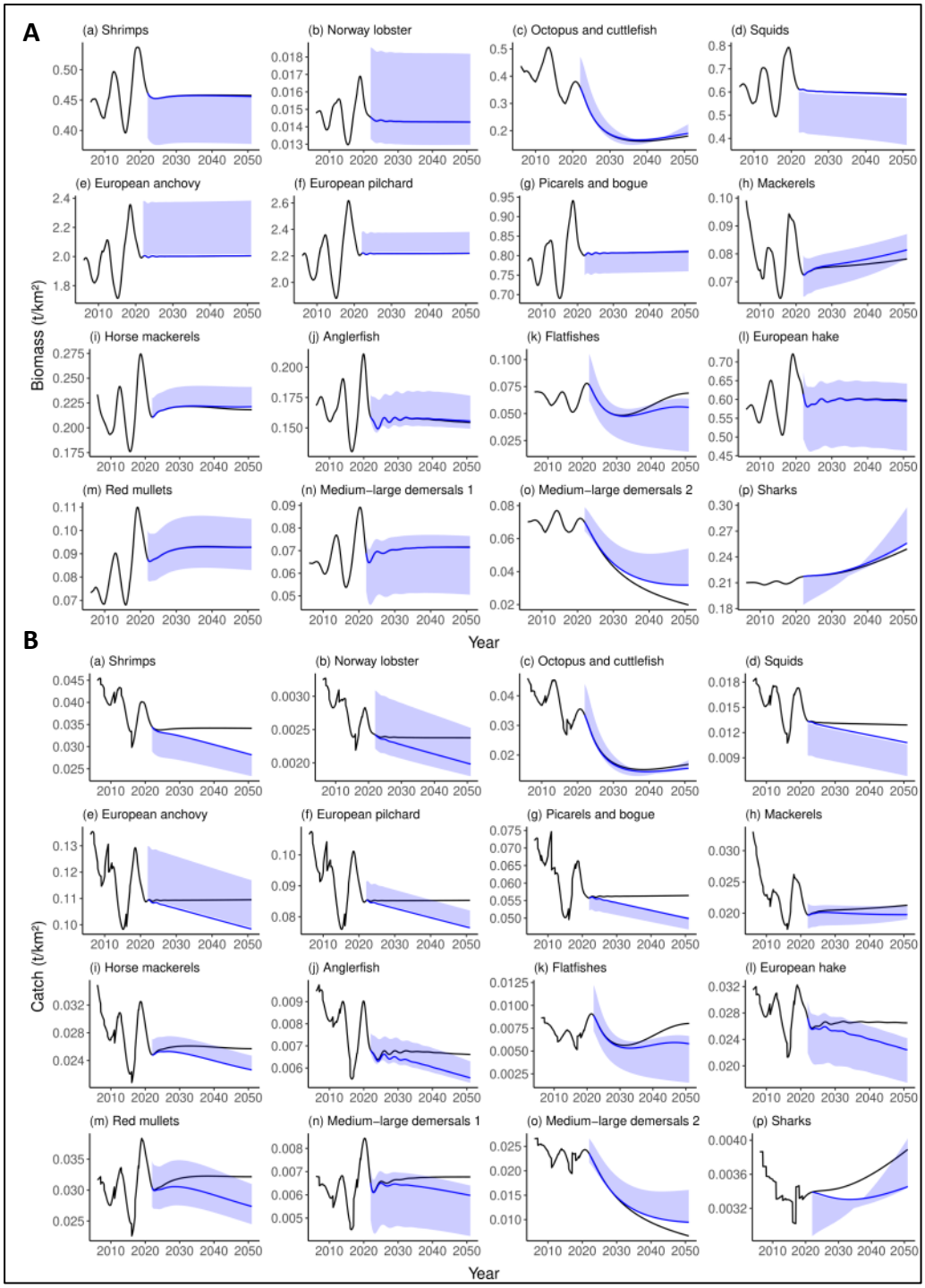

Figure S2: Uncertainty bands obtained from the 5th and 95th percentiles of the Monte Carlo analysis for biomass (A) and catch (B) for the fishing effort reduction scenario by 10% (Sc1).

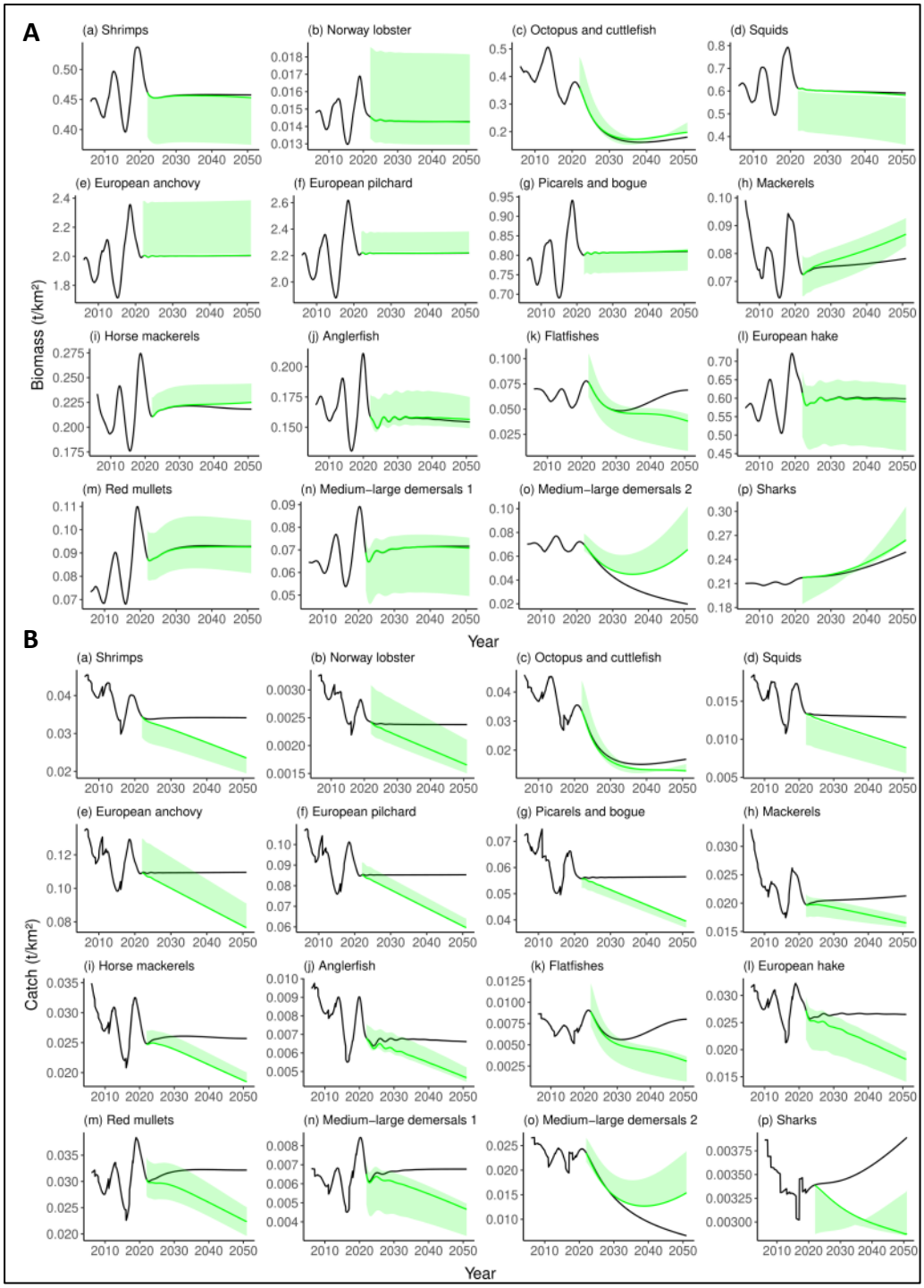

Figure S3: Uncertainty bands obtained from the 5th and 95th percentiles of the Monte Carlo analysis for biomass (A) and catch (B) for the fishing effort reduction scenario by 30% (Sc2).

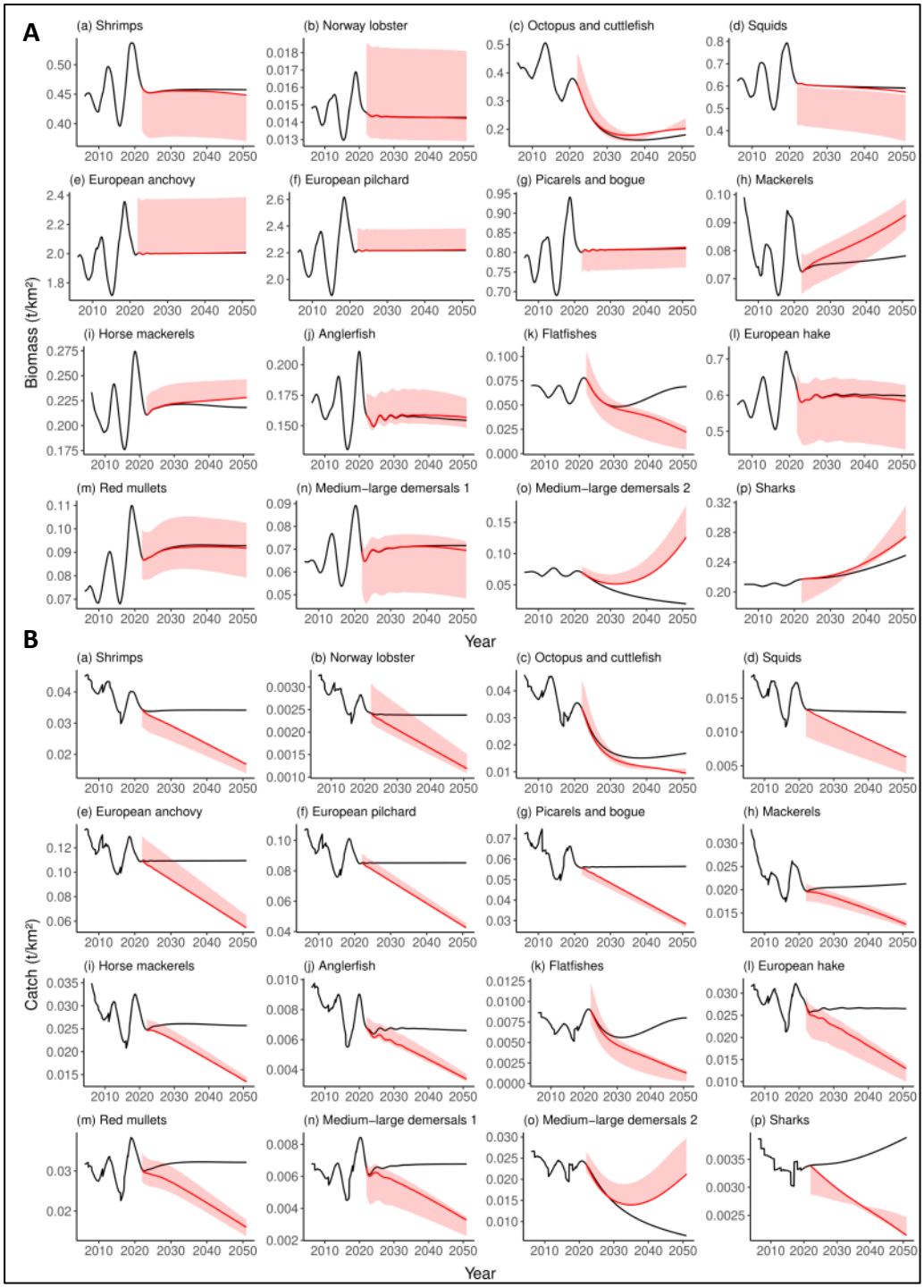

Figure S4: Uncertainty bands obtained from the 5th and 95th percentiles of the Monte Carlo analysis for biomass (A) and catch (B) for the fishing effort reduction scenario by 50% (Sc3).

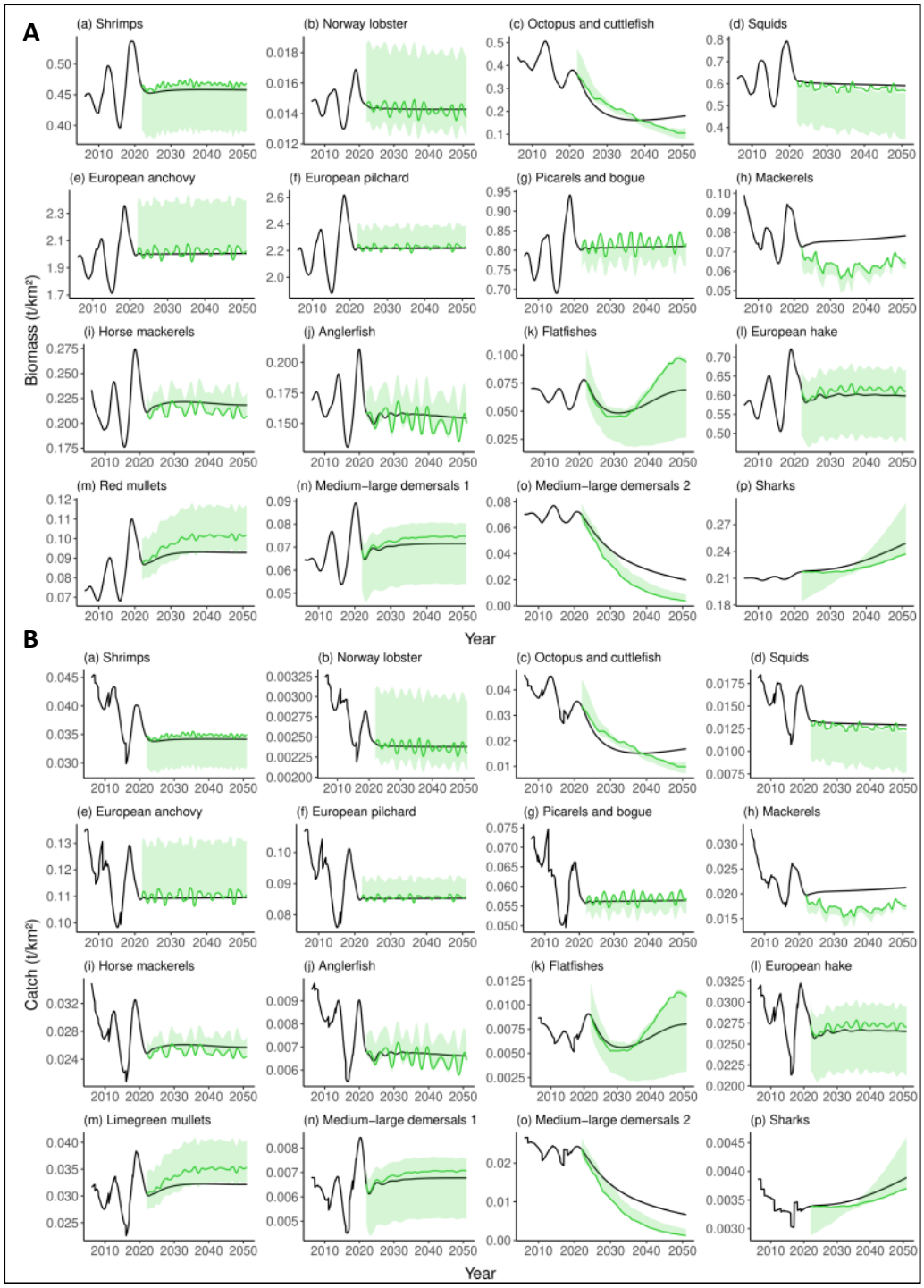

Figure S5: Uncertainty bands obtained from the 5th and 95th percentiles of the Monte Carlo analysis for biomass (A) and catch (B) for the RCP 4.5 climate change scenario (Sc4).

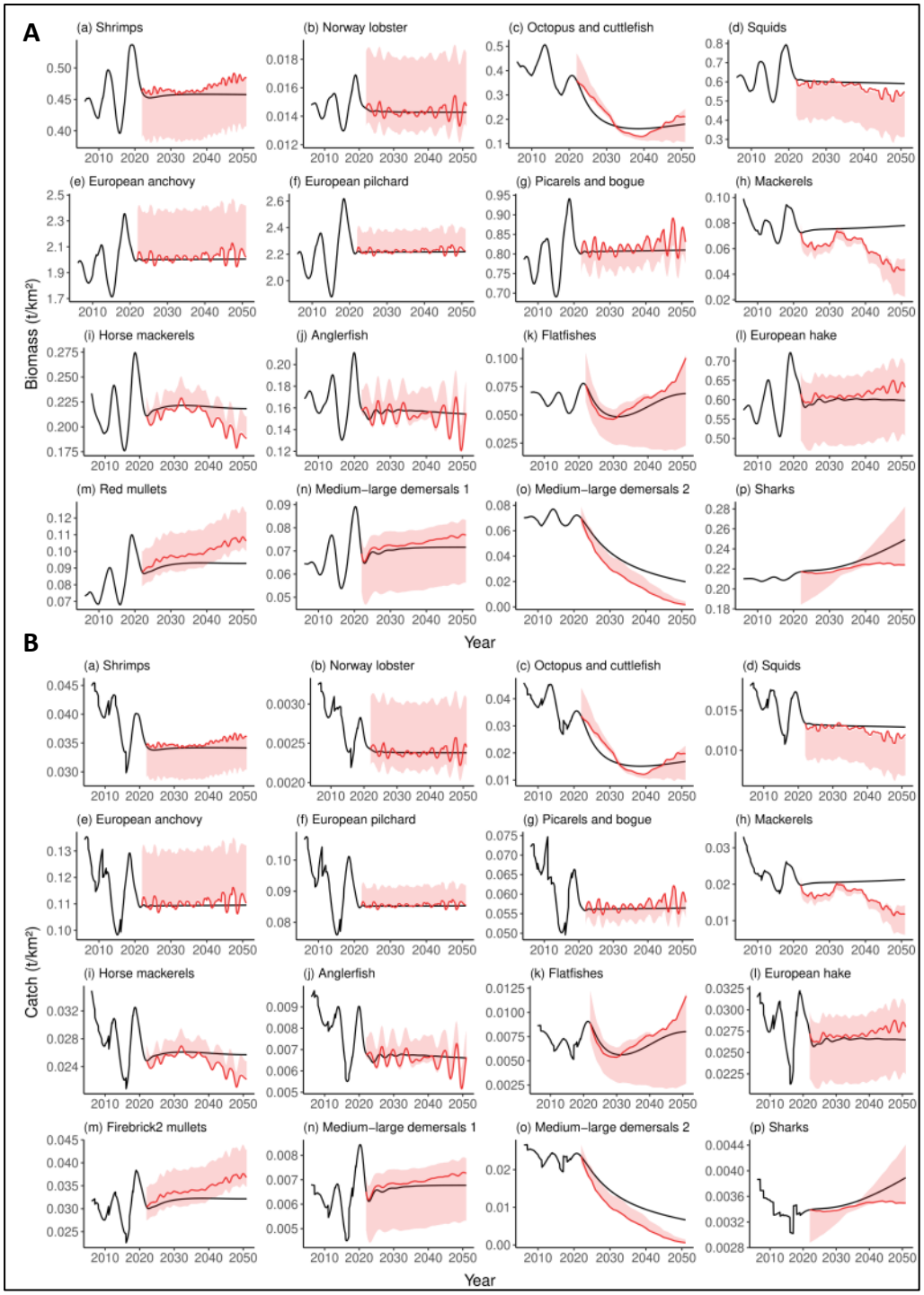

Figure S6: Uncertainty bands obtained from the 5th and 95th percentiles of the Monte Carlo analysis for biomass (A) and catch (B) for the RCP 8.5 climate change scenario (Sc5).

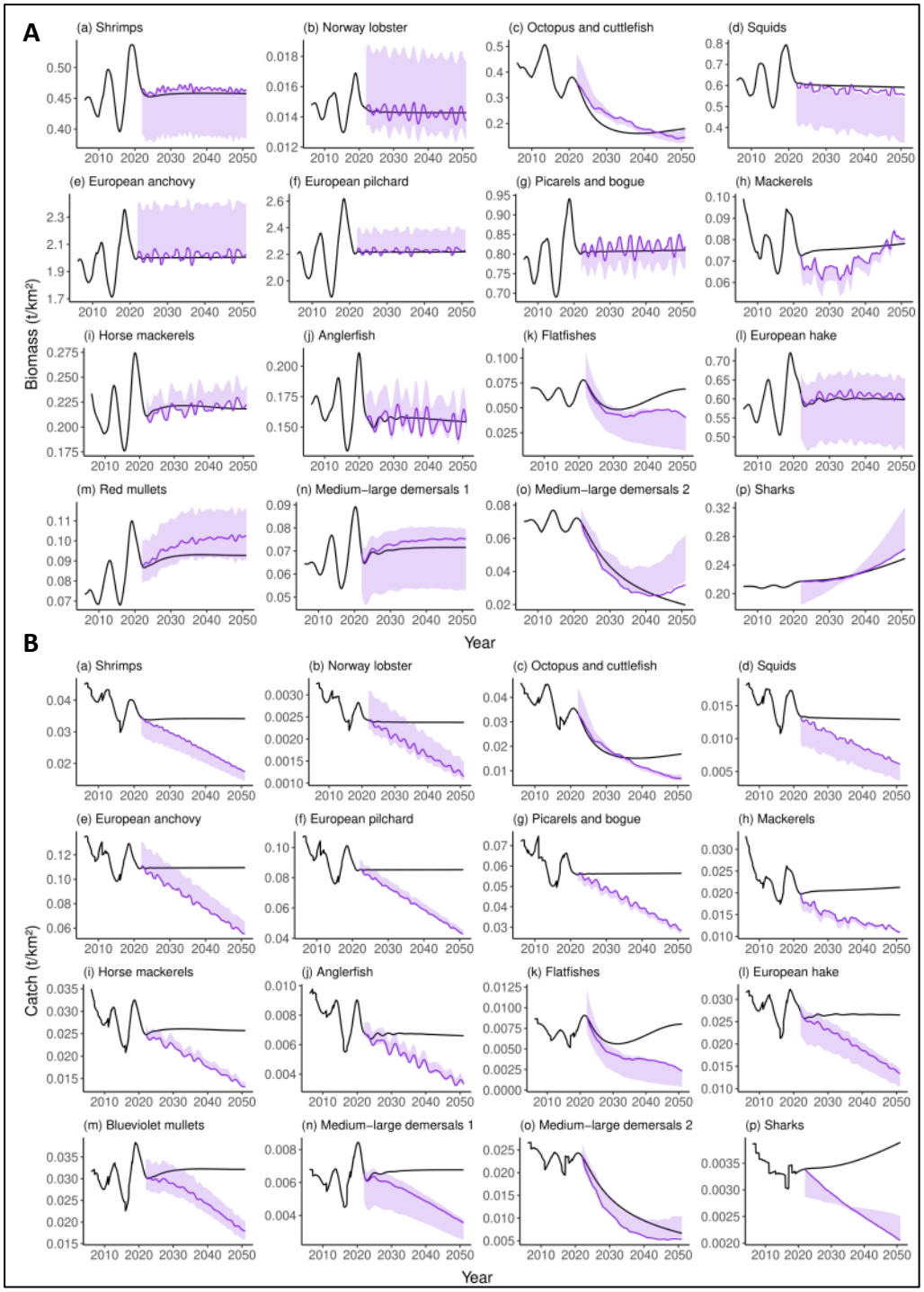

Figure S7: Uncertainty bands obtained from the 5th and 95th percentiles of the Monte Carlo analysis for biomass (A) and catch (B) for the combined scenario of RCP 4.5 and 50% fishing effort reduction (Sc6).

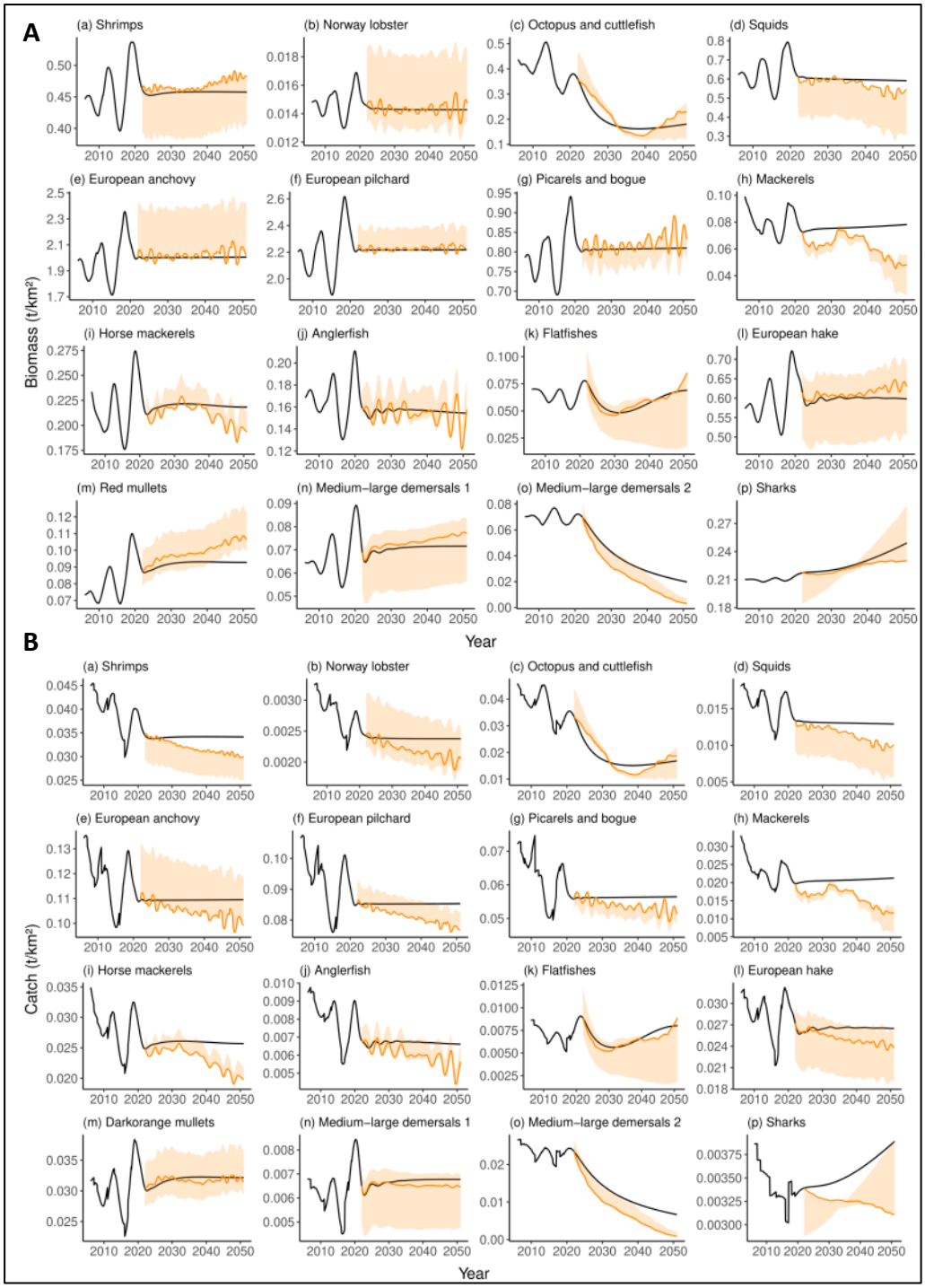

Figure S8: Uncertainty bands obtained from the 5th and 95th percentiles of the Monte Carlo analysis for biomass (A) and catch (B) for the combined scenario of RCP 8.5 and 10% fishing effort reduction (Sc7).

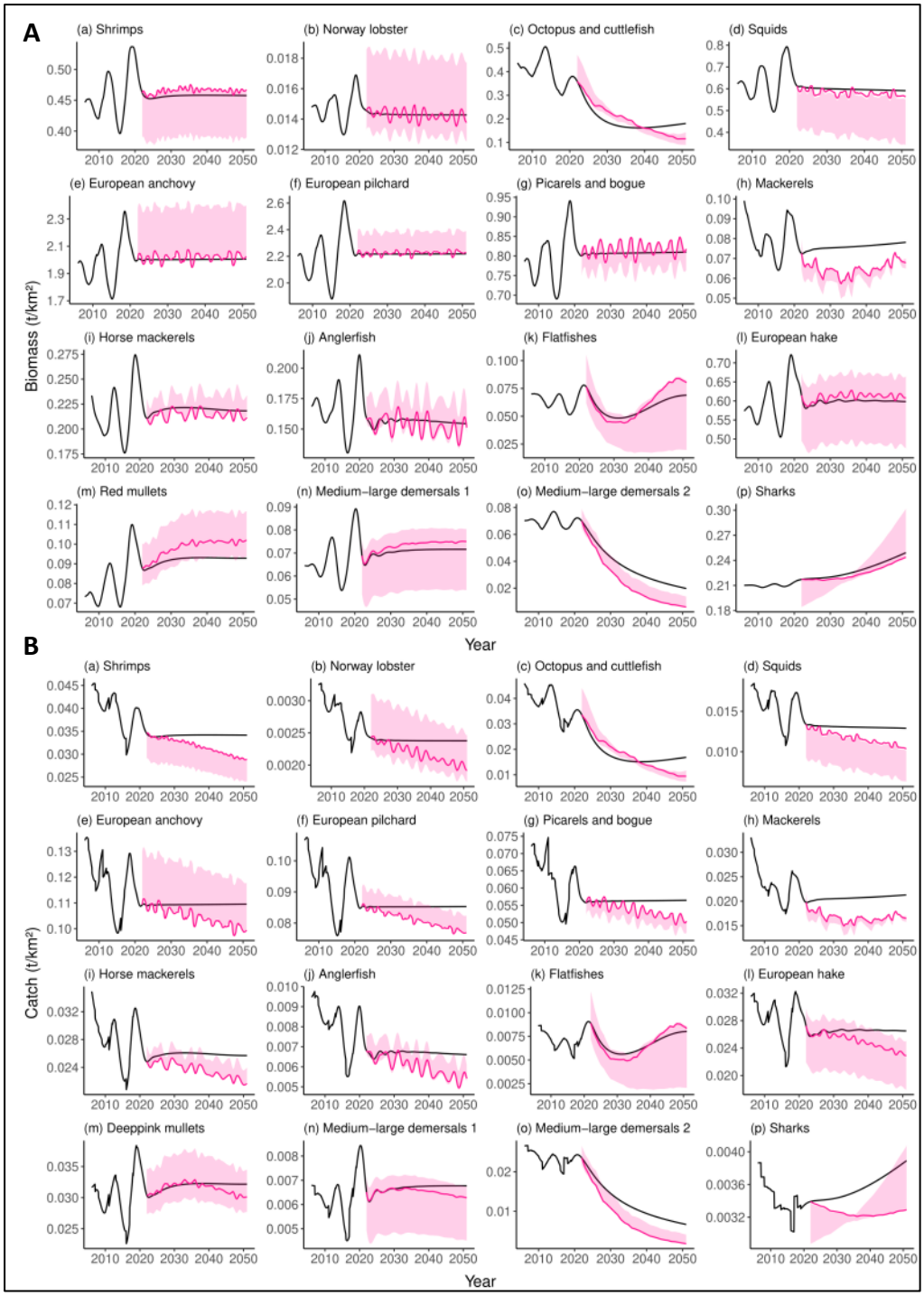

Figure S9: Uncertainty bands obtained from the 5th and 95th percentiles of the Monte Carlo analysis for biomass (A) and catch (B) for the combined scenario of RCP 4.5 and 10% fishing effort reduction (Sc8).

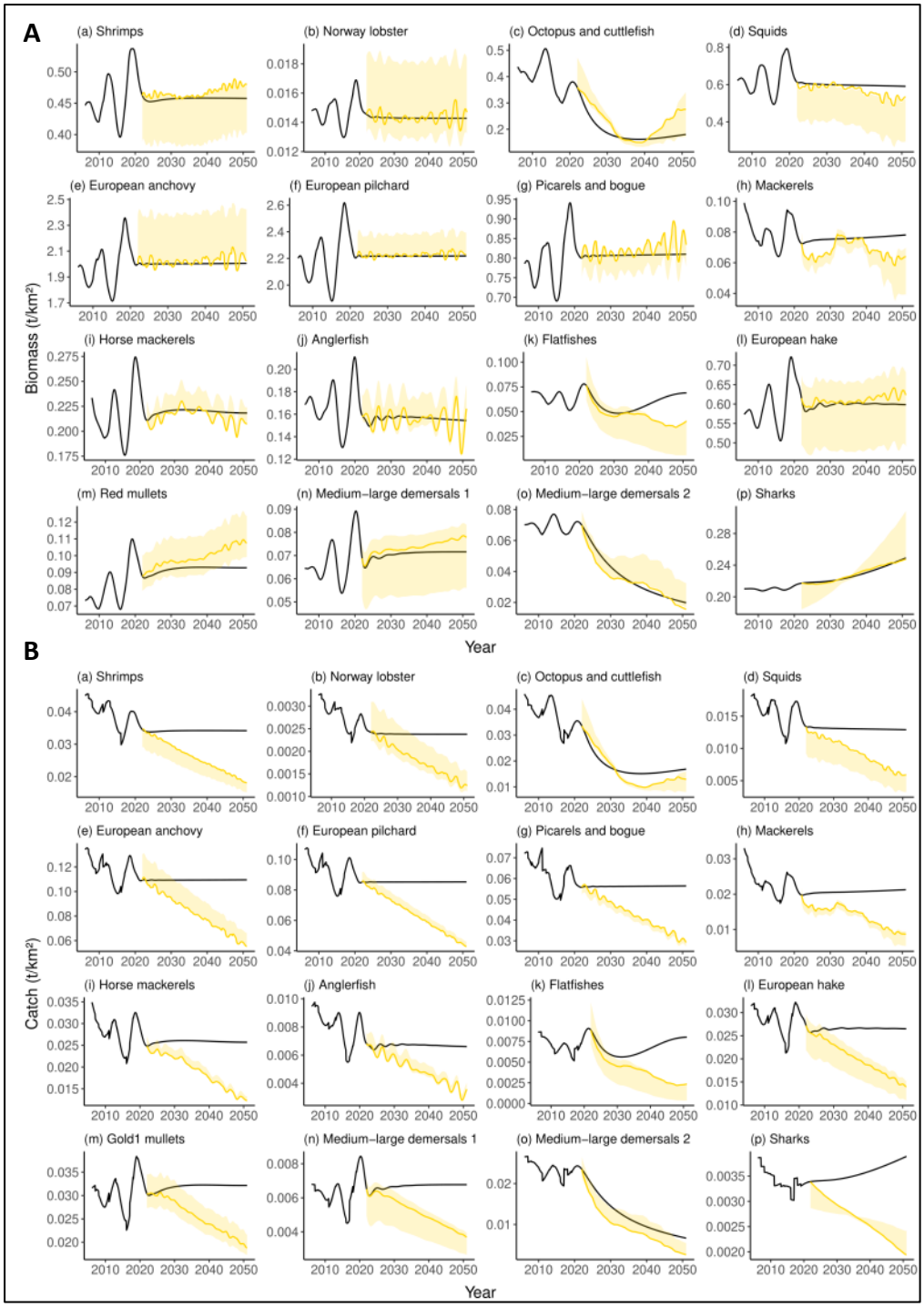

Figure S10: Uncertainty bands obtained from the 5th and 95th percentiles of the Monte Carlo analysis for biomass (A) and catch (B) for the combined scenario of RCP 8.5 and 50% fishing effort reduction (Sc9).

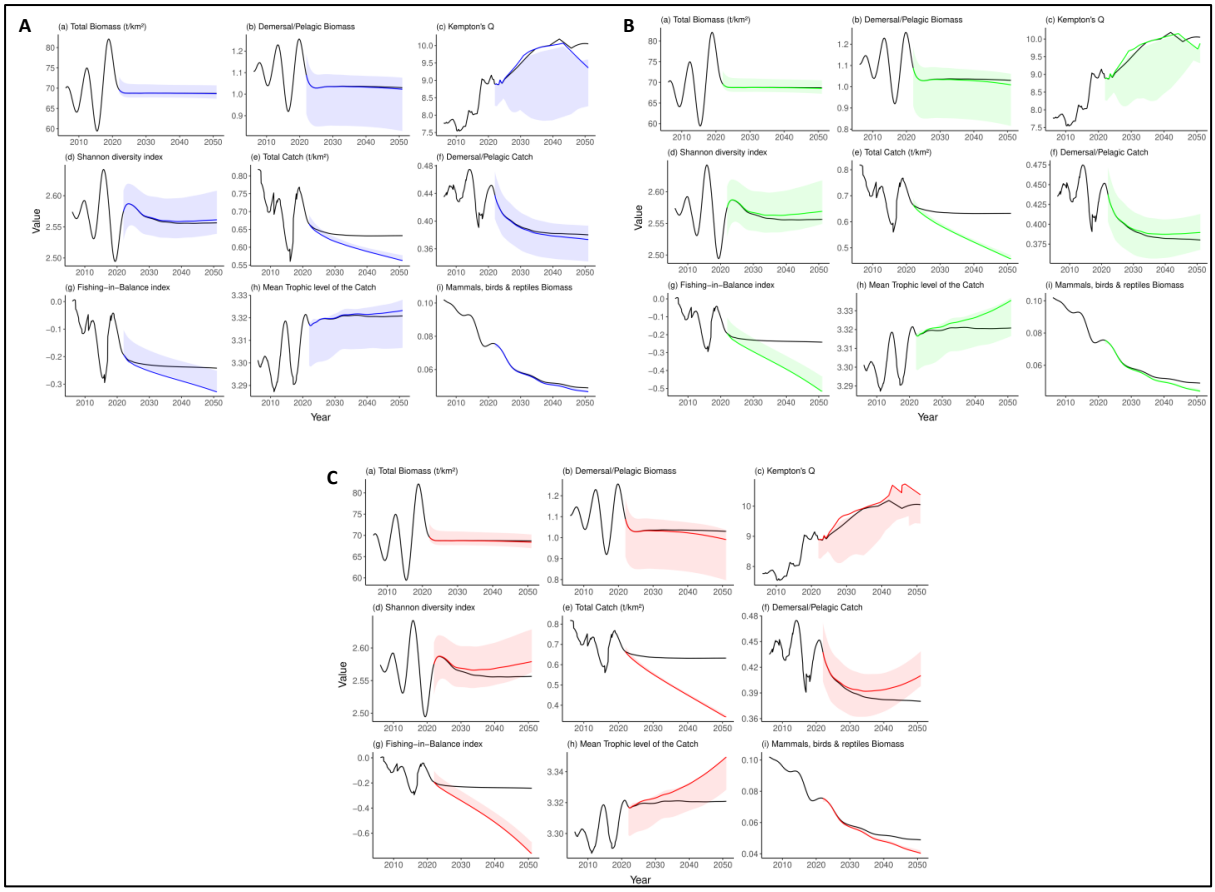

Figure S11: Uncertainty bands obtained from the 5th and 95th percentiles of the Monte Carlo analysis for the ecological indices derived from the ECOIND plug-in for the fishing effort reduction scenarios Sc1 (A), Sc2 (B) and Sc3 (C).

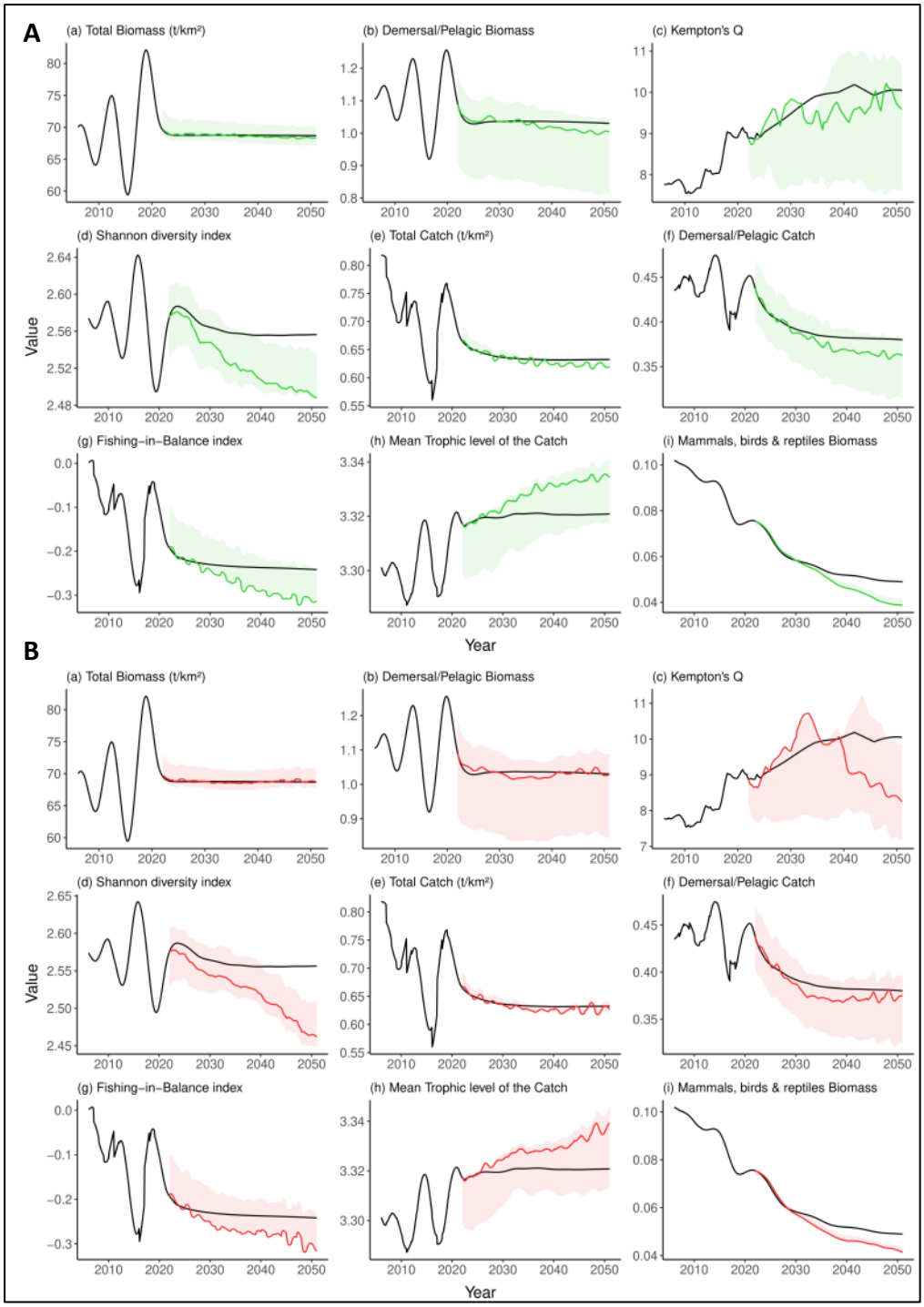

Figure S12: Uncertainty bands obtained from the 5th and 95th percentiles of the Monte Carlo analysis for the ecological indices derived from the ECOIND plug-in for the climate change scenarios Sc4 (A) and Sc5 (B).

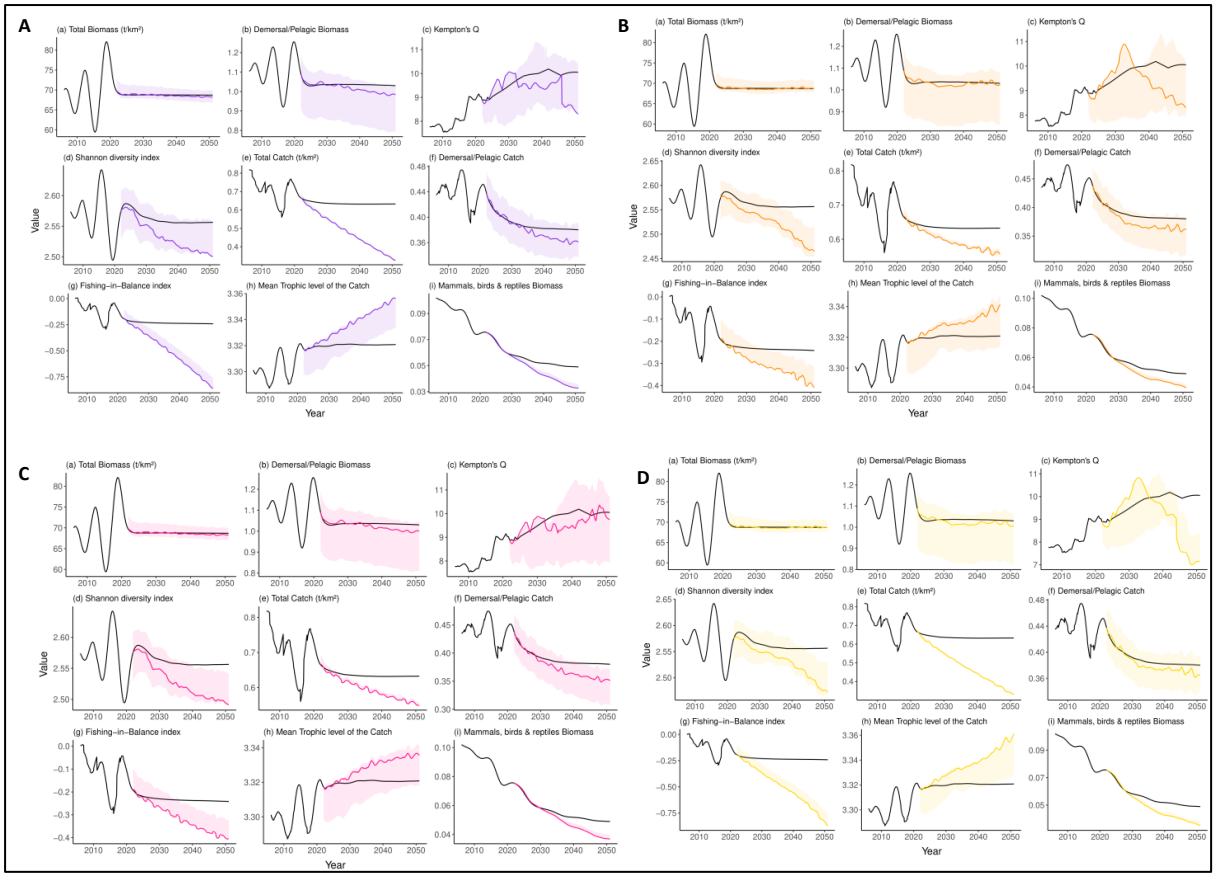

Figure S13: Uncertainty bands obtained from the 5th and 95th percentiles of the Monte Carlo analysis for the ecological indices derived from the ECOIND plug-in for the combined scenarios Sc6 (A), Sc7 (B), Sc8 (C) and Sc9 (D).

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