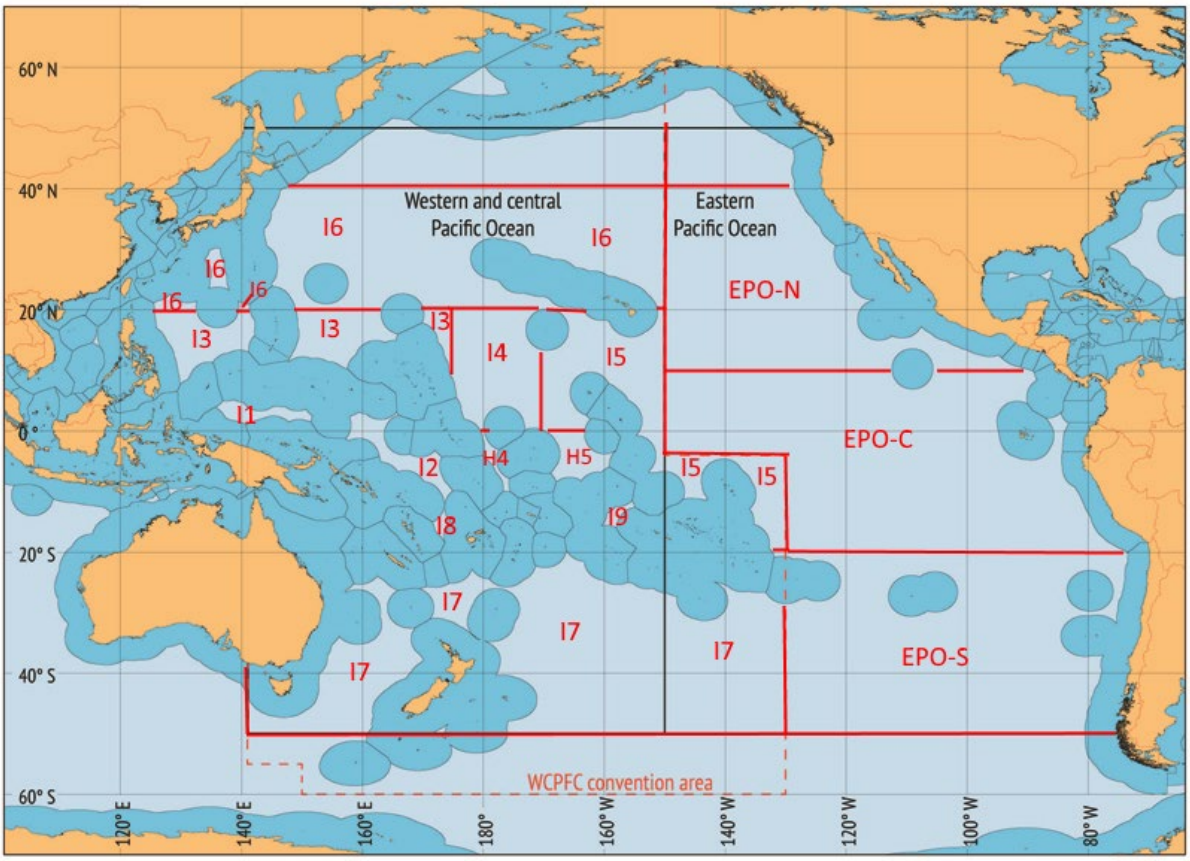
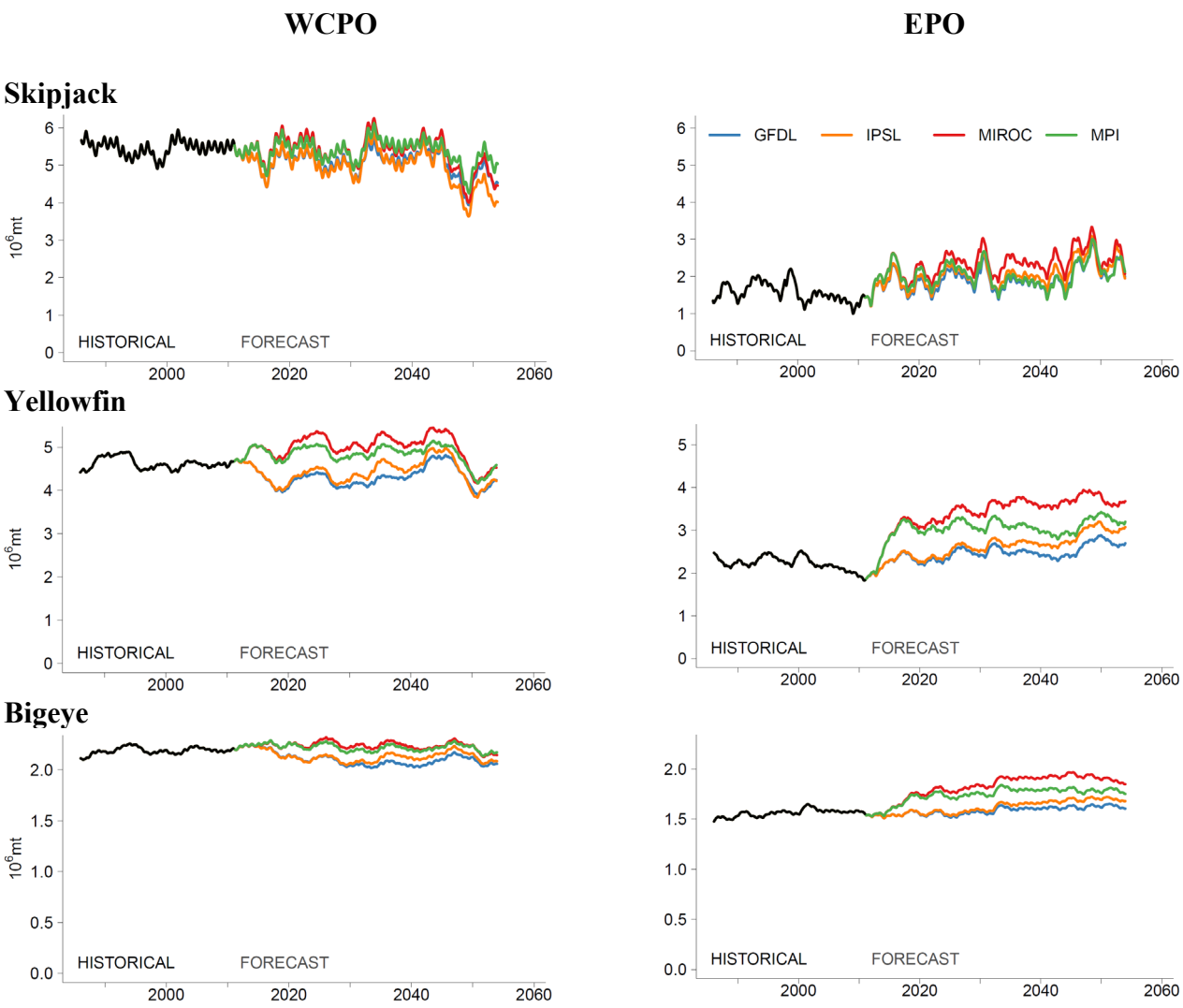
Appendix 2-K. Supplementary Information for analysis of climate-driven tuna redistribution*



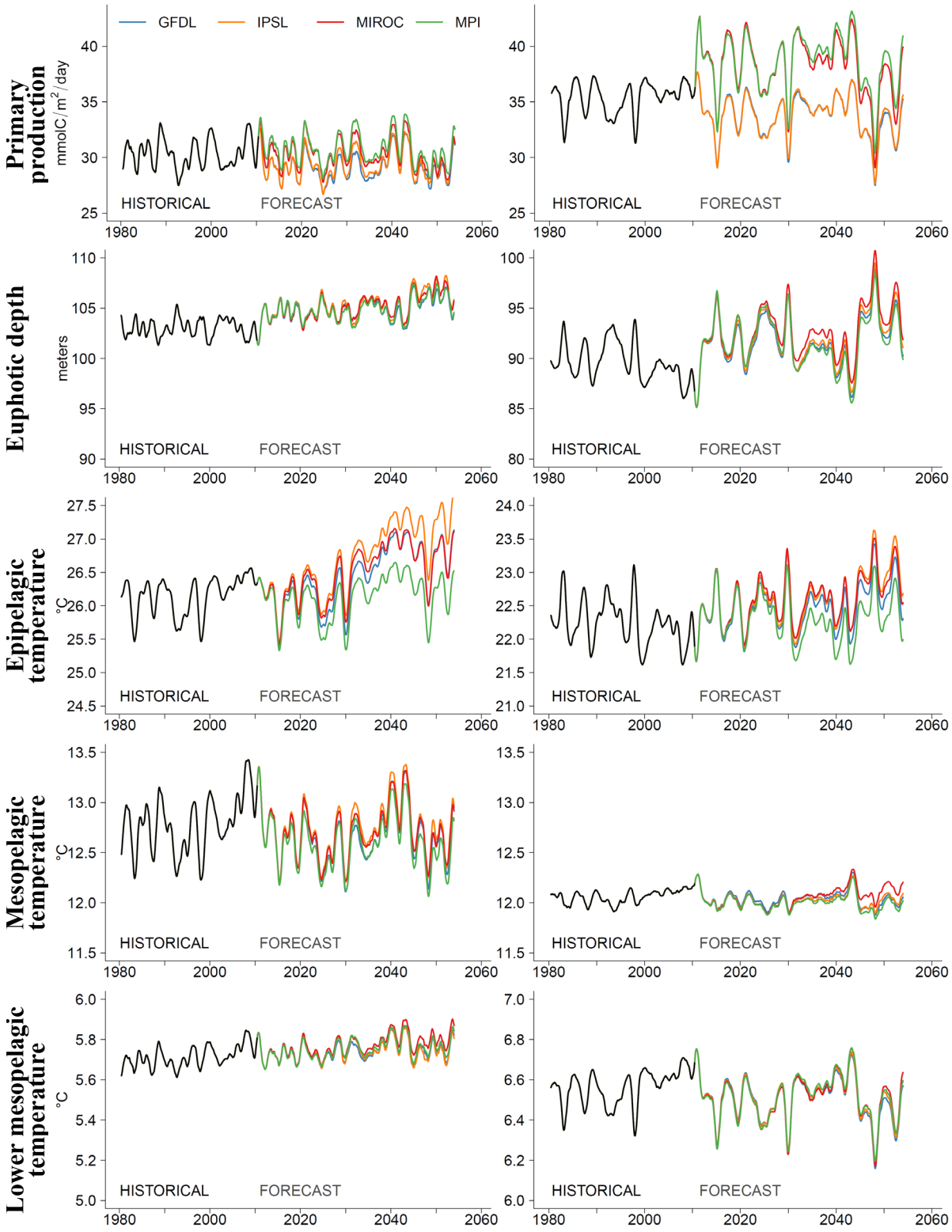
Supplementary Figure 1. Map of the Pacific Ocean basin showing the locations (in red) of the high-seas areas referred to in this study. The exclusive economic zones for all Pacific Small Island Developing States, and other countries, are also shown (darker blue).

High-seas areas in the Western and Central Pacific Ocean. **I1**: 'Doughnut hole' between Papua New Guinea and Federated States of Micronesia; **I2**: Doughnut hole between Federated States of Micronesia, Solomon Islands, Kiribati, Marshall Islands, Nauru and Tuvalu; **I3**: Area east of the Philippines to Guam above Federated States of Micronesia, and around Marshall Islands, up to 20°N and west of 175°E; **I4**: Area around Marshall Islands and Kiribati from the Equator up to 20°N and east of 175°E to 170°W; **I5**: Area around Line Islands group of Kiribati from the Equator up to 20°N, east of 170°W to 150°W and south of the Equator to 20°S from 155°W; **I6**: Remainder of Western and Central Pacific Convention Area in the Northern Hemisphere as far as 40°N **I7**: Remainder of Western and Central Pacific Convention Area in the Southern Hemisphere as far as 50°S; **I8**: Area bordered by Fiji, Solomon Islands and Vanuatu; **I9**: International waters between Cook Islands and French Polynesia; **H4**: Area between Tuvalu, Phoenix Islands Group of Kiribati and Tokelau, from the equator to 10°S and east of 175°E to 170°W; **H5**: Area between Phoenix Islands and Line Islands Groups in Kiribati, from the Equator to 10°S, east of 170°W to 155°W. **High-seas areas in the Eastern Pacific Ocean.** **EPO-C:** Area east of Americas, as far as 150ºW, bound by 10ºN and 20ºS and Area I5; **EPO-S**: Area east of Americas, as far as 130ºW, below EPO-C and above to 50ºS; **EPO-N**: Area east of Americas, as far as 150ºW, above EPO-C and below 40ºN.

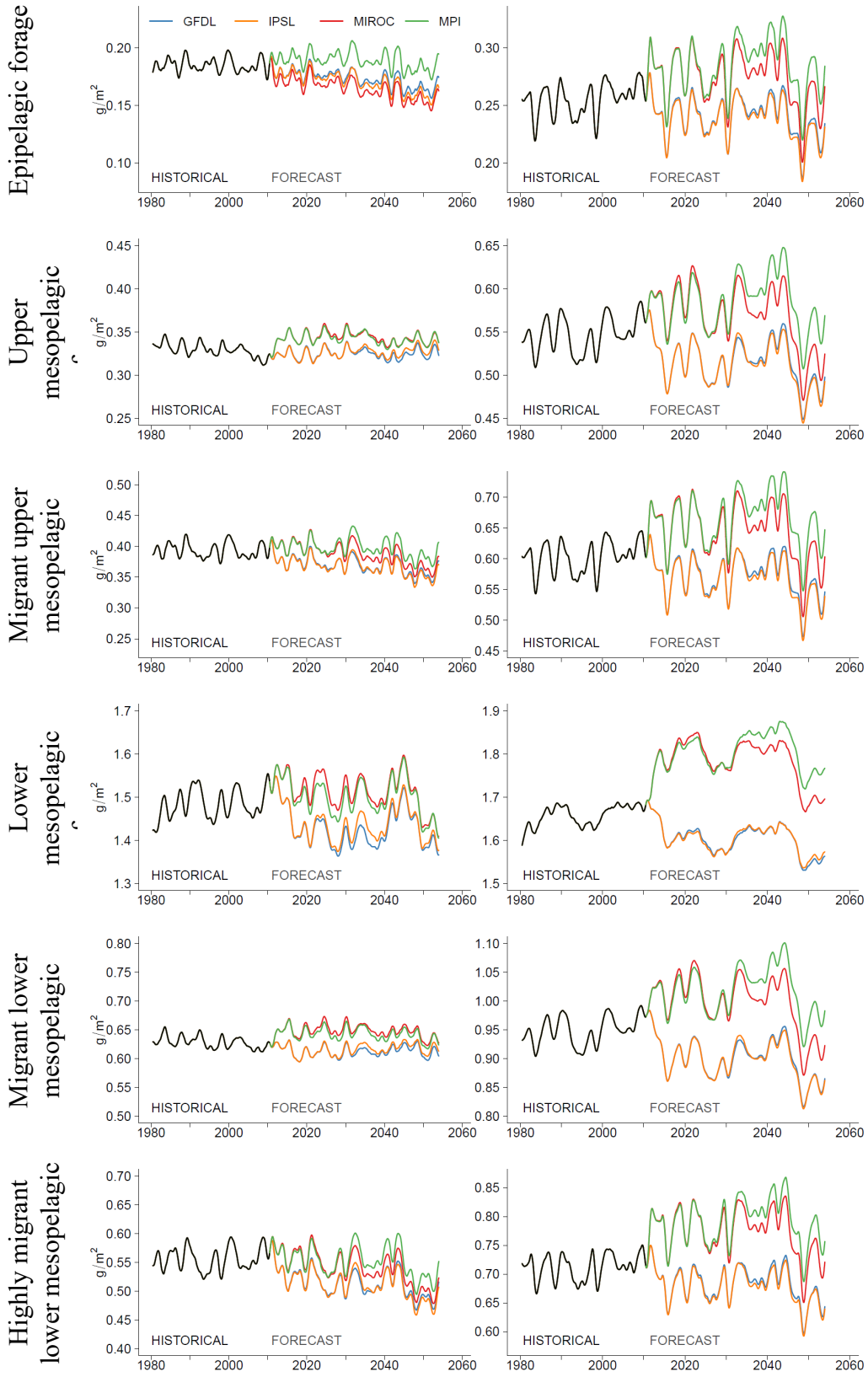
*Source: Bell et al. (2021). *Nature Sustainability*, 4, 900–910, https://doi.org/10.1038/s41893-021-00745-z



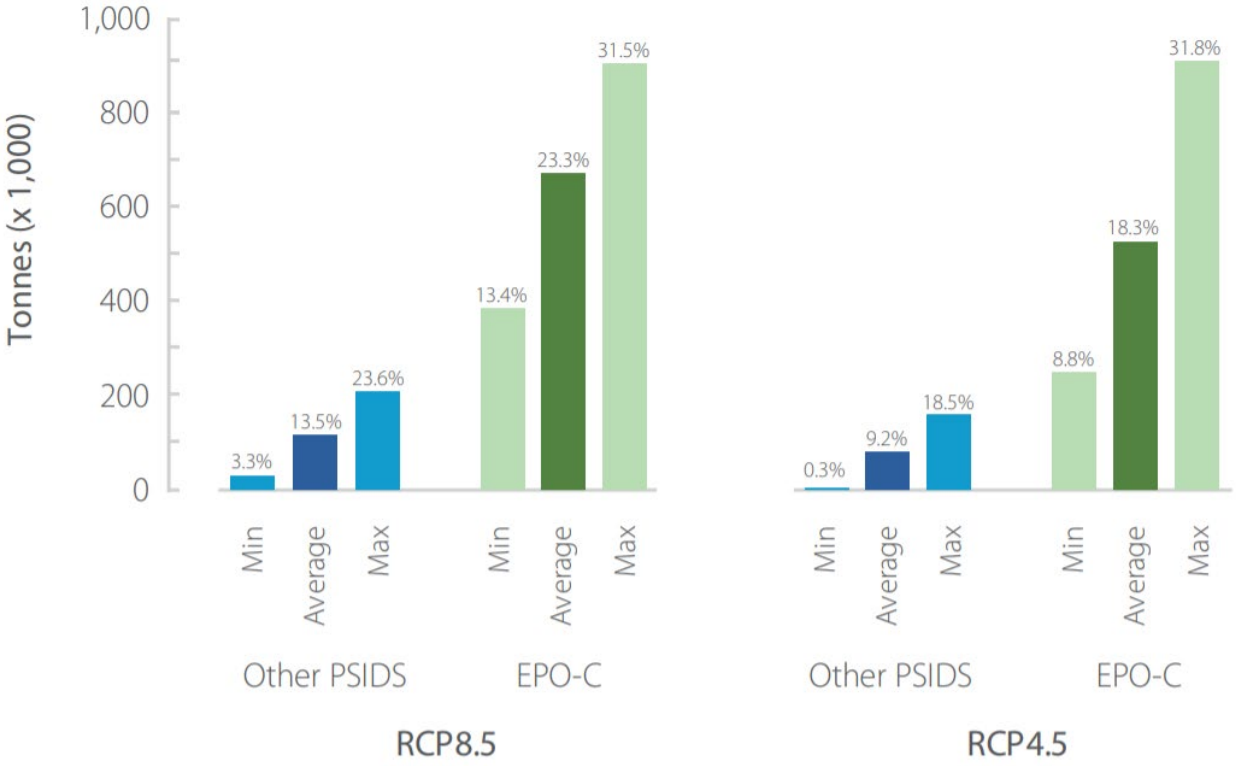
Supplementary Figure 2. Total biomass of adult skipjack, yellowfin and bigeye tuna predicted by SEAPODYM in the Western and Central Pacific Ocean (WCPO) (120ºE–150ºW; 45ºS–50ºN) and Eastern Pacific Ocean (EPO) (150ºW–70ºW; 45ºS–50ºN) during the historical time period (1980–2010), and forecast time period (2011–2053) based on four climate model forcings under the RCP8.5 emissions scenario.



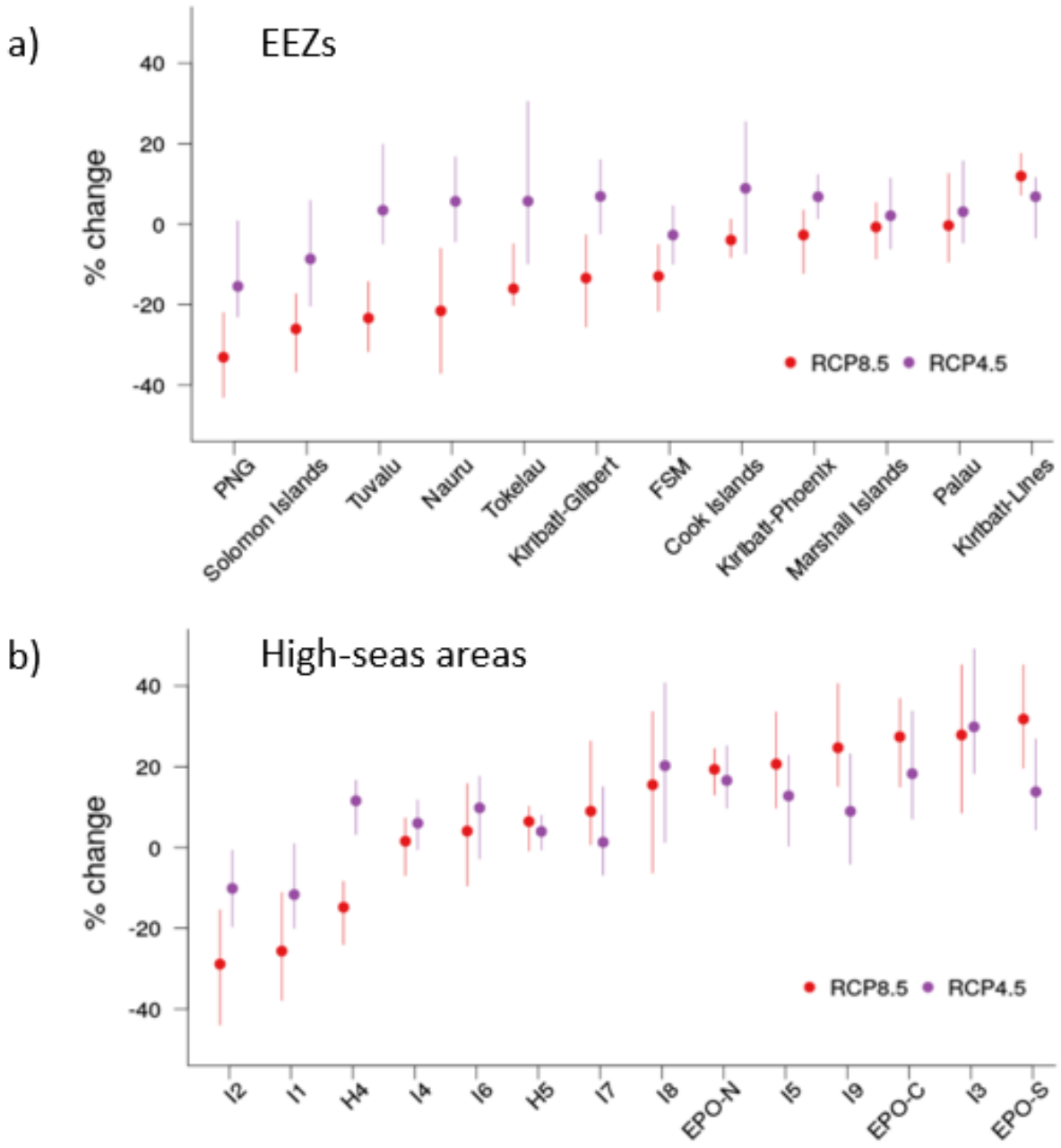
Supplementary Figure 3. Mean values of key environmental forcing variables in the tropical Western and Central Pacific Ocean (120°E–150°W, 20°S–20°S) (left) and tropical Eastern Pacific Ocean (150°W–70°W, 20°S–20°N) (right). The historical simulation of NEMO-PISCES models (black line) and forecasts from four climate models: GFDL-derived (blue), IPSL-derived (orange), MIROC-derived (red) and MPI-derived (green), are plotted as 12-month moving averages. Note the difference in the y axes for the two ocean areas.



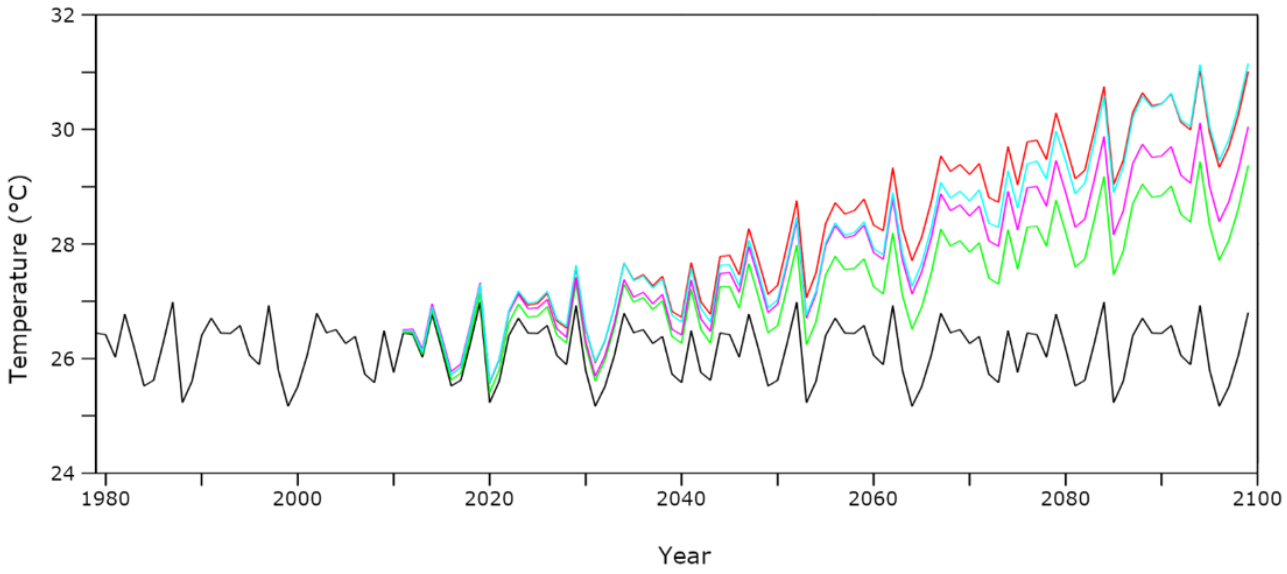
Supplementary Figure 4. Mean values of tuna prey (epipelagic forage and six functional groups of micronekton) in the tropical Western and Central Pacific Ocean (120ºE–150ºW, 20ºS–20ºS) (left) and tropical Eastern Pacific Ocean (150º W–70ºW, 20ºS–20ºN) (right). The historical simulation (black line) and forecasts from four NEMO-PISCES models: GFDL-derived (blue), IPSL-derived (orange), MIROC-derived (red) and MPI-derived (green), are plotted as 12-month moving averages. Note the differences in y axes between the two ocean areas (see Methods for details).



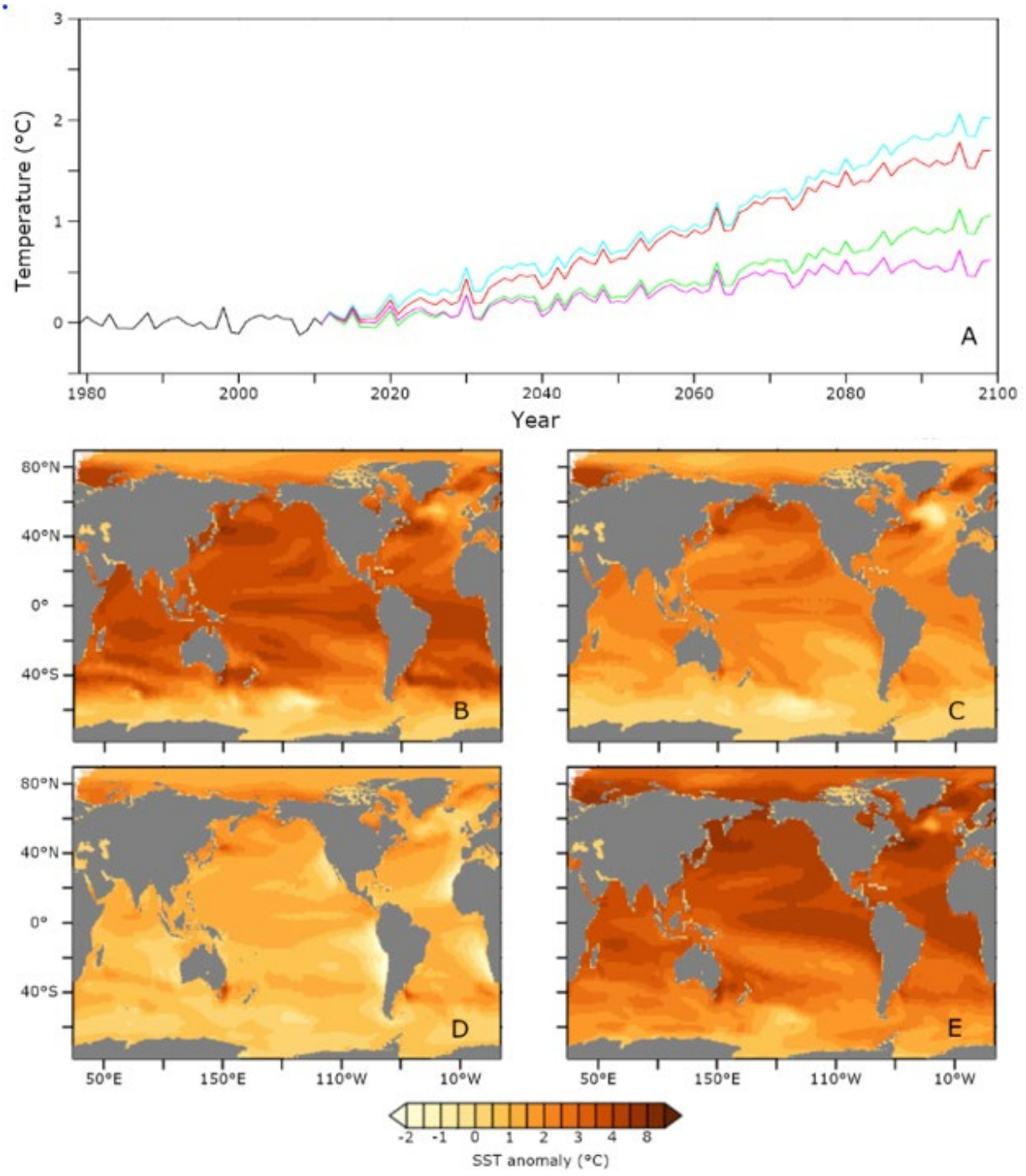
Supplementary Figure 5. Projected average (and maximum/minimum) changes of total biomass of skipjack, yellowfin and bigeye tuna in the combined exclusive economic zones (EEZs) of other Pacific Small Island Developing States (Other PSIDS) (i.e., American Samoa, Fiji, French Polynesia, Guam, New Caledonia, Niue, Northern Mariana Islands, Pitcairn Islands, Samoa, Tonga, Vanuatu, Wallis and Futuna), and in high-seas area EPO-C, by 2050 under RCP8.5 and RCP4.5 relative to 2011–2020 (see also Supplementary Tables 9, 10).



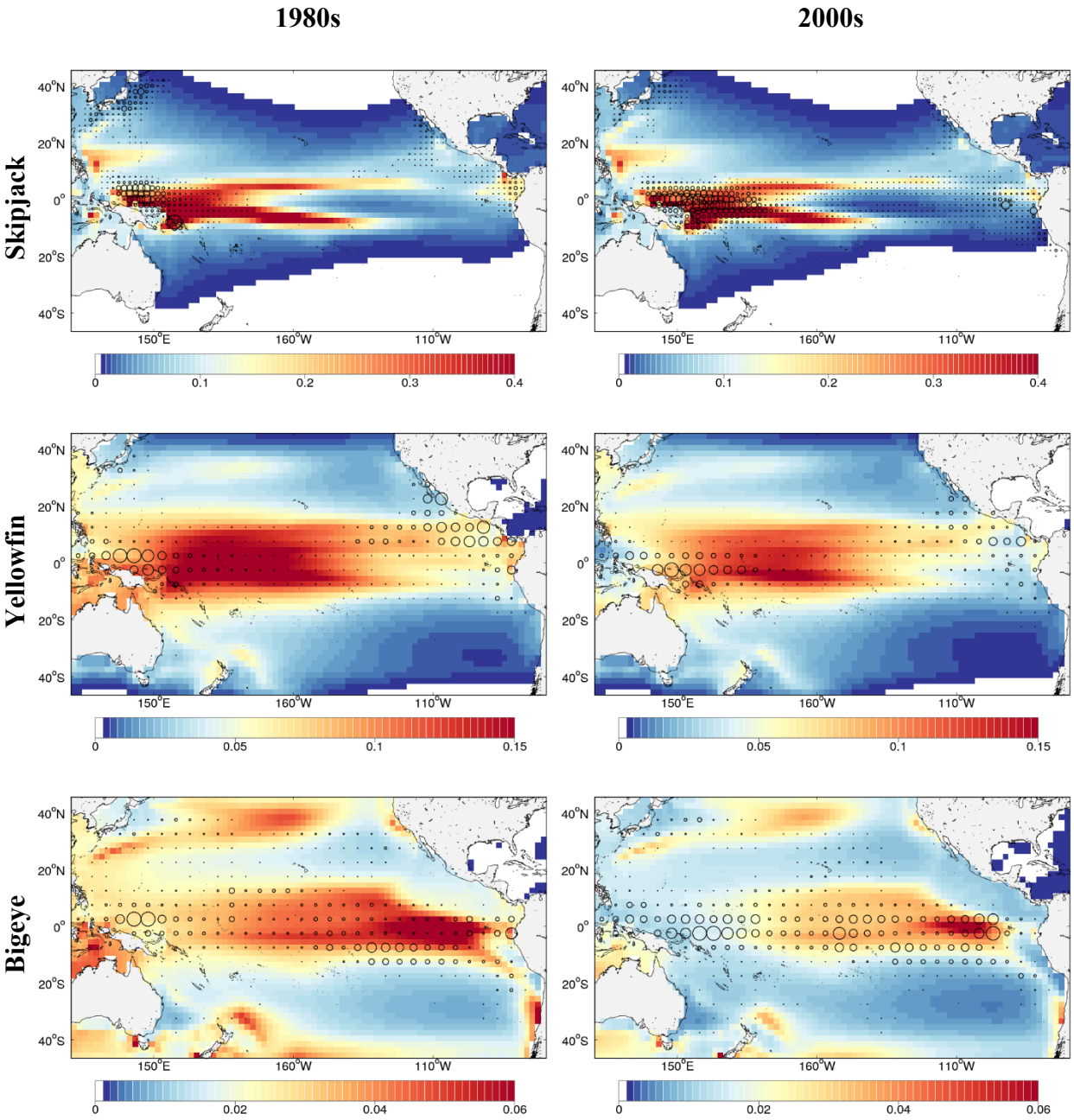
Supplementary Figure 6. Mean percentage change (circles) in purse-seine catch under the RCP8.5 and RCP4.5 emission scenarios by 2050, relative to the period 2011–2020 in a) the individual exclusive economic zones (EEZs) of the 10 tuna-dependent Pacific Small Island Developing States; and b) high-seas areas in the Western and Central Pacific Ocean and Eastern Pacific Ocean (Supplementary Figure 1). The range of percentage changes in purse-seine catch for each EEZ (Supplementary Tables 9,11) and high-seas area (Supplementary Tables 10,12) derived from the four global climate models is also shown.



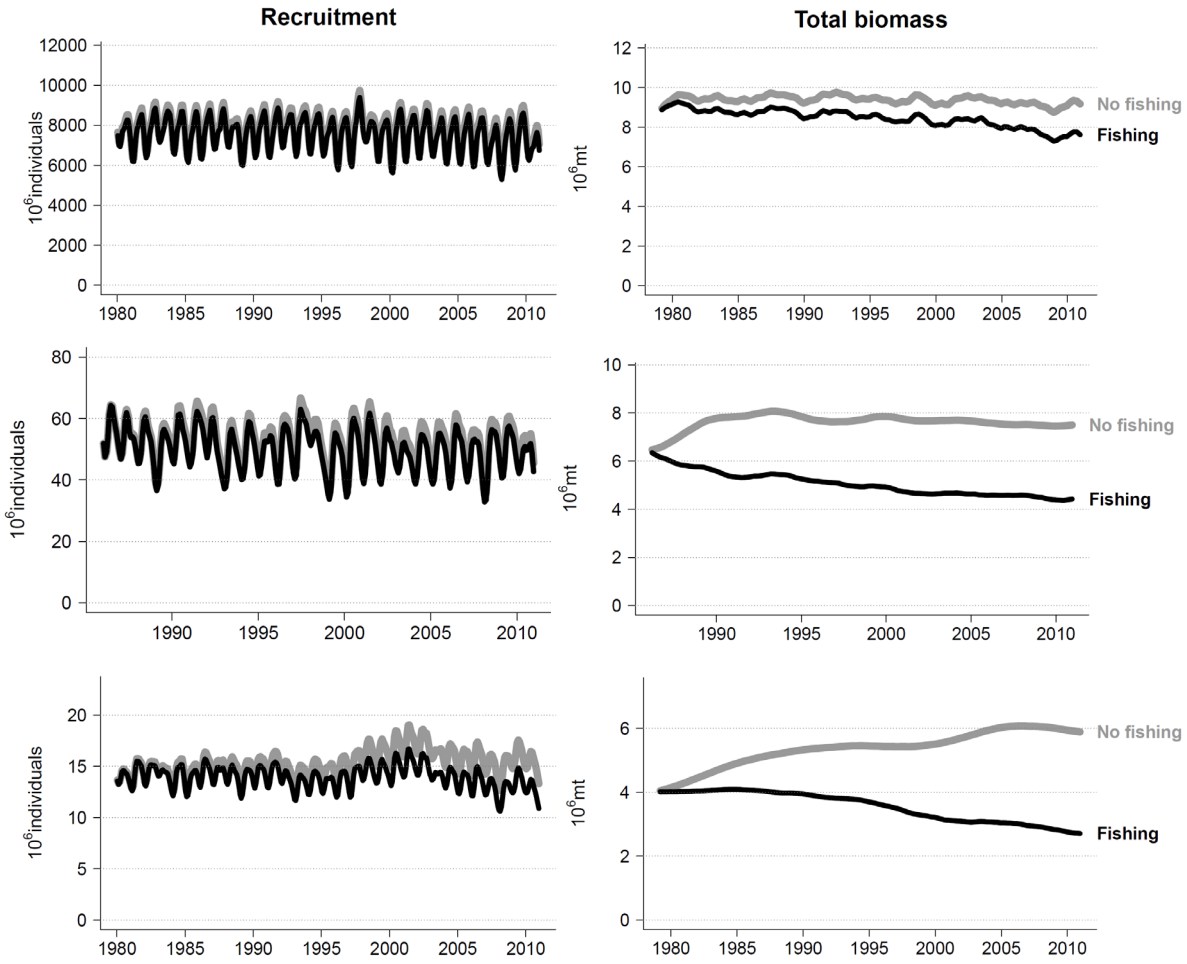
Supplementary Figure 7. Example of an atmospheric variable reconstructed by the pseudo-anomaly method. Time-series of the annual, mean air temperature at 2 m (averaged over the nino3.4 (5ºN–5ºS, 170ºW–120ºW box) (https://climatedataguide.ucar.edu/climate-data/nino-sst-indices-nino-12-3-34-4-oni-and-tni) for the DFS5.2 forcing set (black), and forcing built following the correction method for the IPSL (red), GFDL (green), MIROC (blue) and MPI (pink) Earth System Models.



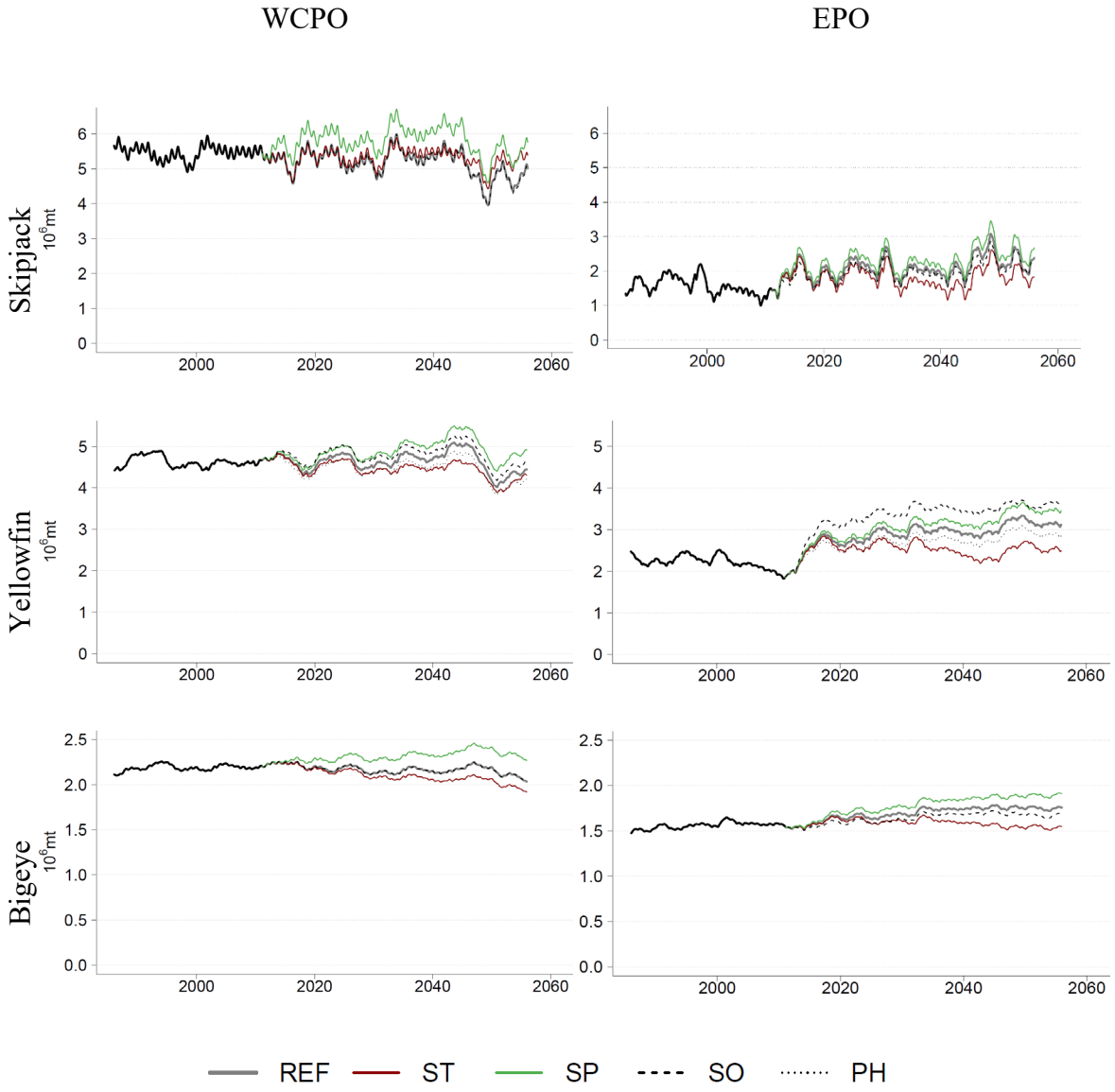
Supplementary Figure 8. (A) Time evolution of sea surface temperature (SST) anomalies (°C) referenced to the historical period 1979–2010 (black) for the four forced NEMO-PISCES simulations derived from IPSL (red), GFDL (green), MIROC (blue) and MPI (pink). Spatial variation in SST warming during the period 2090–2099, relative to historical mean temperatures (1979–2010), from the NEMO-PISCES simulations derived from ESM forcings from IPSL (B), GFDL (C), MPI (D) and MIROC (E) are also shown.



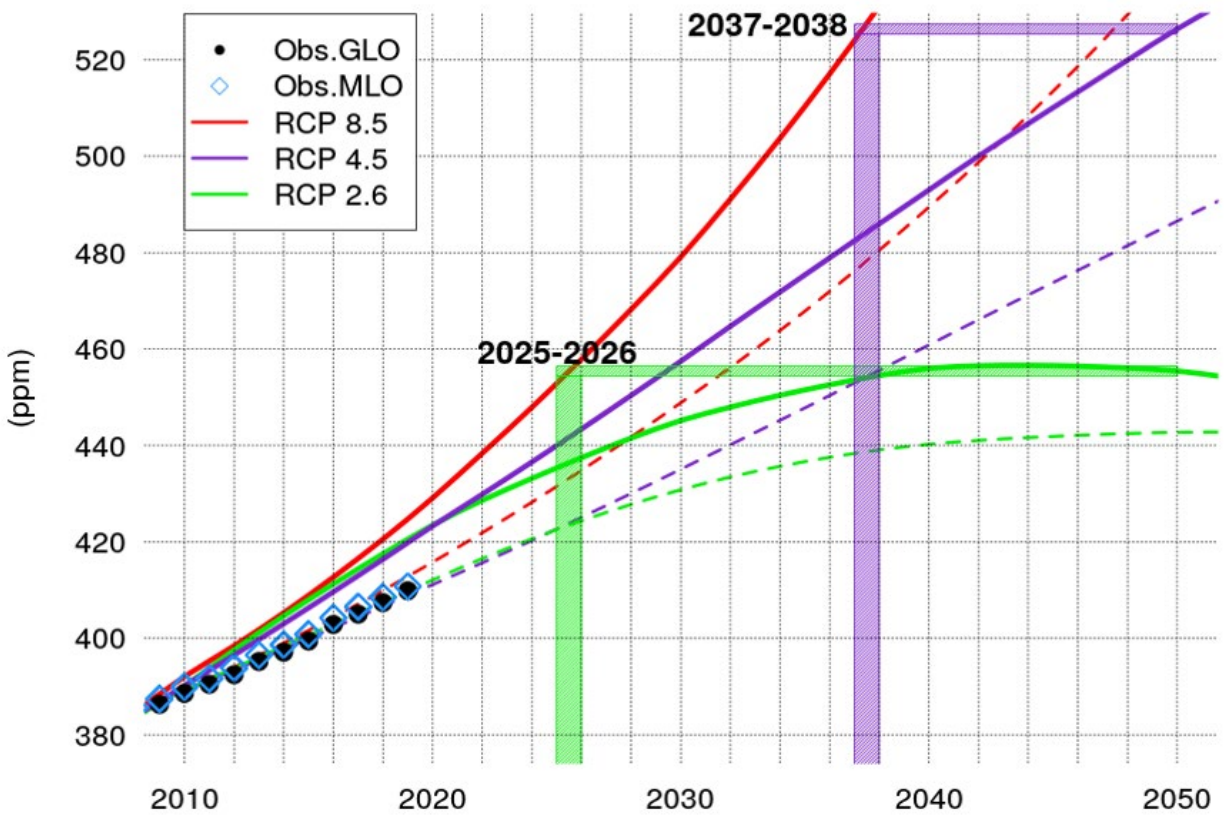
Supplementary Figure 9. Comparison of predicted average total biomass distributions (tonnes/km^2) for the three tropical tuna species produced by SEAPODYM for the first (1980–1989) and last (2000–2009) decades of the historical time series of catch data for these species from the entire Pacific Ocean basin, and the distribution of catches for each species. Circles show the distribution of observed catches, with catch proportional to the size of the circles for each species but not among species.



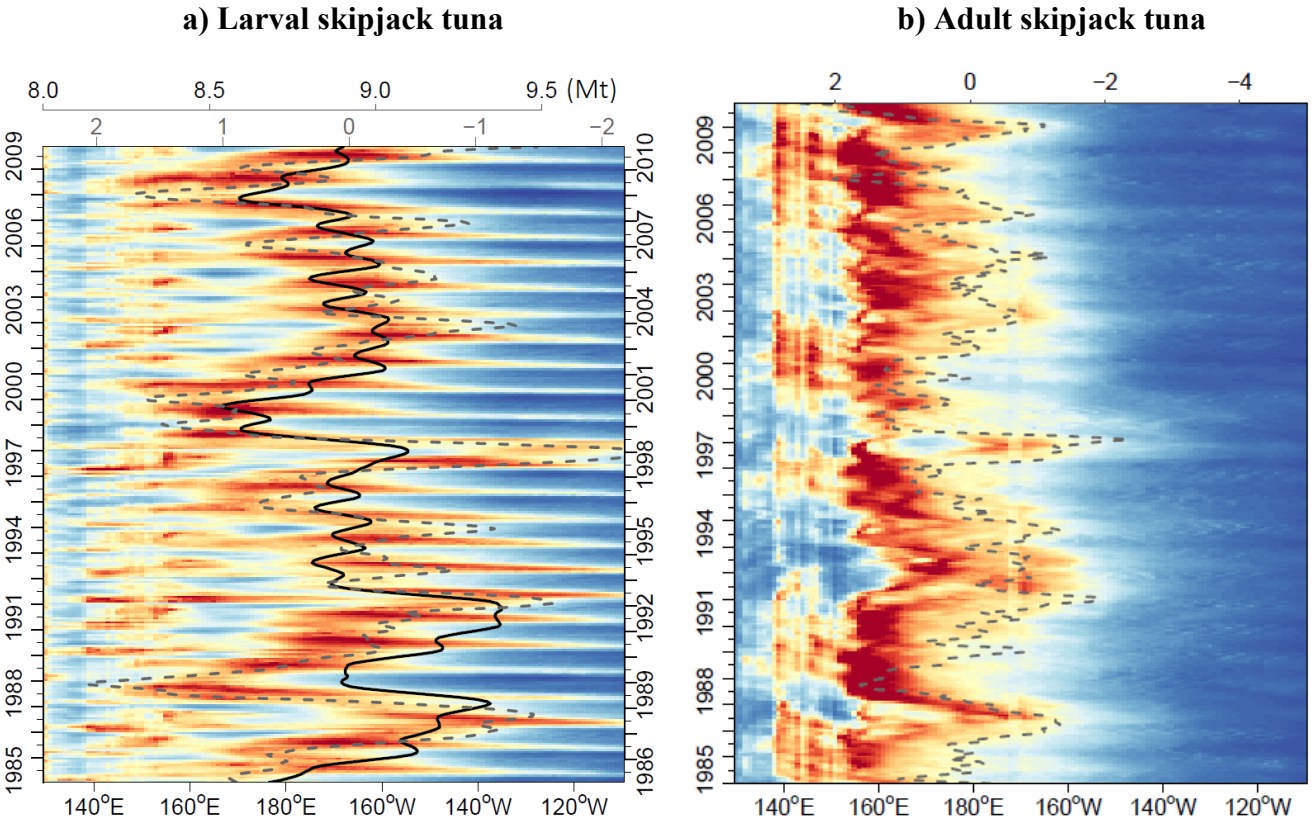
Supplementary Figure 10. Predictions from reference models of skipjack (top), yellowfin (middle) and bigeye (bottom) tuna recruitment (small juveniles, 0–3 months of age) (left), and total biomass computed as the sum of young immature fish and mature adult fish over the Pacific Ocean model domain (right). Curves in all panels represent simulations with observed fishing pressure (black) and with the absence of fishing (grey).



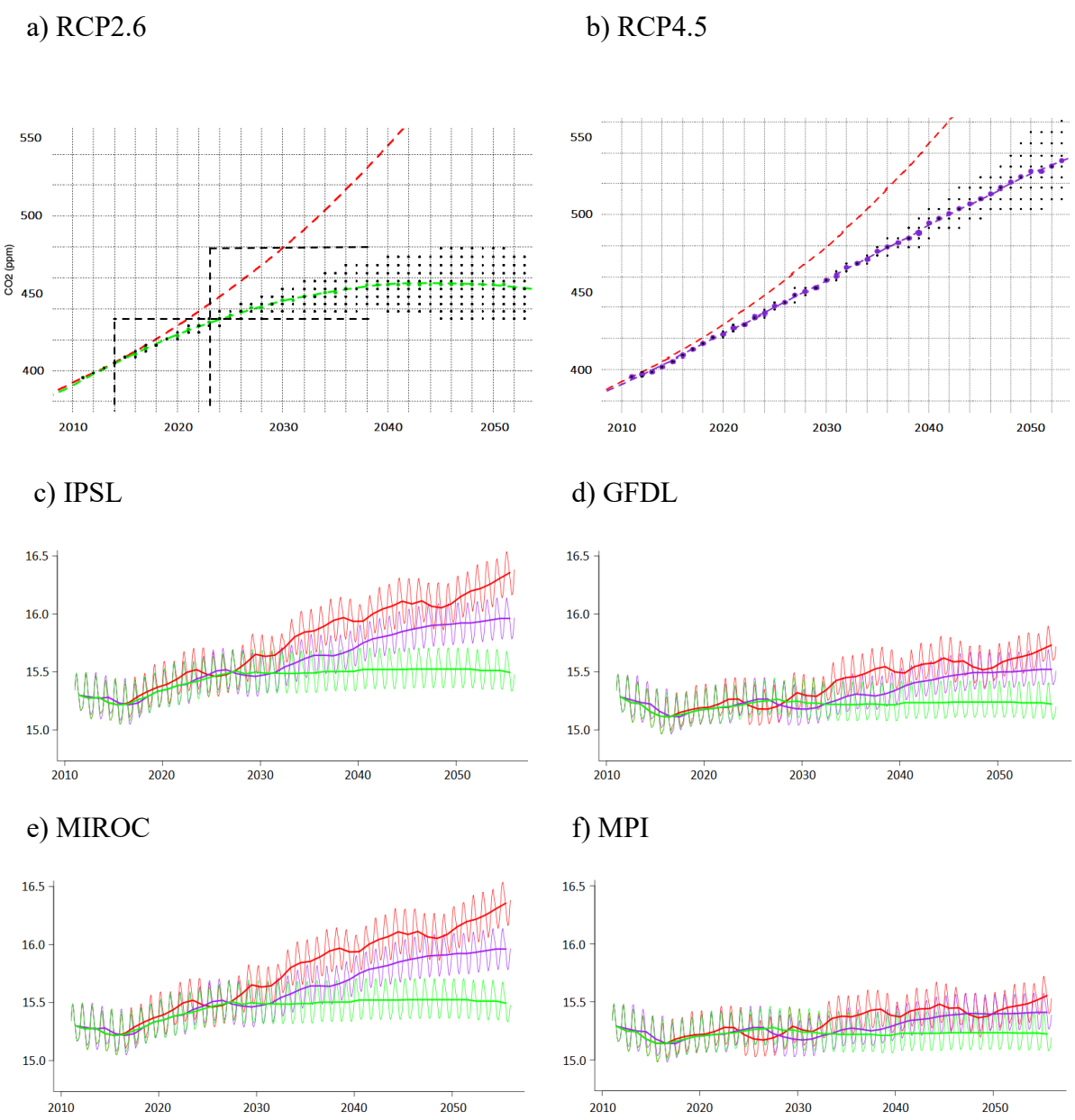
Supplementary Figure 11. Total biomass of adult skipjack, yellowfin and bigeye tuna predicted by SEAPODYM in the Western and Central Pacific Ocean (WCPO) (120°E–150°W; 45°S–50°N) and Eastern Pacific Ocean (EPO) (150°W–70°W; 45°S–50°N) during the historical time period (1980–2010) and forecast time period (2011–2053) by 'uncertainty' scenario: REF = mean of four climate-derived (IPSL, GFDL, MIROC and MPI) NEMO-PISCES ocean simulations; ST = genetic adaptation to increasing temperature; SP = 10% increase of primary production in tropical region defined by 27°C isotherm; SO = no change in dissolved oxygen content over forecast period, and PH = negative impact of ocean acidification of larval survival (for yellowfin tuna only) (Supplementary Table 21). All simulations were run under the RCP8.5 emissions scenario.



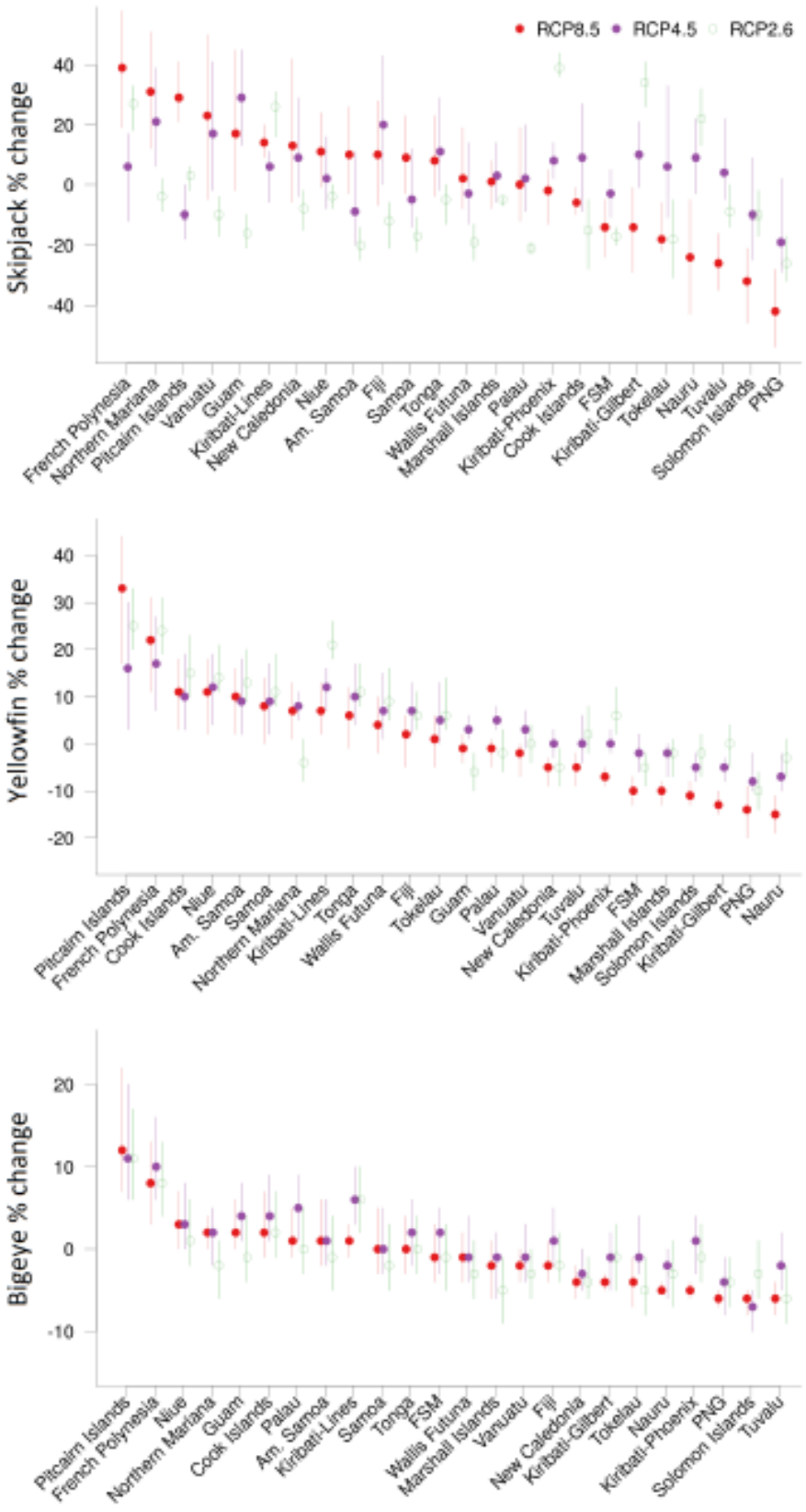
Supplementary Figure 12. IPCC (AR5) simulations of total greenhouse gas (GHG) concentrations (CO_2-eq) (solid lines) and carbon dioxide (CO_2) (dashed lines) under RCP8.5 (red), RCP4.5 (purple), and RCP2.6 (green) emission scenarios. Black dots represent the observed global mean of atmospheric CO_2 concentrations and blue diamonds show the respective Mauna Loa observations for CO_2. The green shaded areas mark the year when the total GHG concentrations under RCP8.5 equal those under RCP2.6 in 2050; and the purple shaded areas mark the year when the total GHG concentrations under RCP8.5 equal those under RCP4.5 in 2050.



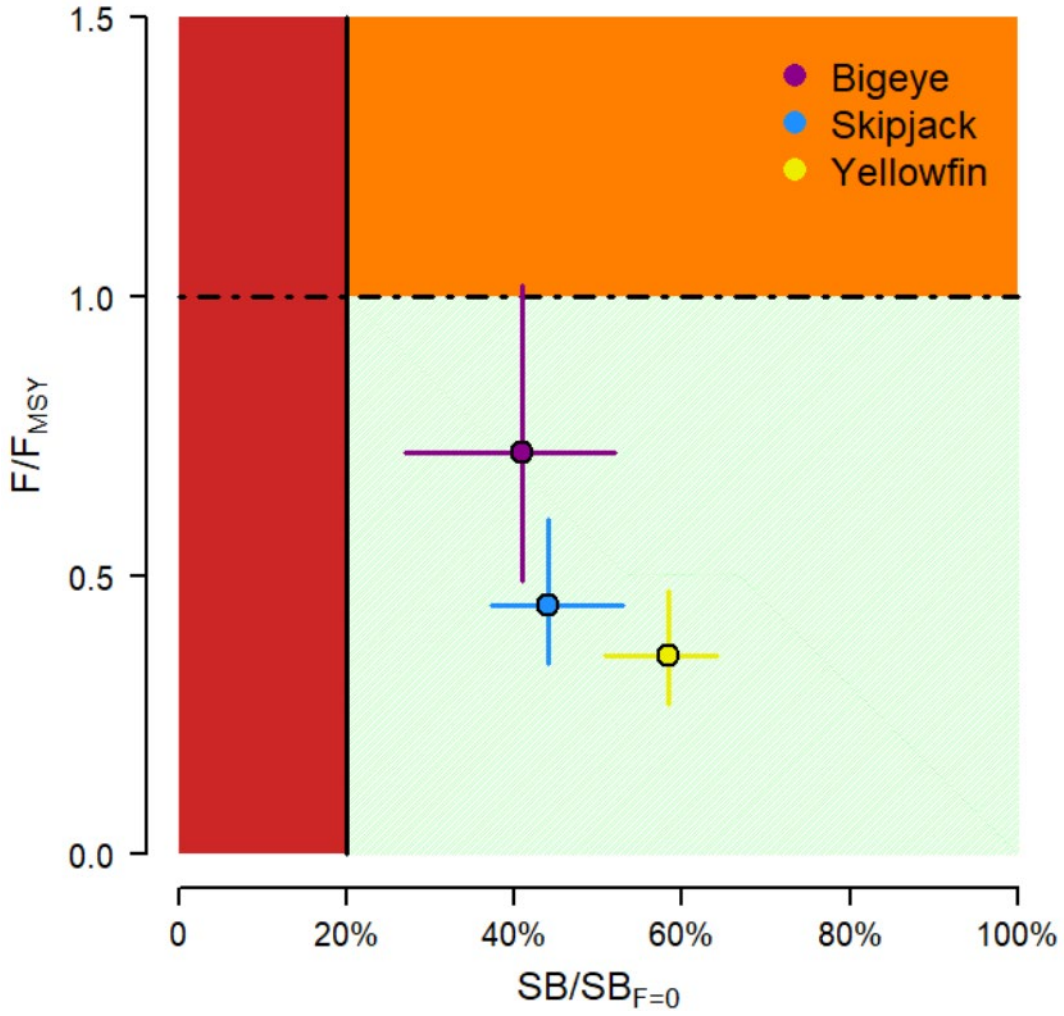
Supplementary Figure 13. Hovmöller diagrams showing simulated temporal-spatial variation of (a) larval skipjack tuna density, and (b) adult skipjack tuna density, in the equatorial Pacific (10°S–10°N) between 1985 and 2010. Densities are depicted with colours ranging from blue (near zero values), to dark red (maximum values). Both panels are overlaid with the 3-month moving average of the Southern Oscillation Index (SOI) (grey dashed line), with SOI values depicted on the upper *x* axis. Panel (a) is also overlaid with the total skipjack biomass (solid line), which has been time-lagged and drawn on the secondary *y* axis on the right, and quantified in tonnes (x 10^6) on the upper *x* axis.



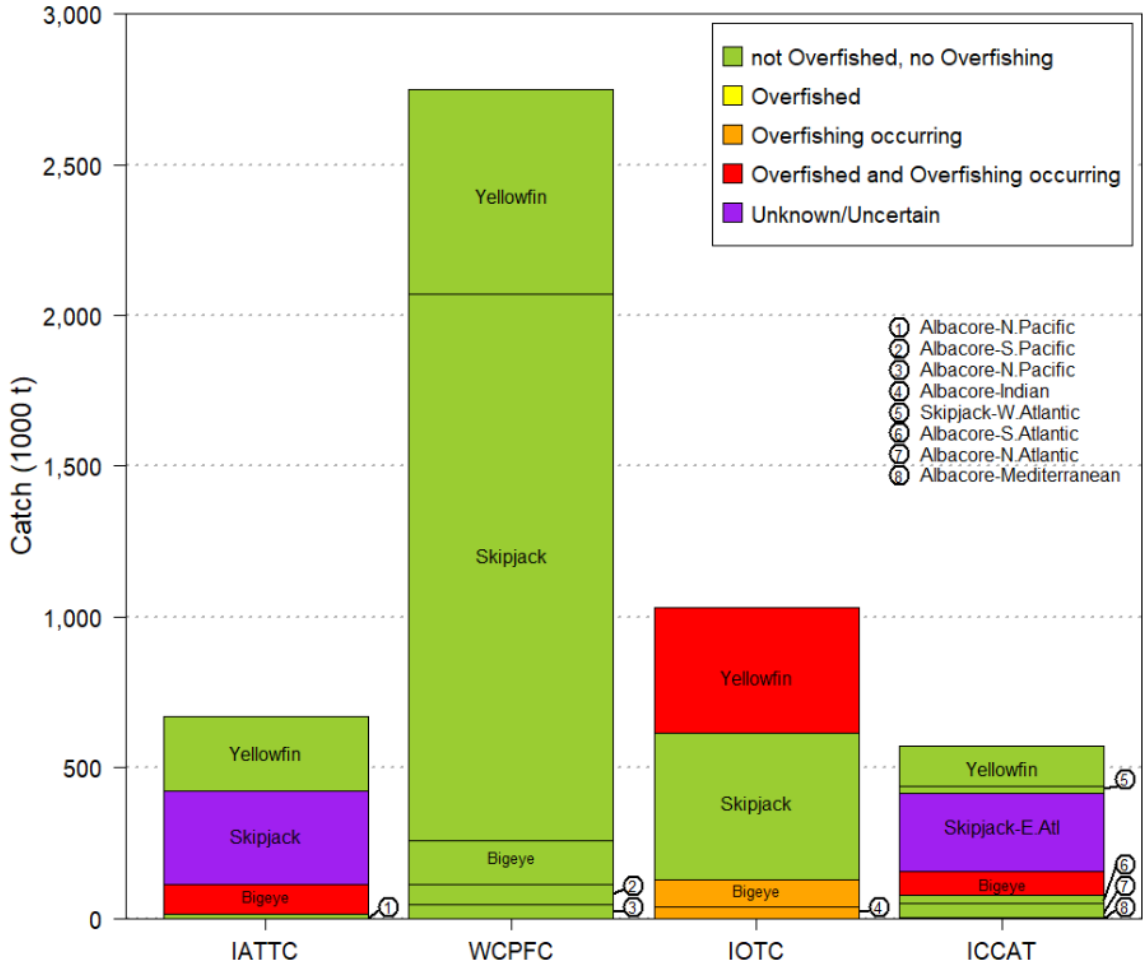
Supplementary Figure 14. The mapping of years between (a) RCP2.6 and RCP8.5, and (b) RCP4.5 and RCP8.5, forcings based on equivalent CO_2-eq concentration to compute smoothed time series for RCP2.6 and RCP4.5 scenarios (see Methods for details); and average ocean temperatures in the epipelagic layer under RCP8.5 forcing (red) and surrogate RCP4.5 (purple) and RCP2.6 (green) forcings in the four climate models (c-f). Thin lines show monthly dynamics and thick lines correspond to the annual average.



Supplementary Figure 15. Percentage change in biomass of skipjack tuna (top), yellowfin tuna (middle) and bigeye tuna (bottom) in the EEZs of Pacific Small Island Developing States in 2050, simulated with ocean forcings under the RCP8.5 emissions scenario (red), and surrogate RCP4.5 (purple) and RCP2.6 (green) scenarios. Circles depict average biomass change projected for each EEZ based on four Earth System Models (ESMs), with the vertical bars showing the range in biomass change from the four ESMs.



Supplementary Figure 16. 'Majuro' plot summarizing the stock status for skipjack, yellowfin and bigeye tuna in the Western and Central Pacific Ocean in 2020 in terms of spawning potential depletion relative to unfished levels ($SB/SB_{F=0}$) and fishing mortality (F) relative to the level required for maximum sustainable yield $F_{(MSY)}$. For each tuna stock, the point represents the median stock status calculated across the grid of assessment runs included by the Scientific Committee of the Western and Central Pacific Fisheries Commission within the 'structural uncertainty grid'. The 'cross hairs' represent the 80 percentile ranges of $SB/SB_{F=0}$ and F/F_{MSY} estimates within that grid, as included in management advice (source: Oceanic Fisheries Programme, Pacific Community).



Supplementary Figure 17. Catch (5-year average) and stock status of skipjack (SKJ), yellowfin (YFT), bigeye (BET) and albacore (ALB) tuna reported by all tuna regional fisheries management organisations for October 2020. IATTC = Inter-American Tropical Tuna Commission; WCPFC = Western and Central Pacific Fisheries Commission; IOTC = Indian Ocean Tuna Commission; ICCAT = International Commission for the Conservation of Atlantic *Tunas* (source: Oceanic Fisheries Programme, Pacific Community).

Supplementary Table 1. Average, and standard deviation (SD), tuna-fishing access fees, total national government revenue (excluding grants), and percentage of government revenue derived from tuna-fishing access fees, for the 10 Pacific Small Island Developing States (Pacific SIDS) where most purse-seine fishing occurs in the Western and Central Pacific Ocean, for the 4-year period (2015 to 2018). The area (km^2) of the exclusive economic zone (EEZ) of each Pacific SIDS is also shown (source: Pacific Islands Forum Fisheries Agency).

Pacific SIDS	Access fees (USD millions)						Non-aid government revenue (USD millions)[1]						Percentage gov't revenue derived from access and licensing fees						EEZ area (km^2)*
	2015	2016	2017	2018	Mean	SD	2015	2016	2017	2018	Mean	SD	2015	2016	2017	2018	Mean	SD	
Cook Is	8	13	18	15	13.5	4.2	120	122	132	130	126.1	6.0	6.7	10.7	13.6	11.5	10.6	2.9	1,947,760
FSM	65	63	73	72	68.4	5.1	117	119	151	215	150.6	45.9	55.7	52.9	48.2	33.6	47.6	9.8	2,939,300
Kiribati	149	107	130	127	128.3	17.2	191	156	183	197	181.7	18.2	78.2	68.7	71.0	64.5	70.6	5.7	3,550,000[2]
Marshall Is	27	32	33	32	31.0	2.7	50	63	80	71	66.1	12.8	54.0	50.8	41.3	45.1	47.8	5.7	2,004,888
Nauru	22	28	36	32	29.5	6.0	58	94	112	130	98.6	30.5	37.6	29.9	32.1	24.7	31.1	5.4	293,079
Palau	6	5	9	8	7.1	1.9	71	75	78	77	75.2	3.0	8.5	6.7	11.6	11.0	9.4	2.3	605,506
PNG	118	149	111	159	134.3	23.3	3669	2891	3163	3720	3360.8	401.7	3.2	5.2	3.5	4.3	4.0	0.9	2,446,757
Solomon Is	40	34	45	47	41.3	6.1	403	388	445	480	429.0	41.7	9.8	8.7	10.1	9.8	9.6	0.6	1,553,444
Tokelau	11	16	13	14	13.4	2.1	12	18	18	16	16.0	2.9	91.7	87.9	72.4	84.6	84.2	8.4	318,990
Tuvalu	18	25	21	38	25.6	9.0	40	53	49	48	47.4	5.4	45.1	47.2	43.1	80.2	53.9	17.6	719,174
Total	**464**	**472**	**489**	**546**	**492.4**	**37.0**	**4,731**	**3,979**	**4,411**	**5,082**	**4,550.6**	**469.4**							**16,378,898**

Supplementary Table 2. Average total catch (in tonnes) for all tuna species, by all fishing methods, from the combined exclusive economic zones (EEZs) of Pacific Small Island Developing States (Pacific SIDS) between 2009 and 2018. Pacific SIDS have been divided into the eight Parties to the Nauru Agreement (PNA) plus Tokelau (Box 1) and 'Other Pacific SIDS'. The average total tuna catch from the EEZ of each Pacific SIDS for the 10-year period, and the average percentage (%) of the total regional tuna catch taken from each EEZ, are also shown. For Kiribati, data are presented for the total EEZ for the nation, and for each of three separate EEZ areas comprising the total EEZ (source: Oceanic Fisheries Programme, Pacific Community).

EEZ*	Year										Average total catch	%
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018		
PNA Members (plus Tokelau)												
FSM[1]	131,886	159,230	161,963	189,270	217,330	143,096	170,786	199,889	195,570	288,997	185,802	12.24
Kiribati	328,734	204,767	214,315	556,320	296,695	735,059	642,118	413,012	384,064	401,081	417,617	27.52
Gilbert Islands	(191,807)	(119,985)	(144,460)	(430,840)	(187,711)	(438,353)	(315,385)	(334,131)	(264,455)	(287,947)	(271,507)	(17.89)
Phoenix Islands	(21,852)	(22,804)	(28,078)	(39,426)	(32,001)	(60,318)	(184,399)	(32,854)	(30,290)	(34,567)	(48,659)	(3.21)
Line Islands	(115,075)	(61,978)	(41,777)	(86,054)	(76,982)	(236,387)	(142,334)	(46,028)	(89,319)	(78,567)	(97,450)	(6.42)
Marshall Islands	16,971	26,200	25,663	32,493	46,153	87,102	38,165	89,093	33,153	36,468	43,146	2.84
Nauru	61,672	109,355	103,310	50,983	163,812	179,776	67,193	115,738	82,316	174,916	110,907	7.31
Palau	2,178	2,924	2,898	3,904	3,415	4,903	1,509	6,571	19,450	11,317	5,907	0.39
PNG[2]	486,102	733,397	626,478	586,094	592,134	339,386	191,135	341,527	383,992	369,451	464,970	30.64
Solomon Islands	140,375	182,422	176,773	97,695	129,322	89,724	132,107	162,812	173,652	91,898	137,678	9.07
Tokelau	7,239	4,018	19,659	21,083	15,981	27,433	46,840	8,143	34,845	38,475	22,371	1.47
Tuvalu	64,506	67,948	61,130	71,276	54,820	98,289	78,426	119,969	57,808	91,825	76,600	5.05
Sub-total	**1,239,664**	**1,490,262**	**1,392,188**	**1,609,118**	**1,519,661**	**1,704,768**	**1,368,278**	**1,456,756**	**1,364,850**	**1,504,428**	**1,464,997**	**96.53**

Other Pacific SIDS												
American Samoa	3,993	3,569	3,271	5,249	2,885	4,169	3,026	3,223	3,849	3,190	3,642	0.24
Cook Islands	6,492	6,559	11,048	30,754	15,971	20,473	25,053	11,732	23,515	36,083	18,768	1.24
Fiji	8,370	9,895	7,333	6,845	5,475	7,423	12,175	10,733	12,159	9,127	8,953	0.59
French Polynesia	6,877	6,249	6,026	7,266	6,670	7,170	7,316	6,940	6,278	7,072	6,786	0.45
Guam	173	165	196	155	251	192	324	256	262	301	228	0.01
New Caledonia	120	162	120	163	175	117	42	96	27	136	116	0.01
CNMI[3]	2,147	2,472	2,358	2,319	2,290	2,422	2,487	2,316	2,362	2,270	2,344	0.15
Niue	293	223	0		420	283	282	110	15	426	228	0.02
Pitcairn Islands	0	0	0	0	0	0	0	0	0	0	0	0.00
Samoa	3,545	3,351	2,749	3,251	2,052	1,352	2,311	3,652	3,320	2,112	2,769	0.18
Tonga	271	128	243	1,345	2,344	740	1,736	2,939	1,849	1,184	1,278	0.08
Vanuatu	7,566	3,800	8,716	6,186	8,536	6,887	6,043	8,910	12,047	6,621	7,531	0.50
Wallis & Futuna	132	0	24	0		167	0	0	0		40	0.00
Sub-total	**39,978**	**36,571**	**42,085**	**63,533**	**47,070**	**51,395**	**60,794**	**50,905**	**65,683**	**68,521**	**52,654**	**3.47**
TOTAL	**1,279,642**	**1,526,833**	**1,434,273**	**1,672,651**	**1,566,731**	**1,756,163**	**1,429,072**	**1,507,661**	**1,430,533**	**1,572,949**	**1,517,651**	**100.00**

*Includes area covered by the EEZ and archipelagic waters where they exist

1. Federated States of Micronesia; 2. Papua New Guinea; 3. Commonwealth of Northern Marinas Islands

Supplementary Table 3. Average (mean ± standard deviation) annual catch (tonnes) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and all three species of tuna combined, taken by purse-seine fishing over the 10-year period (2009–2018) in the exclusive economic zones (EEZs) of 10 Pacific Island Small Developing States; note that Kiribati has three EEZ areas (source: Oceanic Fisheries Programme, Pacific Community).

Tuna species	Year	Pacific Island Small Developing State EEZ*													Total
		Cook Islands	FSM[1]	Kiribati EEZ areas				RMI[2]	Nauru	Palau	PNG[3]	Solomon Islands	Tokelau	Tuvalu	
				Gilbert	Phoenix	Line	Total								
SKJ	2009	660	103,279	149,552	99,067	10,071	258,690	10,434	49,956	678	335,605	88,495	5,913	56,593	910,304
	2010	209	128,633	76,191	49,700	11,022	136,913	13,682	81,891	273	518,133	131,870	3,459	56,766	1,071,829
	2011	1,355	116,283	98,084	26,063	13,730	137,877	17,482	80,197	0	461,595	124,243	17,593	45,701	1,002,326
	2012	11,031	154,285	299,420	69,028	21,010	389,458	18,583	39,147	507	425,565	56,913	17,517	57,596	1,170,601
	2013	6,209	184,767	143,931	62,712	14,628	221,271	33,378	129,015	301	426,845	80,825	13,703	45,250	1,141,564
	2014	11,484	111,683	359,575	189,474	33,673	582,722	65,796	148,165	902	223,145	36,034	24,138	85,491	1,289,559
	2015	16,050	105,107	242,671	126,676	151,641	520,988	23,368	50,134	183	107,868	75,110	42,478	69,977	1,011,261
	2016	5,917	158,084	254,856	39,320	18,780	312,956	70,918	80,135	2,199	207,202	91,968	4,159	98,751	1,032,289
	2017	15,026	148,957	178,585	73,215	21,459	273,259	21,359	56,606	8,261	236,994	113,417	28,662	44,742	947,282
	2018	27,187	231,641	232,617	64,500	24,872	321,989	24,895	146,497	3,503	239,337	47,498	32,749	77,764	1,153,060
	Mean	**9,513**	**144,272**	**203,548**	**79,976**	**32,089**	**315,612**	**29,990**	**86,174**	**1,681**	**318,229**	**84,637**	**19,037**	**63,863**	**1,073,008**
	SD	**8,479**	**40,676**	**90,049**	**47,975**	**42,597**	**180,621**	**21,208**	**40,966**	**2,557**	**134,404**	**32,166**	**13,018**	**18,559**	**115,602**
YFT	2009	80	19,034	18,866	6,931	1,917	27,714	2,032	9,872	272	131,693	27,684	971	5,345	224,697
	2010	45	19,291	25,531	6,857	2,575	34,963	3,232	23,977	63	191,250	25,550	423	6,647	305,442
	2011	48	32,564	18,591	9,508	3,249	31,348	2,546	14,453	0	146,453	31,623	913	7,461	267,407
	2012	1,368	22,466	101,556	10,851	5,500	117,907	3,164	8,257	220	140,960	18,094	1,878	6,763	321,078
	2013	1,428	22,468	27,742	7,702	4,573	40,017	4,899	26,393	7	146,802	26,440	1,351	5,326	275,131
	2014	1,060	19,461	55,009	31,827	12,776	99,612	9,731	23,555	1,801	104,346	20,366	2,074	7,517	289,523
	2015	1,293	50,323	47,592	11,482	15,810	74,884	7,598	14,532	2	72,242	23,156	1,289	5,119	250,438
	2016	939	27,827	56,298	3,169	1,966	61,433	11,261	31,958	1,557	118,169	55,774	665	10,725	320,307
	2017	2,799	36,853	69,162	12,546	3,749	85,457	4,899	22,126	4,249	132,006	41,930	3,462	7,114	340,896
	2018	2,014	42,886	39,462	9,635	4,559	53,656	4,986	24,395	1,245	116,568	21,166	3,588	7,424	277,928
	Mean	**1,107**	**29,317**	**45,981**	**11,051**	**5,667**	**62,699**	**5,435**	**19,952**	**942**	**130,049**	**29,178**	**1,661**	**6,944**	**287,285**
	SD	**896**	**11,016**	**26,024**	**7,792**	**4,746**	**38,562**	**3,123**	**7,726**	**1,355**	**31,174**	**11,546**	**1,104**	**1,625**	**35,507**

BET	2009	35	3,250	6,792	3,780	2,226	12,798	697	1,835	0	14,761	2,269	343	1,380	37,368
	2010	10	5,278	2,671	3,216	2,401	8,288	596	3,397	11	20,917	5,658	132	1,651	45,938
	2011	5	4,248	12,716	4,134	3,485	20,335	1,666	8,486	0	15,496	4,784	658	3,436	59,112
	2012	458	5,323	15,423	3,244	3,251	21,918	1,956	3,354	11	15,263	2,239	686	1,518	52,726
	2013	727	4,865	8,868	4,796	4,724	18,388	1,585	8,222	2	17,137	3,399	749	1,683	56,758
	2014	815	3,588	13,969	5,840	3,802	23,611	2,856	7,760	1	9,917	1,494	981	2,874	53,896
	2015	320	5,214	10,345	2,685	4,455	17,485	691	2,441	1	8,897	1,908	368	1,687	39,011
	2016	393	6,562	12,567	1,515	1,680	15,762	3,112	3,609	53	10,058	3,377	186	4,066	47,178
	2017	1,055	5,355	11,117	3,343	4,083	18,543	1,621	3,563	188	8,396	3,379	1,422	1,472	44,994
	2018	781	6,295	10,975	4,145	5,122	20,242	1,006	4,006	63	6,698	2,104	1,410	2,966	45,570
	Mean	**460**	**4,998**	**10,544**	**3,670**	**3,523**	**17,737**	**1,578**	**4,667**	**33**	**12,754**	**3,061**	**693**	**2,273**	**48,255**
	SD	**375**	**1,060**	**3,708**	**1,180**	**1,139**	**6,028**	**881**	**2,492**	**59**	**4,589**	**1,334**	**463**	**972**	**16,745**
All tuna species	2009	775	125,563	175,210	109,778	14,214	299,202	13,163	61,664	950	482,059	118,449	7,227	63,318	1,172,369
	2010	264	153,203	104,393	59,773	15,998	180,164	7,511	109,265	347	730,300	163,078	4,014	65,064	1,423,209
	2011	1,407	153,094	129,391	39,705	20,464	189,560	21,693	103,136	0	623,544	160,649	19,164	56,599	1,328,845
	2012	12,858	182,074	416,399	83,123	29,761	529,283	23,703	50,758	738	581,788	77,246	20,081	65,877	1,544,406
	2013	8,364	212,100	180,541	75,210	23,925	279,676	39,862	163,631	310	590,784	110,663	15,802	52,259	1,473,453
	2014	13,358	134,732	428,553	227,141	50,251	705,945	78,383	179,480	2,704	337,408	57,894	27,194	95,882	1,632,979
	2015	17,662	160,645	300,608	140,843	171,906	613,357	31,657	67,107	185	189,007	100,174	44,134	76,783	1,300,711
	2016	7,249	192,474	323,721	44,004	22,426	390,151	85,291	115,702	3,809	335,429	151,118	5,010	113,541	1,399,774
	2017	18,879	191,165	258,864	89,104	29,291	377,259	27,880	82,295	12,698	377,397	158,726	33,546	53,328	1,333,173
	2018	29,981	280,822	283,054	78,280	34,553	395,887	,886	174,898	4,812	362,603	70,768	37,747	88,154	1,476,559
	Mean	**11,080**	**178,587**	**260,073**	**94,696**	**41,279**	**396,048**	**37,003**	**110,794**	**2,655**	**461,032**	**116,877**	**21,392**	**73,080**	**1,408,548**
	SD	**9,478**	**45,079**	**112,491**	**55,304**	**47,054**	**214,849**	**24,858**	**47,659**	**3,907**	**167,503**	**40,097**	**14,044**	**20,289**	**132,245**

*Includes area covered by the EEZ and archipelagic waters where they exist

1. Federated States of Micronesia; 2. Republic of Marshall Islands; 3. Papua New Guinea

Supplementary Table 4. Annual average (mean ± standard deviation) catch (tonnes) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and all three species of tuna combined, taken by purse-seine fishing over the 10-year period (2009–2018) from high-seas areas in the Western and Central Pacific Ocean, and Eastern Pacific Ocean (Supplementary Figure 1) (source: Oceanic Fisheries Programme, Pacific Community).

Tuna species	Year	High-seas areas													Total
		I1	I2	I3	I4	I5	I6	I7	I8	I9	H4	H5	EPO-N	EPO-C	EPO-S	
SKJ	2009	17,543	164,867	0	17,300	14,954	16,799	0	0	0	36,743	18,385	2,457	237,466	1,548	528,062
	2010	578	1,881	0	4,013	8,845	28,771	0	0	0	9,828	10,970	3,252	169,348	795	238,281
	2011	0	1,088	170	13,472	8,063	15,993	0	0	0	4,620	7,441	7,929	266,548	793	326,117
	2012	130	530	20	8,517	7,936	21,006	71	0	94	8,196	25,874	9,045	263,449	341	345,209
	2013	9,453	11,399	0	9,195	11,803	15,802	0	15	122	5,537	12,516	9,621	259,034	155	344,652
	2014	19,370	1,214	205	7,917	13,104	28,006	0	0	24	18,581	44,258	5,389	246,195	1,691	385,954
	2015	15,897	1,147	40	17,049	33,499	14,107	57	0	0	18,270	156,393	7,403	294,847	94	558,803
	2016	14,189	1,350	6	51,532	37,033	1,928	0	0	0	35,938	13,386	5,089	272,644	3,364	436,459
	2017	15,750	774	10	18,810	7,414	9,192	0	0	0	30,758	29,307	12,478	279,057	6,547	410,096
	2018	12,370	2,046	0	17,352	27,288	2,988	0	0	0	15,839	72,965	8,057	257,433	4,985	421,323
	Mean	**10,528**	**18,630**	**45**	**16,516**	**16,994**	**15,459**	**13**	**2**	**24**	**18,431**	**39,150**	**7,072**	**254,602**	**2,031**	**399,495**
	SD	**7,597**	**51,483**	**77**	**13,292**	**11,285**	**9,112**	**27**	**5**	**45**	**12,185**	**45,695**	**3,056**	**34,033**	**2,222**	**95,088**
YFT	2009	2,333	32,140	5	4,244	4,803	70	0	0	0	1,700	1,436	76,470	165,564	1,390	290,155
	2010	28	436	0	1,023	2,015	374	0	0	0	1,122	1,515	98,047	129,480	1,438	235,478
	2011	0	196	3	2,002	1,507	2,405	0	0	0	1,092	3,031	74,508	133,305	319	218,369
	2012	11	100	0	3,112	2,078	290	20	0	23	1,204	4,374	63,172	140,474	22	214,880
	2013	2,799	2,476	0	2,770	3,172	225	0	5	38	444	1,926	93,516	126,251	33	233,655
	2014	5,543	171	5	1,336	3,816	317	0	0	1	2,316	13,908	93,446	146,000	409	267,268
	2015	7,667	267	0	3,132	6,349	685	7	0	0	1,300	9,971	69,398	176,302	72	275,150
	2016	7,916	229	1	4,721	2,092	95	0	0	0	2,293	1,063	79,284	153,549	342	251,585
	2017	8,094	141	0	7,685	1,462	499	0	0	0	6,107	4,134	61,627	140,750	372	230,871
	2018	7,757	309	0	1,965	8,005	107	0	0	0	1,783	14,063	61,450	165,753	998	262,190
	Mean	**4,215**	**3,647**	**1**	**3,199**	**3,530**	**507**	**3**	**1**	**6**	**1,936**	**5,542**	**77,092**	**147,743**	**540**	**247,960**
	SD	**3,551**	**10,037**	**2**	**1,969**	**2,227**	**694**	**6**	**2**	**13**	**1,574**	**5,143**	**13,844**	**16,997**	**539**	**25,233**

BET	2009	266	6,571	0	1,614	2,606	112	0	0	0	557	931	9	59,593	1,964	74,223
	2010	11	126	0	645	1,909	211	0	0	0	233	948	12	48,119	998	53,212
	2011	0	115	6	2,078	1,727	498	0	0	0	617	702	0	44,960	204	50,907
	2012	3	35	0	1,784	2,565	362	0	0	14	305	1,017	0	54,935	113	61,133
	2013	485	924	0	2,218	3,166	222	0	2	14	277	1,723	3	51,416	298	60,748
	2014	478	61	0	402	2,369	685	0	0	2	556	3,026	35	52,815	400	60,829
	2015	993	45	0	688	2,460	156	12	0	0	498	2,224	0	65,264	101	72,441
	2016	435	103	1	3,533	2,048	6	0	0	0	609	439	4	57,710	25	64,913
	2017	1,087	24	0	3,279	2,348	7	0	0	0	889	2,728	48	63,810	805	75,025
	2018	2,117	64	0	1,038	5,870	192	0	0	0	715	4,519	2	54,571	2,313	71,401
	Mean	**588**	**807**	**1**	**1,728**	**2,707**	**245**	**1**	**0**	**3**	**526**	**1,826**	**11**	**55,319**	**722**	**64,483**
	SD	**660**	**2,043**	**2**	**1,082**	**1,182**	**215**	**4**	**1**	**6**	**206**	**1,295**	**17**	**6,467**	**813**	**8,610**
All tuna species	2009	20,142	203,578	5	23,158	22,363	16,981	0	0	0	39,000	20,752	78,936	462,622	4,902	892,439
	2010	617	2,443	0	5,681	12,769	29,356	0	0	0	11,183	13,433	101,311	346,946	3,231	526,970
	2011	0	1,399	179	17,552	11,297	18,896	0	0	0	6,329	11,174	82,437	444,813	1,316	595,392
	2012	144	665	20	13,413	12,579	21,658	91	0	131	9,705	31,265	72,217	458,858	476	621,222
	2013	12,737	14,799	0	14,183	18,141	16,249	0	22	174	6,258	16,165	103,140	436,701	486	639,055
	2014	25,391	1,446	210	9,655	19,289	29,008	0	0	27	21,453	61,192	98,870	445,010	2,500	714,051
	2015	24,557	1,459	40	20,869	42,308	14,948	76	0	0	20,068	168,588	76,801	536,412	267	906,393
	2016	22,540	1,682	8	59,786	41,173	2,029	0	0	0	38,840	14,888	84,377	483,903	3,731	752,957
	2017	24,931	939	10	29,774	11,224	9,698	0	0	0	37,754	36,169	74,153	483,616	7,724	715,992
	2018	22,244	2,419	0	20,355	41,163	3,287	0	0	0	18,337	91,547	69,509	477,758	8,296	754,915
	Mean	**15,330**	**23,083**	**47**	**21,443**	**23,231**	**16,211**	**17**	**2**	**33**	**20,893**	**46,517**	**84,175**	**457,664**	**3,293**	**711,939**
	SD	**11,007**	**63,558**	**79**	**15,143**	**13,162**	**9,346**	**35**	**7**	**64**	**13,281**	**49,904**	**12,529**	**48,323**	**2,924**	**122,602**

Supplementary Table 5a. ***Average*** projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and total biomass, in exclusive economic zones of 10 Pacific Small Island Developing States (Pacific SIDS) under RCP8.5 by 2050. Change in tonnes is also shown.

Pacific SIDS	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP8.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
Cook Islands	106,593	79,372	38,968	224,933	47.4	35.3	17.3	-6	+11	+2	+1.4	228,048	+ 3,115
FSM	341,280	299,670	97,815	738,765	46.2	40.6	13.2	-14	-10	-1	-10.7	660,041	-78,724
Kiribati–Gilbert Is	336,009	134,529	35,998	506,536	66.3	26.6	7.1	-14	-13	-4	-13.0	440,566	-65,970
Kiribati–Phoenix Is	202,849	80,528	24,810	308,187	65.8	26.1	8.1	-2	-7	-5	-3.5	297,253	-10,934
Kiribati–Lines Is	250,078	141,321	57,758	449,157	55.7	31.5	12.9	+14	+7	+1	+10.1	494,638	+ 45,481
Marshall Islands	178,892	198,363	60,664	437,919	40.9	45.3	13.9	+1	-10	-2	-4.4	418,658	-19,261
Nauru	92,146	30,347	7,976	130,469	70.6	23.3	6.1	-24	-15	-5	-20.7	103,403	-27,066
Palau	62,544	58,943	22,194	143,681	43.5	41.0	15.4	0	-1	+1	-0.3	143,314	-367
PNG	554,428	248,820	71,292	874,540	63.4	28.5	8.2	-42	-14	-6	-31.1	602,568	- 271,972
Solomon Islands	267,111	138,747	40,297	446,155	59.9	31.1	9.0	-32	-11	-6	-23.1	342,999	- 103,156
Tokelau	63,731	30,688	11,113	105,532	60.4	29.1	10.5	-18	+1	-4	-11.0	93,923	-11,609
Tuvalu	117,569	55,562	18,089	191,220	61.5	29.1	9.5	-26	-5	-6	-18.0	156,789	-34,431
Total	**2,573,230**	**1,496,890**	**486,974**	**4,557,094**	**56.5**	**32.8**	**10.7**					**3,982,199**	**- 574,895 (-12.6%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 5b. ***Maximum*** (i.e., maximum negative/minimum positive) projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and total biomass, in the exclusive economic zones of the 10 Pacific Small Island Developing States (Pacific SIDS) under RCP8.5 by 2050. Change in tonnes is also shown.

Pacific SIDS	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP8.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
Cook Islands	106,593	79,372	38,968	224,933	47.4	35.3	17.3	-10	+3	-1	-3.9	216,265	-8,668
FSM	341,280	299,670	97,815	738,765	46.2	40.6	13.2	-24	-13	-4	-16.9	613,988	-124,777
Kiribati–Gilbert Is	336,009	134,529	35,998	506,536	66.3	26.6	7.1	-29	-15	-5	-23.6	387,114	-119,422
Kiribati–Phoenix Is	202,849	80,528	24,810	308,187	65.8	26.1	8.1	-13	-9	-6	-11.4	273,081	-35,106
Kiribati–Lines Is	250,078	141,321	57,758	449,157	55.7	31.5	12.9	+9	+2	-1	+5.5	473,913	+24,756
Marshall Islands	178,892	198,363	60,664	437,919	40.9	45.3	13.9	-8	-13	-6	-10.0	394,181	-43,738
Nauru	92,146	30,347	7,976	130,469	70.6	23.3	6.1	-43	-19	-5	-35.1	84,681	- 45,788
Palau	62,544	58,943	22,194	143,681	43.5	41.0	15.4	-12	-5	-1	-7.4	133,007	-10,674
PNG	554,428	248,820	71,292	874,540	63.4	28.5	8.2	-54	-20	-7	-40.5	520,394	-354,146
Solomon Islands	267,111	138,747	40,297	446,155	59.9	31.1	9.0	-46	-13	-8	-32.3	302,023	-144,132
Tokelau	63,731	30,688	11,113	105,532	60.4	29.1	10.5	-22	-5	-7	-15.5	89,199	-16,333
Tuvalu	117,569	55,562	18,089	191,220	61.5	29.1	9.5	-35	-9	-8	-24.9	143,623	-47,597
Total	**2,573,230**	**1,496,890**	**486,974**	**4,557,094**	**56.5**	**32.8**	**10.7**					**3,631,469**	**- 925,625 (-20.3%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 5c. ***Minimum*** (i.e., minimum negative/maximum positive) projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and total biomass, in the exclusive economic zones of the 10 Pacific Small Island Developing States (Pacific SIDS) under RCP8.5 by 2050. Change in tonnes is also shown.

Pacific SIDS	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP8.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
Cook Islands	106,593	79,372	38,968	224,933	47.4	35.3	17.3	-1	+18	+7	+7.1	240,882	+15,949
FSM	341,280	299,670	97,815	738,765	46.2	40.6	13.2	-5	-7	+3	-4.8	703,659	-35,106
Kiribati–Gilbert Is	336,009	134,529	35,998	506,536	66.3	26.6	7.1	-1	-10	-3	-3.5	488,643	-17,893
Kiribati–Phoenix Is	202,849	80,528	24,810	308,187	65.8	26.1	8.1	+5	-5	-4	+1.7	313,311	+5,124
Kiribati–Lines Is	250,078	141,321	57,758	449,157	55.7	31.5	12.9	+20	+13	+3	+15.6	519,277	+70,120
Marshall Islands	178,892	198,363	60,664	437,919	40.9	45.3	13.9	+8	-8	+1	-0.2	436,968	-951
Nauru	92,146	30,347	7,976	130,469	70.6	23.3	6.1	-5	-11	-4	-6.3	122,204	-8,265
Palau	62,544	58,943	22,194	143,681	43.5	41.0	15.4	+19	+1	+5	+9.5	157,263	+13,582
PNG	554,428	248,820	71,292	874,540	63.4	28.5	8.2	-28	-9	-5	-20.7	693,342	-181,198
Solomon Islands	267,111	138,747	40,297	446,155	59.9	31.1	9.0	-21	-8	-5	-15.5	376,947	-69,208
Tokelau	63,731	30,688	11,113	105,532	60.4	29.1	10.5	-6	+6	-1	-2.0	103,438	-2,094
Tuvalu	117,569	55,562	18,089	191,220	61.5	29.1	9.5	-16	-2	-4	-10.8	170,574	-20,646
Total	**2,573,230**	**1,496,890**	**486,974**	**4,557,094**	**56.5**	**32.8**	**10.7**					**4,326,508**	**-230,586 (-5.1%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 6a. ***Average*** projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and in total biomass, in high-seas areas under RCP8.5 by 2050. Change in tonnes is also shown.

High-seas area	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP8.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
I1	81,609	45,234	15,605	142,448	57.3	31.8	11.0	-34	-8	-3	-22.3	110,614	-31,834
I2	267,205	96,116	27,397	390,718	68.4	24.6	7.0	-33	-13	-6	-26.2	288,401	-102,317
I3	278,796	169,837	74,682	523,315	53.3	32.5	14.3	+29	+3	+2	+16.7	610,755	+ 87,440
I4	282,157	267,491	90,847	640,495	44.1	41.8	14.2	+3	-3	-4	-0.5	637,301	-3,194
I5	337,986	331,911	149,952	819,849	41.2	40.5	18.3	+26	+9	+2	+14.7	940,596	+ 120,747
I6	218,353	438,615	439,387	1,096,355	19.9	40.0	40.1	+4	+9	-3	+3.2	1,131,383	+35,028
I7	34,044	253,788	301,782	589,614	5.8	43.0	51.2	+10	+9	-2	+3.4	609,824	+20,210
I8	3,969	7,550	2,899	14,418	27.5	52.4	20.1	+23	0	-2	+5.9	15,273	+855
I9	3,487	5,917	3,201	12,605	27.7	46.9	25.4	+29	+18	+4	+17.5	14,809	+2,204
H4	50,735	19,144	6,161	76,040	66.7	25.2	8.1	-16	-6	-6	-12.7	66,404	- 9,636
H5	135,924	63,112	21,508	220,544	61.6	28.6	9.8	+8	-2	-2	+4.2	229,726	+ 9,182
EPO-N	209,308	325,252	211,984	746,544	28.0	43.6	28.4	+12	+20	+11	+15.2	860,030	+113,486
EPO-C	853,639	1,230,664	799,917	2,884,220	29.6	42.7	27.7	+32	+26	+10	+23.3	3,557,349	+673,129
EPO-S	18,127	91,127	217,864	327,118	5.5	27.9	66.6	+36	+41	+13	+22.1	399,328	+72,210
Total	**2,775,339**	**3,345,758**	**2,363,186**	**8,484,283**	**32.7**	**39.4**	**27.9**					**9,471,793**	**+987,510 (+11.6%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 6b. ***Maximum*** (i.e., maximum negative/minimum positive) projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and in total biomass, in high-seas areas under RCP8.5 by 2050. Change in tonnes is also shown.

High-seas area	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP8.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
I1	81,609	45,234	15,605	142,448	57.3	31.8	11.0	-50	-12	-6	-33.1	95,279	-47,169
I2	267,205	96,116	27,397	390,718	68.4	24.6	7.0	-51	-16	-8	-39.4	236,873	-153,845
I3	278,796	169,837	74,682	523,315	53.3	32.5	14.3	+9	-1	0	+4.5	546,708	+23,393
I4	282,157	267,491	90,847	640,495	44.1	41.8	14.2	-7	-7	-6	-6.9	596,569	-43,926
I5	337,986	331,911	149,952	819,849	41.2	40.5	18.3	+13	+3	-2	+6.2	870,745	+50,896
I6	218,353	438,615	439,387	1,096,355	19.9	40.0	40.1	-10	+3	-6	-3.2	1,061,315	-35,040
I7	34,044	253,788	301,782	589,614	5.8	43.0	51.2	+1	+2	-6	-2.2	576,923	-12,691
I8	3,969	7,550	2,899	14,418	27.5	52.4	20.1	-7	-5	-4	-5.3	13,647	-771
I9	3,487	5,917	3,201	12,605	27.7	46.9	25.4	+19	+7	+1	+8.8	13,714	+1,109
H4	50,735	19,144	6,161	76,040	66.7	25.2	8.1	-26	-10	-7	-20.4	60,503	-15,537
H5	135,924	63,112	21,508	220,544	61.6	28.6	9.8	0	-6	-4	-2.1	215,897	-4,647
EPO-N	209,308	325,252	211,984	746,544	28.0	43.6	28.4	+2	+14	+6	+8.4	808,984	+62,440
EPO-C	853,639	1,230,664	799,917	2,884,220	29.6	42.7	27.7	+16	+17	+5	+13.4	3,270,011	+385,791
EPO-S	18,127	91,127	217,864	327,118	5.5	27.9	66.6	+23	+25	+6	+12.2	367,141	40,023
Total	**2,775,339**	**3,345,758**	**2,363,186**	**8,484,283**	**32.7**	**39.4**	**27.9**					**8,734,310**	**+250,027 (+2.9%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 6c. ***Minimum*** (i.e., minimum negative/maximum positive) projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and in total biomass, in high-seas areas under RCP8.5 by 2050. Change in tonnes is also shown.

High-seas area	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP8.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
I1	81,609	45,234	15,605	142,448	57.3	31.8	11.0	-15	-3	-1	-9.7	128,694	-13,754
I2	267,205	96,116	27,397	390,718	68.4	24.6	7.0	-17	-10	-5	-14.4	334,312	-56,406
I3	278,796	169,837	74,682	523,315	53.3	32.5	14.3	+47	+7	+5	28.0	669,972	+146,657
I4	282,157	267,491	90,847	640,495	44.1	41.8	14.2	+9	+3	-1	+5.1	673,005	+32,510
I5	337,986	331,911	149,952	819,849	41.2	40.5	18.3	+41	+20	+4	25.7	1,030,804	+210,955
I6	218,353	438,615	439,387	1,096,355	19.9	40.0	40.1	+16	+17	+1	+10.4	1,210,250	+ 113,895
I7	34,044	253,788	301,782	589,614	5.8	43.0	51.2	+30	+18	+6	+12.6	663,616	+74,002
I8	3,969	7,550	2,899	14,418	27.5	52.4	20.1	+48	+4	0	+15.3	16,625	+2,207
I9	3,487	5,917	3,201	12,605	27.7	46.9	25.4	+48	+27	+9	+28.2	16,164	+3,559
H4	50,735	19,144	6,161	76,040	66.7	25.2	8.1	-9	-4	-4	-7.3	70,462	-5,578
H5	135,924	63,112	21,508	220,544	61.6	28.6	9.8	+12	+1	-1	+7.6	237,271	+16,727
EPO-N	209,308	325,252	211,984	746,544	28.0	43.6	28.4	+19	+25	+18	+21.3	905,783	+159,239
EPO-C	853,639	1,230,664	799,917	2,884,220	29.6	42.7	27.7	+43	+35	+14	+31.5	3,794,006	+909,786
EPO-S	18,127	91,127	217,864	327,118	5.5	27.9	66.6	+48	+63	+24	+36.2	445,516	+ 118,398
Total	**2,775,339**	**3,345,758**	**2,363,186**	**8,484,283**	**32.7**	**39.4**	**27.9**					**10,196,479**	**+1,712,196 (+20.2%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 7a. ***Average*** projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and total biomass, in the exclusive economic zones of the 10 Pacific Small Island Developing States (Pacific SIDS) under RCP4.5 by 2050. Change in tonnes is also shown.

Pacific SIDS	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP4.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
Cook Islands	106,593	79,372	38,968	224,933	47.4	35.3	17.3	+9	+10	+4	+8.5	244,022	+19,089
FSM	341,280	299,670	97,815	738,765	46.2	40.6	13.2	-3	-2	+2	-1.9	724,490	- 4,276
Kiribati–Gilbert Is	336,009	134,529	35,998	506,536	66.3	26.6	7.1	+10	-5	-1	+5.2	533,050	+26,514
Kiribati–Phoenix Is	202,849	80,528	24,810	308,187	65.8	26.1	8.1	+8	0	+1	+5.3	324,663	+16,476
Kiribati–Lines Is	250,078	141,321	57,758	449,157	55.7	31.5	12.9	+6	+12	+6	+7.9	484,586	+ 35,429
Marshall Islands	178,892	198,363	60,664	437,919	40.9	45.3	13.9	+3	-2	-1	+0.2	438,712	+793
Nauru	92,146	30,347	7,976	130,469	70.6	23.3	6.1	+9	-7	-2	+4.6	136,478	+6,009
Palau	62,544	58,943	22,194	143,681	43.5	41.0	15.4	+2	+5	+5	+3.7	148,989	+5,308
PNG	554,428	248,820	71,292	874,540	63.4	28.5	8.2	-19	-8	-4	-14.6	746,441	-128,099
Solomon Islands	267,111	138,747	40,297	446,155	59.9	31.1	9.0	-10	-5	-7	-8.2	409,686	-36,469
Tokelau	63,731	30,688	11,113	105,532	60.4	29.1	10.5	+6	+5	-1	+5.0	110,779	+5,247
Tuvalu	117,569	55,562	18,089	191,220	61.5	29.1	9.5	+4	0	-2	+2.3	195,561	+4,341
Total	**2,573,230**	**1,496,890**	**486,974**	**4,557,094**	**56.5**	**32.8**	**10.7**					**4,497,457**	**-59,637 (-1.3%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 7b. ***Maximum*** (i.e., maximum negative/minimum positive) projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and total biomass, in the exclusive economic zones of the 10 Pacific Small Island Developing States (Pacific SIDS) under RCP4.5 by 2050. Change in tonnes is also shown.

Pacific SIDS	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP4.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
Cook Islands	106,593	79,372	38,968	224,933	47.4	35.3	17.3	-9	+3	+1	-3.0	218,110	-6,823
FSM	341,280	299,670	97,815	738,765	46.2	40.6	13.2	-11	-6	-3	-7.9	680,310	-58,455
Kiribati–Gilbert Is	336,009	134,529	35,998	506,536	66.3	26.6	7.1	-1	-8	-5	-3.1	490,614	-15,922
Kiribati–Phoenix Is	202,849	80,528	24,810	308,187	65.8	26.1	8.1	+2	-2	-3	0.6	309,889	+1,702
Kiribati–Lines Is	250,078	141,321	57,758	449,157	55.7	31.5	12.9	-6	+7	+3	-0.8	445,778	-3,379
Marshall Islands	178,892	198,363	60,664	437,919	40.9	45.3	13.9	-6	-7	-6	-6.5	409,660	-28,259
Nauru	92,146	30,347	7,976	130,469	70.6	23.3	6.1	-3	-10	-6	-4.8	124,191	-6,278
Palau	62,544	58,943	22,194	143,681	43.5	41.0	15.4	-9	+3	+1	-2.5	140,042	-3,639
PNG	554,428	248,820	71,292	874,540	63.4	28.5	8.2	-29	-10	-8	-21.9	683,171	-191,369
Solomon Islands	267,111	138,747	40,297	446,155	59.9	31.1	9.0	-25	-8	-10	-18.4	364,248	-81,907
Tokelau	63,731	30,688	11,113	105,532	60.4	29.1	10.5	-11	0	-3	-7.0	98,188	-7,344
Tuvalu	117,569	55,562	18,089	191,220	61.5	29.1	9.5	-5	-4	-5	-4.7	182,215	-9,005
Total	**2,573,230**	**1,496,890**	**486,974**	**4,557,094**	**56.5**	**32.8**	**10.7**					**4,146,415**	**-410,679 (-9.0%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 7c. ***Minimum*** (i.e., minimum negative/maximum positive) projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and total biomass, in the exclusive economic zones of the 10 Pacific Small Island Developing States (Other Pacific SIDS) under RCP4.5 by 2050. Change in tonnes is also shown.

Pacific SIDS	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP4.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
Cook Islands	106,593	79,372	38,968	224,933	47.4	35.3	17.3	+27	+19	+9	+21.1	272,301	+47,368
FSM	341,280	299,670	97,815	738,765	46.2	40.6	13.2	+5	+2	+5	+3.8	766,713	+27,948
Kiribati–Gilbert Is	336,009	134,529	35,998	506,536	66.3	26.6	7.1	+21	-3	+2	+13.3	573,782	+67,246
Kiribati–Phoenix Is	202,849	80,528	24,810	308,187	65.8	26.1	8.1	+14	+3	+4	+10.3	339,994	+31,807
Kiribati–Lines Is	250,078	141,321	57,758	449,157	55.7	31.5	12.9	+11	+16	+10	+12.4	505,053	+55,896
Marshall Islands	178,892	198,363	60,664	437,919	40.9	45.3	13.9	+14	0	+2	+6.0	464,177	+26,258
Nauru	92,146	30,347	7,976	130,469	70.6	23.3	6.1	+22	-2	0	+15.1	150,134	+19,665
Palau	62,544	58,943	22,194	143,681	43.5	41.0	15.4	+20	+8	+9	+13.4	162,903	+19,222
PNG	554,428	248,820	71,292	874,540	63.4	28.5	8.2	+2	-2	-1	+0.6	879,939	+5,399
Solomon Islands	267,111	138,747	40,297	446,155	59.9	31.1	9.0	+9	-2	-5	+4.3	465,405	+19,250
Tokelau	63,731	30,688	11,113	105,532	60.4	29.1	10.5	+33	+13	+4	+24.1	130,997	+25,465
Tuvalu	117,569	55,562	18,089	191,220	61.5	29.1	9.5	+22	+6	+2	+15.5	220,781	+29,561
Total	**2,573,230**	**1,496,890**	**486,974**	**4,557,094**	**56.5**	**32.8**	**10.7**					**4,932,179**	**+375,085 (+8.2%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 8a. ***Average*** projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and in total biomass, in high-seas areas under RCP4.5 by 2050. Change in tonnes is also shown.

High-seas area	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP4.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
I1	81,609	45,234	15,605	142,448	57.3	31.8	11.0	-17	0	0	-9.7	128,574	-13,874
I2	267,205	96,116	27,397	390,718	68.4	24.6	7.0	-11	-7	-5	-9.6	353,227	-37,491
I3	278,796	169,837	74,682	523,315	53.3	32.5	14.3	+31	+6	+3	+18.9	622,172	+98,857
I4	282,157	267,491	90,847	640,495	44.1	41.8	14.2	+7	+4	0	+4.8	670,946	+30,451
I5	337,986	331,911	149,952	819,849	41.2	40.5	18.3	+13	+16	+7	+13.1	927,390	+107,541
I6	218,353	438,615	439,387	1,096,355	19.9	40.0	40.1	+10	+9	-1	+5.2	1,153,272	+56,917
I7	34,044	253,788	301,782	589,614	5.8	43.0	51.2	0	+8	0	+3.4	609,917	+20,303
I8	3,969	7,550	2,899	14,418	27.5	52.4	20.1	+28	+5	0	+10.3	15,907	+1,489
I9	3,487	5,917	3,201	12,605	27.7	46.9	25.4	+8	+14	+6	+10.3	13,904	+1,299
H4	50,735	19,144	6,161	76,040	66.7	25.2	8.1	+13	+1	0	+8.9	82,827	+6,787
H5	135,924	63,112	21,508	220,544	61.6	28.6	9.8	+4	+4	+3	+3.9	229,151	+8,607
EPO-N	209,308	325,252	211,984	746,544	28.0	43.6	28.4	+12	+17	+10	+13.6	848,152	+101,608
EPO-C	853,639	1,230,664	799,917	2,884,220	29.6	42.7	27.7	+17	+22	+14	+18.3	3,412,073	+527,853
EPO-S	18,127	91,127	217,864	327,118	5.5	27.9	66.6	+14	+18	+10	+12.5	367,845	+40,727
Total	**2,775,339**	**3,345,758**	**2,363,186**	**8,484,283**	**32.7**	**39.4**	**27.9**					**9,435,358**	**+951,075 (+11.2%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 8b. ***Maximum*** (i.e., maximum negative/minimum positive) projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and in total biomass, in high-seas areas under RCP4.5 by 2050. Change in tonnes is also shown.

High-seas area	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP4.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
I1	81,609	45,234	15,605	142,448	57.3	31.8	11.0	-28	-2	-5	-17.2	117,913	-24,535
I2	267,205	96,116	27,397	390,718	68.4	24.6	7.0	-22	-10	-9	-18.1	319,856	-70,862
I3	278,796	169,837	74,682	523,315	53.3	32.5	14.3	+19	+4	-1	+11.3	582,333	+59,018
I4	282,157	267,491	90,847	640,495	44.1	41.8	14.2	0	-1	-5	-1.1	633,278	-7,217
I5	337,986	331,911	149,952	819,849	41.2	40.5	18.3	-2	+11	+1	+3.8	851,099	+31,250
I6	218,353	438,615	439,387	1,096,355	19.9	40.0	40.1	-3	+4	-6	-1.4	1,080,986	-15,369
I7	34,044	253,788	301,782	589,614	5.8	43.0	51.2	-9	+3	-6	-2.3	576,057	-13,557
I8	3,969	7,550	2,899	14,418	27.5	52.4	20.1	+2	+1	-4	+0.3	14,457	+39
I9	3,487	5,917	3,201	12,605	27.7	46.9	25.4	-7	+4	+2	+0.4	12,662	+57
H4	50,735	19,144	6,161	76,040	66.7	25.2	8.1	+4	-2	-4	+1.8	77,440	+1,400
H5	135,924	63,112	21,508	220,544	61.6	28.6	9.8	-1	+2	0	0.0	220,447	-97
EPO-N	209,308	325,252	211,984	746,544	28.0	43.6	28.4	+7	+10	+5	+7.7	804,320	+57,776
EPO-C	853,639	1,230,664	799,917	2,884,220	29.6	42.7	27.7	+3	+14	+7	+8.8	3,138,116	+ 253,896
EPO-S	18,127	91,127	217,864	327,118	5.5	27.9	66.6	+4	+5	+5	+4.9	343,293	+16,175
Total	**2,775,339**	**3,345,758**	**2,363,186**	**8,484,283**	**32.7**	**39.4**	**27.9**					**8,772,255**	**+287,972 (+3.4%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 8c. ***Minimum*** (i.e., minimum negative/maximum positive) projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and in total biomass, in high-seas areas under RCP4.5 by 2050. Change in tonnes is also shown.

High-seas area	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP4.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
I1	81,609	45,234	15,605	142,448	57.3	31.8	11.0	0	+3	+2	+1.2	144,117	+1,669
I2	267,205	96,116	27,397	390,718	68.4	24.6	7.0	0	-4	-2	-1.1	386,325	-4,393
I3	278,796	169,837	74,682	523,315	53.3	32.5	14.3	+51	+10	+7	+31.4	687,712	+164,397
I4	282,157	267,491	90,847	640,495	44.1	41.8	14.2	+13	+10	+3	+10.3	706,650	+66,155
I5	337,986	331,911	149,952	819,849	41.2	40.5	18.3	+25	+22	+10	+21.0	992,361	+172,512
I6	218,353	438,615	439,387	1,096,355	19.9	40.0	40.1	+18	+14	+1	+9.6	1,201,459	+105,104
I7	34,044	253,788	301,782	589,614	5.8	43.0	51.2	+15	+18	+8	+12.7	664,545	+74,931
I8	3,969	7,550	2,899	14,418	27.5	52.4	20.1	+56	+10	+3	+21.3	17,483	+3,065
I9	3,487	5,917	3,201	12,605	27.7	46.9	25.4	+25	+22	+11	+20.0	15,131	+2,526
H4	50,735	19,144	6,161	76,040	66.7	25.2	8.1	+18	+7	+4	+14.1	86,759	+10,719
H5	135,924	63,112	21,508	220,544	61.6	28.6	9.8	+8	+8	+7	+7.9	237,972	+17,428
EPO-N	209,308	325,252	211,984	746,544	28.0	43.6	28.4	+16	26	+16	+20.4	898,516	+151,972
EPO-C	853,639	1,230,664	799,917	2,884,220	29.6	42.7	27.7	+35	+36	+22	+31.8	3,802,014	+ 917,794
EPO-S	18,127	91,127	217,864	327,118	5.5	27.9	66.6	+27	+37	+19	+24.5	407,123	+80,005
Total	**2,775,339**	**3,345,758**	**2,363,186**	**8,484,283**	**32.7**	**39.4**	**27.9**					**10,248,168**	**+1,763,885 (+20.8%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 9a. ***Average*** projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and total biomass, in the exclusive economic zones of other Pacific Small Island Developing States (Other Pacific SIDS) under RCP8.5 by 2050. Change in tonnes is also shown.

Other Pacific SIDS	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP8.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL*		
American Samoa	10,291	21,262	9,239	40,792	25.2	52.1	22.6	+10	+10	+1	+8.0	44,040	+3,248
Fiji	22,430	50,460	22,257	95,147	23.6	53.0	23.4	+10	+2	-2	+3.0	97,954	+ 2,807
French Polynesia	109,222	127,431	85,269	321,922	33.9	39.6	26.5	+39	+22	+8	+24.1	399,375	+77,453
Guam	19,096	14,368	5,689	39,153	48.8	36.7	14.5	+17	-1	+2	+8.2	42,369	+ 3,216
New Caledonia	18,682	49,159	21,226	89,067	21.0	55.2	23.8	+13	-5	-4	-1.0	88,189	- 878
Niue	2,989	9,692	5,579	18,260	16.4	53.1	30.6	+11	+11	+3	+8.6	19,822	+1,562
Northern Mariana Is	61,047	37,202	19,499	117,748	51.8	31.6	16.6	+31	+7	+2	+18.6	139,667	+21,919
Pitcairn Islands	2,055	7,428	9,425	18,908	10.9	39.3	49.8	+29	+33	+12	+22.1	23,086	+4,178
Samoa	1,038	2,433	1,000	4,471	23.2	54.4	22.4	+9	+8	0	+6.4	4,759	+288
Tonga	8,420	24,704	13,283	46,407	18.1	53.2	28.6	+8	+6	0	+4.6	48,563	+ 2,156
Vanuatu	16,478	34,920	13,418	64,816	25.4	53.9	20.7	+23	-2	-2	+4.4	67,639	+ 2,823
Wallis Futuna	6,581	13,742	5,206	25,529	25.8	53.8	20.4	+2	+4	-1	+2.5	26,158	+629
Total	**278,329**	**392,801**	**211,090**	**882,220**	**31.5**	**44.5**	**23.9**					**1,001,621**	**+119,401 (13.5%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 9b. ***Maximum*** (i.e., maximum negative/minimum positive) projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and total biomass, in the exclusive economic zones of other Pacific Small Island Developing States (Other Pacific SIDS) under RCP8.5 by 2050. Change in tonnes is also shown.

Other Pacific SIDS	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP8.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
American Samoa	10,291	21,262	9,239	40,792	25.2	52.1	22.6	-3	+2	-2	-0.2	40,724	- 68
Fiji	22,430	50,460	22,257	95,147	23.6	53.0	23.4	-7	-5	-4	-5.2	90,164	-4,983
French Polynesia	109,222	127,431	85,269	321,922	33.9	39.6	26.5	+19	+11	+3	+11.6	359,250	+37,328
Guam	19,096	14,368	5,689	39,153	48.8	36.7	14.5	-2	-4	0	-2.4	38,196	-957
New Caledonia	18,682	49,159	21,226	89,067	21.0	55.2	23.8	-6	-9	-6	-7.7	82,248	-6,819
Niue	2,989	9,692	5,579	18,260	16.4	53.1	30.6	-1	+2	0	+0.9	18,424	+164
Northern Mariana Is	61,047	37,202	19,499	117,748	51.8	31.6	16.6	+12	+1	0	+6.5	125,446	+7,698
Pitcairn Islands	2,055	7,428	9,425	18,908	10.9	39.3	49.8	+21	+17	+7	+12.5	21,262	+2,354
Samoa	1,038	2,433	1,000	4,471	23.2	54.4	22.4	-3	0	-3	-1.4	4,410	- 61
Tonga	8,420	24,704	13,283	46,407	18.1	53.2	28.6	-4	-1	-3	-2.1	45,425	-982
Vanuatu	16,478	34,920	13,418	64,816	25.4	53.9	20.7	-5	-7	-4	-5.9	61,011	-3,805
Wallis Futuna	6,581	13,742	5,206	25,529	25.8	53.8	20.4	-8	-2	-4	-4.0	24,519	- 1,010
Total	**278,329**	**392,801**	**211,090**	**882,220**	**31.5**	**44.5**	**23.9**					**911,078**	**+28,858 (3.3%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 9c. ***Minimum*** (i.e., minimum negative/maximum positive) projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and total biomass, in the exclusive economic zones of other Pacific Small Island Developing States (Other Pacific SIDS) under RCP8.5 by 2050. Change in tonnes is also shown.

Other Pacific SIDS	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP8.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
American Samoa	10,291	21,262	9,239	40,792	25.2	52.1	22.6	+26	+16	+6	+16.3	47,424	+6,632
Fiji	22,430	50,460	22,257	95,147	23.6	53.0	23.4	+28	+6	+1	+10.0	104,678	+9,531
French Polynesia	109,222	127,431	85,269	321,922	33.9	39.6	26.5	+58	+31	+13	+35.4	435,859	+113,937
Guam	19,096	14,368	5,689	39,153	48.8	36.7	14.5	+45	+2	+6	+23.6	48,375	+9,222
New Caledonia	18,682	49,159	21,226	89,067	21.0	55.2	23.8	+42	-3	-2	+6.7	95,014	+5,947
Niue	2,989	9,692	5,579	18,260	16.4	53.1	30.6	+24	+18	+7	+15.6	21,112	+2,852
Northern Mariana Is	61,047	37,202	19,499	117,748	51.8	31.6	16.6	+51	+13	+4	+31.2	154,498	+36,750
Pitcairn Islands	2,055	7,428	9,425	18,908	10.9	39.3	49.8	+41	+44	+22	+32.7	25,092	+6,184
Samoa	1,038	2,433	1,000	4,471	23.2	54.4	22.4	+23	+14	+5	+14.1	5,100	+629
Tonga	8,420	24,704	13,283	46,407	18.1	53.2	28.6	+23	+12	+4	+11.7	51,839	+5,432
Vanuatu	16,478	34,920	13,418	64,816	25.4	53.9	20.7	+50	0	0	+12.7	73,055	+8,239
Wallis Futuna	6,581	13,742	5,206	25,529	25.8	53.8	20.4	+19	+10	+2	+10.7	28,258	+ 2,729
Total	**278,329**	**392,801**	**211,090**	**882,220**	**31.5**	**44.5**	**23.9**					**1,090,305**	**+208,085 (+23.6%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 10a. ***Average*** projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and total biomass, in exclusive economic zones of other Pacific Small Island Developing States (Other Pacific SIDS) under RCP4.5 by 2050. Change in tonnes is also shown.

Other Pacific SIDS	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP4.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
American Samoa	10,291	21,262	9,239	40,792	25.2	52.1	22.6	-9	+9	+1	+2.6	41,872	+1,080
Fiji	22,430	50,460	22,257	95,147	23.6	53.0	23.4	+20	+7	+1	+8.7	103,388	+ 8,241
French Polynesia	109,222	127,431	85,269	321,922	33.9	39.6	26.5	+6	+17	+10	+11.4	358,665	36,743
Guam	19,096	14,368	5,689	39,153	48.8	36.7	14.5	+29	+3	+4	+15.8	45,349	+ 6,196
New Caledonia	18,682	49,159	21,226	89,067	21.0	55.2	23.8	+9	0	-3	+1.2	90,112	+1,045
Niue	2,989	9,692	5,579	18,260	16.4	53.1	30.6	+2	+12	+3	+7.6	19,650	+ 1,390
Northern Mariana Is	61,047	37,202	19,499	117,748	51.8	31.6	16.6	+21	+8	+2	+13.7	133,934	+16,186
Pitcairn Islands	2,055	7,428	9,425	18,908	10.9	39.3	49.8	-10	+16	+11	+10.7	20,928	+ 2,020
Samoa	1,038	2,433	1,000	4,471	23.2	54.4	22.4	-5	+9	0	+3.7	4,638	+167
Tonga	8,420	24,704	13,283	46,407	18.1	53.2	28.6	+11	+10	+2	+7.9	50,069	+3,662
Vanuatu	16,478	34,920	13,418	64,816	25.4	53.9	20.7	+17	+3	-1	+5.7	68,531	+3,715
Wallis Futuna	6,581	13,742	5,206	25,529	25.8	53.8	20.4	-3	+7	-1	+2.8	26,241	+712
Total	**278,329**	**392,801**	**211,090**	**882,220**	**31.5**	**44.5**	**23.9**					**963,377**	**+81,157 (+9.2%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 10b. ***Maximum*** (i.e., maximum negative/minimum positive) projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and total biomass, in the exclusive economic zones of other Pacific Small Island Developing States (Other Pacific SIDS) under RCP4.5 by 2050. Change in tonnes is also shown.

Other Pacific SIDS	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP4.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
American Samoa	10,291	21,262	9,239	40,792	25.2	52.1	22.6	-20	+2	-2	-4.5	38,974	-1,818
Fiji	22,430	50,460	22,257	95,147	23.6	53.0	23.4	0	+2	-2	+0.6	95,711	+564
French Polynesia	109,222	127,431	85,269	321,922	33.9	39.6	26.5	-12	+7	+6	+0.3	322,852	+930
Guam	19,096	14,368	5,689	39,153	48.8	36.7	14.5	+13	+1	+1	+6.9	41,836	+2,683
New Caledonia	18,682	49,159	21,226	89,067	21.0	55.2	23.8	-4	-3	-5	-3.7	85,784	-3,283
Niue	2,989	9,692	5,579	18,260	16.4	53.1	30.6	-8	+4	0	+0.8	18,409	+149
Northern Mariana Is	61,047	37,202	19,499	117,748	51.8	31.6	16.6	+6	+5	-2	+4.4	122,881	+5,133
Pitcairn Islands	2,055	7,428	9,425	18,908	10.9	39.3	49.8	-18	+3	+6	_2.2	19,326	+418
Samoa	1,038	2,433	1,000	4,471	23.2	54.4	22.4	-14	+2	-3	-2.8	4,344	-127
Tonga	8,420	24,704	13,283	46,407	18.1	53.2	28.6	-2	+4	-2	+1.2	46,961	+554
Vanuatu	16,478	34,920	13,418	64,816	25.4	53.9	20.7	-2	-1	-4	-1.9	63,601	-1,215
Wallis Futuna	6,581	13,742	5,206	25,529	25.8	53.8	20.4	-13	+1	-4	-3.6	24,603	-926
Total	**278,329**	**392,801**	**211,090**	**882,220**	**31.5**	**44.5**	**23.9**					**885,281**	**+3,061 (+0.3%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 10c. ***Minimum*** (i.e., minimum negative/maximum positive) projected percentage changes in biomass (relative to 2011–2020) of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna, and total biomass, in the exclusive economic zones of other Pacific Small Island Developing States (Other Pacific SIDS) under RCP4.5 by 2050. Change in tonnes is also shown.

Other Pacific SIDS	Reference biomass (tonnes)				Relative abundance (%)			% change in reference biomass under RCP4.5 in 2050				Biomass in 2050 (tonnes)	Change in biomass (tonnes)
	SKJ	YFT	BET	TOTAL	SKJ*	YFT*	BET*	SKJ	YFT	BET	TOTAL**		
American Samoa	10,291	21,262	9,239	40,792	25.2	52.1	22.6	+11	+18	+6	+13.5	46,306	+5,514
Fiji	22,430	50,460	22,257	95,147	23.6	53.0	23.4	+43	+13	+5	+18.2	112,465	+17,318
French Polynesia	109,222	127,431	85,269	321,922	33.9	39.6	26.5	+17	+27	+16	+20.7	388,539	+ 66,617
Guam	19,096	14,368	5,689	39,153	48.8	36.7	14.5	+45	+6	+8	+25.3	49,063	+ 9,910
New Caledonia	18,682	49,159	21,226	89,067	21.0	55.2	23.8	+29	+3	0	+7.7	95,960	+6,893
Niue	2,989	9,692	5,579	18,260	16.4	53.1	30.6	+16	+19	+8	+15.1	21,026	+2,766
Northern Mariana Is	61,047	37,202	19,499	117,748	51.8	31.6	16.6	+39	+11	+5	+24.5	146,624	+28,876
Pitcairn Islands	2,055	7,428	9,425	18,908	10.9	39.3	49.8	0	+30	+20	+21.8	23,021	+4,113
Samoa	1,038	2,433	1,000	4,471	23.2	54.4	22.4	+12	+17	+5	+13.2	5,059	+588
Tonga	8,420	24,704	13,283	46,407	18.1	53.2	28.6	+29	+17	+6	+16.0	53,845	+7,438
Vanuatu	16,478	34,920	13,418	64,816	25.4	53.9	20.7	+41	+7	+3	+14.8	74,419	+9,603
Wallis Futuna	6,581	13,742	5,206	25,529	25.8	53.8	20.4	+14	+15	+4	+12.5	28,720	+3,191
Total	**278,329**	**392,801**	**211,090**	**882,220**	**31.5**	**44.5**	**23.9**					**1,045,047**	**+162,827 (+18.5%)**

* Rounded to one decimal place; ** weighted average of projected changes in reference biomass for SKJ, YFT and BET

Supplementary Table 11a. Projected ***average*** changes in catches of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna in tonnes (t) caught by purse-seine fishing in the exclusive economic zones (EEZs) of 10 Pacific Island Small Developing States by 2050 under the IPCC RCP8.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table17a. Changes in the total catch from all EEZs for each species, and for all species from all EEZs, are also shown. All values except 'Change (%)' for totals for EEZs and for all species combined are rounded to nearest whole number.

Species	Catch	EEZ												Total
		Cook Islands	FSM	Kiribati			Marshall Islands	Nauru	Palau	PNG	Solomon Islands	Tokelau	Tuvalu	
				Gilbert	Phoenix	Line								
SKJ	Average catch	9,513	144,272	203,548	79,976	32,089	29,990	86,174	1,681	318,229	84,637	19,037	63,863	**1,073,008**
	2050 catch	8,942	124,074	175,051	78,376	36,581	30,289	65,492	1,681	184,573	57,553	15,610	47,259	**825,482**
	Change (t)	-571	-20,198	-28,497	-1,600	+4,492	+ 300	-20,682	0	-133,656	-27,084	-3,427	-16,604	**-247,526**
	Change (%)	-6	-14	-14	-2	+14	+1	-24	0	-42	-32	-18	-26	**-23.1**
YFT	Average catch	1,107	29,317	45,981	11,051	5,667	5,435	19,952	942	130,049	29,178	1,661	6,944	**287,285**
	2050 catch	1,229	26,386	40,003	10,277	6,064	4,891	16,959	932	111,842	25,969	1,678	6,597	**252,827**
	Change (t)	+122	-2,932	-5,978	-774	+397	-543	-2,993	-9	-18,207	-3,210	+17	-347	**-34,457**
	Change (%)	+11	-10	-13	-7	+7	-10	-15	-1	-14	-11	1	-5	**-12.0**
BET	Average catch	460	4,998	10,544	3,670	3,523	1,578	4,667	33	12,754	3,061	693	2,273	**48,256**
	2050 catch	469	4,948	10,123	3,486	3,558	1,547	4,434	33	11,989	2,877	666	2,137	**46,267**
	Change (t)	+9	-50	-422	-183	+35	-32	-233	0	-765	-184	-28	-136	**-1,988**
	Change (%)	+2	-1	-4	-5	+1	-2	-5	+1	-6	-6	-4	-6	**-4.1**
All species combined	**Average catch**	**11,080**	**178,587**	**260,073**	**94,696**	**41,279**	**37,003**	**110,794**	**2,655**	**461,032**	**116,877**	**21,392**	**73,080**	**1,408,548**
	2050 catch	**10,640**	**155,407**	**225,177**	**92,140**	**46,203**	**36,728**	**86,886**	**2,646**	**308,404**	**86,399**	**17,954**	**55,992**	**1,124,577**
	Change (t)	**-440**	**-23,180**	**-34,896**	**-2,557**	**+4,924**	**-275**	**-23,908**	**-9**	**-152,628**	**-30,477**	**-3,438**	**-17,088**	**-283,971**
	Change (%)	**-4.0**	**-13.0**	**-13.4**	**-2.7**	**+11.9**	**-0.7**	**-21.6**	**-0.3**	**-33.1**	**-26.1**	**-16.1**	**-23.4**	**-20.2**

Supplementary Table 11b. Projected ***maximum*** (i.e., maximum negative/minimum positive) changes in catches of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna in tonnes (t) caught by purse-seine fishing in the exclusive economic zones (EEZs) of 10 Pacific Island Small Developing States by 2050 under the IPCC RCP8.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table17b. Changes in the total catch from all EEZs for each species, and for all species from all EEZs, are also shown. All values except 'Change (%)' for totals for EEZs and for all species combined are rounded to nearest whole number.

Species	Catch	EEZ												Total
		Cook Islands	FSM	Kiribati			Marshall Islands	Nauru	Palau	PNG	Solomon Islands	Tokelau	Tuvalu	
				Gilbert	Phoenix	Line								
SKJ	Average catch	9,513	144,272	203,548	79,976	32,089	29,990	86,174	1,681	318,229	84,637	19,037	63,863	**1,073,008**
	2050 catch	8,562	109,647	144,519	69,579	34,977	27,590	49,119	1,479	146,385	45,704	14,849	41,511	**693,921**
	Change (t)	-951	-34,625	-59,029	-10,397	+2,888	-2,399	-37,055	-202	-171,844	-38,933	-4,188	-22,352	**-379,087**
	Change (%)	-10	-24	-29	-13	+9	-8	-43	-12	-54	-46	-22	-35	**-35.3**
YFT	Average catch	1,107	29,317	45,981	11,051	5,667	5,435	19,952	942	130,049	29,178	1,661	6,944	**287,285**
	2050 catch	1,140	25,506	39,084	10,056	5,781	4,728	16,161	894	104,039	25,385	1,578	6,319	**240,673**
	Change (t)	+33	-3,811	-6,897	-995	+113	-707	-3,791	-47	-26,010	-3,793	-83	-625	**-46,612**
	Change (%)	+3	-13	-15	-9	+2	-13	-19	-5	-20	-13	-5	-9	**-16.2**
BET	Average catch	460	4,998	10,544	3,670	3,523	1,578	4,667	33	12,754	3,061	693	2,273	**48,256**
	2050 catch	455	4,798	10,017	3,450	3,488	1,484	4,434	33	11,861	2,816	645	2,091	**45,572**
	Change (t)	-5	-200	-527	-220	-35	-95	-233	0	-893	-245	-49	-182	**-2,684**
	Change (%)	-1	-4	-5	-6	-1	-6	-5	-1	-7	-8	-7	-8	**-5.6**
All species combined	**Average catch**	**11,080**	**178,587**	**260,073**	**94,696**	**41,279**	**37,003**	**110,794**	**2,655**	**461,032**	**116,877**	**21,392**	**73,080**	**1,408,548**
	2050 catch	**10,157**	**139,951**	**193,620**	**83,085**	**44,245**	**33,802**	**69,714**	**2,406**	**262,286**	**73,905**	**17,072**	**49,922**	**980,165**
	Change (t)	**-923**	**-38,636**	**-66,453**	**-11,612**	**+2,966**	**-3,200**	**-41,079**	**-249**	**-198,746**	**-42,971**	**-4,320**	**-23,159**	**-428,383**
	Change (%)	**-8.3**	**-21.6**	**-25.6**	**-12.3**	**+7.2**	**-8.6**	**-37.1**	**-9.4**	**-43.1**	**-36.8**	**-20.2**	**-31.7**	**-30.4**

Supplementary Table 11c. Projected ***minimum*** (i.e., minimum negative/maximum positive) changes in catches of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna in tonnes (t) caught by purse-seine fishing in the exclusive economic zones (EEZs) of 10 Pacific Island Small Developing States by 2050 under the IPCC RCP8.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table17c. Changes in the total catch from all EEZs for each species, and for all species from all EEZs, are also shown. All values except 'Change (%)' for totals for EEZs and for all species combined are rounded to nearest whole number.

Species	Catch	EEZ												Total
		Cook Islands	FSM	Kiribati			Marshall Islands	Nauru	Palau	PNG	Solomon Islands	Tokelau	Tuvalu	
				Gilbert	Phoenix	Line								
SKJ	Average catch	9,513	144,272	203,548	79,976	32,089	29,990	86,174	1,681	318,229	84,637	19,037	63,863	**1,073,008**
	2050 catch	9,418	137,058	201,513	83,974	38,506	32,389	81,865	2,000	229,125	66,863	17,895	53,645	**954,252**
	Change (t)	-95	-7,214	-2,035	+3,999	+6,418	+ 2,399	-4,309	+319	-89,104	-17,774	-1,142	-10,218	**-118,756**
	Change (%)	-1	-5	-1	+5	+20	+8	-5	19	-28	-21	-6	-16	**-11.1**
YFT	Average catch	1,107	29,317	45,981	11,051	5,667	5,435	19,952	942	130,049	29,178	1,661	6,944	**287,285**
	2050 catch	1,306	27,265	41,383	10,498	6,404	5,000	17,757	951	118,344	26,844	1,761	6,805	**264,320**
	Change (t)	+199	-2,052	-4,598	-553	+737	-435	-2,195	+9	-11,704	-2,334	+100	-139	**-22,965**
	Change (%)	+18	-7	-10	-5	+13	-8	-11	+1	-9	-8	6	-2	**-8.0**
BET	Average catch	460	4,998	10,544	3,670	3,523	1,578	4,667	33	12,754	3,061	693	2,273	**48,256**
	2050 catch	492	5,148	10,228	3,523	3,629	1,594	4,481	35	12,116	2,908	686	2,182	**47,022**
	Change (t)	+32	+150	-316	-147	+106	+16	-187	+2	-638	-153	-7	-91	**-1,233**
	Change (%)	+7	+3	-3	-4	+3	+1	-4	+5	-5	-5	-1	-4	**-2.6**
All species combined	**Average catch**	**11,080**	**178,587**	**260,073**	**94,696**	**41,279**	**37,003**	**110,794**	**2,655**	**461,032**	**116,877**	**21,392**	**73,080**	**1,408,548**
	2050 catch	**11,216**	**169,471**	**253,123**	**97,996**	**48,539**	**38,983**	**104,103**	**2,986**	**359,586**	**96,615**	**20,342**	**62,633**	**1,265,594**
	Change (t)	**+136**	**-9,116**	**-6,950**	**+3,299**	**+7,260**	**+1,980**	**-6,690**	**+330**	**-101,446**	**-20,261**	**-1,049**	**-10,448**	**-142,954**
	Change (%)	**+1.2**	**-5.1**	**-2.7**	**+3.5**	**+17.6**	**+5.4**	**-6.0**	**+12.4**	**-22.0**	**-17.3**	**-4.9**	**-14.3**	**-10.1**

Supplementary Table 12a. Projected ***average*** changes in catches of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna in tonnes (t) caught by purse-seine fishing in the high-seas areas (Supplementary Figure 1) by 2050 under the IPCC RCP8.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table17a. Changes in the total catch from all high-seas areas for each species, and for all species from all high-seas areas, are also shown.

Species	Catch	High-seas area													Total
		I1	I2	I3	I4	I5	I6	I7	I8	I9	H4	H5	EPO-N	EPO-C	EPO-S	
SKJ	Average catch	10,528	18,630	45	16,516	16,994	15,459	13	2	24	18,431	39,150	7,072	254,602	2,031	**399,495**
	2050 catch	6,948	12,482	58	17,011	21,412	16,078	14	2	31	15,482	42,281	7,921	336,075	2,763	**478,558**
	Change (t)	-3,580	-6,148	+ 13	+ 495	+4,418	+618	+1	0	+7	-2,949	+3,132	+849	+ 81,473	+731	**+79,062**
	Change (%)	-34	-33	+29	+3	+26	+4	+10	+23	+29	-16	+8	+12	+32	+36	**+19.8**
YFT	Average catch	4,215	3,647	1	3,199	3,530	507	3	1	6	1,936	5,542	77,092	147,743	540	**247,960**
	2050 catch	3,878	3,172	1	3,103	3,848	552	3	1	7	1,820	5,431	92,510	186,156	761	**301,243**
	Change (t)	-337	-474	0	-96	+318	+46	0	0	+ 1	-116	-111	+15,418	+38,413	+221	**+53,283**
	Change (%)	-8	-13	+3	-3	+9	+9	+9	0	+18	-6	-2	+20	+26	+41	**+ 21.5**
BET	Average catch	588	807	1	1,728	2,707	245	1	0	3	526	1,826	11	55,319	722	**64,483**
	2050 catch	570	758	1	1,659	2,761	238	1	0	3	494	1,789	13	60,851	816	**69,954**
	Change (t)	-18	-48	0	-69	+54	-7	0	0	0	-32	-37	+1	+ 5,532	+ 94	**+5,471**
	Change (%)	-3	-6	+2	-4	+2	-3	-2	-2	+4	-6	-2	+11	+10	+13	**+8.5**
All species combined	**Average catch**	**15,330**	**23,083**	**47**	**21,443**	**23,231**	**16,211**	**17**	**2.2**	**33**	**20,893**	**46,517**	**84,175**	**457,664**	**3,293**	**711,939**
	2050 catch	**11,396**	**16,413**	**60**	**21,773**	**28,021**	**16,868**	**18**	**2.5**	**41**	**17,796**	**49,502**	**100,443**	**583,082**	**4,339**	**849,755**
	Change (t)	**-3,934**	**-6,670**	**+13**	**+ 330**	**+4,790**	**+657**	**+ 1**	**+ 0.3**	**+8**	**-3,097**	**+2,985**	**+16,268**	**+125,418**	**+1,046**	**+137,816**
	Change (%)	**-25.7**	**-28.9**	**+27.8**	**+1.5**	**+20.6**	**+4.1**	**+9.0**	**15.5**	**+24.7**	**-14.8**	**+6.4**	**+19.3**	**+27.4**	**+31.8**	**+19.4**

All values except 'Change (%)' for totals for high-seas areas and for all species combined are rounded to nearest whole number.

Supplementary Table 12b. Projected ***maximum*** (i.e., maximum negative, minimum positive) changes in catches of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna in tonnes (t) caught by purse-seine fi shing in the high-seas areas (Supplementary Figure 1) by 2050 under the IPCC RCP8.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table17b. Changes in the total catch from all high-seas areas for each species, and for all species from all high-seas areas, are also shown. All values except 'Change (%)' for totals for high-seas areas and for all species combined are rounded to nearest whole number.

Species	Catch	High-seas area													Total
		I1	I2	I3	I4	I5	I6	I7	I8	I9	H4	H5	EPO-N	EPO-C	EPO-S	
SKJ	Average catch	10,528	18,630	45	16,516	16,994	15,459	13	2	24	18,431	39,150	7,072	254,602	2,031	**399,495**
	2050 catch	5,264	9,129	49	15,360	19,203	13,913	13	1	29	13,639	39,150	7,213	295,338	2,499	**420,799**
	Change (t)	-5,264	-9,501	+4	-1,156	+2,209	-1,546	0	0	+5	-4,792	0	+141	+40,736	+467	**+21,304**
	Change (%)	-50	-51	+9	-7	+13	-10	+1	-7	+19	-26	0	+2	+16	+23	**+5.3**
YFT	Average catch	4,215	3,647	1	3,199	3,530	507	3	1	6	1,936	5,542	77,092	147,743	540	**247,960**
	2050 catch	3,709	3,063	1	2,975	3,636	522	3	0	7	1,742	5,210	87,885	172,859	674	**282,286**
	Change (t)	-506	-583	0	-224	+106	+15	0	0	+1	-194	-333	+10,793	+25,116	+135	**+34,326**
	Change (%)	-12	-16	-1	-7	+3	+3	+2	-5	+7	-10	-6	+14	+17	+25	**+13.8**
BET	Average catch	588	807	1	1,728	2,707	245	1	0	3	526	1,826	11	55,319	722	**64,483**
	2050 catch	552	742	1	1,624	2,653	230	1	0	3	489	1,753	12	58,085	765	**66,911**
	Change (t)	-35	-65	0	-104	-54	-15	0	0	0	-37	-73	+1	+2,766	+43	**+2,428**
	Change (%)	-6	-8	0	-6	-2	-6	-6	-4	+1	-7	-4	+6	+5	+6	**+3.8**
All species combined	**Average catch**	**15,330**	**23,083**	**47**	**21,443**	**23,231**	**16,211**	**17**	**2.2**	**33**	**20,893**	**46,517**	**84,175**	**457,664**	**3,293**	**711,939**
	2050 catch	**9,525**	**12,934**	**51**	**19,959**	**25,492**	**14,666**	**17**	**2.1**	**38**	**15,870**	**46,112**	**95,110**	**526,283**	**3,938**	**769,996**
	Change (t)	**-5,805**	**10,149**	**+4**	**-1,484**	**+ 2,261**	**-1,545**	**0**	**-0.1**	**+ 5**	**-5,022**	**-406**	**+10,935**	**+68,619**	**+645**	**+58,058**
	Change (%)	**-37.9**	**-44.0**	**+ 8.6**	**-6.9**	**+ 9.7**	**-9.5**	**0**	**-6.3**	**+15.1**	**-24.0**	**-0.9**	**+13.0**	**+15.0**	**+19.6**	**+8.2**

Supplementary Table 12c. Projected ***minimum*** (i.e., minimum negative/maximum positive) changes in catches of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna in tonnes (t) caught by purse-seine fishing in the high-seas areas (Supplementary Figure 1) by 2050 under the IPCC RCP8.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table17c. Changes in the total catch from all high-seas areas for each species, and for all species from all high-seas areas, are also shown. All values except 'Change (%)' for totals for high-seas areas and for all species combined are rounded to nearest whole number.

Species	Catch	High-seas area													Total
		I1	I2	I3	I4	I5	I6	I7	I8	I9	H4	H5	EPO-N	EPO-C	EPO-S	
SKJ	Average catch	10,528	18,630	45	16,516	16,994	15,459	13	2	24	18,431	39,150	7,072	254,602	2,031	**399,495**
	2050 catch	8,949	15,463	66	18,002	23,961	17,933	17	2	36	16,772	43,847	8,416	364,081	3,006	**520,551**
	Change (t)	-1,579	-3,167	+21	+1,486	+ 6,967	+2,473	+ 4	0	+12	-1,659	+4,698	+1,344	+109,479	+975	**+121,055**
	Change (%)	-15	-17	+47	+9	+41	+16	+30	+48	+48	-9	+12	+19	+43	+48	**+30.3**
YFT	Average catch	4,215	3,647	1	3,199	3,530	507	3	1	6	1,936	5,542	77,092	147,743	540	**247,960**
	2050 catch	4,088	3,282	1	3,295	4,236	593	3	1	8	1,859	5,598	96,365	199,453	879	**319,660**
	Change (t)	-126	-365	0	+ 96	+706	+86	0	0	+2	-77	+55	+19,273	+51,710	+340	**+71,700**
	Change (%)	-3	-10	+7	+3	+20	+17	+18	+4	+27	-4	+1	+25	+35	+63	**+28.9**
BET	Average catch	588	807	1	1,728	2,707	245	1	0	3	526	1,826	11	55,319	722	**64,483**
	2050 catch	582	766	1	1,711	2,815	248	1	0	3	505	1,807	13	63,064	895	**72,411**
	Change (t)	-6	-40	0	-17	+108	+2	0	0	0	-21	-18	+2	+7,745	+173	**+7,928**
	Change (%)	-1	-5	+5	-1	+4	+1	+6	0	+9	-4	-1	+18	+14	+24	**+12.3**
All species combined	**Average catch**	**15,330**	**23,083**	**47**	**21,443**	**23,231**	**16,211**	**17**	**2**	**33**	**20,893**	**46,517**	**84,175**	**457,664**	**3,293**	**711,939**
	2050 catch	**13,619**	**19,511**	**69**	**23,008**	**31,012**	**18,773**	**21**	**3**	**47**	**19,135**	**51,252**	**104,794**	**626,598**	**4,781**	**912,622**
	Change (t)	**-1,712**	**-3,572**	**+21**	**+1,565**	**+7,782**	**+2,562**	**+ 4**	**+ 1**	**+13**	**-1,757**	**+4,735**	**+20,619**	**+168,934**	**+1,488**	**+200,684**
	Change (%)	**-11.2**	**-15.5**	**+45.2**	**+7.3**	**+33.5**	**+15.8**	**+26.3**	**+33.6**	**+40.6**	**-8.4**	**+10.2**	**+24.5**	**+36.9**	**+45.2**	**+28.2**

Supplementary Table 13a. Projected ***average*** changes in catches of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna in tonnes (t) caught by purse-seine fishing in the exclusive economic zones (EEZs) of 10 Pacific Island Small Developing States by 2050 under the IPCC RCP4.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table18a. Changes in the total catch from all EEZs for each species, and for all species from all EEZs, are also shown. All values except 'Change (%)' for totals for EEZs and for all species combined are rounded to nearest whole number.

Species	Catch	EEZ											Total
		Cook Islands	FSM	Kiribati			Marshall Islands	Nauru	Palau	PNG	Solomon Islands	Tokelau	Tuvalu	
				Gilbert	Phoenix	Line								
SKJ	Average catch	9,513	144,272	203,548	79,976	32,089	29,990	86,174	1,681	318,229	84,637	19,037	63,863	**1,073,009**
	2050 catch	10,369	139,944	223,903	86,374	34,014	30,889	93,930	1,714	257,766	76,174	20,179	66,418	**1,041,673**
	Change (t)	+856	-4,328	+20,355	+6,398	+ 1,925	+ 900	+7,756	+34	-60,464	-8,464	+1,142	+2,555	**-31,335**
	Change (%)	+9	-3	+10	+8	+6	+3	+9	+2	-19	-10	+6	+4	**-2.9**
YFT	Average catch	1,107	29,317	45,981	11,051	5,667	5,435	19,952	942	130,049	29,178	1,661	6,944	**287,284**
	2050 catch	1,218	28,731	43,682	11,051	6,347	5,326	18,555	989	119,645	27,719	1,745	6,944	**271,952**
	Change (t)	+ 111	-586	-2,299	0	+680	-109	-1,397	+ 47	-10,404	-1,459	+83	0	**-15,333**
	Change (%)	+10	-2	-5	0	+12	-2	-7	+5	-8	-5	+5	0	**-5.3**
BET	Average catch	460	4,998	10,544	3,670	3,523	1,578	4,667	33	12,754	3,061	693	2,273	**48,256**
	2050 catch	478	5,098	10,439	3,707	3,734	1,563	4,574	35	12,244	2,847	686	2,228	**47,632**
	Change (t)	+18	+100	-105	+37	+211	-16	-93	+2	-510	-214	-7	-45	**-623**
	Change (%)	+4	+2	-1	+1	+6	-1	-2	+5	-4	-7	-1	-2	**-4.0**
All species combined	**Average catch**	**11,080**	**178,587**	**260,073**	**94,697**	**41,279**	**37,003**	**110,794**	**2,655**	**461,032**	**116,877**	**21,392**	**73,080**	**1,408,549**
	2050 catch	**12,065**	**173,773**	**278,023**	**101,132**	**44,096**	**37,778**	**117,059**	**2,738**	**389,654**	**106,740**	**22,610**	**75,589**	**1,361,257**
	Change (t)	**+985**	**-4,815**	**+17,950**	**+ 6,435**	**+2,817**	**+775**	**+ 6,266**	**+ 82**	**-71,378**	**-10,137**	**+1,218**	**+2,509**	**-47,291**
	Change (%)	**+8.9**	**-2.7**	**+6.9**	**+ 6.8**	**+ 6.8**	**+2.1**	**+ 5.7**	**+3.1**	**-15.5**	**-8.7**	**+5.7**	**+ 3.4**	**-3.4**

Supplementary Table 13b. Projected ***maximum*** (i.e., maximum negative, minimum positive) changes in catches of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna in tonnes (t) caught by purse-seine fishing in the exclusive economic zones (EEZs) of 10 Pacific Island Small Developing States by 2050 under the IPCC RCP4.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table18b. Changes in the total catch from all EEZs for each species, and for all species from all EEZs, are also shown. All values except 'Change (%)' for totals for EEZs and for all species combined are rounded to nearest whole number.

Species	Catch	EEZ												Total
		Cook Islands	FSM	Kiribati			Marshall Islands	Nauru	Palau	PNG	Solomon Islands	Tokelau	Tuvalu	
				Gilbert	Phoenix	Line								
SKJ	Average catch	9,513	144,272	203,548	79,976	32,089	29,990	86,174	1,681	318,229	84,637	19,037	63,863	**1,073,009**
	2050 catch	8,657	128,402	201,513	81,576	30,164	28,190	83,589	1,529	225,943	63,478	16,943	60,670	**930,652**
	Change (t)	-856	-15,870	-2,035	+1,600	-1,925	-1,799	-2,585	-151	-92,286	-21,159	-2,094	-3,193	**-142,356**
	Change (%)	-9	-11	-1	+2	-6	-6	-3	-9	-29	-25	-11	-5	**-13.3**
YFT	Average catch	1,107	29,317	45,981	11,051	5,667	5,435	19,952	942	130,049	29,178	1,661	6,944	**287,284**
	2050 catch	1,140	27,558	42,303	10,830	6,064	5,054	17,957	970	117,044	26,844	1,661	6,666	**264,091**
	Change (t)	+33	-1,759	-3,678	-221	+397	-380	-1,995	+28	-13,005	-2,334	0	-278	**-23,193**
	Change (%)	+3	-6	-8	-2	+7	-7	-10	+3	-10	-8	0	-4	**-8.1**
BET	Average catch	460	4,998	10,544	3,670	3,523	1,578	4,667	33	12,754	3,061	693	2,273	**48,256**
	2050 catch	465	4,848	10,017	3,560	3,629	1,484	4,387	33	11,734	2,755	673	2,160	**45,743**
	Change (t)	+5	-150	-527	-110	+106	-95	-280	0	-1,020	-306	-21	-114	**-2,512**
	Change (%)	+1	-3	-5	-3	+3	-6	-6	+1	-8	-10	-3	-5	**-5.2**
All species combined	**Average catch**	**11,080**	**178,587**	**260,073**	**94,697**	**41,279**	**37,003**	**110,794**	**2,655**	**461,032**	**116,877**	**21,392**	**73,080**	**1,408,549**
	2050 catch	**10,262**	**160,808**	**253,832**	**95,965**	**39,856**	**34,728**	**105,933**	**2,533**	**354,720**	**93,077**	**19,277**	**69,496**	**1,240,487**
	Change (t)	**-818**	**-17,779**	**-6,241**	**1,268**	**-1,423**	**-2,275**	**-4,860**	**-123**	**-106,312**	**-23,800**	**-2,115**	**-3,585**	**-168,061**
	Change (%)	**-7.4**	**-10.0**	**-2.4**	**1.3**	**-3.4**	**-6.1**	**-4.4**	**-4.6**	**-23.1**	**-20.4**	**-9.9**	**-4.9**	**-11.9**

Supplementary Table 13c. Projected ***minimum*** (i.e., minimum negative, maximum positive) changes in catches of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna in tonnes (t) caught by purse-seine fishing in the exclusive economic zones (EEZs) of 10 Pacific Island Small Developing States by 2050 under the IPCC RCP4.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table18c. Changes in the total catch from all EEZs for each species, and for all species from all EEZs, are also shown. All values except 'Change (%)' for totals for EEZs and for all species combined are rounded to nearest whole number.

Species	Catch	EEZ												Total
		Cook Islands	FSM	Kiribati			Marshall Islands	Nauru	Palau	PNG	Solomon Islands	Tokelau	Tuvalu	
				Gilbert	Phoenix	Line								
SKJ	Average catch	9,513	144,272	203,548	79,976	32,089	29,990	86,174	1,681	318,229	84,637	19,037	63,863	**1,073,009**
	2050 catch	12,082	151,485	246,293	91,173	35,619	34,188	105,133	2,017	324,594	92,255	25,319	77,913	**1,198,069**
	Change (t)	+2,569	+7,214	+42,745	+11,197	+3,530	+4,199	+18,958	+336	+6,365	+ 7,617	+6,282	+14,050	**125,061**
	Change (%)	+27	+5	+21	+14	+11	+14	+22	+20	+2	+9	+33	+22	**+11.7**
YFT	Average catch	1,107	29,317	45,981	11,051	5,667	5,435	19,952	942	130,049	29,178	1,661	6,944	**287,284**
	2050 catch	1,317	29,904	44,602	11,383	6,574	5,435	19,553	1,017	127,448	28,595	1,877	7,361	**285,064**
	Change (t)	+210	+586	-1,379	+332	+ 907	0	-399	+75	-2,601	-584	+216	+417	**-2,220**
	Change (%)	+19	+2	-3	+3	+16	0	-2	+8	-2	-2	+13	+6	**-0.8**
BET	Average catch	460	4,998	10,544	3,670	3,523	1,578	4,667	33	12,754	3,061	693	2,273	**48,256**
	2050 catch	501	5,248	10,755	3,817	3,875	1,610	4,667	36	12,627	2,908	721	2,319	**49,084**
	Change (t)	+41	+ 250	+ 211	+147	+352	+32	0	+3	-128	-153	+28	+45	**+ 828**
	Change (%)	+9	+5	+2	+4	+10	+2	0	+9	-1	-5	+4	+2	**+9.0**
All species combined	**Average catch**	**11,080**	**178,587**	**260,073**	**94,697**	**41,279**	**37,003**	**110,794**	**2,655**	**461,032**	**116,877**	**21,392**	**73,080**	**1,408,549**
	2050 catch	**13,900**	**186,637**	**301,650**	**106,372**	**46,068**	**41,233**	**129,353**	**3,070**	**464,668**	**123,757**	**27,918**	**87,592**	**1,532,218**
	Change (t)	**+2,820**	**+8,050**	**+41,577**	**+11,675**	**+4,789**	**+4,230**	**+18,559**	**+414**	**+3,636**	**+6,881**	**+6,526**	**+14,512**	**+123,669**
	Change (%)	**+25.5**	**+4.5**	**+16.0**	**+12.3**	**+11.6**	**+11.4**	**+16.8**	**+15.6**	**+0.8**	**+5.9**	**+30.5**	**+19.9**	**+8.8**

Supplementary Table 14a. Projected ***average*** changes in catches of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna in tonnes (t) caught by purse-seine fishing in the high-seas areas (Supplementary Figure 1) by 2050 under the IPCC RCP4.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table18a. Changes in the total catch from all high-seas areas for each species, and for all species from all high-seas areas, are also shown. All values except 'Change (%)' for totals for high-seas areas and for all species combined are rounded to nearest whole number.

Species	Catch	High-seas area													Total
		I1	I2	I3	I4	I5	I6	I7	I8	I9	H4	H5	EPO-N	EPO-C	EPO-S	
SKJ	Average catch	10,528	18,630	45	16,516	16,994	15,459	13	2	24	18,431	39,150	7,072	254,602	2,031	**399,495**
	2050 catch	8,738	16,580	59	17,672	19,203	17,005	13	2	26	20,827	40,715	7,921	297,884	2,316	**448,961**
	Change (t)	-1,790	-2,049	+14	+1,156	+2,209	+1,546	0	0	+2	+2,396	+1,566	+ 849	+43,282	+ 284	**+49,466**
	Change (%)	-17	-11	+31	+7	+13	+10	0	+28	+8	+13	+4	+12	+17	+14	**+ 12.4**
YFT	Average catch	4,215	3,647	1	3,199	3,530	507	3	1	6	1,936	5,542	77,092	147,743	540	**247,960**
	2050 catch	4,215	3,391	1	3,327	4,095	552	3	1	7	1,955	5,764	90,197	180,246	637	**294,392**
	Change (t)	0	-255	0	+128	+ 565	+46	0	0	+ 1	+19	+ 222	+13,106	+32,503	+ 97	**+46,431**
	Change (%)	0	-7	+6	+4	+16	+9	+8	+5	+14	+1	+4	+17	+22	+18	**+18.7**
BET	Average catch	588	807	1	1,728	2,707	245	1	0	3	526	1,826	11	55,319	722	**64,483**
	2050 catch	588	766	1	1,728	2,896	243	1	0	3	526	1,880	12	63,064	794	**72,503**
	Change (t)	0	-40	0	0	+189	-2	0	0	0	0	+55	+ 1	+7,745	+72	**+ 8,020**
	Change (%)	0	-7	+6	+4	+16	+9	+8	+5	+14	+1	+4	+17	+22	+18	**+12.4**
All species combined	**Average catch**	**15,330**	**23,083**	**47**	**21,443**	**23,231**	**16,211**	**17**	**2**	**33**	**20,893**	**46,517**	**84,175**	**457,664**	**3,293**	**711,939**
	2050 catch	**13,541**	**20,738**	**61**	**22,727**	**26,194**	**17,800**	**17**	**3**	**36**	**23,308**	**48,360**	**98,130**	**541,194**	**3,747**	**815,856**
	Change (t)	**-1,790**	**-2,345**	**+14**	**+1,284**	**+2,963**	**+1,589**	**0**	**+1**	**+3**	**+2,415**	**+1,842**	**+13,955**	**+83,530**	**+454**	**+103,917**
	Change (%)	**-11.7**	**-10.2**	**+29.8**	**+6.0**	**+12.8**	**+9.8**	**0**	**+20.2**	**+8.9**	**+ 11.6**	**+4.0**	**+16.6**	**+18.3**	**+13.8**	**+14.6**

Supplementary Table 14b. Projected ***maximum*** (i.e., maximum negative, minimum positive) changes in catches of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna in tonnes (t) caught by purse-seine fishing in the high-seas areas (Supplementary Figure 1) by 2050 under the IPCC RCP4.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table18b. Changes in the total catch from all high-seas areas for each species, and for all species from all high-seas areas, are also shown. All values except 'Change (%)' for totals for high-seas areas and for all species combined are rounded to nearest whole number.

Species	Catch	High-seas area														Total
		I1	I2	I3	I4	I5	I6	I7	I8	I9	H4	H5	EPO-N	EPO-C	EPO-S	
SKJ	Average catch	10,528	18,630	45	16,516	16,994	15,459	13	2	24	18,431	39,150	7,072	254,602	2,031	**399,495**
	2050 catch	7,580	14,531	54	16,516	16,654	14,995	12	2	22	19,168	38,758	7,567	262,240	2,113	**400,211**
	Change (t)	-2,948	-4,099	+ 9	0	-340	-464	-1	0	-2	+737	-391	+ 495	+ 7,638	+81	**+716**
	Change (%)	-28	-22	+19	0	-2	-3	-9	+2	-7	+4	-1	+7	+3	+4	**0.2**
YFT	Average catch	4,215	3,647	1	3,199	3,530	507	3	1	6	1,936	5,542	77,092	147,743	540	**247,960**
	2050 catch	4,131	3,282	1	3,167	3,918	527	3	1	6	1,897	5,653	84,801	168,427	567	**276,380**
	Change (t)	-84	-365	0	-32	+388	+20	0	0	0	-39	+111	+7,709	+20,684	+27	**+28,420**
	Change (%)	-2	-10	+4	-1	+11	+4	+3	+1	+4	-2	+2	+10	+14	+5	**+11.5**
BET	Average catch	588	807	1	1,728	2,707	245	1	0	3	526	1,826	11	55,319	722	**64,483**
	2050 catch	558	734	1	1,642	2,734	230	1	0	3	505	1,826	12	59,192	758	**68,195**
	Change (t)	-29	-73	0	-86	+ 27	-15	0	0	0	-21	0	+1	+ 3,872	+36	**3,712**
	Change (%)	-5	-9	-1	-5	+1	-6	-6	-4	+2	-4	0	+5	+7	+5	**5.8**
All species combined	**Average catch**	**15,330**	**23,083**	**47**	**21,443**	**23,231**	**16,211**	**17**	**2**	**33**	**20,893**	**46,517**	**84,175**	**457,664**	**3,293**	**711,939**
	2050 catch	**12,269**	**18,547**	**56**	**21,324**	**23,306**	**15,753**	**16**	**2**	**32**	**21,570**	**46,237**	**92,380**	**489,858**	**3,437**	**744,787**
	Change (t)	**-3,062**	**-4,536**	**+9**	**-118**	**+75**	**-458**	**-1**	**0**	**-1**	**+677**	**-281**	**+8,205**	**+32,194**	**+144**	**+32,848**
	Change (%)	**-20.0**	**-19.6**	**+18.3**	**-0.6**	**+0.3**	**-2.8**	**-6.8**	**0**	**-4.1**	**_3.2**	**-0.6**	**+9.7**	**+7.0**	**+4.4**	**+ 4.6**

Supplementary Table 14c. Projected ***minimum*** (i.e., minimum negative/maximum positive) changes in catches of skipjack (SKJ), yellowfin (YFT) and bigeye (BET) tuna in tonnes (t) caught by purse-seine fishing in the high-seas areas (Supplementary Figure 1) by 2050 under the IPCC RCP4.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table18c. Changes in the total catch from all high-seas areas for each species, and for all species from all high-seas areas, are also shown. All values except 'Change (%)' for totals for high-seas areas and for all species combined are rounded to nearest whole number.

Species	Catch	High-seas area													Total
		I1	I2	I3	I4	I5	I6	I7	I8	I9	H4	H5	EPO-N	EPO-C	EPO-S	
SKJ	Average catch	10,528	18,630	45	16,516	16,994	15,459	13	2	24	18,431	39,150	7,072	254,602	2,031	**399,495**
	2050 catch	10,528	18,630	68	18,663	21,242	18,242	15	2	30	21,749	42,281	8,203	343,713	2,580	**505,946**
	Change (t)	0	0	+ 23	+2,147	+ 4,248	+2,783	+ 2	0	+6	+3,318	+3,132	+1,132	+89,111	+548	**+106,450**
	Change (%)	0	0	+51	+13	+25	+18	+15	+56	+25	+18	+8	+16	+35	+27	**+26.6**
YFT	Average catch	4,215	3,647	1	3,199	3,530	507	3	1	6	1,936	5,542	77,092	147,743	540	**247,960**
	2050 catch	4,341	3,501	2	3,519	4,306	578	3	1	8	2,072	5,985	97,136	200,930	739	**323,120**
	Change (t)	+126	-146	1	+320	+777	+71	0	0	2	+136	+ 443	+20,044	+53,187	+199	**+75,160**
	Change (%)	+3	-4	+10	+10	+22	+14	+18	+10	+22	+7	+8	+26	+36	+37	**+30.3**
BET	Average catch	588	807	1	1,728	2,707	245	1	0	3	526	1,826	11	55,319	722	**64,483**
	2050 catch	599	791	1	1,780	2,977	248	1	0	3	547	1,953	13	67,489	859	**77,262**
	Change (t)	+12	-16	0	+52	+271	+2	0	0	0	+21	+128	+2	+12,170	+137	**+12,779**
	Change (%)	+2	-2	+7	+3	+10	+1	*8	+3	+11	+4	+7	+16	+22	+19	**+19.8**
All species combined	**Average catch**	**15,330**	**23,083**	**47**	**21,443**	**23,231**	**16,211**	**17**	**2**	**33**	**20,893**	**46,517**	**84,175**	**457,664**	**3,293**	**711,939**
	2050 catch	**15,468**	**22,921**	**70**	**23,961**	**28,526**	**19,067**	**19**	**3**	**41**	**24,367**	**50,220**	**105,352**	**612,132**	**4,178**	**906,328**
	Change (t)	**+138**	**-162**	**+23**	**+ 2,519**	**+5,296**	**+2,856**	**+2**	**1**	**+8**	**+3,474**	**+3,703**	**+21,177**	**+154,468**	**+885**	**+194,389**
	Change (%)	**+0.9**	**-0.7**	**+49.1**	**+11.7**	**+22.8**	**+17.6**	**+12.0**	**+50.0**	**+24.2**	**+16.6**	**+8.0**	**+ 25.2**	**+33.8**	**+26.9**	**+27.3**

Supplementary Table 15a. Estimated ***average*** changes in tuna-fishing access fees, and contributions of access fees to total government revenue (excluding grants) in percentage terms, for 10 Pacific Small Island Developing States (Pacific SIDS) under the RCP8.5 emissions scenario by 2050; FSM = Federated States of Micronesia; PNG = Papua New Guinea.

Pacific SIDS	Average 2015–2018			Change in tuna biomass by 2050 (RCP8.5) (%)*	2050 (RCP8.5)			Change by 2050	
	Gov't revenue (USD) million	Access fees (USD) million	Gov't revenue (%)		Gov't revenue (USD) million	Access fees (USD) million	Access fees as % Gov't revenue	Access fees (USD) million	Gov't revenue (%)
Cook Is	126.1	13.5	10.6	-4.0	125.6	13.0	10.3	-0.5	-0.4
FSM	150.6	68.4	47.6	-13.0	141.8	59.5	42.0	-8.9	-5.9
Kiribati	181.7	128.3	70.6	-8.2	171.2	117.8	68.8	-10.5	-5.8
Marshall Is	66.1	31.0	47.8	-0.7	65.8	30.8	46.8	-0.2	-0.3
Nauru	98.6	29.5	31.1	-21.6	92.2	23.2	25.1	-6.4	-6.5
Palau	75.2	7.1	9.4	-0.3	75.2	7.1	9.4	-0.02	-0.03
PNG	3360.8	134.3	4.0	-33.1	3316.4	89.8	2.7	-44.4	-1.3
Solomon Is	429.0	41.3	9.6	-26.1	418.2	30.5	7.3	-10.8	-2.5
Tokelau	16.0	13.4	84.2	-16.1	13.9	11.2	80.9	-2.1	-13.4
Tuvalu	47.4	25.6	53.9	-23.4	41.4	19.6	47.4	-6.0	-12.6
Total		**492.4**				**402.5**		**-89.9**	

* Weighted average change in biomass of skipjack, yellowfin and bigeye tuna (see Supplementary Table17a, and Supplementary Table19a for Kiribati)

Supplementary Table 15b. Estimated ***maximum*** loss of tuna-fishing access fees, and contributions of access fees to total government revenue (excluding grants) in percentage terms, for 10 Pacific Small Island Developing States (Pacific SIDS) under the RCP8.5 emissions scenario by 2050; FSM = Federated States of Micronesia; PNG = Papua New Guinea.

Pacific SIDS	Average 2015–2018			Change in tuna biomass by 2050 (RCP8.5) (%)*	2050 (RCP8.5)			Change by 2050	
	Gov't revenue (USD) million	Access fees (USD) million	Gov't revenue (%)		Gov't revenue (USD) million	Access fees (USD) million	Access fees as % Gov't revenue	Access fees (USD) million	Gov't revenue (%)
Cook Is	126.1	13.5	10.6	-8.3	125.0	12.4	9.9	-1.1	-0.9
FSM	150.6	68.4	47.6	-21.6	135.9	53.6	39.4	-14.8	-9.8
Kiribati	181.7	128.3	70.6	-19.0	157.3	103.9	66.1	-24.4	-13.4
Marshall Is	66.1	31.0	47.8	-8.6	63.4	28.4	44.7	-2.7	-4.0
Nauru	98.6	29.5	31.1	-37.1	87.6	18.6	21.2	-10.9	-11.1
Palau	75.2	7.1	9.4	-9.5	74.5	6.4	8.6	-0.7	-0.9
PNG	3360.8	134.3	4.0	-43.1	3302.9	76.4	2.3	-57.9	-1.7
Solomon Is	429.0	41.3	9.6	-36.8	413.8	26.1	6.3	-15.2	-3.5
Tokelau	16.0	13.4	84.2	-20.2	13.3	10.7	80.1	-2.7	-16.9
Tuvalu	47.4	25.6	53.9	-31.7	39.3	17.5	44.6	-8.1	-17.1
Total		**492.4**				**354.0**		**-138.5**	

*Weighted average change in biomass of skipjack, yellowfin and bigeye tuna (see Supplementary Table17b, and Supplementary Table19b for Kiribati)

Supplementary Table 15c. Estimated ***minimum*** loss of tuna-fishing access fees, and contributions of access fees to total government revenue (excluding grants) in percentage terms, for 10 Pacific Small Island Developing States (Pacific SIDS) under the RCP8.5 emissions scenario by 2050; FSM = Federated States of Micronesia; PNG = Papua New Guinea.

Pacific SIDS	Average 2015–2018			Change in tuna biomass by 2050 (RCP8.5) (%)*	2050 (RCP8.5)			Change by 2050	
	Gov't revenue (USD) million	Access fees (USD) million	Gov't revenue (%)		Gov't revenue (USD) million	Access fees (USD) million	Access fees as % Gov't revenue	Access fees (USD) million	Gov't revenue (%)
Cook Is	126.1	13.5	10.6	+1.2	126.3	13.7	10.8	+0.2	+0.1
FSM	150.6	68.4	47.6	-5.1	147.2	64.9	44.1	-3.5	-2.3
Kiribati	181.7	128.3	70.6	+0.9	182.9	129.5	70.8	+1.2	+0.6
Marshall Is	66.1	31.0	47.8	+5.4	67.7	32.7	48.3	+1.7	+2.5
Nauru	98.6	29.5	31.1	-6.0	96.8	27.7	28.7	-1.8	-1.8
Palau	75.2	7.1	9.4	+12.6	76.1	8.0	10.5	+0.9	+1.2
PNG	3360.8	134.3	4.0	-22.0	3331.3	104.7	3.1	-29.5	-0.9
Solomon Is	429.0	41.3	9.6	-17.3	421.8	34.2	8.1	-7.2	-1.7
Tokelau	16.0	13.4	84.2	-4.9	15.4	12.7	82.7	-0.7	-4.1
Tuvalu	47.4	25.6	53.9	-14.3	43.7	22.0	50.2	-3.7	-7.7
Total		**492.4**				**450.0**		**-42.4**	

* Weighted average change in biomass of skipjack, yellowfin and bigeye tuna (see Supplementary Table17c, and Supplementary Table19c for Kiribati)

Supplementary Table 16a. Estimated ***average*** changes in tuna-fishing access fees, and contributions of access fees to total government revenue (excluding grants) in percentage terms, for 10 Pacific Small Island Developing States (Pacific SIDS) under the RCP4.5 emissions scenario by 2050; FSM = Federated States of Micronesia; PNG = Papua New Guinea.

Pacific SIDS	Average 2015–2018			Change in tuna biomass by 2050 (RCP4.5) (%)*	2050 (RCP4.5)			Change by 2050	
	Gov't revenue (USD) million	Access fees (USD) million	Gov't revenue (%)		Gov't revenue (USD) million	Access fees (USD) million	Access fees as % Gov't revenue	Access fees (USD) million	Gov't revenue (%)
Cook Is	126.1	13.5	10.6	+8.9	127.3	14.7	11.6	+1.2	+1.0
FSM	150.6	68.4	47.6	-2.7	148.8	66.5	44.7	-1.8	-1.2
Kiribati	181.7	128.3	70.6	+6.9	190.6	137.2	72.0	+8.9	+4.9
Marshall Is	66.1	31.0	47.8	+2.1	66.7	31.7	47.5	+0.7	+1.0
Nauru	98.6	29.5	31.1	+5.7	100.2	31.2	31.1	+1.7	+1.7
Palau	75.2	7.1	9.4	+3.1	75.4	7.3	9.7	+0.2	+0.3
PNG	3360.8	134.3	4.0	-15.5	3340.0	113.5	3.4	-20.8	-0.6
Solomon Is	429.0	41.3	9.6	-8.7	425.4	37.7	8.9	-3.6	-0.8
Tokelau	16.0	13.4	84.2	+5.7	16.8	14.1	84.2	+0.8	+4.8
Tuvalu	47.4	25.6	53.9	+3.4	48.3	26.5	54.9	+0.9	+1.9
Total		**492.4**				**480.5**		**-12.0**	

*Weighted average change in biomass of skipjack, yellowfin and bigeye tuna (see Supplementary Table18a, and Supplementary Table20a for Kiribati)

Supplementary Table 16b. Estimated ***maximum*** loss of tuna-fishing access fees, and contributions of access fees to total government revenue (excluding grants) in percentage terms, for 10 Pacific Small Island Developing States (Pacific SIDS) under the RCP4.5 emissions scenario by 2050; FSM = Federated States of Micronesia; PNG = Papua New Guinea.

Pacific SIDS	Average 2015–2018			Change in tuna biomass by 2050 (RCP4.5) (%)*	2050 (RCP4.5)			Change by 2050	
	Gov't revenue (USD) million	Access fees (USD) million	Gov't revenue (%)		Gov't revenue (USD) million	Access fees (USD) million	Access fees as % Gov't revenue	Access fees (USD) million	Gov't revenue (%)
Cook Is	126.1	13.5	10.6	-7.4	125.1	12.5	10.0	-1.0	-0.8
FSM	150.6	68.4	47.6	-10.0	143.8	61.5	42.8	-6.8	-4.5
Kiribati	181.7	128.3	70.6	-1.6	179.7	126.3	70.3	-2.1	-1.1
Marshall Is	66.1	31.0	47.8	-6.1	64.2	29.1	45.4	-1.9	-2.9
Nauru	98.6	29.5	31.1	-4.4	97.3	28.2	29.0	-1.3	-1.3
Palau	75.2	7.1	9.4	-4.7	74.9	6.8	9.1	-0.3	-0.4
PNG	3360.8	134.3	4.0	-23.1	3329.8	103.3	3.1	-31.0	-0.9
Solomon Is	429.0	41.3	9.6	-20.4	420.6	32.9	7.8	-8.4	-2.0
Tokelau	16.0	13.4	84.2	-9.9	14.7	12.1	82.0	-1.3	-8.3
Tuvalu	47.4	25.6	53.9	-4.9	46.1	24.4	52.8	-1.3	-2.7
Total		**492.4**				**437.1**		**-55.3**	

*Weighted average change in biomass of skipjack, yellowfin and bigeye tuna (see Supplementary Table18b, and Supplementary Table20b for Kiribati)

Supplementary Table 16c. Estimated ***minimum*** changes in tuna-fishing access fees, and contributions of access fees to total government revenue (excluding grants) in percentage terms, for 10 Pacific Small Island Developing States (Pacific SIDS) under the RCP4.5 emissions scenario by 2050; FSM = Federated States of Micronesia; PNG = Papua New Guinea.

Pacific SIDS	Average 2015–2018			Change in tuna biomass by 2050 (RCP4.5) (%)*	2050 (RCP4.5)			Change by 2050	
	Gov't revenue (USD) million	Access fees (USD) million	Gov't revenue (%)		Gov't revenue (USD) million	Access fees (USD) million	Access fees as % Gov't revenue	Access fees (USD) million	Gov't revenue (%)
Cook Is	126.1	13.5	10.6	+25.5	129.6	16.9	13.1	+3.4	+2.7
FSM	150.6	68.4	47.6	+4.5	153.7	71.4	46.5	+3.1	+2.0
Kiribati	181.7	128.3	70.6	+14.7	200.6	147.2	73.4	+18.9	+10.4
Marshall Is	66.1	31.0	47.8	+11.4	69.6	34.6	49.7	+3.5	+5.4
Nauru	98.6	29.5	31.1	+16.8	103.5	34.5	33.3	+4.9	+5.0
Palau	75.2	7.1	9.4	+15.7	76.3	8.2	10.8	+1.1	+1.5
PNG	3360.8	134.3	4.0	+0.8	3361.9	135.3	4.0	+1.1	<0.001
Solomon Is	429.0	41.3	9.6	+5.9	431.4	43.7	10.1	+2.4	+0.6
Tokelau	16.0	13.4	84.2	+30.5	20.1	17.5	86.8	+4.1	+25.5
Tuvalu	47.4	25.6	53.9	+19.9	52.5	30.7	58.5	+5.1	+10.7
Total		**492.4**				**540.1**		**+47.7**	

* Weighted average change in biomass of skipjack, yellowfin and bigeye tuna (see Supplementary Table18c, and Supplementary Table20c for Kiribati).

Supplementary Table 17a. Projected ***average*** percentage changes in purse-seine catch in the exclusive economic zones (EEZs) of 10 Pacific Small Island Developing States (Pacific SIDS), and high-seas areas (Supplementary Figure 1), using SEAPODYM under the IPCC RCP8.5 emissions scenario by 2050. Projections for the percentage changes in purse-seine catch are average percentage changes in combined biomass of skipjack, yellowfin and bigeye tuna, weighted by their average relative abundance in purse-seine catches for the 10-year period (2009–2018) (Supplementary Table3). FSM = Federated States of Micronesia; PNG = Papua New Guinea.

Area	Relative abundance of tuna species (%)*			Projected changes in biomass (%)			Change in purse-seine catch by 2050 (%)**
	Skipjack	Yellowfin	Bigeye	Skipjack	Yellowfin	Bigeye	
	a	*b*	*c*	*d*	*e*	*f*	
EEZs of Pacific SIDS							
Cook Islands	85.9	10.0	4.1	-6	+11	+2	-4.0
FSM	80.8	16.4	2.8	-14	-10	-1	-13.0
Kiribati - Gilbert Is	78.3	17.7	4.1	-14	-13	-4	-13.4
Kiribati - Phoenix Is	84.5	11.7	3.9	-2	-7	-5	-2.7
Kiribati - Line Is	77.7	13.7	8.5	+14	+7	+1	+11.9
Marshall Islands	81.0	14.7	4.3	+1	-10	-2	-0.7
Nauru	77.8	18.0	4.2	-24	-15	-5	-21.6
Palau	64.0	35.5	1.2	0	-1	+1	-0.3
PNG	69.0	28.2	2.8	-42	-14	-6	-33.1
Solomon Islands	72.4	25.0	2.6	-32	-11	-6	-26.1
Tokelau	89.0	7.8	3.2	-18	+1	-4	-16.1
Tuvalu	87.4	9.5	3.1	-26	-5	-6	-23.4
High-seas areas							
I1	68.7	27.5	3.8	-34	-8	-3	-25.7
I2	80.7	15.8	3.5	-33	-13	-6	-28.9
I3	95.6	3.0	1.5	+29	+3	+2	+27.8
I4	77.0	14.9	8.1	+3	-3	-4	+1.5
I5	73.2	15.2	11.7	+26	+9	+2	+20.6
I6	95.4	3.1	1.5	+4	+9	-3	+4.1
I7	76.6	16.2	7.2	+10	+9	-2	+9.0
I8	68.2	22.7	9.1	+23	0	-2	+15.5
I9	72.3	18.7	9.0	+29	+18	+4	+24.7
H4	88.2	9.3	2.5	-16	-6	-6	-14.8
H5	84.2	11.9	3.9	+8	-2	-2	+6.4
EPO-N	8.4	91.6	0.0	+12	+20	+11	+19.3
EPO-C	55.6	32.3	12.1	+32	+26	+10	+27.4
EPO-S	61.7	16.4	21.9	+36	+41	+13	+31.8

*Rounded to one decimal place; **Calculated as ((a x d) + (b x e) + (c x f))/100

Supplementary Table 17b. Projected ***maximum*** (i.e., maximum negative/minimum positive) percentage changes in purse-seine catch in the exclusive economic zones (EEZs) of 10 Pacific Small Island Developing States (Pacific SIDS), and high-seas areas (Supplementary Figure 1), using SEAPODYM under the IPCC RCP8.5 emissions scenario by 2050. Projections for the percentage changes in purse-seine catch are average percentage changes in combined biomass of skipjack, yellowfin and bigeye tuna, weighted by their average relative abundance in purse-seine catches for the 10-year period (2009–2018) (Supplementary Table3). FSM = Federated States of Micronesia; PNG = Papua New Guinea.

Area	Relative abundance of tuna species (%)*			Projected changes in biomass (%)			Change in purse-seine catch by 2050 (%)**
	Skipjack	Yellowfin	Bigeye	Skipjack	Yellowfin	Bigeye	
	a	*b*	*C*	*d*	*e*	*f*	
EEZs of Pacific SIDS							
Cook Islands	85.9	10.0	4.1	-10	+3	-1	-8.3
FSM	80.8	16.4	2.8	-24	-13	-4	-21.6
Kiribati - Gilbert Is	78.3	17.7	4.1	-29	-15	-5	-25.6
Kiribati - Phoenix Is	84.5	11.7	3.9	-13	-9	-6	-12.3
Kiribati - Line Is	77.7	13.7	8.5	+9	+2	-1	+7.2
Marshall Islands	81.0	14.7	4.3	-8	-13	-6	-8.6
Nauru	77.8	18.0	4.2	-43	-19	-5	-37.1
Palau	64.0	35.5	1.2	-12	-5	-1	-9.5
PNG	69.0	28.2	2.8	-54	-20	-7	-43.1
Solomon Islands	72.4	25.0	2.6	-46	-13	-8	-36.8
Tokelau	89.0	7.8	3.2	-22	-5	-7	-20.2
Tuvalu	87.4	9.5	3.1	-35	-9	-8	-31.7
High-seas areas							
I1	68.7	27.5	3.8	-50	-12	-6	-37.9
I2	80.7	15.8	3.5	-51	-16	-8	-44.0
I3	95.6	3.0	1.5	+9	-1	0	+8.6
I4	77.0	14.9	8.1	-7	-7	-6	-6.9
I5	73.2	15.2	11.7	+13	+3	-2	+9.7
I6	95.4	3.1	1.5	-10	+3	-6	-9.5
I7	76.6	16.2	7.2	+1	+2	-6	+0.7
I8	68.2	22.7	9.1	-7	-5	-4	-6.3
I9	72.3	18.7	9.0	+19	+7	+1	+15.1
H4	88.2	9.3	2.5	-26	-10	-7	-24.0
H5	84.2	11.9	3.9	0	-6	-4	-0.9
EPO-N	8.4	91.6	0.0	+2	+14	+6	+13.0
EPO-C	55.6	32.3	12.1	+16	+17	+5	+15.0
EPO-S	61.7	16.4	21.9	+23	+25	+6	+19.6

*Rounded to one decimal place; **Calculated as $((a \times d) + (b \times e) + (c \times f))/100$

Supplementary Table 17c. Projected ***minimum*** (i.e., minimum negative/maximum positive)percentage changes in purse-seine catch in the exclusive economic zones (EEZs) of 10 Pacific Small Island Developing States (Pacific SIDS), and high-seas areas (Supplementary Figure 1), using SEAPODYM under the IPCC RCP8.5 emissions scenario by 2050. Projections for the percentage changes in purse-seine catch are average percentage changes in combined biomass of skipjack, yellowfin and bigeye tuna, weighted by their average relative abundance in purse-seine catches for the 10-year period (2009–2018) (Supplementary Table3). FSM = Federated States of Micronesia; PNG = Papua New Guinea.

Area	Relative abundance of tuna species (%)*			Projected changes in biomass (%)			Change in purse-seine catch by 2050 (%)**
	Skipjack	Yellowfin	Bigeye	Skipjack	Yellowfin	Bigeye	
	a	*b*	*C*	*d*	*e*	*f*	
EEZs of Pacific SIDS							
Cook Islands	85.9	10.0	4.1	-1	+18	+7	+1.2
FSM	80.8	16.4	2.8	-5	-7	+3	-5.1
Kiribati - Gilbert Is	78.3	17.7	4.1	-1	-10	-3	-2.7
Kiribati - Phoenix Is	84.5	11.7	3.9	+5	-5	-4	+3.5
Kiribati - Line Is	77.7	13.7	8.5	+20	+13	+3	+17.6
Marshall Islands	81.0	14.7	4.3	+8	-8	+1	+5.4
Nauru	77.8	18.0	4.2	-5	-11	-4	-6.0
Palau	64.0	35.5	1.2	+19	+1	+5	+12.6
PNG	69.0	28.2	2.8	-28	-9	-5	-22.0
Solomon Islands	72.4	25.0	2.6	-21	-8	-5	-17.3
Tokelau	89.0	7.8	3.2	-6	+6	-1	-4.9
Tuvalu	87.4	9.5	3.1	-16	-2	-4	-14.3
High-seas areas							
I1	68.7	27.5	3.8	-15	-3	-1	-11.2
I2	80.7	15.8	3.5	-17	-10	-5	-15.5
I3	95.6	3.0	1.5	+47	+7	+5	+45.2
I4	77.0	14.9	8.1	+9	+3	-1	+7.3
I5	73.2	15.2	11.7	+41	+20	+4	+33.5
I6	95.4	3.1	1.5	+16	+17	+1	+15.8
I7	76.6	16.2	7.2	+30	+18	+6	+26.3
I8	68.2	22.7	9.1	+48	+4	0	+33.6
I9	72.3	18.7	9.0	+48	+27	+9	+40.6
H4	88.2	9.3	2.5	-9	-4	-4	-8.4
H5	84.2	11.9	3.9	+12	+1	-1	+10.2
EPO-N	8.4	91.6	0.0	+19	+25	+18	+24.5
EPO-C	55.6	32.3	12.1	+43	+35	+14	+36.9
EPO-S	61.7	16.4	21.9	+48	+63	+24	+45.2

* Rounded to one decimal place; **Calculated as ((a x d) + (b x e) + (c x f))/100

Supplementary Table 18a. Projected ***average*** percentage changes in purse-seine catch in the exclusive economic zones (EEZs) of 10 Pacific Small Island Developing States (Pacific SIDS), and high-seas areas (Supplementary Figure 1), using SEAPODYM under the IPCC RCP4.5 emissions scenario by 2050. Projections for the percentage changes in purse-seine catch are average percentage changes in combined biomass of skipjack, yellowfin and bigeye tuna, weighted by their average relative abundance in purse-seine catches for the 10-year period (2009–2018) (Supplementary Table3). FSM = Federated States of Micronesia; PNG = Papua New Guinea.

Area	Relative abundance of tuna species (%)*			Projected changes in biomass (%)			Change in purse-seine catch by 2050 (%)**
	Skipjack	Yellowfin	Bigeye	Skipjack	Yellowfin	Bigeye	
	a	*b*	*c*	*d*	*e*	*F*	
EEZs of Pacific SIDS							
Cook Is	85.9	10.0	4.1	+9	+10	+4	+8.9
FSM	80.8	16.4	2.8	-3	-2	+2	-2.7
Kiribati - Gilbert Is	78.3	17.7	4.1	+10	-5	-1	+6.9
Kiribati - Phoenix Is	84.5	11.7	3.9	+8	0	+1	+6.8
Kiribati - Line Is	77.7	13.7	8.5	+6	+12	+6	+6.8
Marshall Is	81.0	14.7	4.3	+3	-2	-1	+2.1
Nauru	77.8	18.0	4.2	+9	-7	-2	+5.7
Palau	64.0	35.5	1.2	+2	+5	+5	+3.1
PNG	69.0	28.2	2.8	-19	-8	-4	-15.5
Solomon Is	72.4	25.0	2.6	-10	-5	-7	-8.7
Tokelau	89.0	7.8	3.2	+6	+5	-1	+5.7
Tuvalu	87.4	9.5	3.1	+4	0	-2	+3.4
High-seas areas							
I1	68.7	27.5	3.8	-17	0	0	-11.7
I2	80.7	15.8	3.5	-11	-7	-5	-10.2
I3	95.6	3.0	1.5	+31	+6	+3	+29.8
I4	77.0	14.9	8.1	+7	+4	0	+6.0
I5	73.2	15.2	11.7	+13	+16	+7	+12.8
I6	95.4	3.1	1.5	+10	+9	-1	+9.8
I7	76.6	16.2	7.2	0	+8	0	+1.3
I8	68.2	22.7	9.1	+28	+5	0	+20.2
I9	72.3	18.7	9.0	+8	+14	+6	+8.9
H4	88.2	9.3	2.5	+13	+1	0	+11.6
H5	84.2	11.9	3.9	+4	+4	+3	+4.0
EPO-N	8.4	91.6	0.0	+12	+17	+10	+16.6
EPO-C	55.6	32.3	12.1	+17	+22	+14	+18.3
EPO-S	61.7	16.4	21.9	+14	+18	+10	+13.8

* Rounded to one decimal place; **Calculated as $((a \times d) + (b \times e) + (c \times f))/100$

Supplementary Table 18b. Projected ***maximum*** (i.e., maximum negative, minimum positive***)*** percentage changes in purse-seine catch in the exclusive economic zones (EEZs) of 10 Pacific Small Island Developing States (Pacific SIDS), and high-seas areas (Supplementary Figure 1), using SEAPODYM under the IPCC RCP4.5 emissions scenario by 2050. Projections for the percentage changes in purse-seine catch are average percentage changes in combined biomass of skipjack, yellowfin and bigeye tuna, weighted by their average relative abundance in purse-seine catches for the 10-year period (2009–2018) (Supplementary Table3). FSM = Federated States of Micronesia; PNG = Papua New Guinea.

Area	Relative abundance of tuna species (%)*			Projected changes in biomass (%)			Change in purse-seine catch by 2050 (%)**
	Skipjack	Yellowfin	Bigeye	Skipjack	Yellowfin	Bigeye	
	a	*b*	*c*	*d*	*e*	*F*	
EEZs of Pacific SIDS							
Cook Is	85.9	10.0	4.1	-9	+3	1	-7.4
FSM	80.8	16.4	2.8	-11	-6	-3	-10.0
Kiribati - Gilbert Is	78.3	17.7	4.1	-1	-8	-5	-2.4
Kiribati - Phoenix Is	84.5	11.7	3.9	+2	-2	-3	1.3
Kiribati - Line Is	77.7	13.7	8.5	-6	+7	3	-3.4
Marshall Is	81.0	14.7	4.3	-6	-7	-6	-6.1
Nauru	77.8	18.0	4.2	-3	-10	-6	-4.4
Palau	64.0	35.5	1.2	-9	+3	1	-4.7
PNG	69.0	28.2	2.8	-29	-10	-8	-23.1
Solomon Is	72.4	25.0	2.6	-25	-8	-10	-20.4
Tokelau	89.0	7.8	3.2	-11	0	-3	-9.9
Tuvalu	87.4	9.5	3.1	-5	-4	-5	-4.9
High-seas areas							
I1	68.7	27.5	3.8	-28	-2	-5	-20.0
I2	80.7	15.8	3.5	-22	-10	-9	-19.6
I3	95.6	3.0	1.5	+19	+4	-1	+18.3
I4	77.0	14.9	8.1	0	-1	-5	-0.6
I5	73.2	15.2	11.7	-2	+11	+1	+0.3
I6	95.4	3.1	1.5	-3	+4	-6	-2.8
I7	76.6	16.2	7.2	-9	+3	-6	-6.8
I8	68.2	22.7	9.1	+2	+1	-4	+1.2
I9	72.3	18.7	9.0	-7	+4	+2	-4.1
H4	88.2	9.3	2.5	+4	-2	-4	+3.2
H5	84.2	11.9	3.9	-1	+2	0	-0.6
EPO-N	8.4	91.6	0.0	+7	+10	+5	+9.7
EPO-C	55.6	32.3	12.1	+3	+14	+7	+7.0
EPO-S	61.7	16.4	21.9	+4	+5	+5	+4.4

* Rounded to one decimal place; **Calculated as ((a x d) + (b x e) + (c x f))/100

Supplementary Table 18c. Projected ***minimum*** (i.e., minimum negative, maximum positive) percentage changes in purse-seine catch in the exclusive economic zones (EEZs) of 10 Pacific Small Island Developing States (Pacific SIDS), and high-seas areas (Supplementary Figure 1), using SEAPODYM under the IPCC RCP4.5 emissions scenario by 2050. Projections for the percentage changes in purse-seine catch are average percentage changes in combined biomass of skipjack, yellowfin and bigeye tuna, weighted by their average relative abundance in purse-seine catches for the 10-year period (2009–2018) (Supplementary Table3). FSM = Federated States of Micronesia; PNG = Papua New Guinea.

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Area	Relative abundance of tuna species (%)*			Projected changes in biomass (%)			Change in purse-seine catch by 2050 (%)**
	Skipjack	Yellowfin	Bigeye	Skipjack	Yellowfin	Bigeye	
	a	*B*	*c*	*d*	*e*	*F*	
EEZs of Pacific SIDS							
Cook Is	85.9	10.0	4.1	+27	+19	+9	+25.5
FSM	80.8	16.4	2.8	+5	+2	+5	+4.5
Kiribati - Gilbert Is	78.3	17.7	4.1	+21	-3	+2	+16.0
Kiribati - Phoenix Is	84.5	11.7	3.9	+14	+3	+4	+12.3
Kiribati - Line Is	77.7	13.7	8.5	+11	+16	+10	+11.6
Marshall Is	81.0	14.7	4.3	+14	0	+2	+11.4
Nauru	77.8	18.0	4.2	+22	-2	+0	+16.8
Palau	64.0	35.5	1.2	+20	+8	+9	+15.7
PNG	69.0	28.2	2.8	+2	-2	-1	+0.8
Solomon Is	72.4	25.0	2.6	+9	-2	-5	+5.9
Tokelau	89.0	7.8	3.2	+33	+13	+4	+30.5
Tuvalu	87.4	9.5	3.1	+22	+6	+2	+19.9
High-seas areas							
I1	68.7	27.5	3.8	0	+3	+2	+0.9
I2	80.7	15.8	3.5	0	-4	-2	-0.7
I3	95.6	3.0	1.5	+51	+10	+7	+49.1
I4	77.0	14.9	8.1	+13	+10	+3	+11.7
I5	73.2	15.2	11.7	+25	+22	+10	+22.8
I6	95.4	3.1	1.5	+18	+14	+1	+17.6
I7	76.6	16.2	7.2	+15	+18	+8	+15.0
I8	68.2	22.7	9.1	+56	+10	+3	+40.7
I9	72.3	18.7	9.0	+25	+22	+11	+23.2
H4	88.2	9.3	2.5	+18	+7	+4	+16.6
H5	84.2	11.9	3.9	+8	+8	+7	+8.0
EPO-N	8.4	91.6	0.0	+16	+26	+16	+25.2
EPO-C	55.6	32.3	12.1	+35	+36	+22	+33.8
EPO-S	61.7	16.4	21.9	+27	+37	+19	+26.9

* Rounded to one decimal place; **Calculated as ((a x d) + (b x e) + (c x f))/100

Supplementary Table 19a. Projected ***average*** changes in the catches of skipjack, yellowfin and bigeye tuna in tonnes (t) caught by purse-seine fishing in the three exclusive economic zone (EEZ) areas of Kiribati by 2050 under the IPCC RCP8.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table17a. Changes in the total combined catch of all three tuna species in each EEZ area, and for the total EEZ of Kiribati, are also shown. Values for '2050 catch' and 'Change (t)' are rounded to the nearest whole number.

Species	Catch	EEZ area			
		Gilbert Is	**Phoenix Is**	**Line Is**	**Total**
Skipjack	10-year average catch	203,548	79,976	32,089	**315,613**
	2050 catch	175,051	78,376	36,581	**290,008**
	Change (t)	-28,497	-1,600	+4,492	**-25,604**
	Change (%)	-14	-2	+14	**-8.1**
Yellowfin	10-year average catch	45,981	11,051	5,667	**62,699**
	2050 catch	40,003	10,277	6,064	**56,345**
	Change (t)	-5,978	-774	+397	**-6,354**
	Change (%)	-13	-7	+7	**-10.1**
Bigeye	10-year average catch	10,544	3,670	3,523	**17,737**
	2050 catch	10,123	3,486	3,558	**17,167**
	Change (t)	-422	-183	+35	**-570**
	Change (%)	-4	-5	+1	**-3.2**
All species combined	**10-year average catch**	**260,073**	**94,697**	**41,279**	**396,049**
	2050 catch	**225,177**	**92,140**	**46,203**	**363,520**
	Change (t)	**-34,896**	**-2,557**	**+4,924**	**-32,528**
	Change (%)	**-13.4**	**-2.7**	**+11.9**	**-8.2**

Supplementary Table 19b. Projected ***maximum*** (i.e., maximum negative, minimum positive) changes in the catches of skipjack, yellowfin and bigeye tuna in tonnes (t) caught by purse-seine fishing in the three exclusive economic zone (EEZ) areas of Kiribati by 2050 under the IPCC RCP8.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table17b. Changes in the total combined catch of all three tuna species in each EEZ area, and for the total EEZ of Kiribati, are also shown. Values for '2050 catch' and 'Change (t)' are rounded to the nearest whole number.

Species	Catch	EEZ area			
		Gilbert Is	Phoenix Is	Line Is	Total
Skipjack	10-year average catch	203,548	79,976	32,089	**315,613**
	2050 catch	144,519	69,579	34,977	**249,074**
	Change (t)	-59,029	-10,397	+2,888	**-66,538**
	Change (%)	-29	-13	+9	**-21.1**
Yellowfin	10-year average catch	45,981	11,051	5,667	**62,699**
	2050 catch	39,084	10,056	5,781	**54,921**
	Change (t)	-6,897	-995	+113	**-7,778**
	Change (%)	-15	-9	+2	**-12.4**
Bigeye	10-year average catch	10,544	3,670	3,523	**17,737**
	2050 catch	10,017	3,450	3,488	**16,954**
	Change (t)	-527	-220	-35	**-783**
	Change (%)	-5.0	-6.0	-1.0	**-4.4**
All species combined	**10-year average catch**	**260,073**	**94,697**	**41,279**	**396,049**
	2050 catch	**193,620**	**83,085**	**44,245**	**320,950**
	Change (t)	**-66,453**	**-11,612**	**+2,966**	**-75,099**
	Change (%)	**-25.6**	**-12.3**	**+7.2**	**-19.0**

Supplementary Table 19c. Projected ***minimum*** (i.e., minimum negative, maximum positive) changes in the catches of skipjack, yellowfin and bigeye tuna in tonnes (t) caught by purse-seine fishing in the three exclusive economic zone (EEZ) areas of Kiribati by 2050 under the IPCC RCP8.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table17c. Changes in the total combined catch of all three tuna species in each EEZ area, and for the total EEZ of Kiribati, are also shown. Values for '2050 catch' and 'Change (t)' are rounded to the nearest whole number.

Species	Catch	EEZ area			
		Gilbert Is	Phoenix Is	Line Is	Total
Skipjack	10-year average catch	203,548	79,976	32,089	**315,613**
	2050 catch	201,513	83,974	38,506	**323,993**
	Change (t)	-2,035	+3,999	+6,418	**+8,381**
	Change (%)	-1	+5	+20	**+2.7**
Yellowfin	10-year average catch	45,981	11,051	5,667	**62,699**
	2050 catch	41,383	10,498	6,404	**58,285**
	Change (t)	-4,598	-553	+737	**-4,414**
	Change (%)	-10	-5	+13	**-7.0**
Bigeye	10-year average catch	10,544	3,670	3,523	**17,737**
	2050 catch	10,228	3,523	3,629	**17,380**
	Change (t)	-316	-147	+106	**-357**
	Change (%)	-3	-4	+3	**-2.0**
All species combined	**10-year average catch**	**260,073**	**94,697**	**41,279**	**396,049**
	2050 catch	**253,123**	**97,996**	**48,539**	**399,658**
	Change (t)	**-6,950**	**+3,299**	**+7,260**	**+3,610**
	Change (%)	**-2.7**	**+3.5**	**+17.6**	**+0.9**

Supplementary Table 20a. Projected ***average*** changes in the catches of skipjack, yellowfin and bigeye tuna in tonnes (t) caught by purse-seine fishing in the three exclusive economic zone (EEZ) areas of Kiribati by 2050 under the IPCC RCP4.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table18a. Changes in the total combined catch of all three tuna species in each EEZ area, and for the total EEZ of Kiribati, are also shown. Values for '2050 catch' and 'Change (t)' are rounded to the nearest whole number.

Species	Catch	EEZ area			
		Gilbert Is	Phoenix Is	Line Is	Total
Skipjack	10-year average catch	203,548	79,976	32,089	**315,613**
	2050 catch	223,903	86,374	34,014	**344,291**
	Change (t)	+20,355	+6,398	+1,925	**+28,678**
	Change (%)	+10	+8	+6	**+9.1**
Yellowfin	10-year average catch	45,981	11,051	5,667	**62,699**
	2050 catch	43,682	11,051	6,347	**61,080**
	Change (t)	-2,299	0	+680	**-1,619**
	Change (%)	-5	0	+12	**-2.6**
Bigeye	10-year average catch	10,544	3,670	3,523	**17,737**
	2050 catch	10,439	3,707	3,734	**17,880**
	Change (t)	-105	+37	+211	**+143**
	Change (%)	-1	+1	+6	**+0.8**
All species combined	**10-year average catch**	**260,073**	**94,697**	**41,279**	**396,049**
	2050 catch	**278,023**	**101,132**	**44,096**	**423,251**
	Change (t)	**+17,950**	**+6,435**	**+2,817**	**+27,202**
	Change (%)	**+6.9**	**+6.8**	**+6.8**	**+6.9**

Supplementary Table 20b. Projected ***maximum*** (i.e., maximum negative, minimum positive) changes in the catches of skipjack, yellowfin and bigeye tuna in tonnes (t) caught by purse-seine fishing in the three exclusive economic zone (EEZ) areas of Kiribati by 2050 under the IPCC RCP4.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table18b. Changes in the total combined catch of all three tuna species in each EEZ area, and for the total EEZ of Kiribati, are also shown. Values for '2050 catch' and 'Change (t)' are rounded to the nearest whole number.

Species	Catch	EEZ area			
		Gilbert Is	Phoenix Is	Line Is	Total
Skipjack	10-year average catch	203,548	79,976	32,089	**315,613**
	2050 catch	201,513	81,576	30,164	**313,252**
	Change (t)	-2,035	1,600	-1,925	**-2,361**
	Change (%)	-1	+2	-6	**-0.7**
Yellowfin	10-year average catch	45,981	11,051	5,667	**62,699**
	2050 catch	42,303	10,830	6,064	**59,196**
	Change (t)	-3,678	-221	+397	**-3,503**
	Change (%)	-8	-2	+7	**-5.6**
Bigeye	10-year average catch	10,544	3,670	3,523	**17,737**
	2050 catch	10,017	3,560	3,629	**17,205**
	Change (t)	-527	-110	+106	**-532**
	Change (%)	-5	-3	+3	**-3.0**
All species combined	**10-year average catch**	**260,073**	**94,697**	**41,279**	**396,049**
	2050 catch	**253,832**	**95,965**	**39,856**	**389,653**
	Change (t)	**-6,241**	**+1,268**	**-1,423**	**-6,396**
	Change (%)	**-2.4**	**+1.3**	**-3.4**	**-1.6**

Supplementary Table 20c. Projected ***minimum*** (i.e., minimum negative, maximum positive) changes in the catches of skipjack, yellowfin and bigeye tuna in tonnes (t) caught by purse-seine fishing in the three exclusive economic zone (EEZ) areas of Kiribati by 2050 under the IPCC RCP4.5 emissions scenario, relative to average catches for the 10-year period 2009–2018, based on the projected changes in biomass of each tuna species in Supplementary Table18c. Changes in the total combined catch of all three tuna species in each EEZ area, and for the total EEZ of Kiribati, are also shown. Values for '2050 catch' and 'Change (t)' are rounded to the nearest whole number.

Species	Catch	EEZ area			
		Gilbert Is	**Phoenix Is**	**Line Is**	**Total**
Skipjack	10-year average catch	203,548	79,976	32,089	**315,613**
	2050 catch	246,293	91,173	35,619	**373,085**
	Change (t)	+42,745	+11,197	+3,530	**+57,472**
	Change (%)	+21	+14	+11	**+18.2**
Yellowfin	10-year average catch	45,981	11,051	5,667	**62,699**
	2050 catch	44,602	11,383	6,574	**62,558**
	Change (t)	-1,379	+332	+907	**-141**
	Change (%)	-3	+3	+16	**-0.2**
Bigeye	10-year average catch	10,544	3,670	3,523	**17,737**
	2050 catch	10,755	3,817	3,875	**18,447**
	Change (t)	+211	+147	+352	**+710**
	Change (%)	+2	+4	+10	**+4**
All species combined	**10-year average catch**	**260,073**	**94,697**	**41,279**	**396,049**
	2050 catch	**301,650**	**106,372**	**46,068**	**454,089**
	Change (t)	**+41,577**	**+11,675**	**+4,789**	**+58,040**
	Change (%)	**+16.0**	**+12.3**	**+11.6**	**+14.7**

Supplementary Table 21. Uncertainties explored in the simulation ensembles for the three tropical tuna species.

<table>
<tr><th rowspan="2">Name</th><th colspan="4">Model</th><th rowspan="2">Uncertainty</th></tr>
<tr><th>GFDL</th><th>IPSL</th><th>MIROC-</th><th>MPI</th></tr>
<tr><td>REF</td><td>DSF5+GFDL-ESM2G anomalies</td><td>DSF5+IPSL-CM5A-MR anomalies</td><td>DSF5+MIROC-ESM anomalies</td><td>DSF5+MPI-ESM-MR anomalies</td><td>Atmospheric forcing</td></tr>
<tr><td>SP</td><td colspan="4">Primary production: Increase of PP by 10% in tropical waters (defined by SST >27°C)</td><td rowspan="2">Structural uncertainty in biogeochemical model</td></tr>
<tr><td>SO</td><td colspan="4">Dissolved Oxygen: No change = Use of climatological fields</td></tr>
<tr><td>ST</td><td colspan="4">Genetic adaptation: Gradual increase in optimal spawning temperature to reach + 1°C by mid-century</td><td rowspan="2">Structural uncertainty in SEAPODYM</td></tr>
<tr><td>PH</td><td colspan="4">Ocean acidification: Additional mortality of larvae based on laboratory experiments with low medium and high sensitivity to pH (available only for yellowfin tuna).</td></tr>
</table>