REVIEW OF INDIAN OCEAN SKIPJACK TUNA STATISTICAL DATA

Author: IOTC Secretariat

Introduction

The overarching objective of the paper is to provide participants at the preparatory meeting of the 24th Session of the IOTC Working Party on Tropical Tunas (WPTT24(DP)) with a review of the status of the information on skipjack tuna (*Katsuwonus pelamis*; SKJ) available at the IOTC Secretariat as of May 2022. The document provides an overview of the fisheries catching skipjack tuna in the Indian Ocean through temporal and spatial trends in catches and their main recent features, as well as an assessment of the reporting quality of the data sets. A full description of the data collated and curated by the Secretariat is available in IOTC (2022).

Nominal catch

Historical trends (1950-2020)

Table 1: Best scientific estimates of average annual nominal catches (t) of skipjack tuna by decade and fishery for the period 1950-2019. The background intensity color of each cell is directly proportional to the catch level. Data source: raised time-area catches

Fishery	1950s	1960s	1970s	1980s	1990s	2000s	2010s
Purse seine | Other		28	905	7,435	13,563	24,710	41,558
Purse seine | FS			41	15,252	30,776	25,672	9,516
Purse seine | LS			125	34,457	124,043	163,801	168,388
Longline | Other				31	625	1,812	859
Longline | Fresh					3	312	1,351
Longline | Deep-freezing	195	382	65	38	96	55	71
Line | Coastal longline	6	29	186	1,213	2,529	5,067	12,178
Line | Trolling	2,370	4,190	8,650	12,281	21,167	20,537	25,462
Line | Handline	22	38	554	1,356	2,799	4,017	5,943
Baitboat	10,007	15,148	24,684	41,705	76,903	109,571	88,463
Gillnet	2,308	6,774	11,191	14,524	43,159	111,700	96,050
Other	104	277	515	1,829	3,468	5,728	7,545
Total	15,013	26,864	46,918	130,121	319,130	472,982	457,382

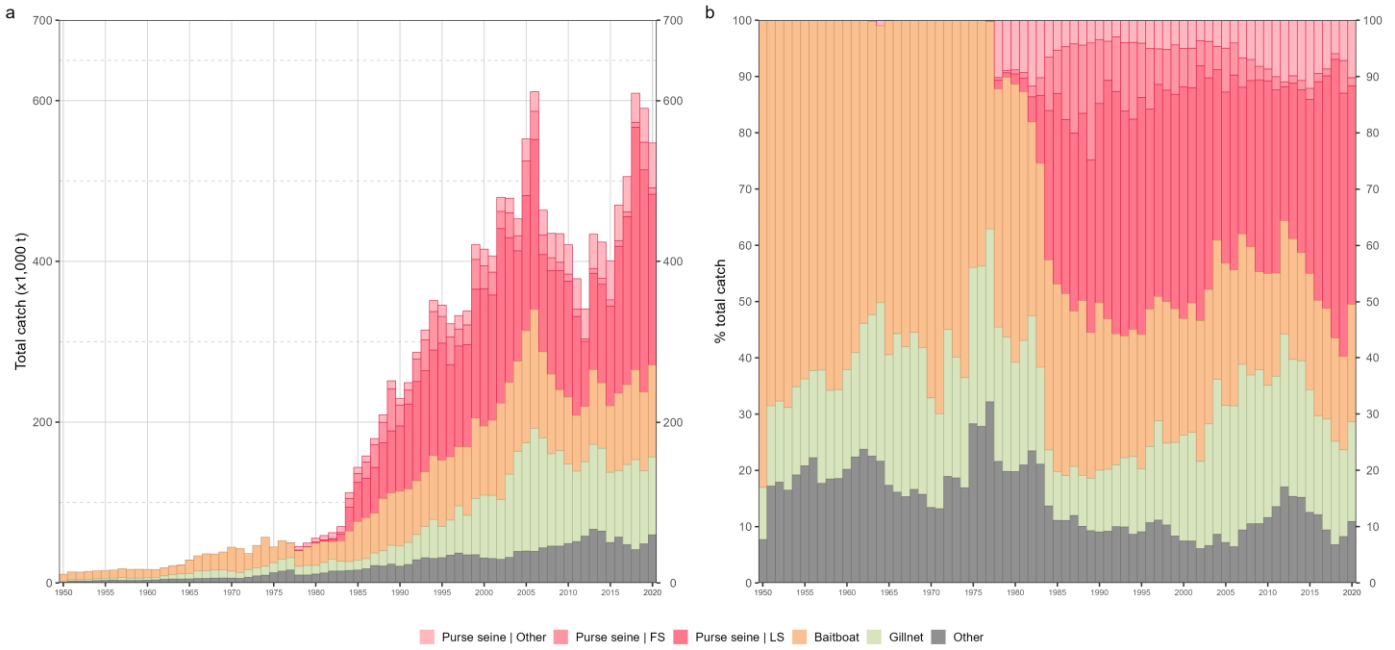

Figure 1: Annual time series of cumulative nominal absolute (a) and relative (b) catches (t) of skipjack tuna by fishery for the period 1950-2020. LS = schools associated with floating objects; FS = free-swimming schools. Data source: raised time-area catches

Table 2: Best scientific estimates of annual nominal catches (t) of skipjack tuna by fishery for the period 2011-2020. The background intensity color of each cell is directly proportional to the catch level. Data source: raised time-area catches

Fishery	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Purse seine | Other	37,980	37,431	42,859	45,411	48,513	44,534	43,821	36,178	42,313	55,938
Purse seine | FS	9,000	2,984	5,742	7,228	7,800	6,888	6,170	6,235	34,335	7,980
Purse seine | LS	123,056	80,989	119,864	122,490	123,994	182,735	208,876	301,570	276,212	212,329
Longline | Other	2,114	1,991	2,224	1	0	6	1	0	1	1
Longline | Fresh	0	5,536	2,303	476	767	537	678	1,546	1,663	1,995
Longline | Deep-freezing	73	72	88	65	58	138	67	59	59	64
Line | Coastal longline	7,120	13,244	20,396	21,530	8,926	10,789	10,831	9,129	11,495	12,793
Line | Trolling	24,432	22,095	27,105	29,203	27,704	32,203	24,740	21,118	21,430	25,238
Line | Handline	9,737	7,645	6,070	5,220	5,127	5,793	4,240	3,716	6,040	9,476
Baitboat	69,404	68,821	93,010	81,568	82,748	96,268	99,423	111,867	98,017	114,336
Gillnet	87,713	92,559	105,666	102,878	87,385	82,757	99,663	111,970	90,987	96,964
Other	7,809	7,551	8,502	7,967	7,617	7,498	6,976	5,789	7,899	10,195
Total	378,438	340,919	433,829	424,037	400,639	470,148	505,485	609,178	590,450	547,309

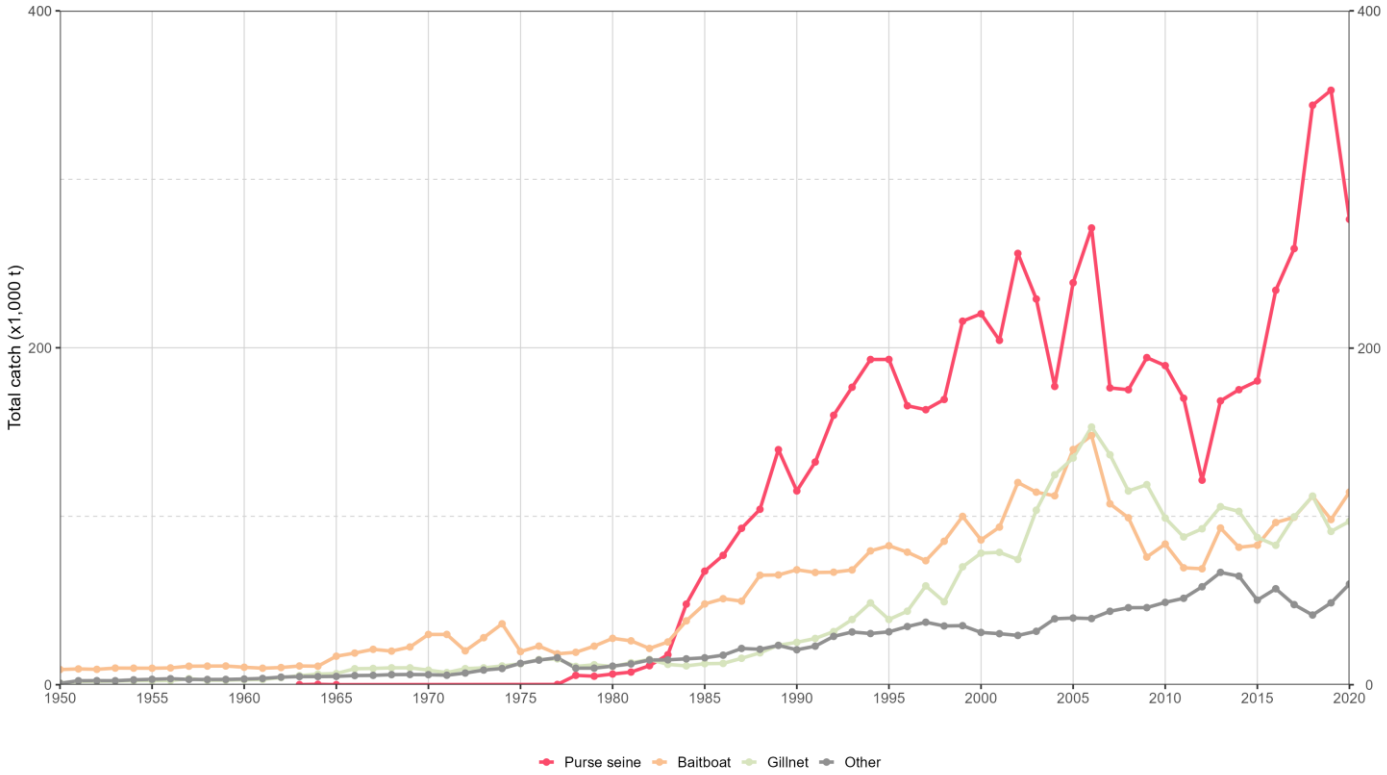

Figure 2: Annual time series of nominal catches (t) of skipjack tuna by fishery group for the period 1950-2020. Data source: best scientific estimate of nominal catches

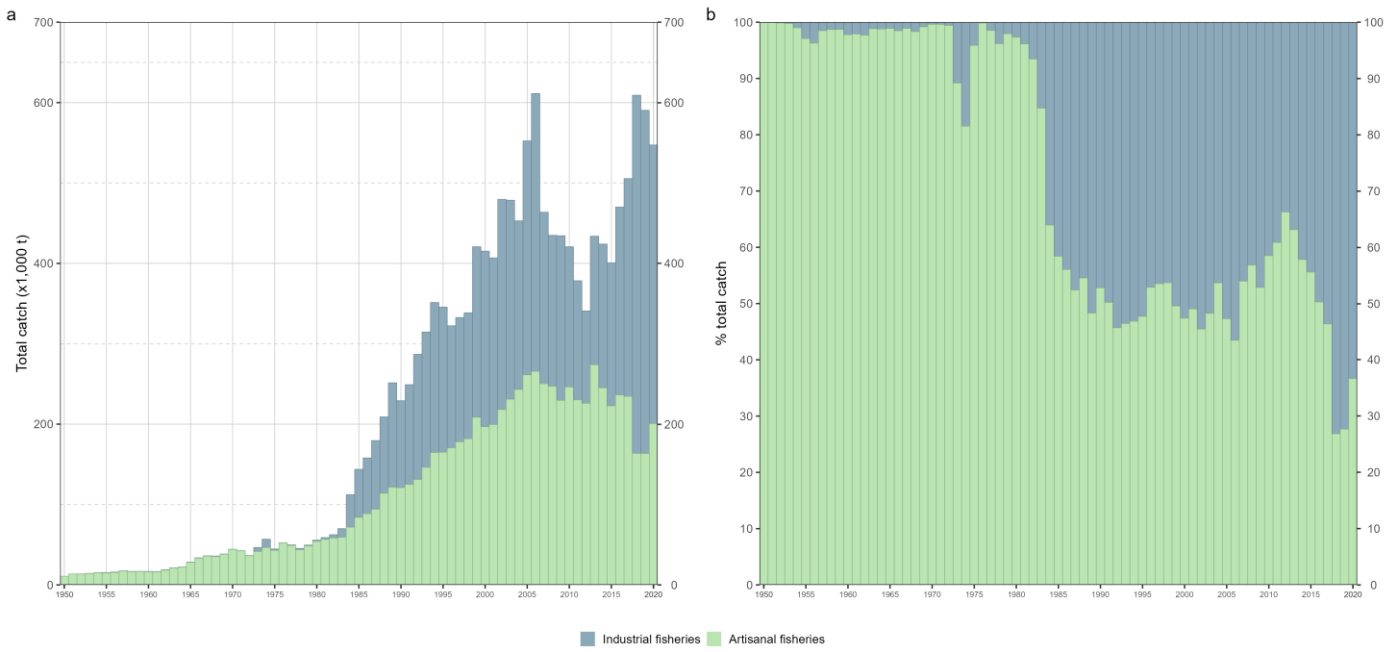

Figure 3: Annual time series of cumulative nominal absolute (a) and relative (b) catches (t) of skipjack tuna by type of fishery for the period 1950-2020. Data source: best scientific estimate of nominal catches

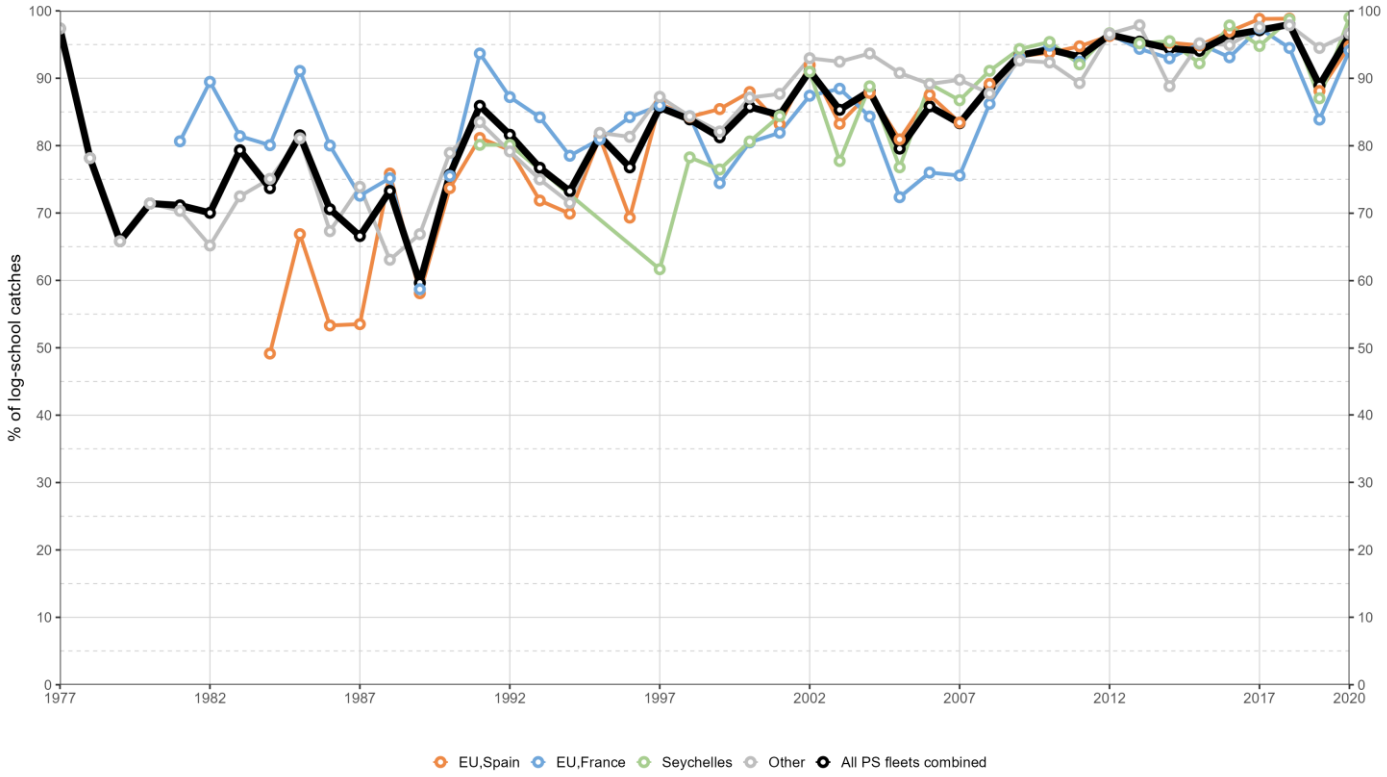

Figure 4: Annual percentages of purse seine FOB-associated catches of skipjack tuna by fleet for the period 1977-2020. *Other* includes purse seine fleets such as ex-Soviet Union, I.R. Iran, France (Mayotte), Mauritius, Japan, Korea, Indonesia, Thailand, EU,Italy, Belize, and others. Data source: time-area catch dataset for purse seine fisheries (Res. 15/02)

Main fishery features (2016-2020)

Table 3: Mean annual catches of skipjack tuna (t) by fishery between 2016 and 2020. LS = schools associated with floating objects; FS = free-swimming schools. Data source: raised time-area catches

Fishery	Fishery code	Catch	Percentage
Purse seine | LS	PSLS	236,344	43.4
Baitboat	BB	103,982	19.1
Gillnet	GN	96,468	17.7
Other	OT	50,841	9.3
Purse seine | Other	PSOT	44,557	8.2
Purse seine | FS	PSFS	12,322	2.3

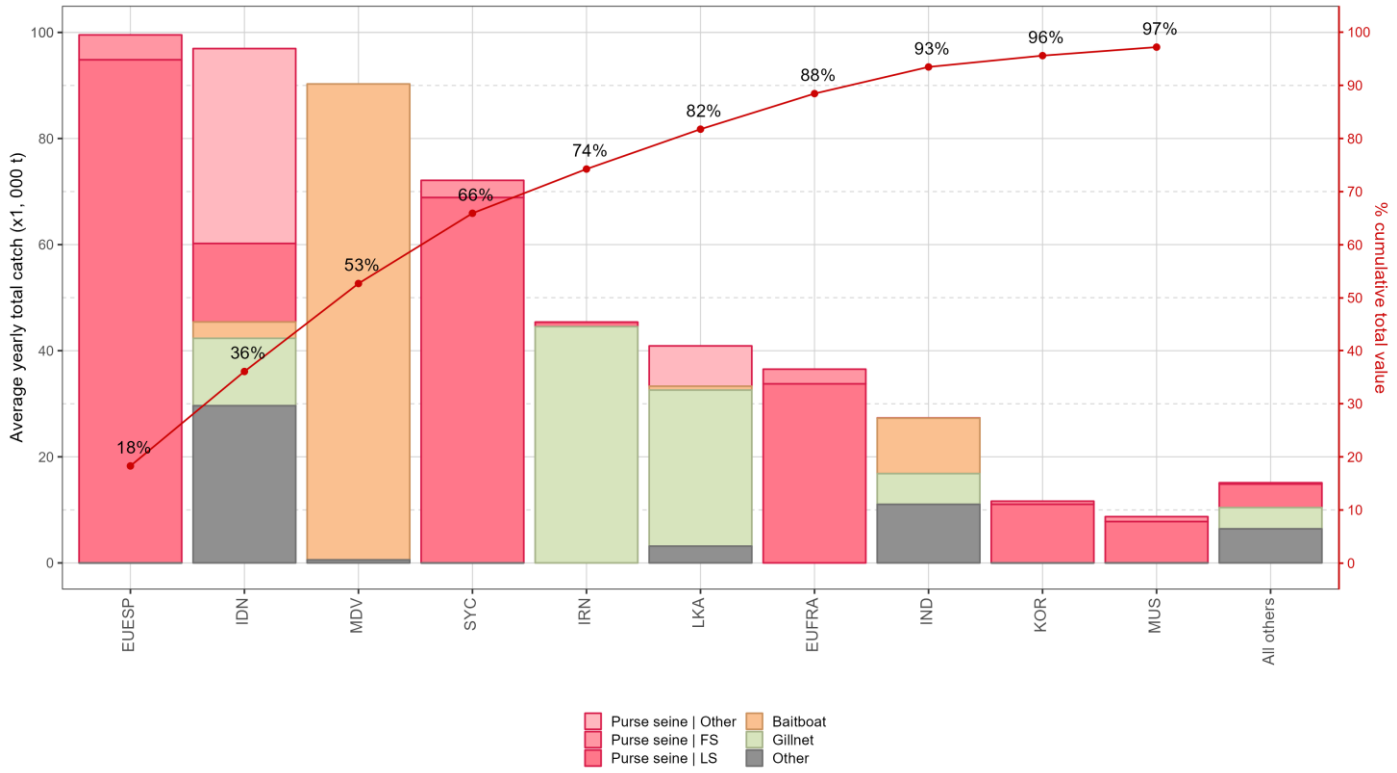

Figure 5: Mean annual catches of skipjack (t) tuna by fleet and fishery between 2016 and 2020, with indication of cumulative catches by fleet. FS = free-swimming schools; LS = schools associated with floating objects. Data source: raised time-area catches

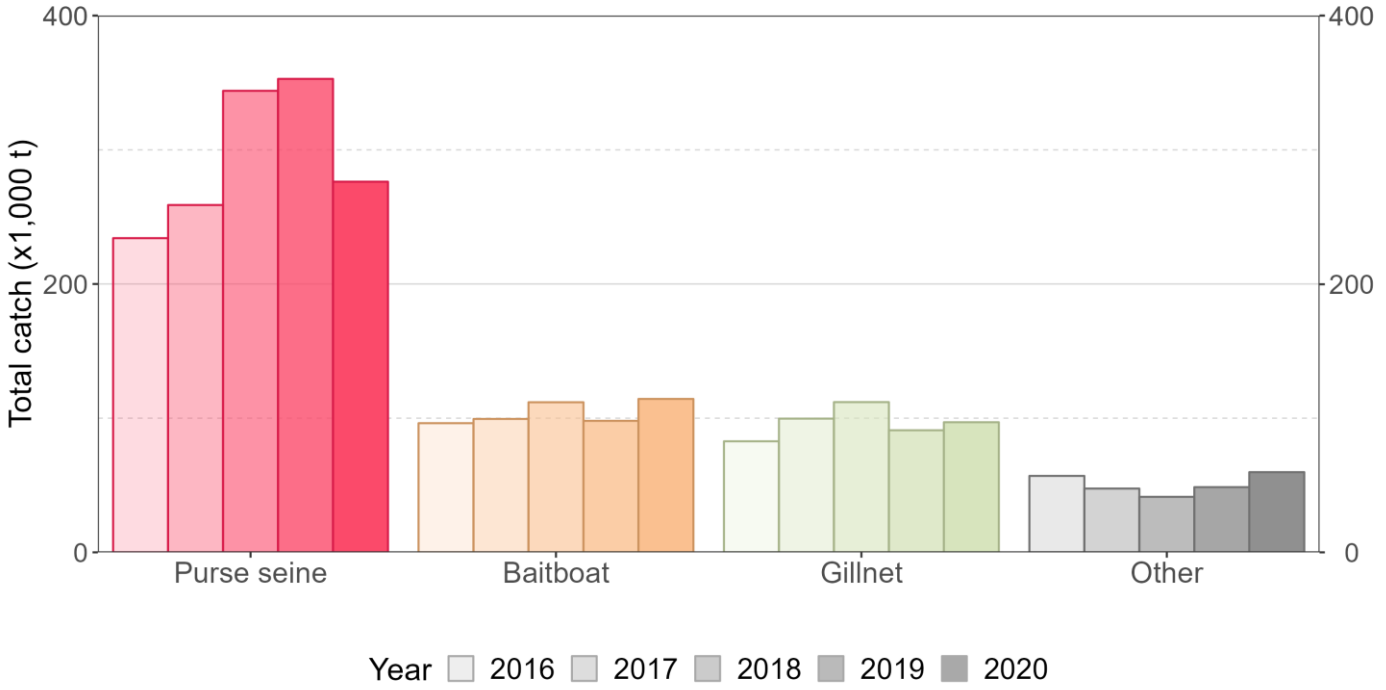

Figure 6: Annual catch (t) trends of skipjack tuna by fishery group between 2016 and 2020. Data source: best scientific estimate of nominal catches

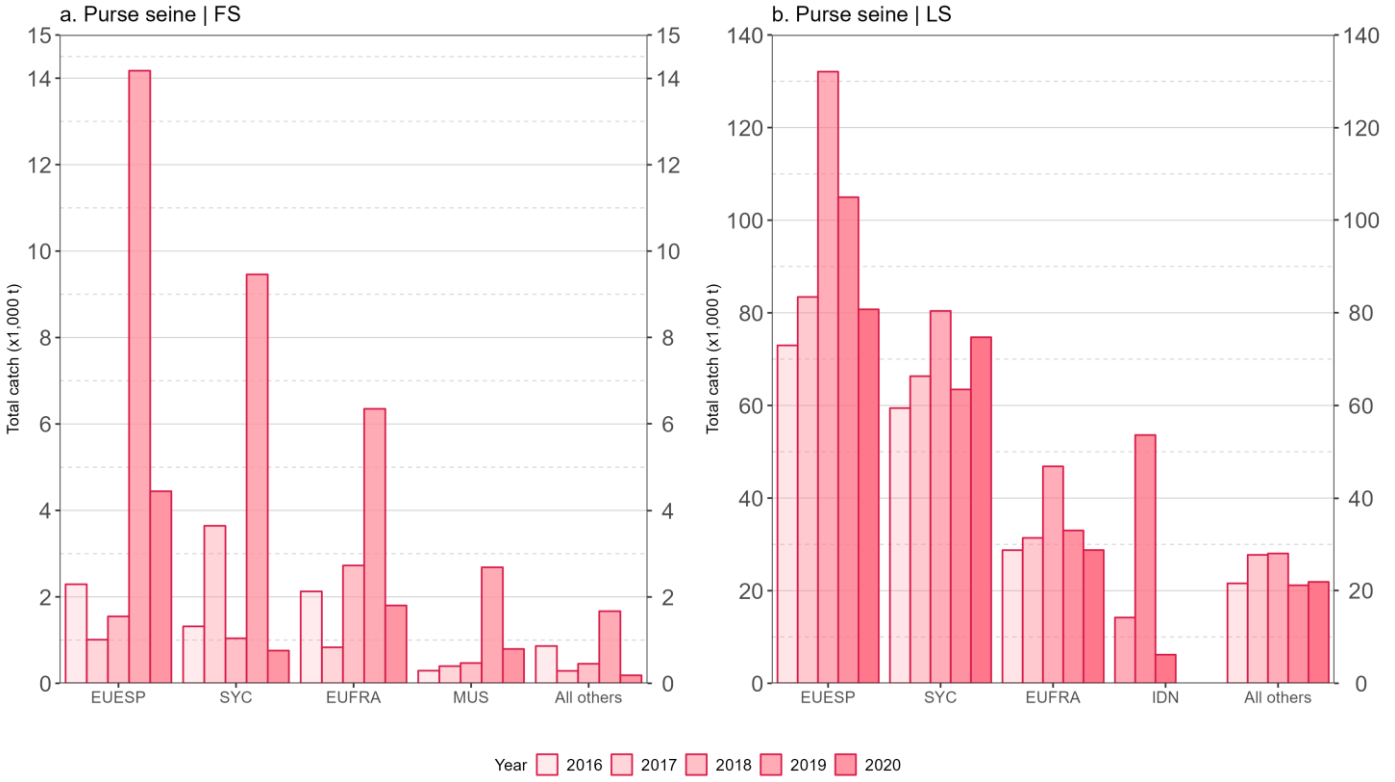

Figure 7: Annual purse seine catch (t) trends of skipjack tuna by fishing mode and fleet between 2016 and 2020. FS = free-swimming schools; LS = schools associated with floating objects. Data source: raised time-area catches

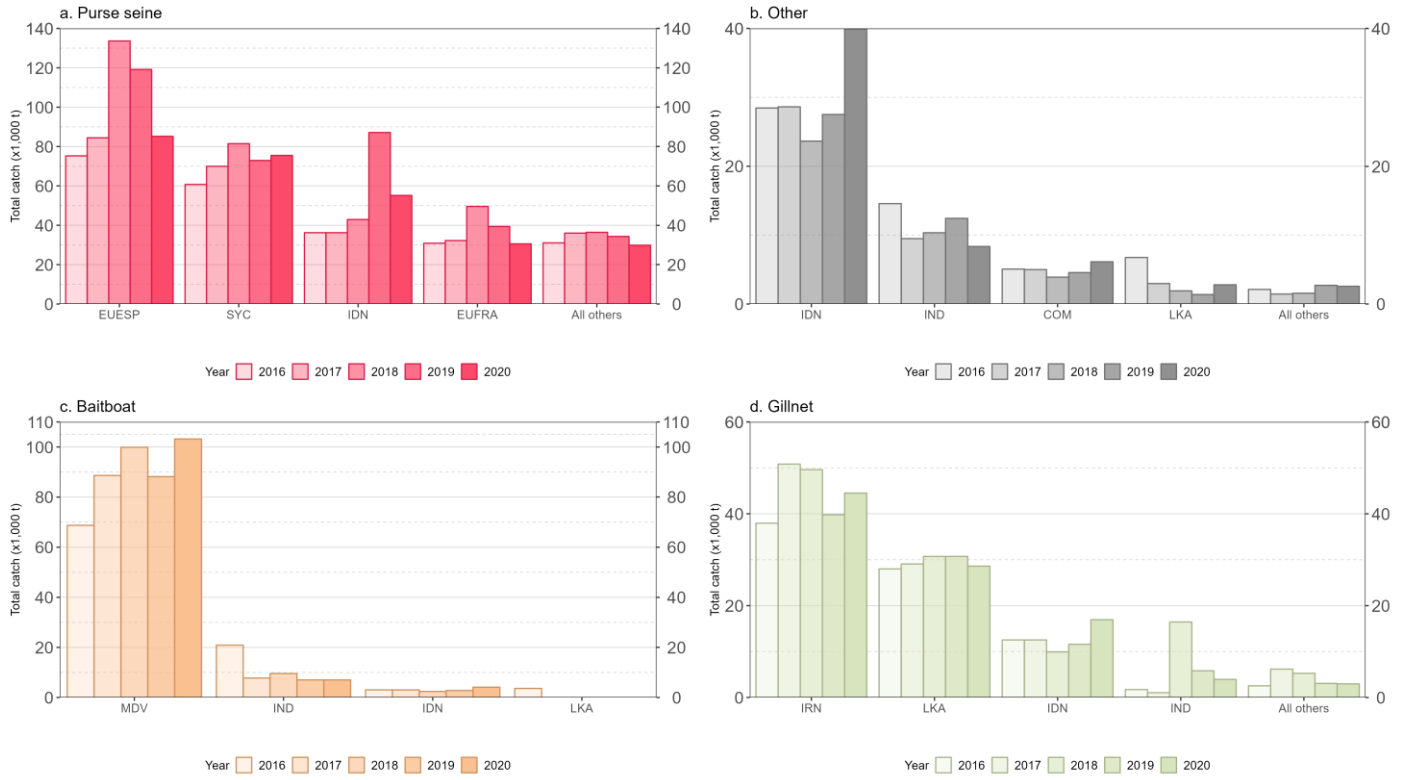

Figure 8: Annual catch (t) trends of skipjack tuna by fishery group and fleet between 2016 and 2020. Data source: [best scientific estimate of nominal catches]

Changes from previous WPTT

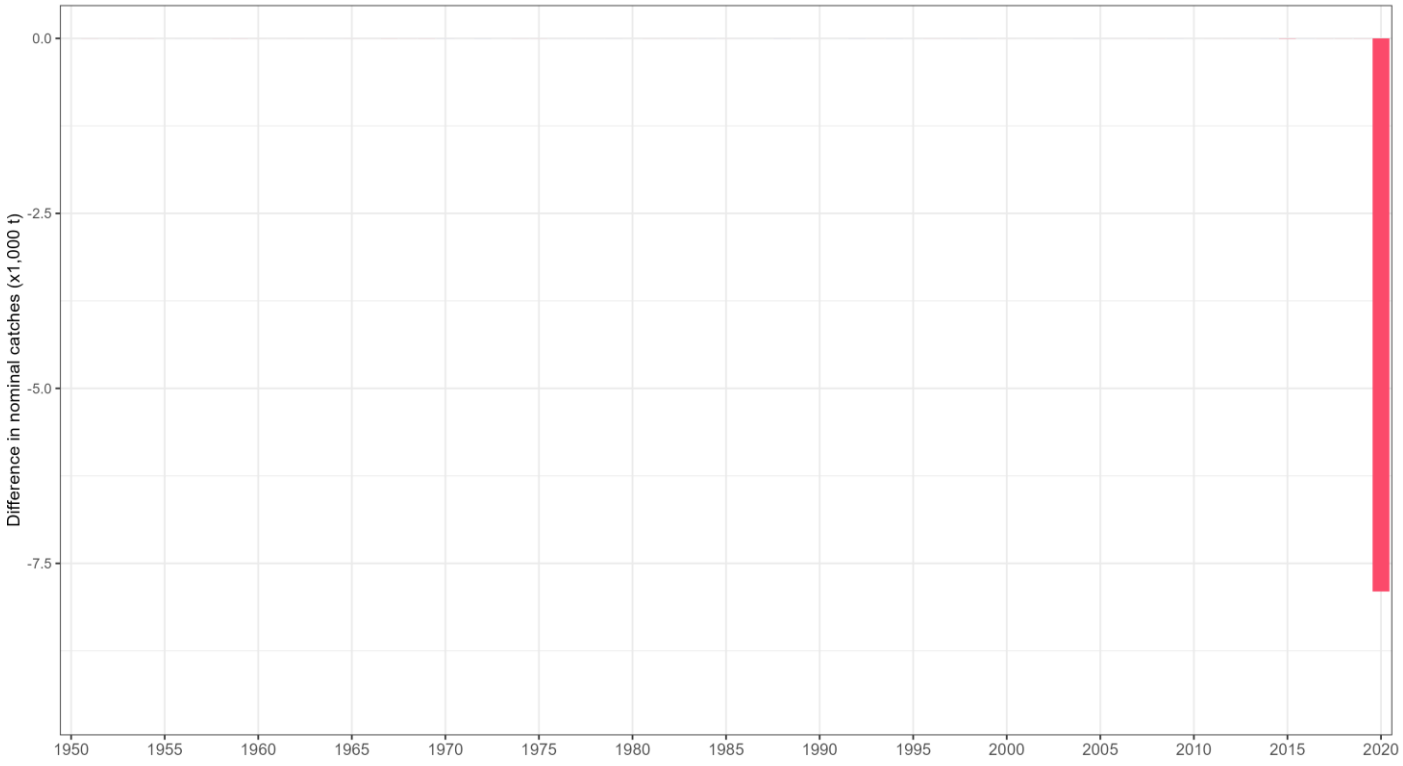

Figure 9: Differences in the available best scientific estimates of nominal catches (t) of skipjack tuna between this WPTT and its previous session (data preparatory meeting held in May 2021)

Table 4: Changes in best scientific estimates of average annual nominal catches of skipjack tuna by year, fleet, fishery group and main Indian Ocean area, limited to absolute values higher than 10 t. Data source: best scientific estimate of nominal catches 2019 and 2020

Year	Fleet	Fishery group	Area	Current (t)	Previous (t)	Difference (t)
2020	EUMYT	Line	Western Indian Ocean	61	123	-61
	IDN	Baitboat	Eastern Indian Ocean	4,114	2,520	1,594
		Gillnet	Eastern Indian Ocean	16,938	10,374	6,564
		Line	Eastern Indian Ocean	29,130	17,841	11,289
		Longline	Eastern Indian Ocean	1,843	2,161	-318
		Other	Eastern Indian Ocean	8,943	5,477	3,466
		Purse seine	Eastern Indian Ocean	55,152	85,616	-30,464
	LKA	Gillnet	Eastern Indian Ocean	27,476	28,600	-1,124
		Gillnet	Western Indian Ocean	1,124	0	1,124
		Longline	Eastern Indian Ocean	28	48	-20
		Longline	Western Indian Ocean	20	0	20
		Purse seine	Eastern Indian Ocean	6,118	6,294	-176
		Purse seine	Western Indian Ocean	176	0	176
	PAK	Gillnet	Western Indian Ocean	1,077	1,050	28
	YEM	Gillnet	Western Indian Ocean	1,326	188	1,137
		Line	Western Indian Ocean	701	1,836	-1,135
2019	JOR	Gillnet	Western Indian Ocean	5	21	-16
		Line	Western Indian Ocean	28	12	15
	LKA	Gillnet	Eastern Indian Ocean	28,991	20,398	8,593
		Gillnet	Western Indian Ocean	1,732	10,324	-8,593
		Line	Eastern Indian Ocean	1,261	1,149	112
		Other	Eastern Indian Ocean	85	72	13
		Purse seine	Eastern Indian Ocean	8,676	8,097	579
		Purse seine	Western Indian Ocean	16	595	-579

Uncertainties in nominal catch data

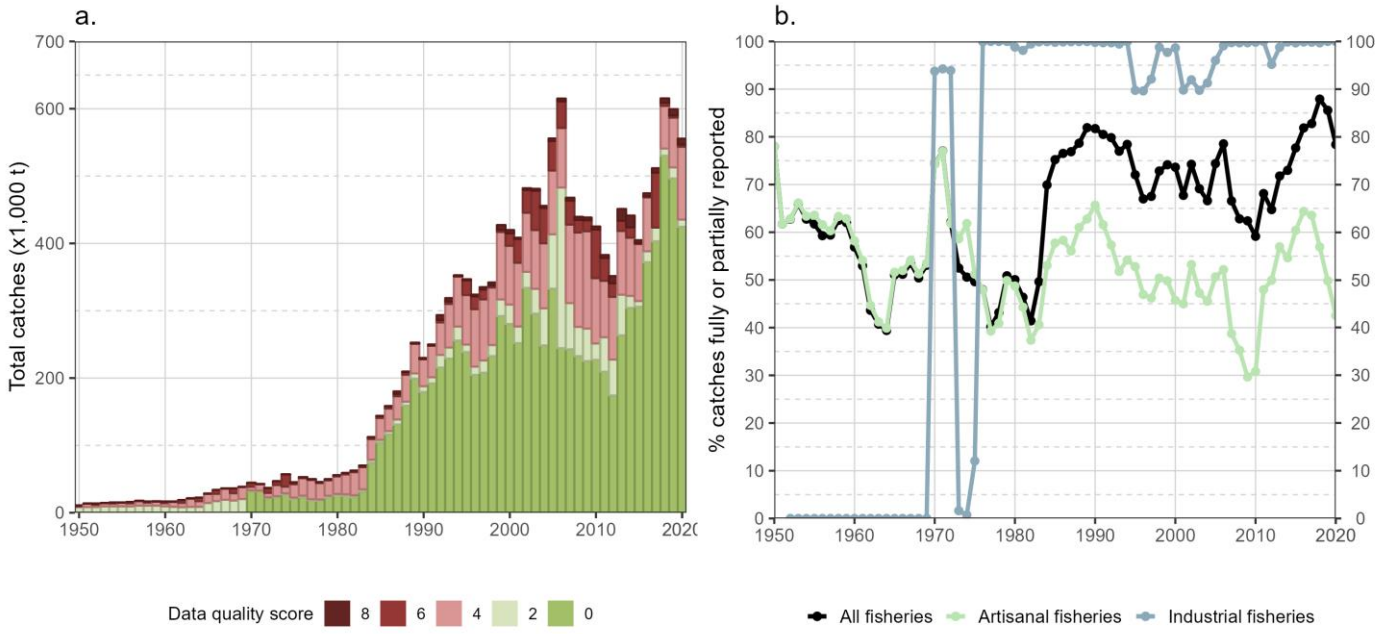

Figure 10: Annual nominal catches (t) of skipjack tuna estimated by quality score (barplot) and percentage of nominal catch fully/partially reported to the IOTC Secretariat (lines with dots) for all fisheries (a) and by type of fishery (b), in the period 1950-2020

Discard levels

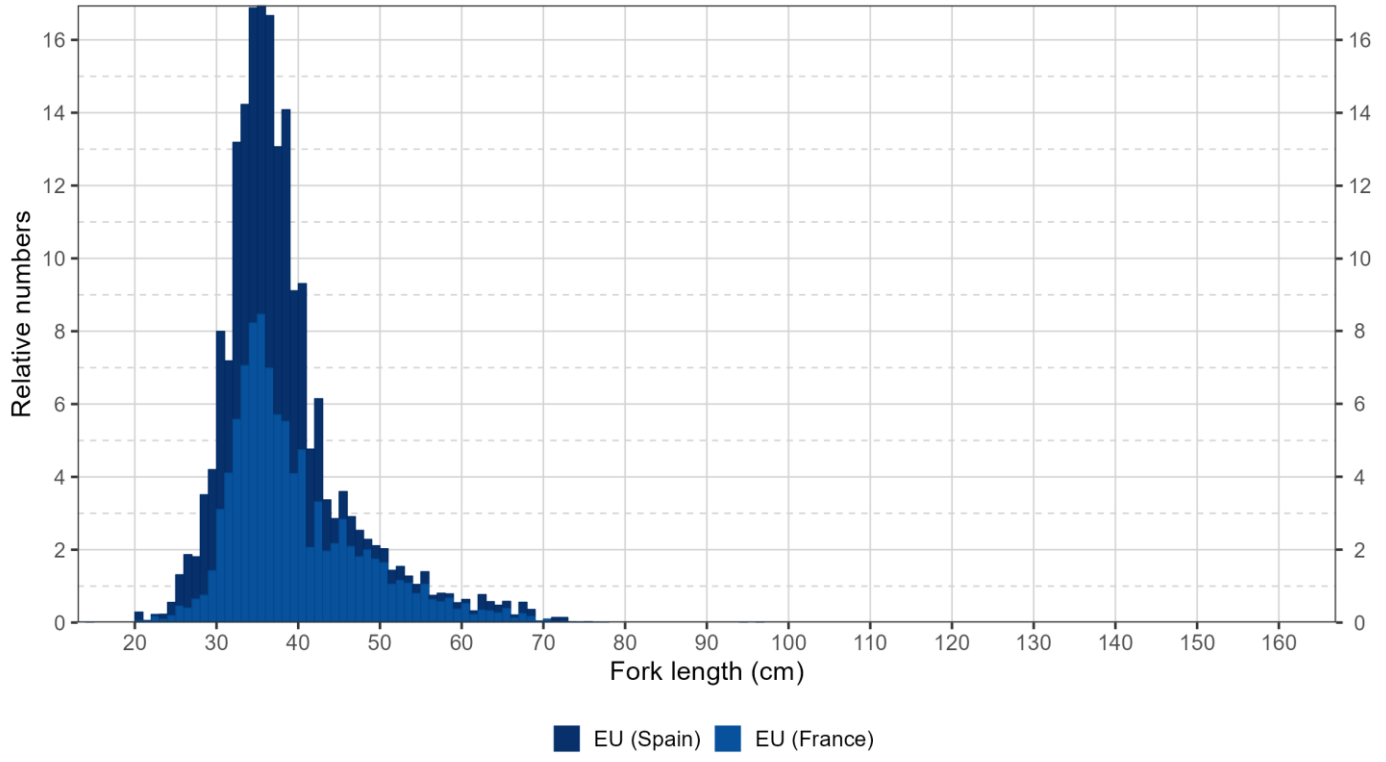

Figure 11: Fork length distribution of skipjack tuna discarded at sea in purse seine fisheries during the period 2016-2020 (n = 214,824). Data source: IOTC ROS database

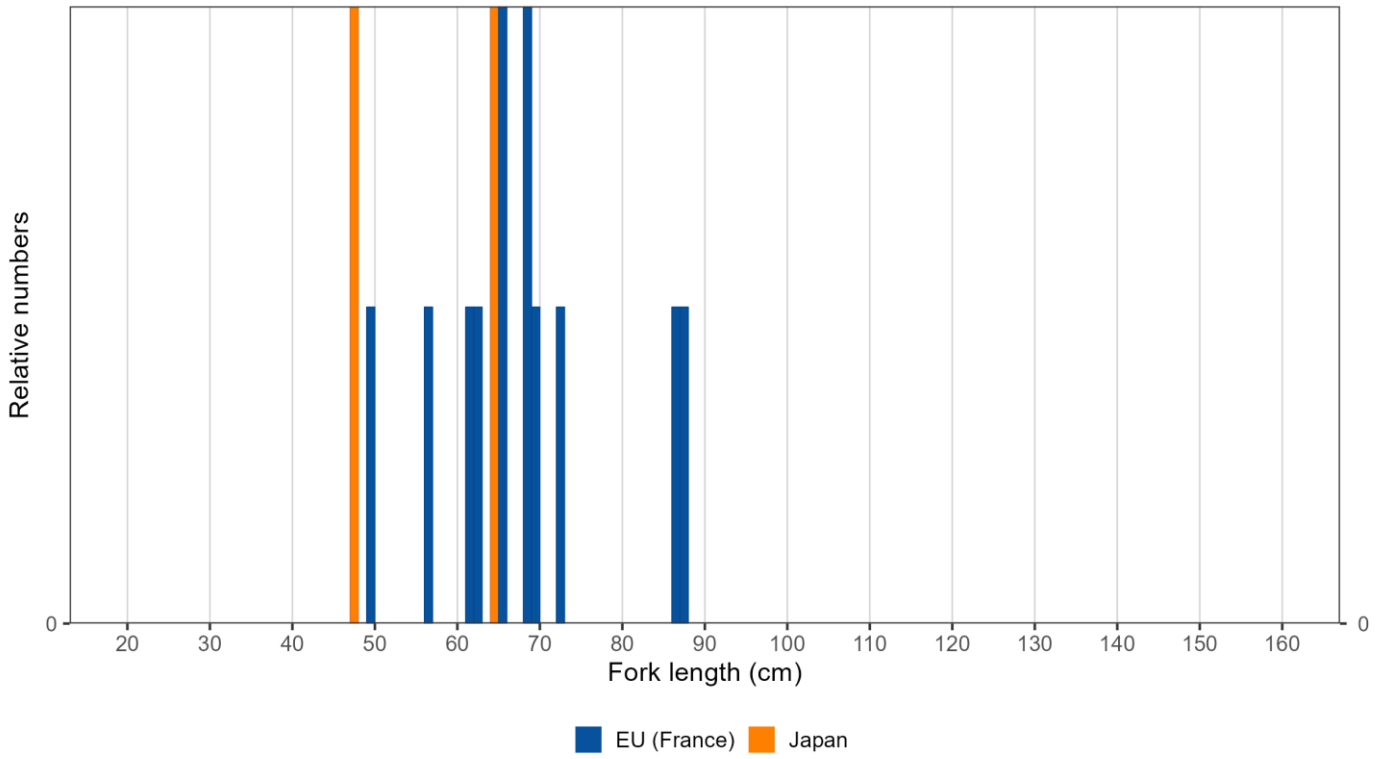

Figure 12: Fork length distribution of skipjack tuna discarded at sea in longline fisheries during the period 2014-2020 (n = 112). Data source: IOTC ROS database

Geo-referenced catch

Spatial distribution of catches

Georeferenced catches by fishery and decade (1950-2009)

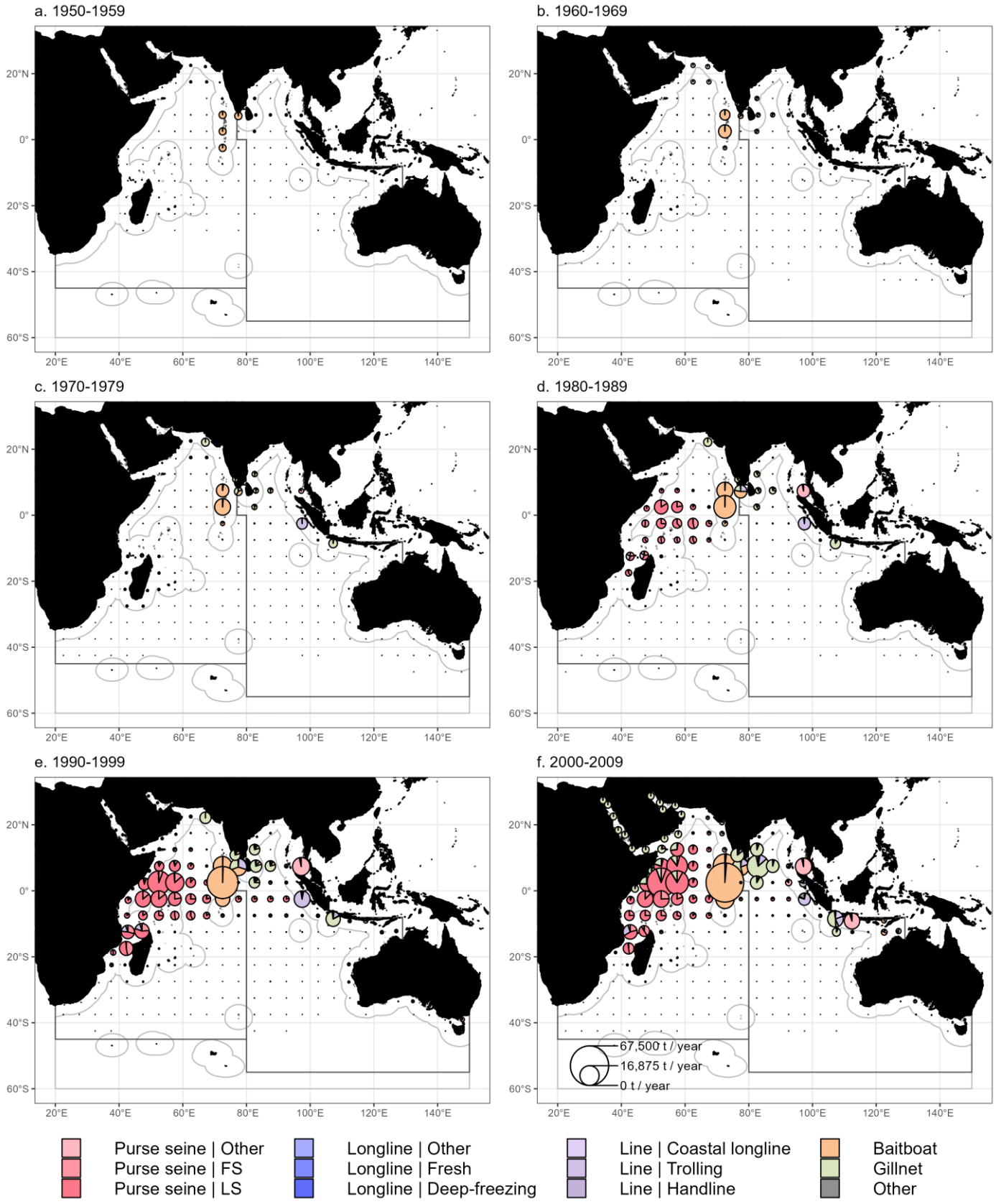

Figure 13: Estimated mean annual time-area catches (t) of skipjack tuna, by decade, 5x5 grid, and fishery. Data source: raised time-area catches

Georeferenced catches by fishery, last years (2016-2020) and decade (2010-2019)

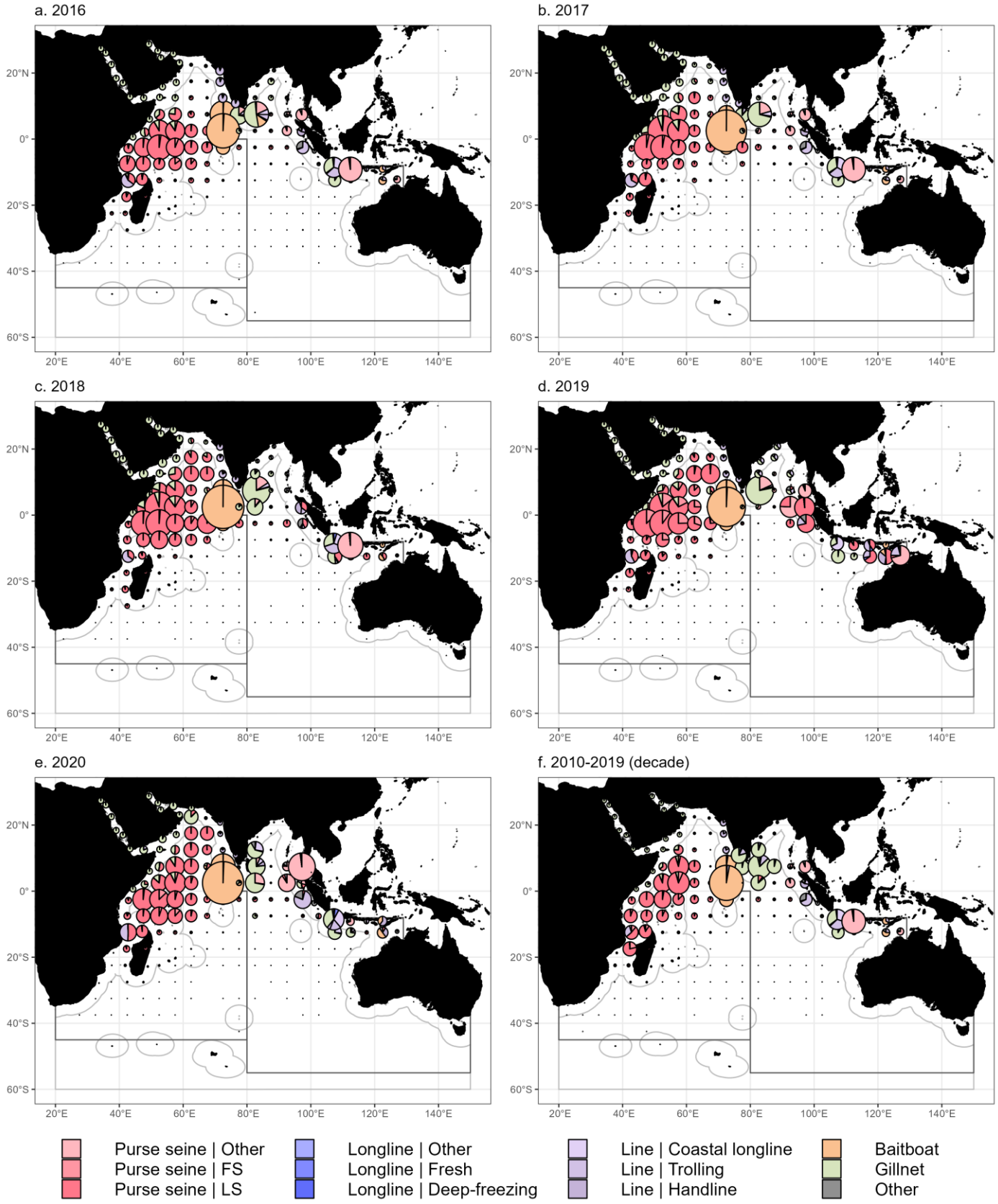

Figure 14: Estimated average annual time-area catches (t) of skipjack tuna, by year / decade, 5x5 grid, and fishery. Data source: raised time-area catches

Uncertainties in catch and effort data

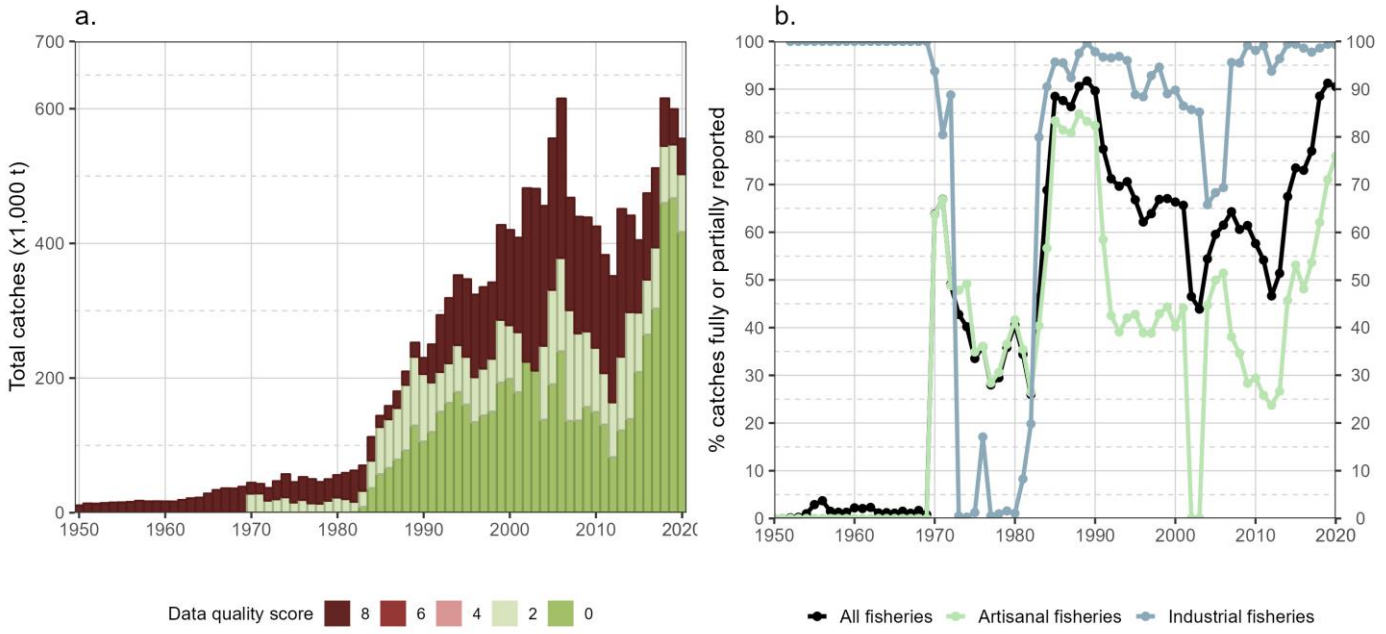

Figure 15: Annual nominal catches (t) of skipjack tuna estimated by quality score (barplot) and percentage of geo-referenced catches reported to the IOTC Secretariat in agreement with the requirements of Res. 15/02 (lines with dots) for all fisheries (a) and by type of fishery (b), in the period 1950-2020

Size composition of the catch

Samples availability

By fishery group

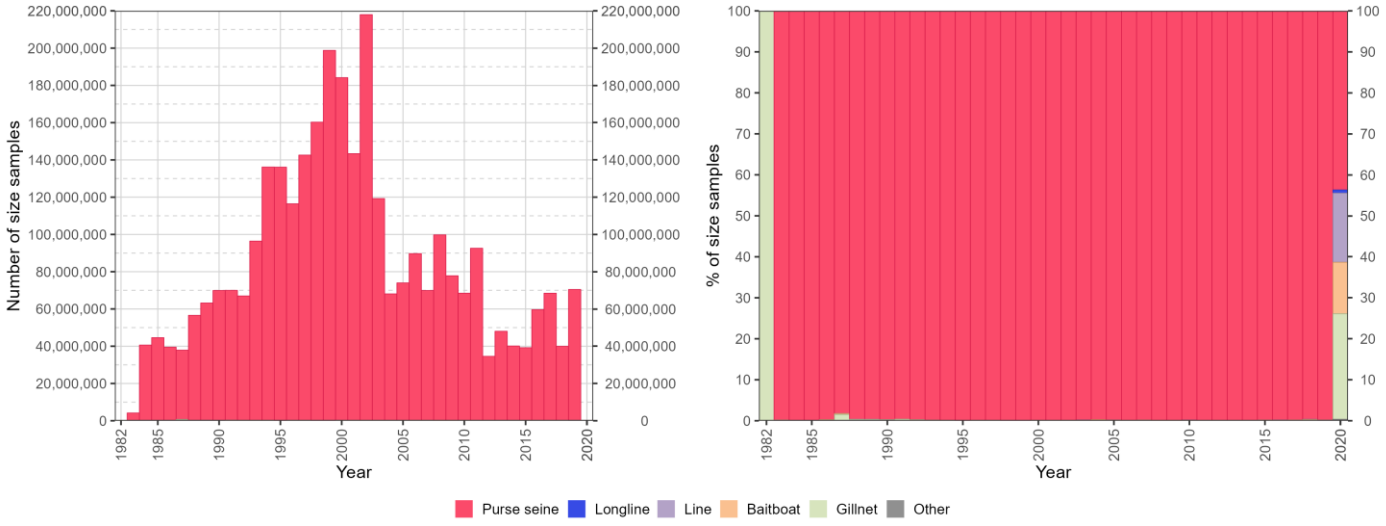

Figure 16: Availability of skipjack tuna size-frequency data as absolute number of samples (left) and relative number of samples (right) per year and fishery group. Data source: standardized size-frequency dataset (Res. 15/02)

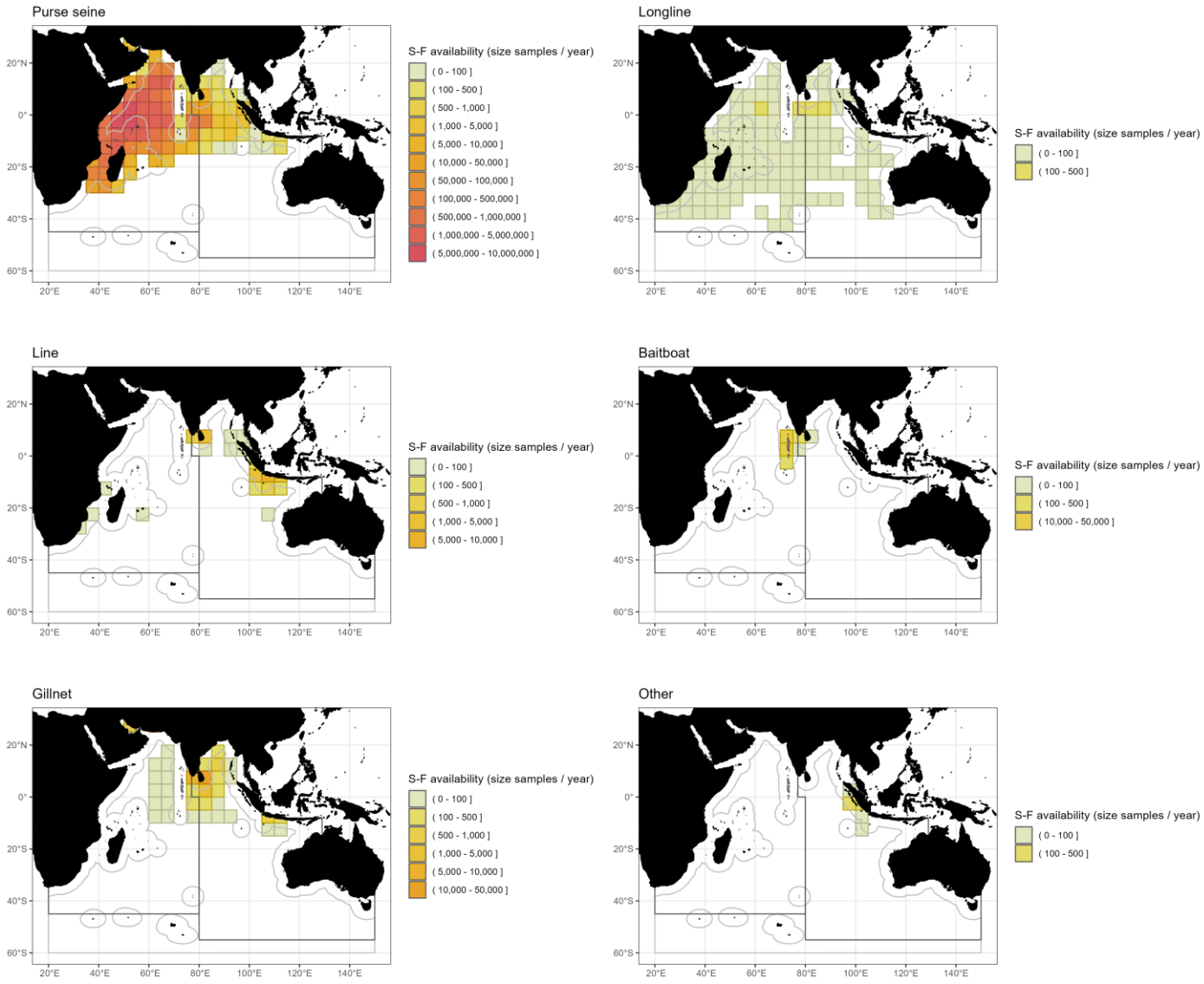

Figure 17: Spatial distribution (average number of samples per grid per year) of available skipjack tuna size-frequency data for each fishery group in the period 2016-2020. Data source: standardized size-frequency dataset (Res. 15/02)

By fishery

Purse seine fisheries

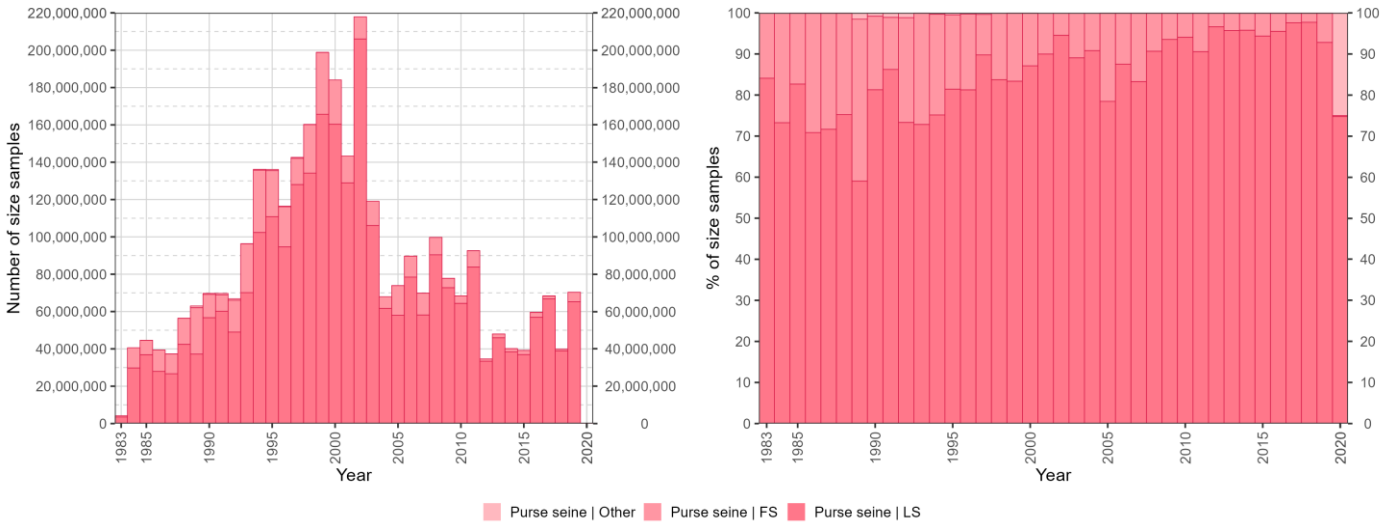

Figure 18: Availability of skipjack tuna size-frequency data as absolute number of samples (left) and relative number of samples (right) per year and purse seine fishery type. Data source: standardized size-frequency dataset (Res. 15/02)

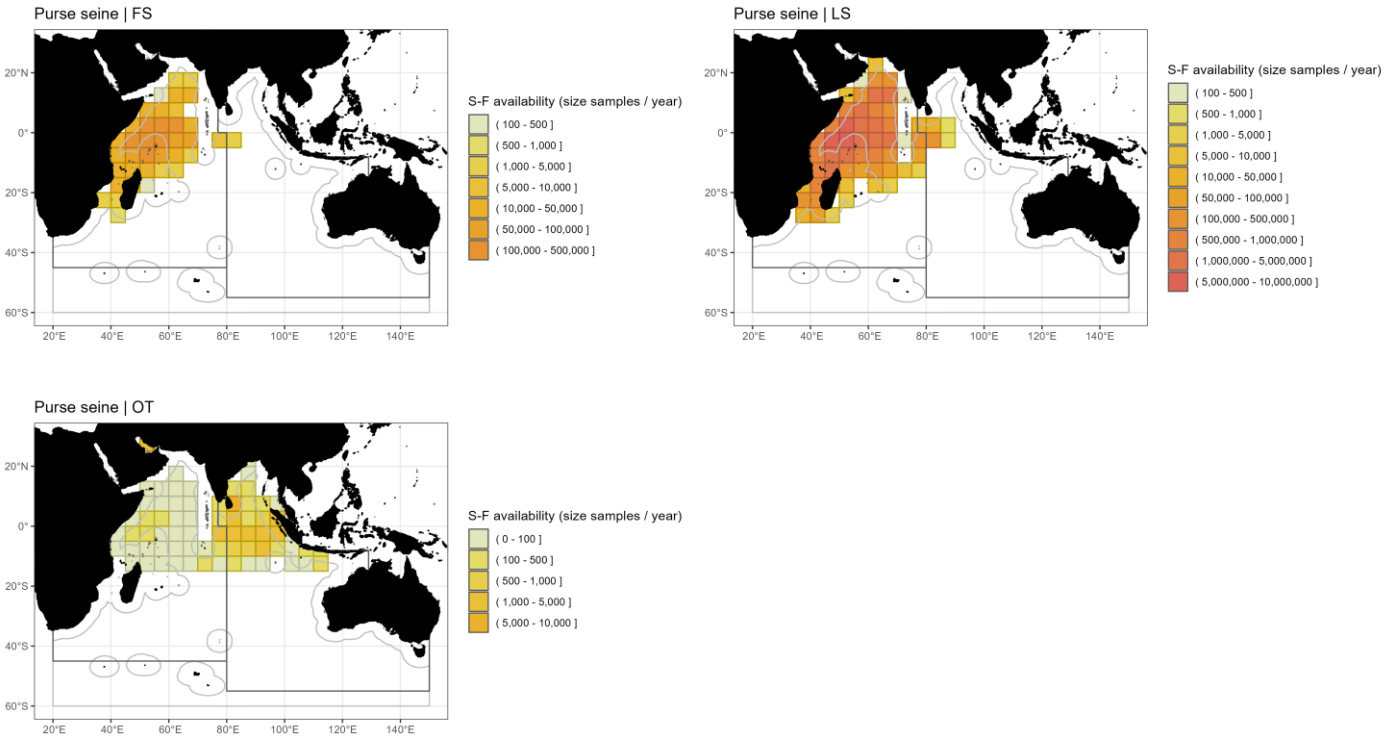

Figure 19: Spatial distribution (average number of samples per grid per year) of available skipjack tuna size-frequency data by purse seine fishery types in the period 2016-2020. Data source: standardized size-frequency dataset (Res. 15/02)

Longline fisheries

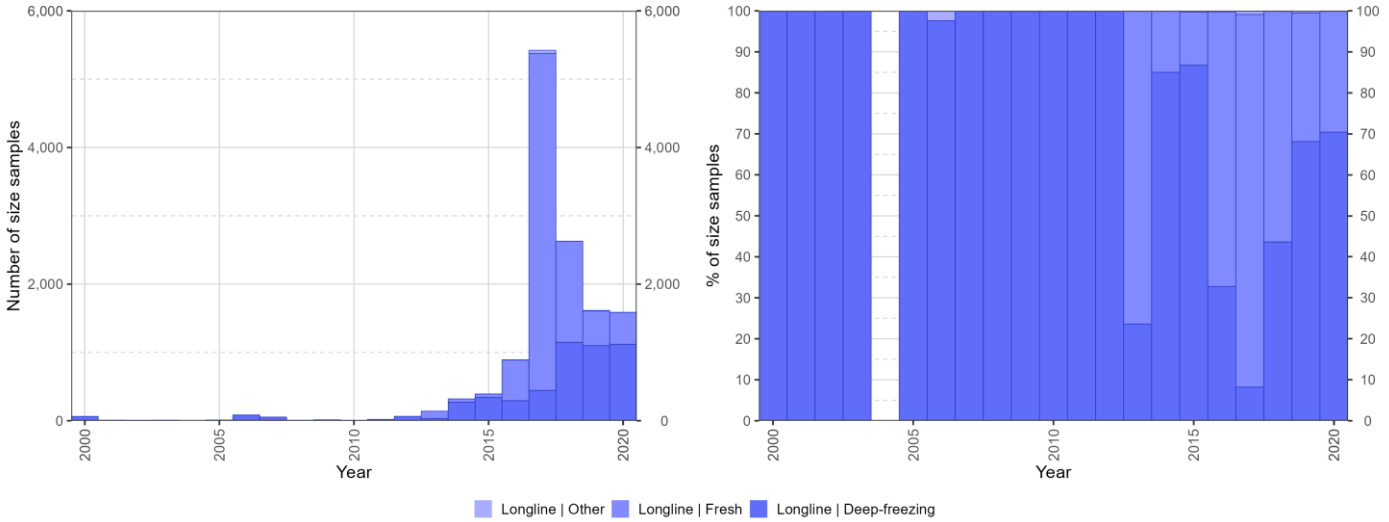

Figure 20: Availability of skipjack tuna size-frequency data as absolute number of samples (left) and relative number of samples (right) per year and longline fishery type. Data source: standardized size-frequency dataset (Res. 15/02)

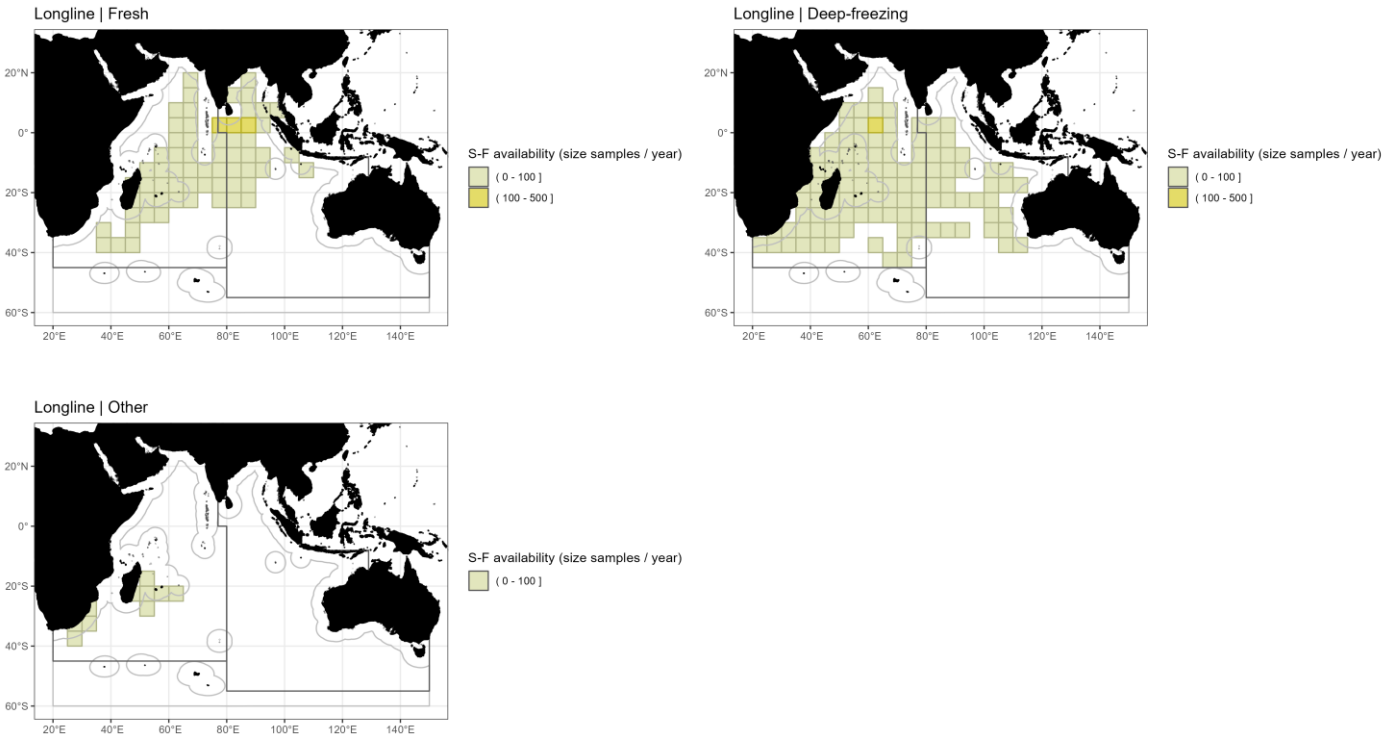

Figure 21: Spatial distribution (average number of samples per grid per year) of available skipjack tuna size-frequency data by longline fishery types in the period 2016-2020. Data source: standardized size-frequency dataset (Res. 15/02)

Line fisheries

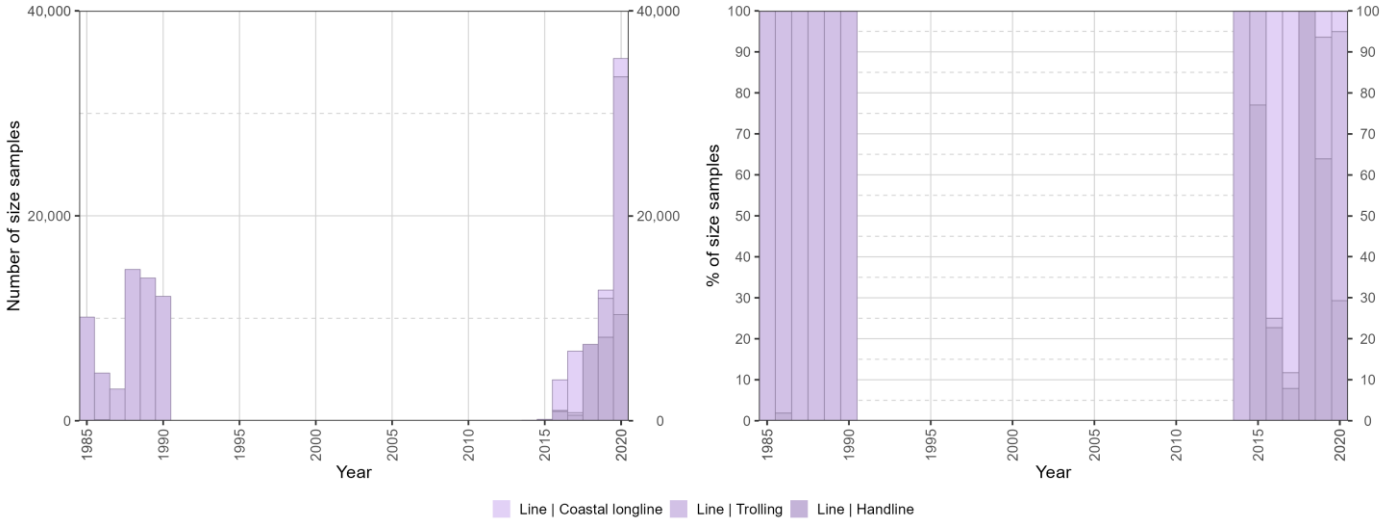

Figure 22: Availability of skipjack tuna size-frequency data as absolute number of samples (left) and relative number of samples (right) per year and line fishery type. Data source: standardized size-frequency dataset (Res. 15/02)

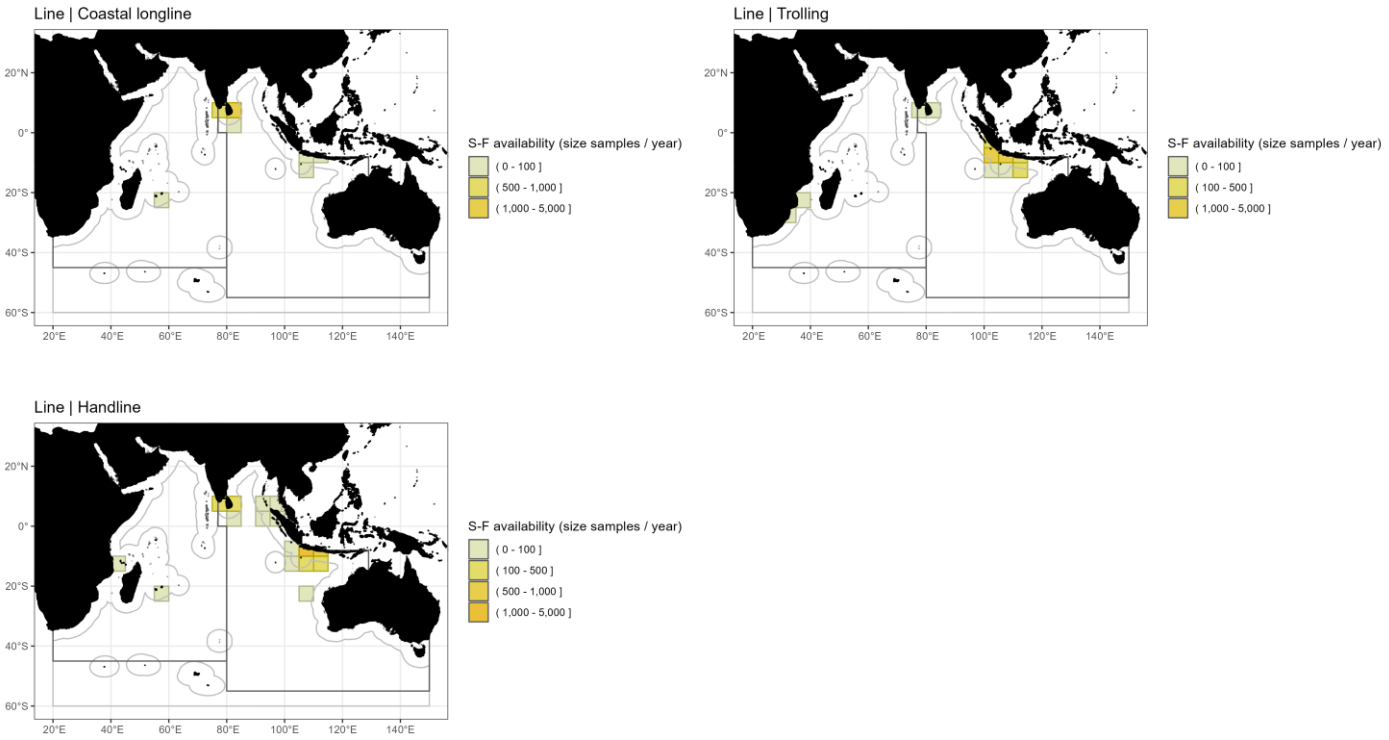

Figure 23: Spatial distribution (average number of samples per grid per year) of available skipjack tuna size-frequency data by line fishery types in the period 2016-2020. Data source: standardized size-frequency dataset (Res. 15/02)

Other fisheries

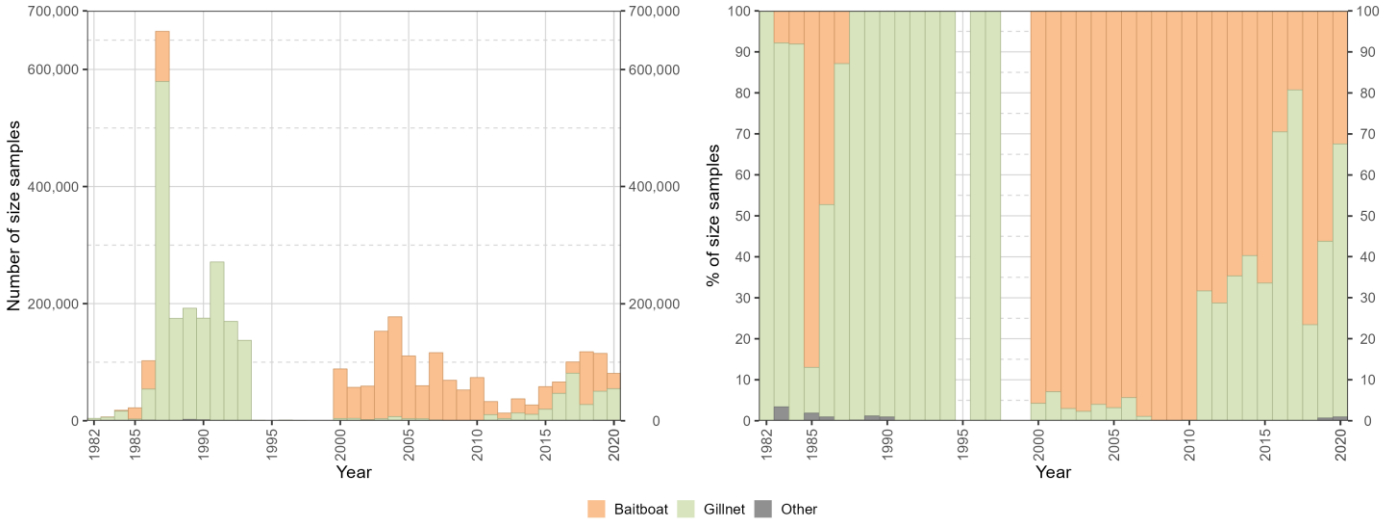

Figure 24: Availability of skipjack tuna size-frequency data as absolute number of samples (left) and relative number of samples (right) per year and all other fishery types. Data source: standardized size-frequency dataset (Res. 15/02)

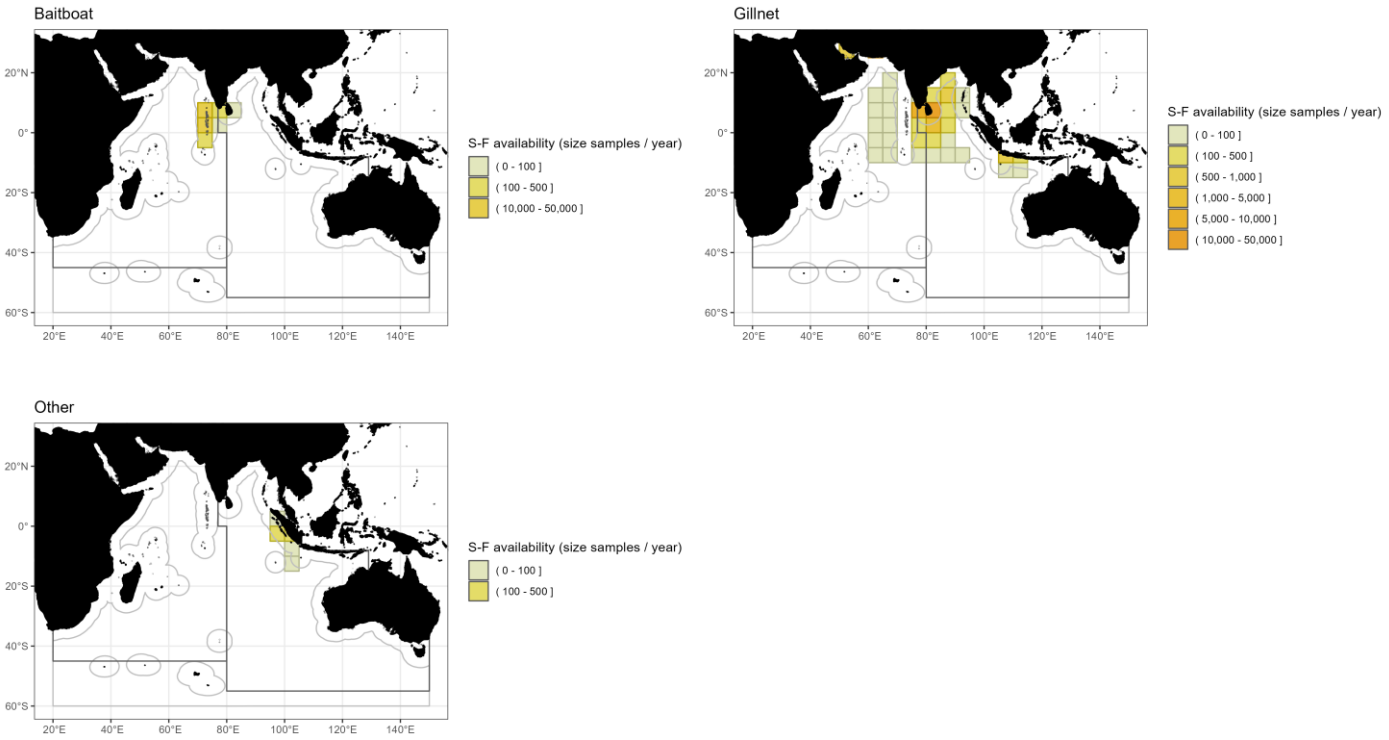

Figure 25: Spatial distribution (average number of samples per grid per year) of available skipjack tuna size-frequency data by all other fishery types in the period 2016-2020. Data source: standardized size-frequency dataset (Res. 15/02)

Temporal patterns and trends in size distributions

Industrial purse seine fisheries

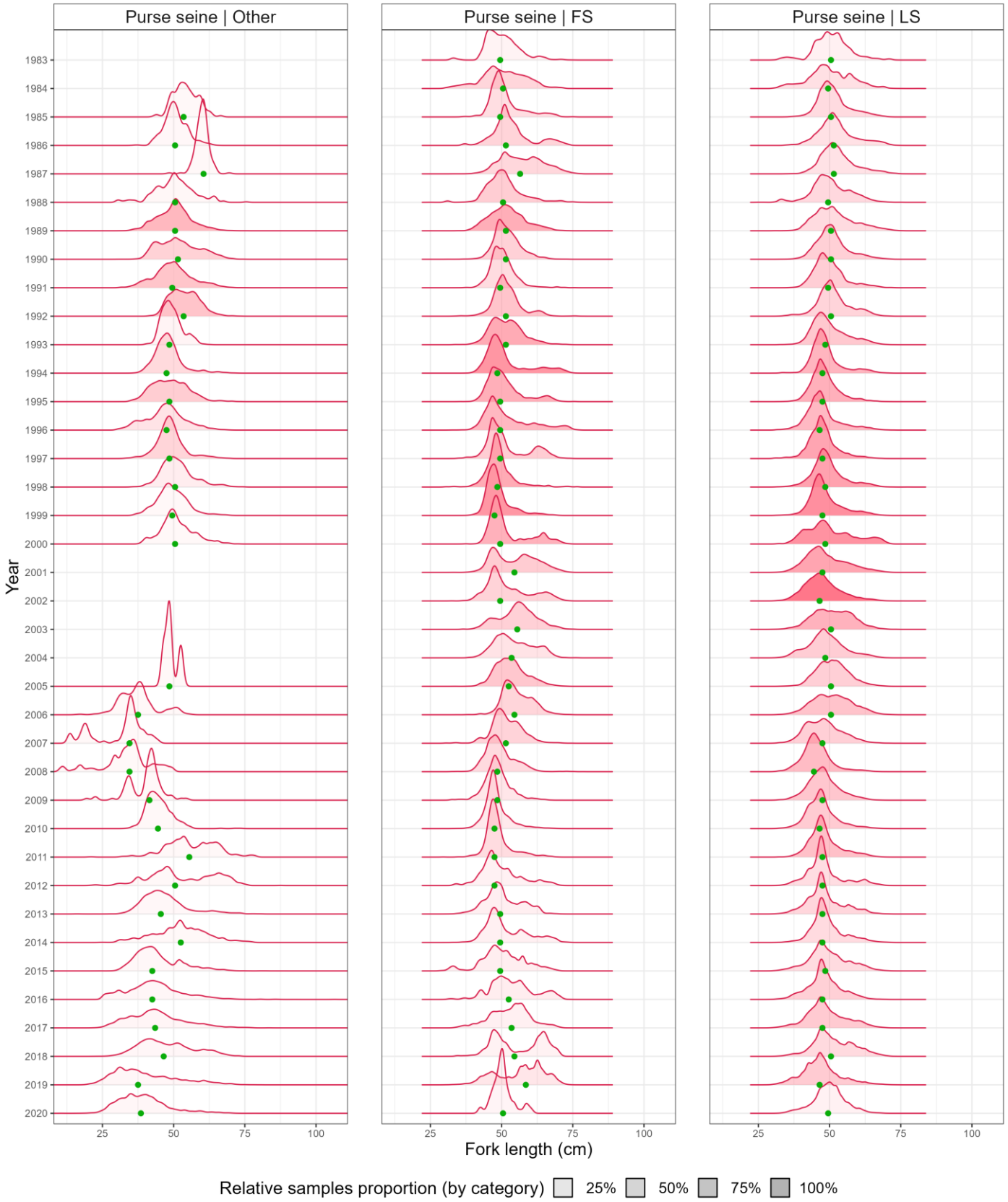

Figure 26: Relative size distribution (fork length in 2 cm size bins) of skipjack tuna caught by all purse seine fleets for the period 1983-2020. Other = no information provided on the school association; FS = free-swimming schools; LS = schools associated with floating objects. Fill intensity is proportional to the number of samples recorded for the year, while the green dot corresponds to the median value. Data source: standardized size-frequency dataset (Res. 15/02)

Temporal trends in estimated average weights

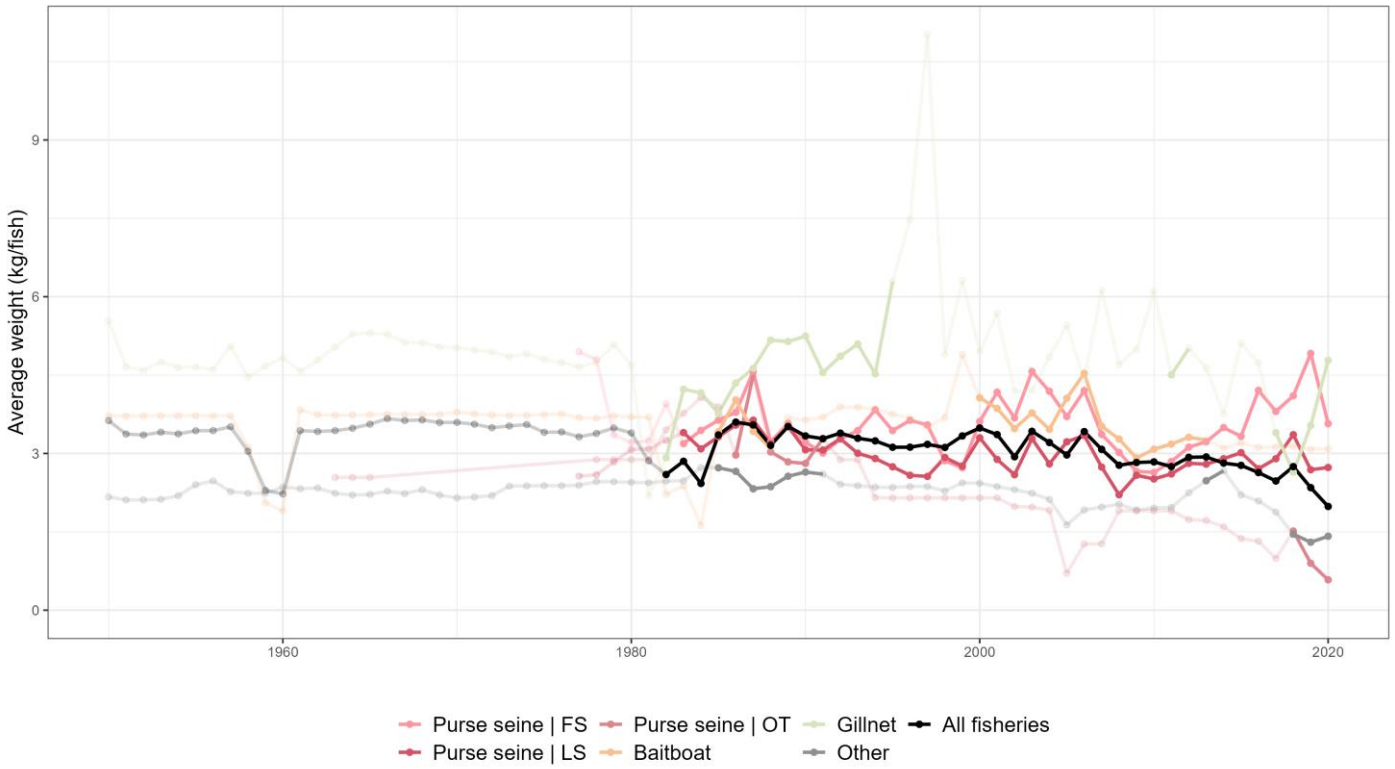

Figure 27: Combined estimated skipjack tuna average weight (kg/fish) in the catch by fishery and year. Semi-transparent points correspond to years for which the original size samples cover strata with reported catches (by year and fishery) **lower** than 50 t. LS = schools associated with floating objects; FS = free-swimming schools. Longline | Japan = includes data from longliners flagged by Japan, Rep. of Korea and Thailand; Longline | Taiwan = includes data from longliners flagged by Taiwan,China and all other flags not otherwise mentioned. Data source: raised time-area catches

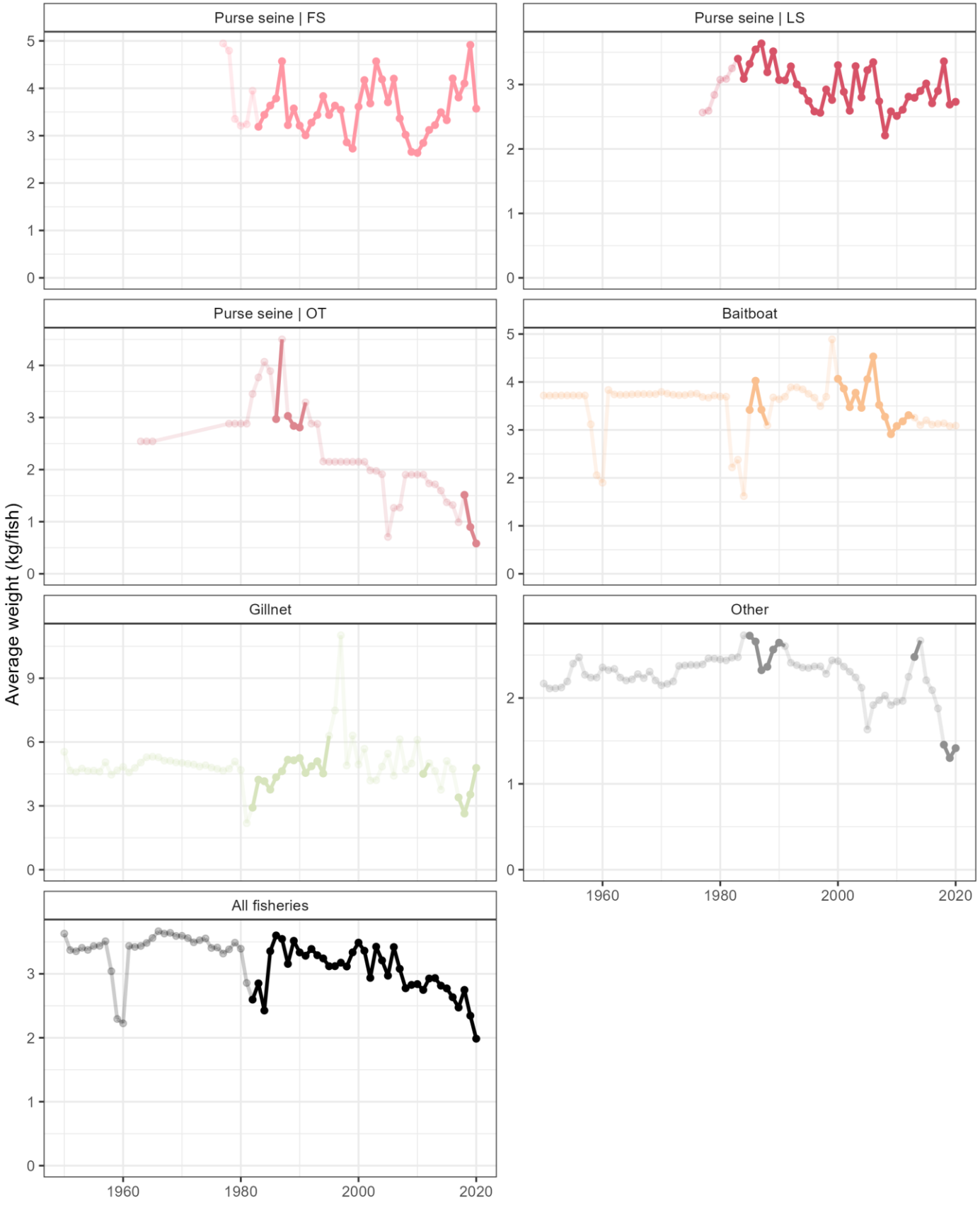

Figure 28: Estimated skipjack tuna average weight (kg/fish) in the catch by fishery and year. Semi-transparent points correspond to years for which the original size samples cover strata with reported catches (by year and fishery) **lower** than 50 t. LS = schools associated with floating objects; FS = free-swimming schools. Longline | Japan = includes data from longliners flagged by Japan, Rep. of Korea and Thailand; Longline | Taiwan = includes data from longliners flagged by Taiwan,China and all other flags not otherwise mentioned. Data source: raised time-area catches

Spatial distribution of average weights

Estimated average weights by decade (1950-2019)

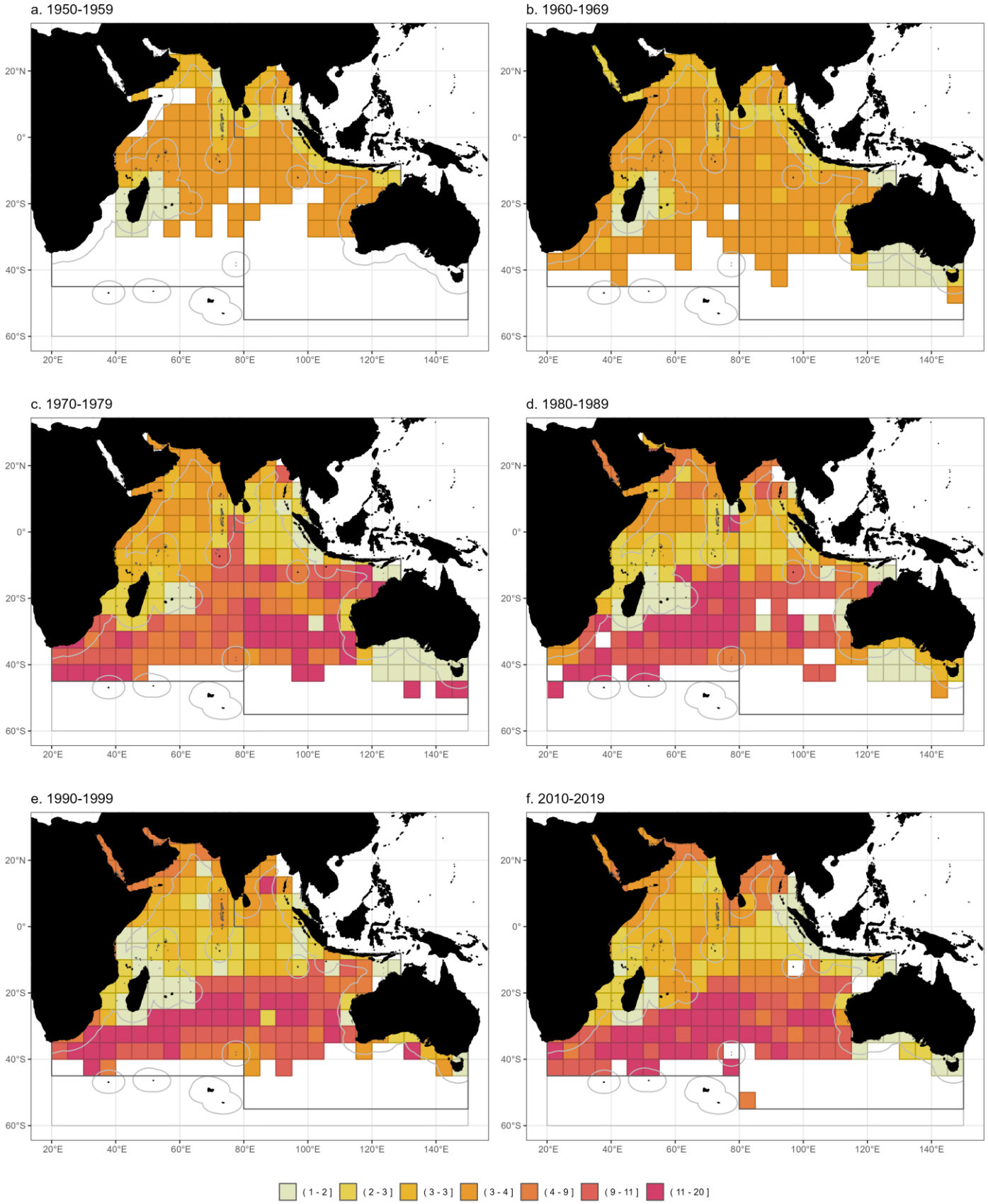

Figure 29: Estimated skipjack tuna average weight (kg/fish) in the catch by decade and 5x5 grid, for all fisheries combined for the period 1950-2019. Data source: raised time-area catches

Estimated average weights by year (2016-2020) and last decade (2010-2019)

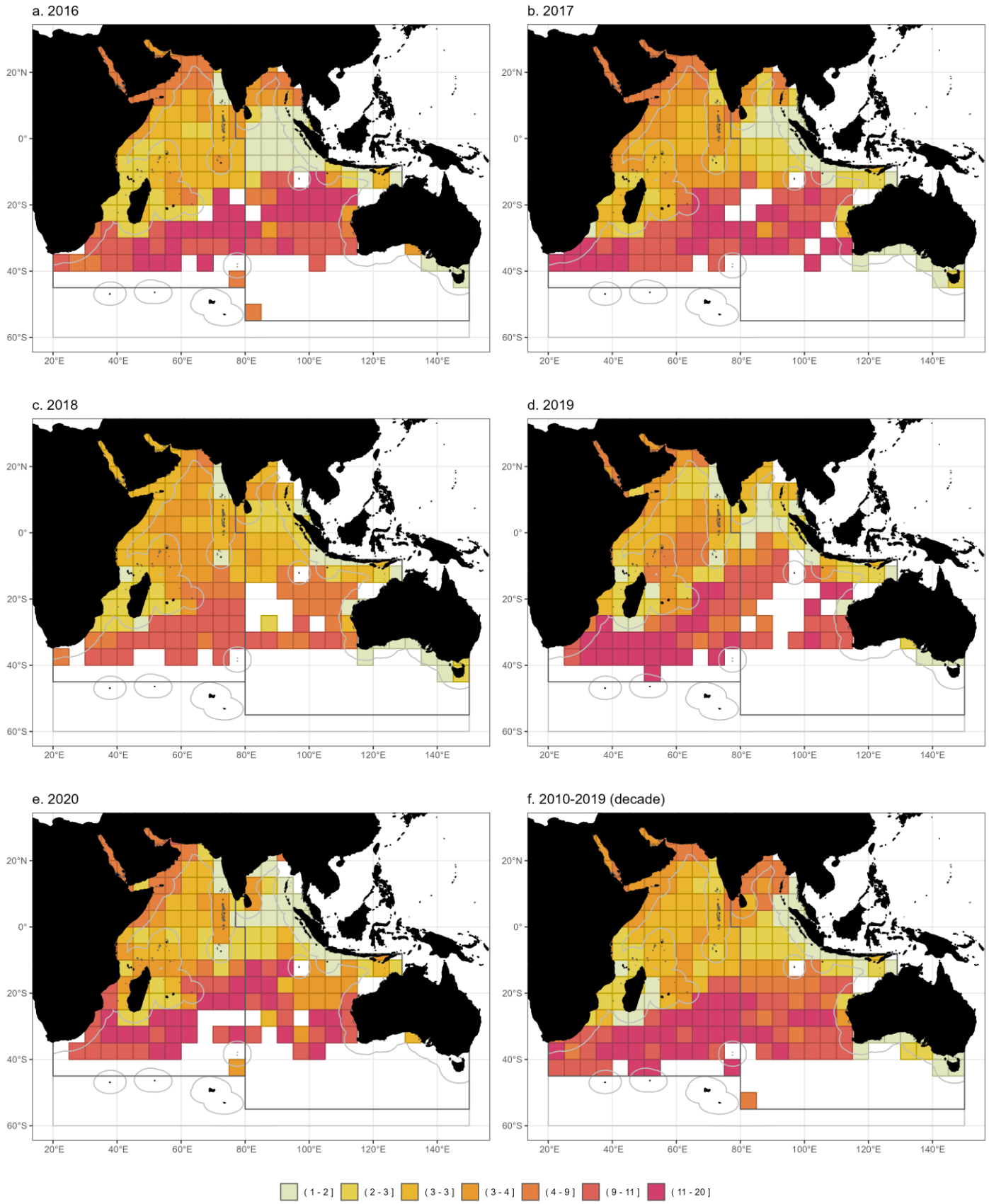

Figure 30: Estimated skipjack tuna average weight (kg/fish) in the catch by year and 5x5 grid, for all fisheries combined for the period 2016-2020 and for the decade 2010-2019. Data source: raised time-area catches

Estimated average weights by fishery group in recent years (2016-2020)

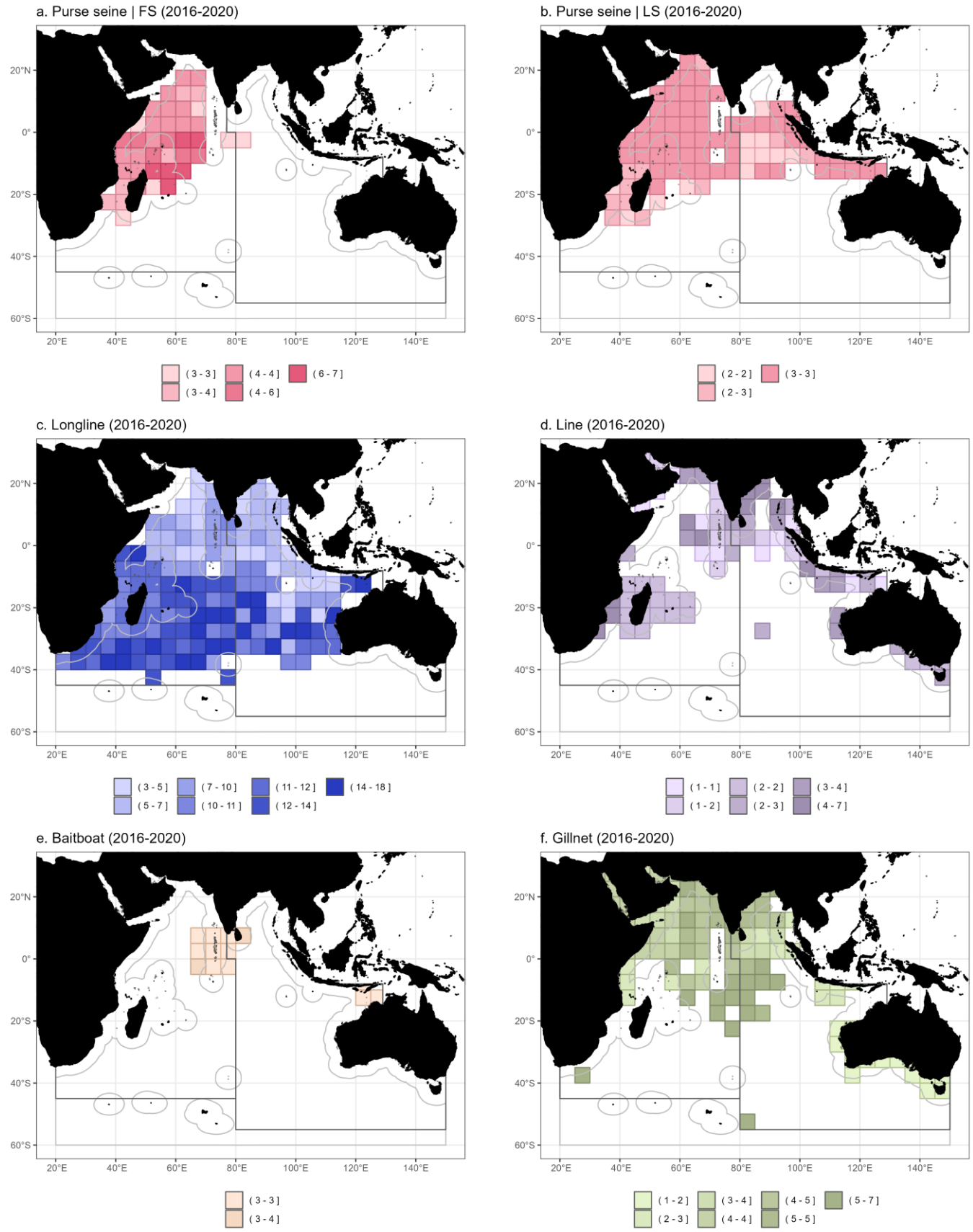

Figure 31: Estimated skipjack tuna average weight (kg/fish) in the catch by 5x5 grid and fishery group for the period 2016-2020. LS = schools associated with floating objects; FS = free-swimming schools. Data source: raised time-area catches

Uncertainties in size-frequency data

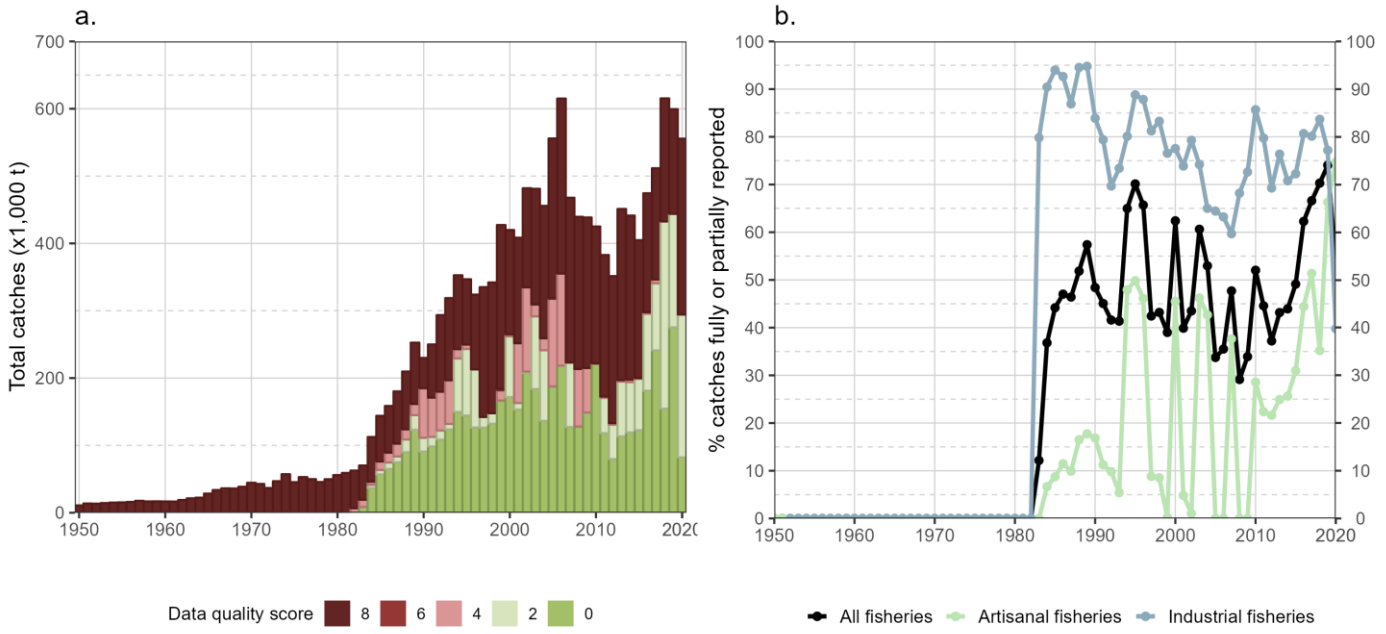

Figure 32: Annual nominal catches (t) of skipjack tuna estimated by quality score (barplot) and percentage of geo-referenced size-frequency data reported to the IOTC Secretariat in agreement with the requirements of Res. 15/02 (lines with dots) for all fisheries (a) and by type of fishery (b), in the period 1950–2020

Industrial purse seine fisheries

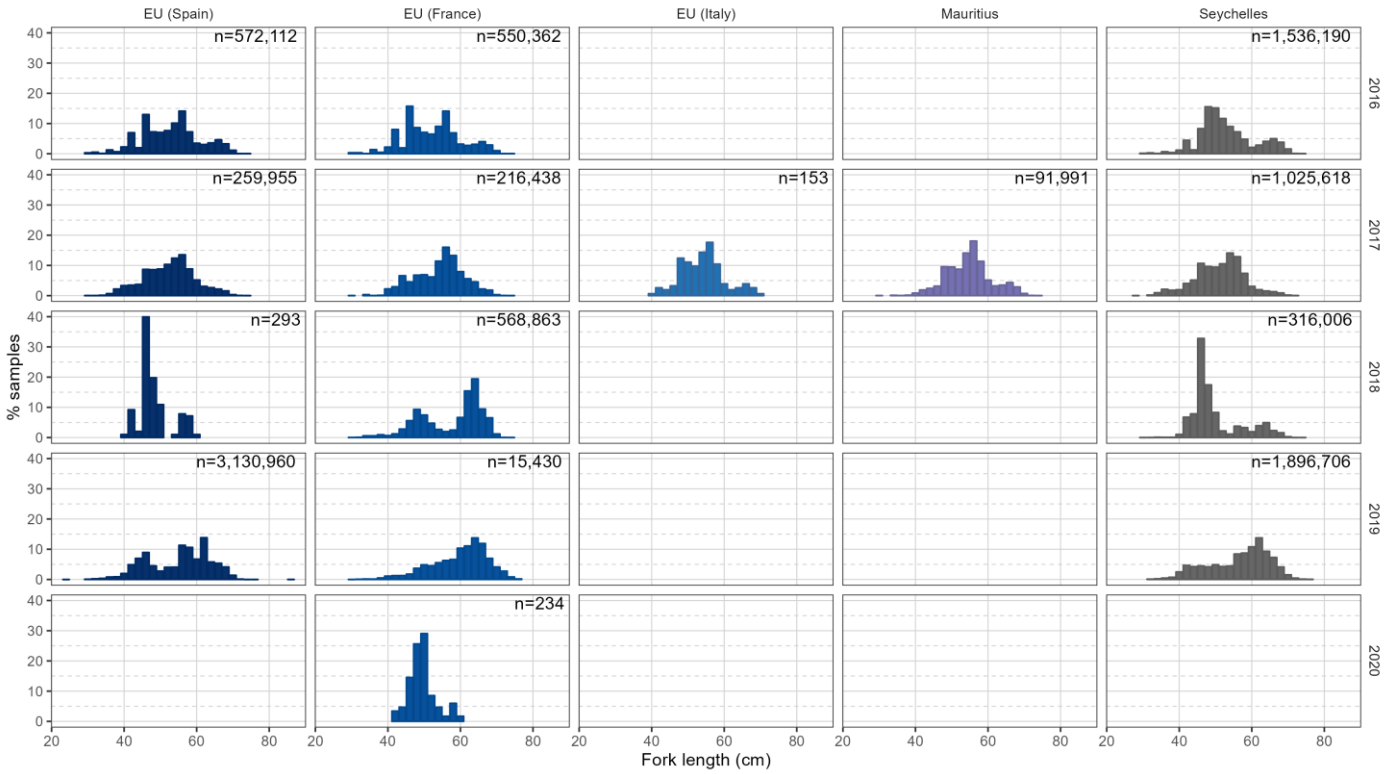

Figure 33: Relative size distribution of skipjack tuna (fork length in cm) recorded for free-swimming schools, by year (2016–2020) and main purse seine fleet. Data source: standardized size-frequency dataset (Res. 15/02)

Table 5: Percentage of sampled skipjack tuna with fork length below 50 cm recorded by the major purse seine fleets fishing on free-swimming schools, as reported for the period 2016-2020. Data source: standardized size-frequency dataset (Res. 15/02)

Fleet	2016	2017	2018	2019	2020
EUESP	34	31	72	30	
EUFRA	39	24	22	10	48
MUS		18			
SYC	32	37	66	22	

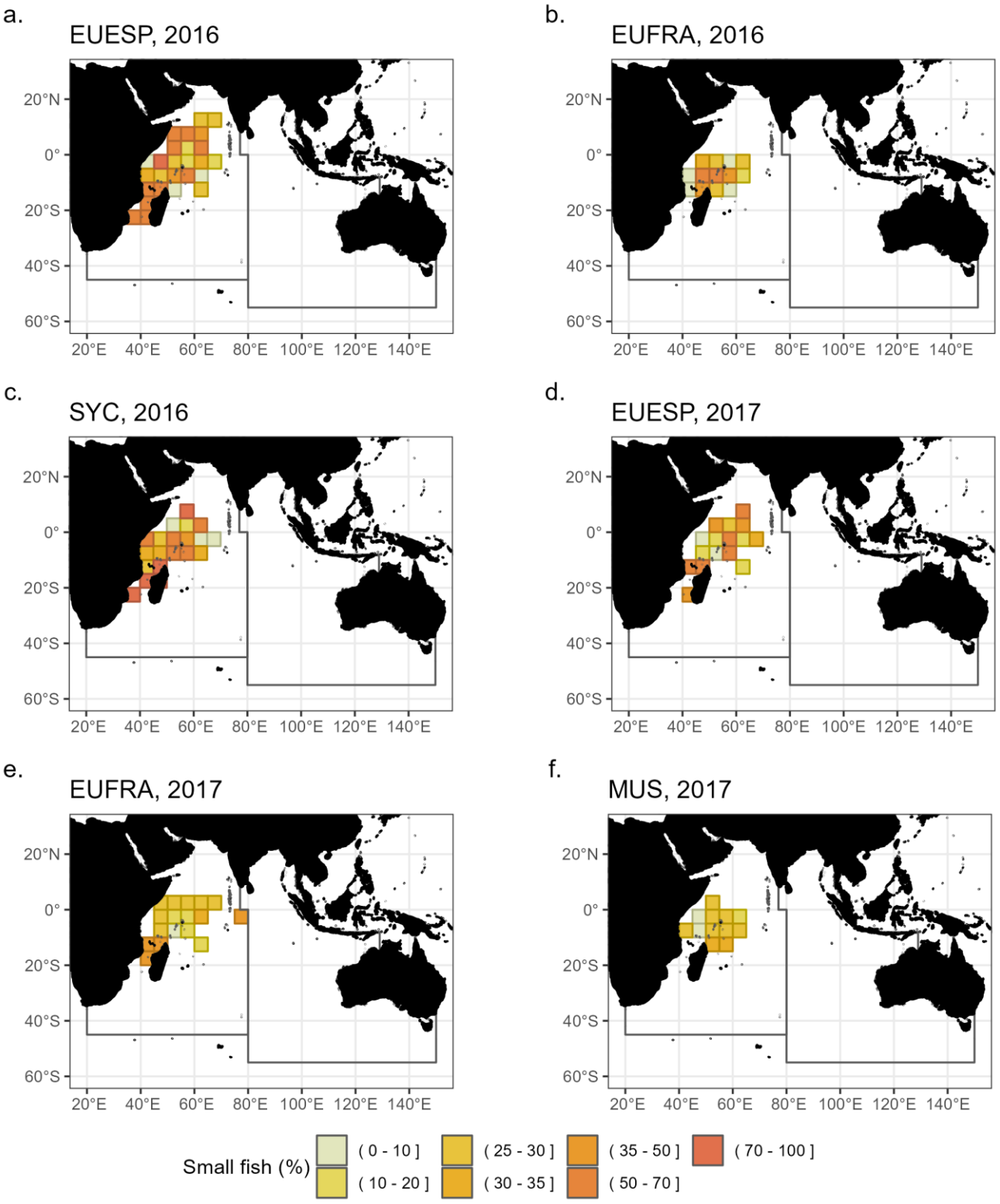

Figure 34: Spatial distribution of sampled skipjack tuna with fork length below 50 cm recorded by the major purse seine fleets fishing on free-swimming schools, as reported for the period 2016-2020. Data source: standardized size-frequency dataset (Res. 15/02)

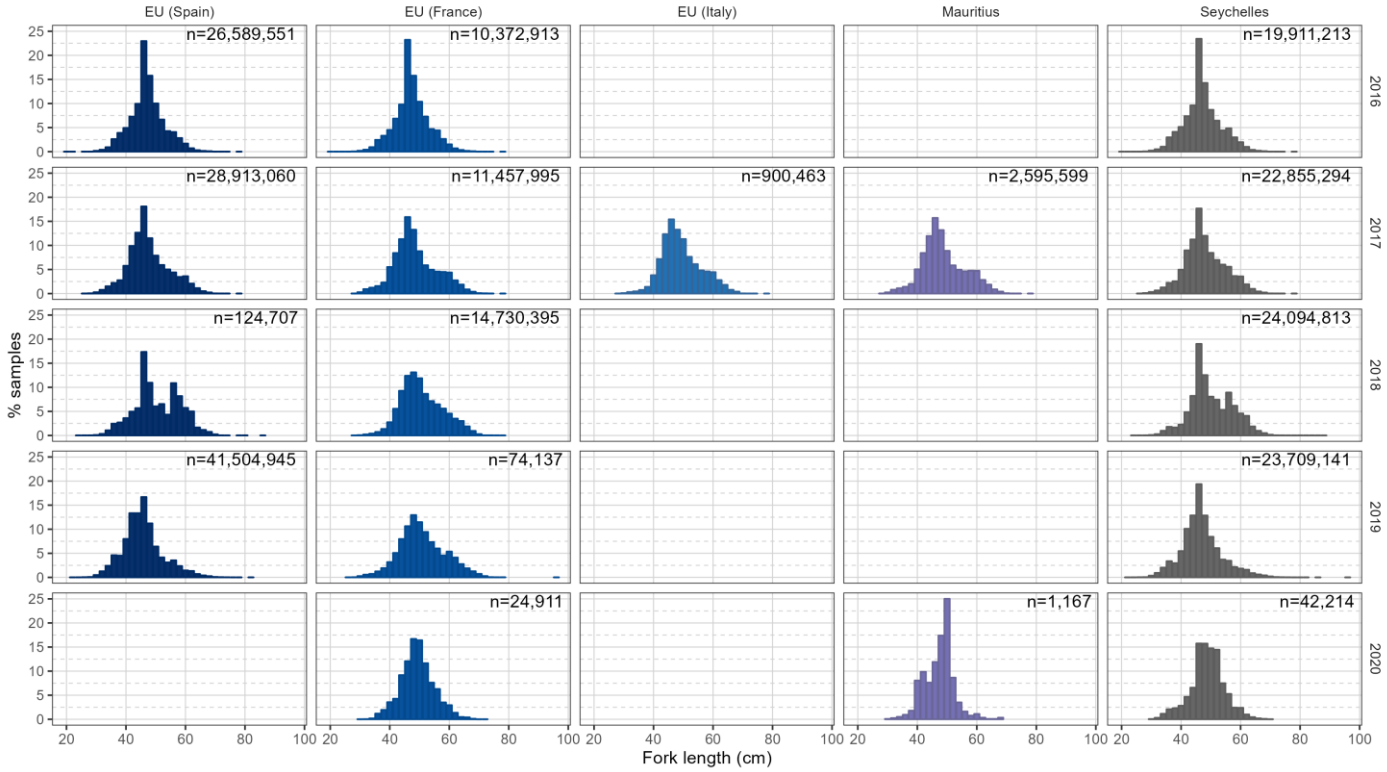

Figure 35: Relative size distribution of skipjack tuna (fork length in cm) recorded for FOB-associated schools, by year (2016–2020) and major purse seine fleet. Data source: standardized size-frequency dataset (Res. 15/02)

Table 6: Percentage of sampled skipjack tuna with fork length above 50 cm recorded by the major purse seine fleets fishing on FOB-associated schools, as reported for the period 2016-2020. Data source: standardized size-frequency dataset (Res. 15/02)

Fleet	2016	2017	2018	2019	2020
EUESP	31	34	51	24	
EUFRA	32	39	54	55	51
MUS		40			42
SYC	31	38	48	30	49

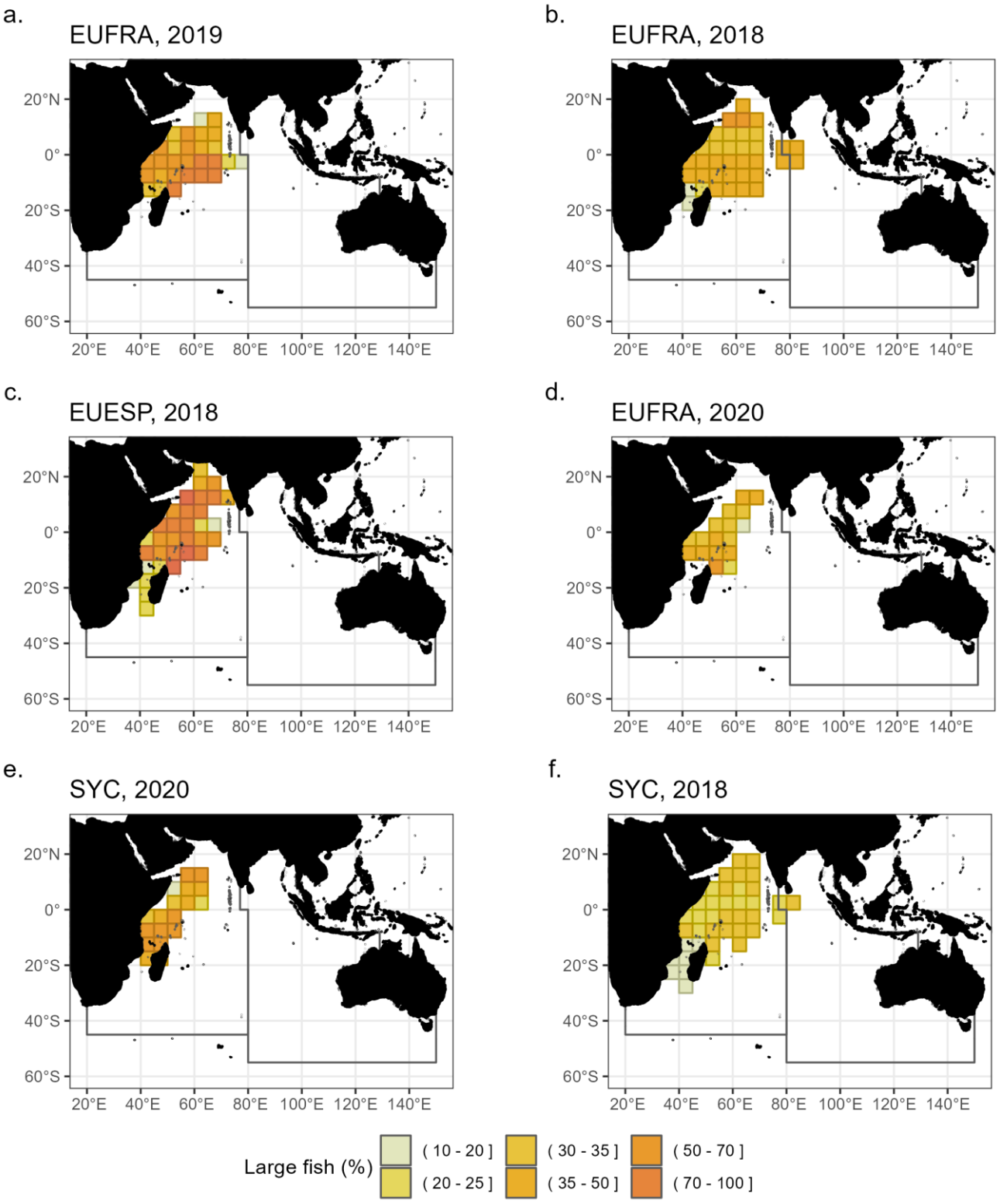

Figure 36: Spatial distribution of sampled skipjack tuna with fork length above 50 cm recorded by the major purse seine fleets fishing on FOB-associated schools, as reported for the period 2016-2020. Data source: standardized size-frequency dataset (Res. 15/02)

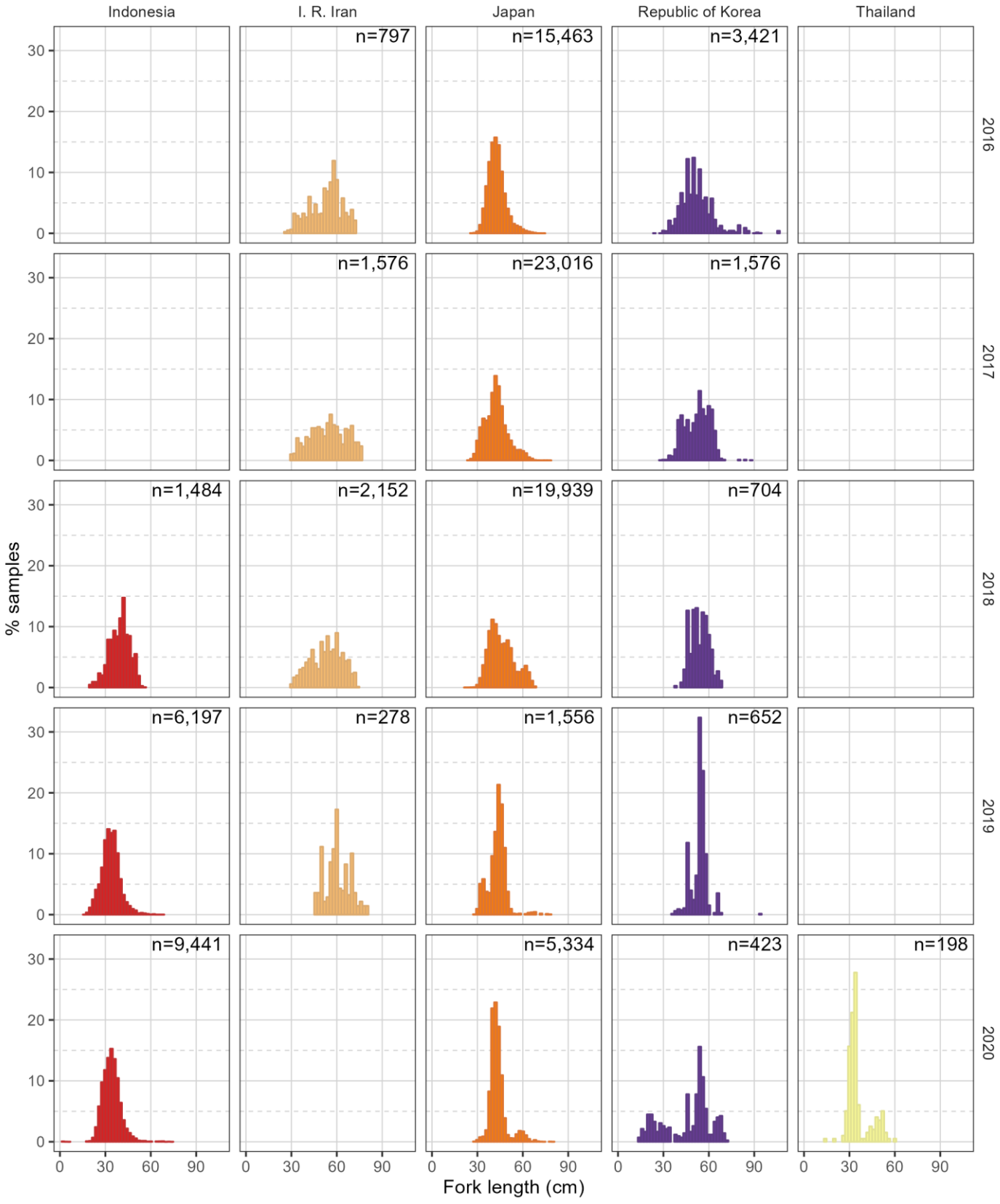

Figure 37: Relative size distribution of skipjack tuna (fork length in cm) recorded for unclassified schools, by year (2016–2020) and other purse seine fleet. Data source: standardized size-frequency dataset (Res. 15/02)

References

IOTC (2022) Overview of indian ocean tropical tuna fisheries. IOTC, Virtual meeting, 30 May - 03 June 2022, p 26