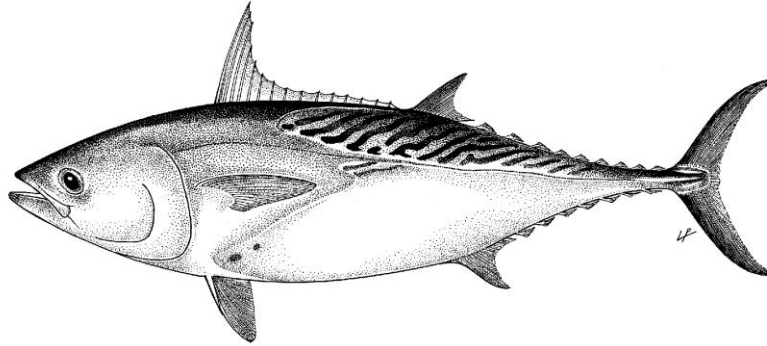


REVIEW OF FISHERIES STATISTICAL DATA AVAILABLE FOR INDIAN OCEAN KAWAKAWA

Author: [IOTC Secretariat](#)



Introduction

The overarching objective of the paper is to provide participants at the 14th Session of the IOTC Working Party on Neritic Tunas ([WPNT14](#)) with a review of the status of fisheries information available on kawakawa (*Euthynnus affinis*) ([Risso 1810](#)) occurring in the Indian Ocean. The document describes the temporal and spatial trends in retained catches at global and ocean-basin scale and the main characteristics of the fisheries catching kawakawa in the Indian Ocean, as well as providing an assessment of the reporting quality of the data sets available at the IOTC Secretariat. A full description of the data sources, processing steps to generate the data sets, and key for reporting quality scores is available in ([IOTC2024 NERI?](#)).

Global catches

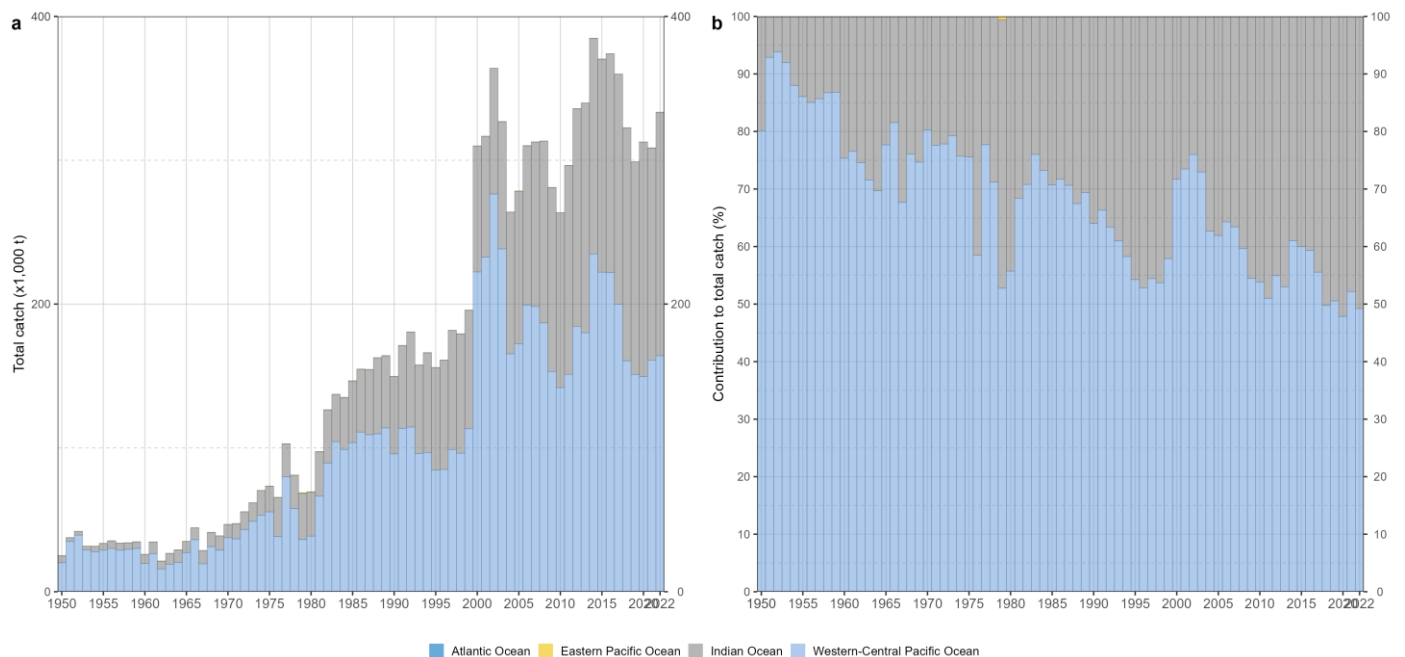


Figure 1: Annual time series of (a) cumulative retained catches (metric tonnes; t) and (b) contribution to the total retained catches (percentage; %) of kawakawa by ocean basin for the period 1950-2021. Source: [FAO global capture production database](#)

Indian Ocean catches & discards

Historical trends (1950-2022)

Table 1: Mean annual retained catches (metric tonnes; t) of kawakawa by decade and fishery for the period 1950-2019. The background intensity colour of each cell is directly proportional to the catch level. Data source: [best scientific estimates of retained catches](https://www.iotc.org/meetings/14th-working-party-neritic-tunas-wpnt14-meetingData/03-NC)

Fishery	1950s	1960s	1970s	1980s	1990s	2000s	2010s
Purse seine Other	111	385	2,616	12,071	21,401	28,613	43,453
Longline Other	0	0	0	24	706	1,106	549
Longline Fresh	0	0	0	0	0	0	24
Longline Deep-freezing	0	0	0	37	0	0	105
Line Coastal longline	84	177	528	862	1,432	2,192	4,111
Line Trolling	1,418	2,810	5,090	7,355	11,304	11,623	11,824
Line Handline	208	272	1,024	1,638	2,527	6,018	10,025
Baitboat	88	297	579	1,094	2,005	1,790	1,195
Gillnet	2,564	4,486	9,691	18,001	28,425	47,161	71,961
Other	207	422	778	1,534	2,444	4,961	6,753
Total	4,680	8,848	20,306	42,615	70,244	103,465	150,000

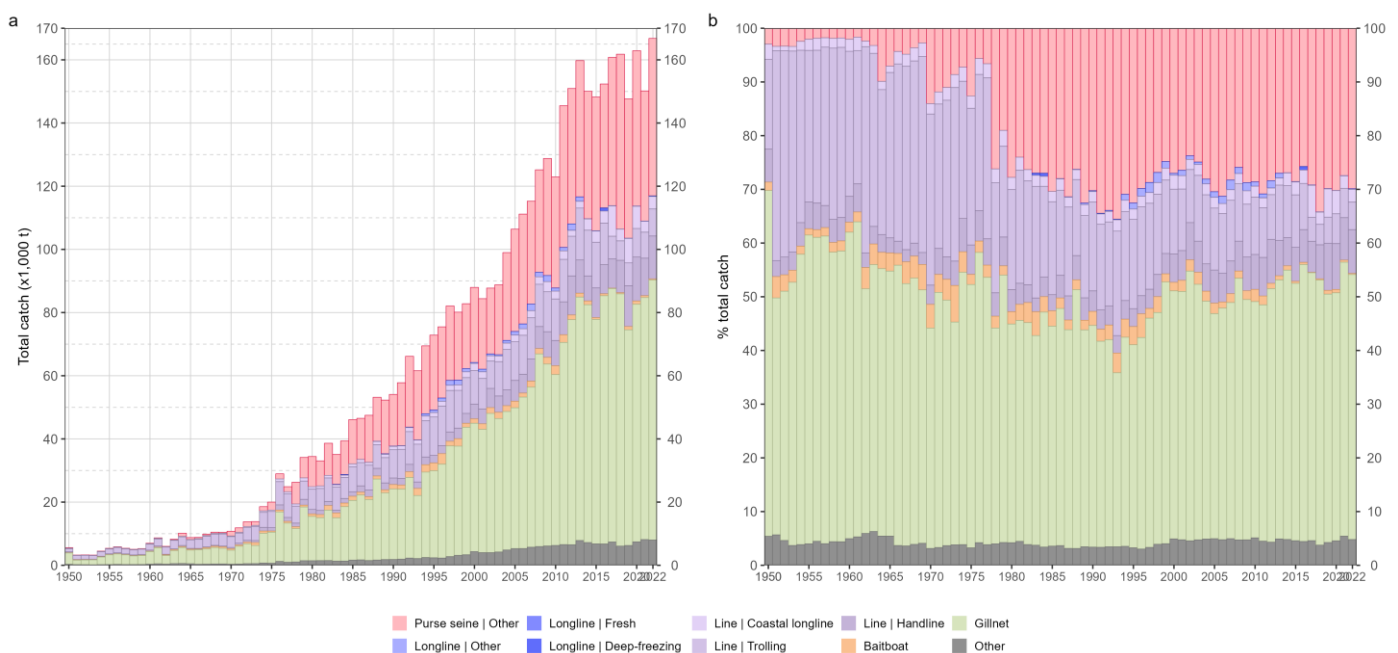


Figure 2: Annual time series of (a) cumulative retained catches (metric tonnes; t) and (b) cumulative contribution to the total retained catches (percentage; %) of kawakawa by fishery for the period 1950-2022. Data source: [best scientific estimates of retained catches](#)

Table 2: Annual retained catches (metric tonnes; t) of kawakawa by fishery for the period 2013-2022. The background intensity colour of each cell is directly proportional to the catch level. Data source: [best scientific estimates of retained catches](https://www.iotc.org/meetings/14th-working-party-neritic-tunas-wpnt14-meetingData/03-NC)

Fishery	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Purse seine Other	43,146	40,406	42,348	39,235	46,968	55,378	44,104	49,230	41,253	49,847
Longline Other	1,403	0	0	0	0	0	0	0	0	0
Longline Fresh	3	24	51	37	31	27	57	21	14	172
Longline Deep-freezing	0	0	41	954	34	6	15	8	8	14
Line Coastal longline	2,123	3,563	3,566	3,791	9,589	3,686	7,748	7,017	3,464	3,945
Line Trolling	16,448	14,504	14,461	13,123	7,179	6,151	7,209	9,043	8,231	8,577
Line Handline	10,514	7,876	9,388	9,280	9,257	10,236	12,933	13,907	11,868	13,584
Baitboat	1,234	1,214	565	624	145	394	1,050	1,031	586	354
Gillnet	77,056	75,266	71,054	78,566	80,215	79,843	68,270	75,215	76,611	82,291
Other	7,835	7,197	6,773	6,745	7,367	6,064	6,259	7,414	8,135	7,993
Total	159,761	150,050	148,247	152,355	160,786	161,785	147,645	162,886	150,169	166,777

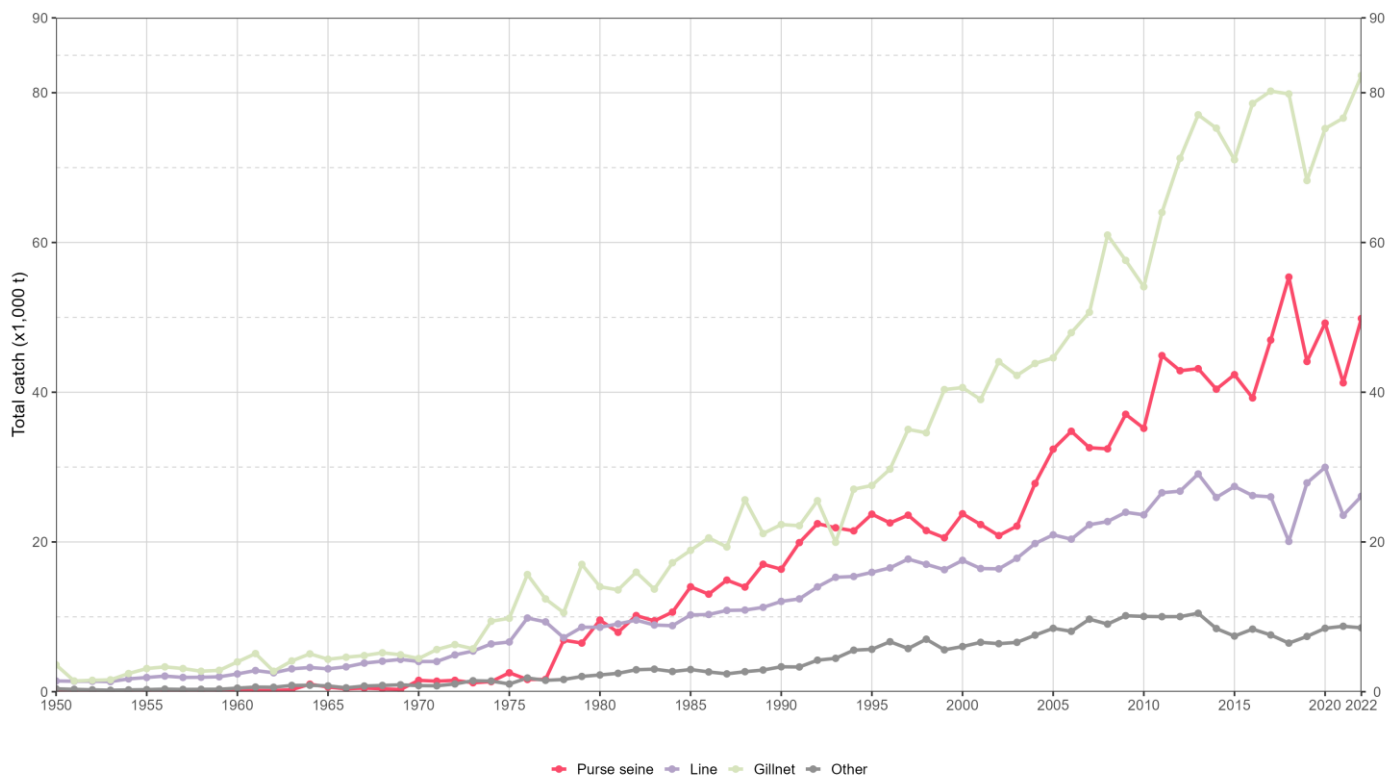


Figure 3: Annual time series of retained catches (metric tonnes; t) of kawakawa by fishery group for the period 1950-2022. Data source: [best scientific estimates of retained catches](#)

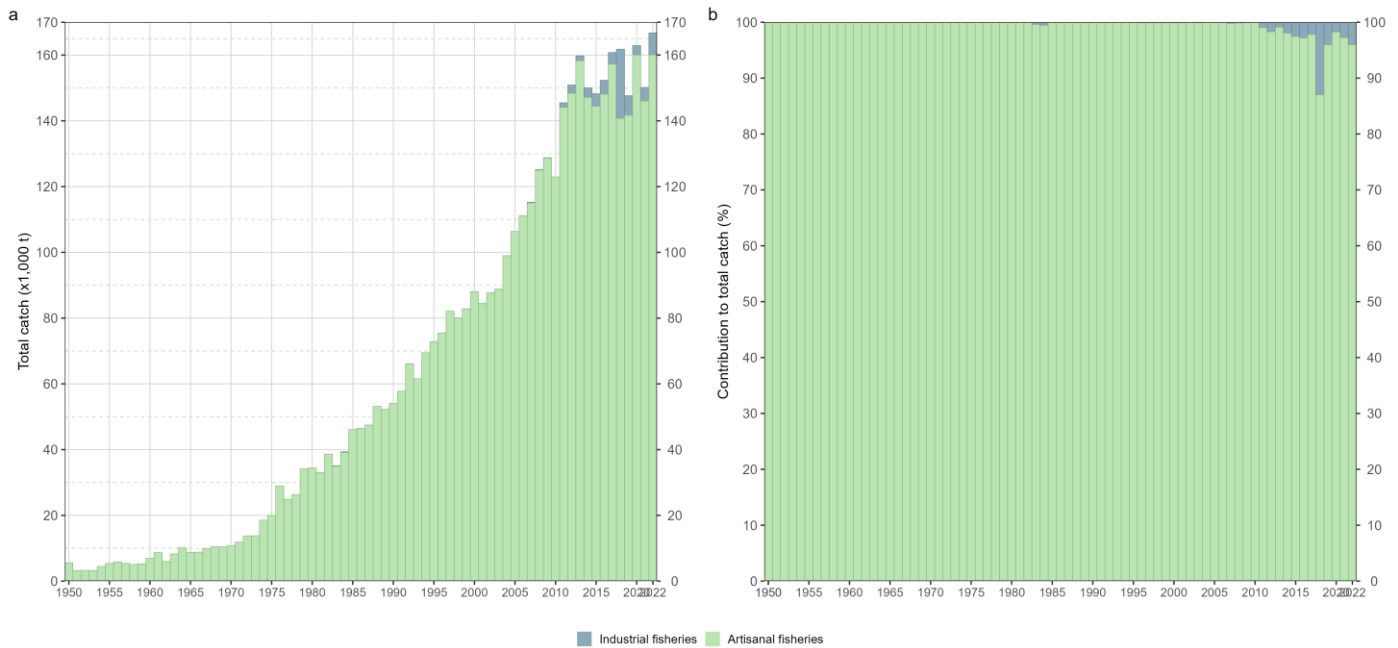


Figure 4: Annual time series of (a) cumulative retained catches (metric tonnes; t) and (b) cumulative contribution to the total retained catches (percentage; %) of kawakawa by type of fishery for the period 1950-2022. Data source: [best scientific estimates of retained catches](#)

Recent fishery features (2018-2022)

Table 3: Mean annual retained catches (metric tonnes; t) of kawakawa by fishery between 2018 and 2022. Data source: [best scientific estimates of retained catches](<https://www.iotc.org/meetings/14th-working-party-neritic-tunas-wpnt14-meetingData/03-NC>)

Fishery	Fishery code	Catch	Percentage
Gillnet	GN	76,446	48.4
Purse seine Other	PSOT	47,962	30.4
Line Handline	LIH	12,506	7.9
Line Trolling	LIT	7,842	5.0
Other	OT	7,173	4.5
Line Coastal longline	LIC	5,172	3.3
Baitboat	BB	683	0.4
Longline Fresh	LLF	58	0.0
Longline Deep-freezing	LLD	10	0.0

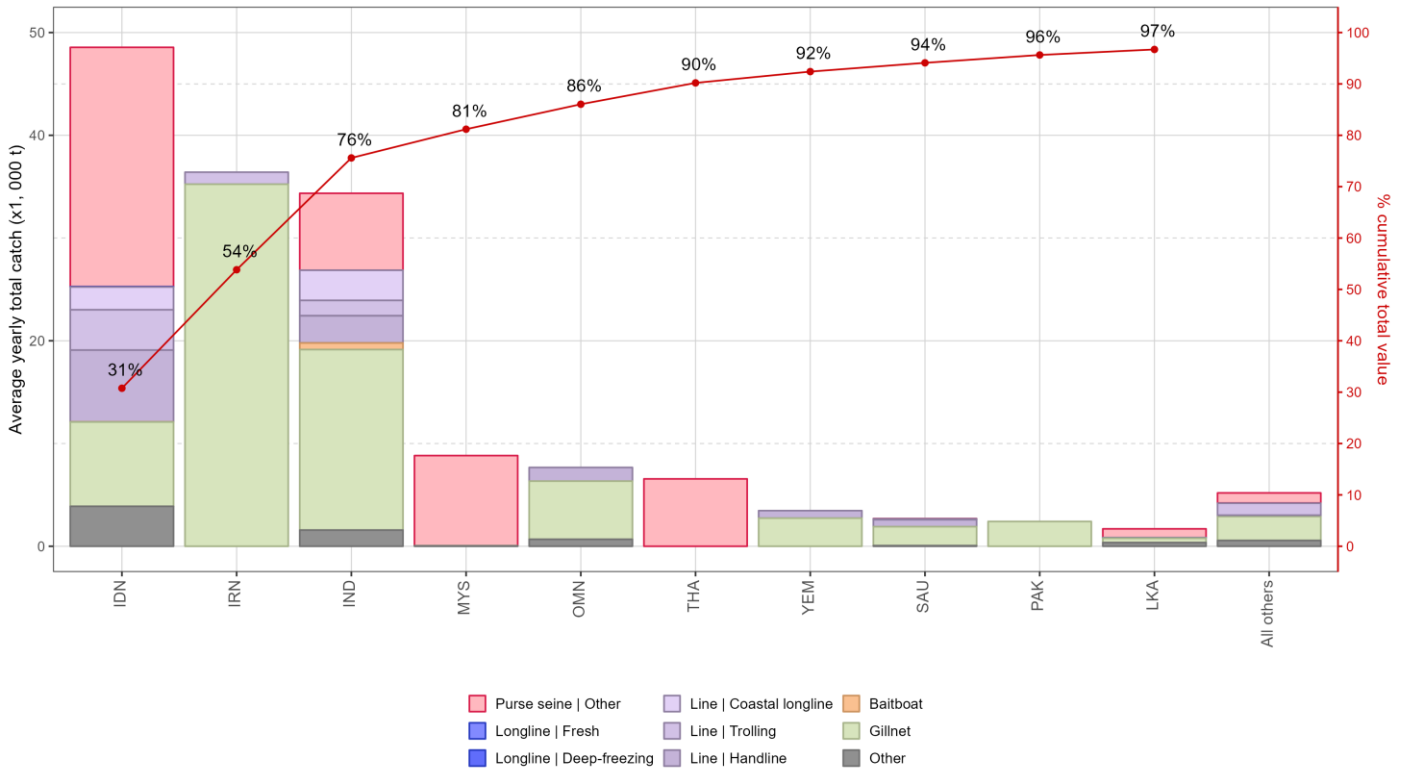


Figure 5: Mean annual retained catches (metric tonnes; t) of kawakawa by fleet and fishery between 2018 and 2022, with indication of cumulative contribution (percentage; %) of catches by fleet. Data source: [best scientific estimates of retained catches](#)

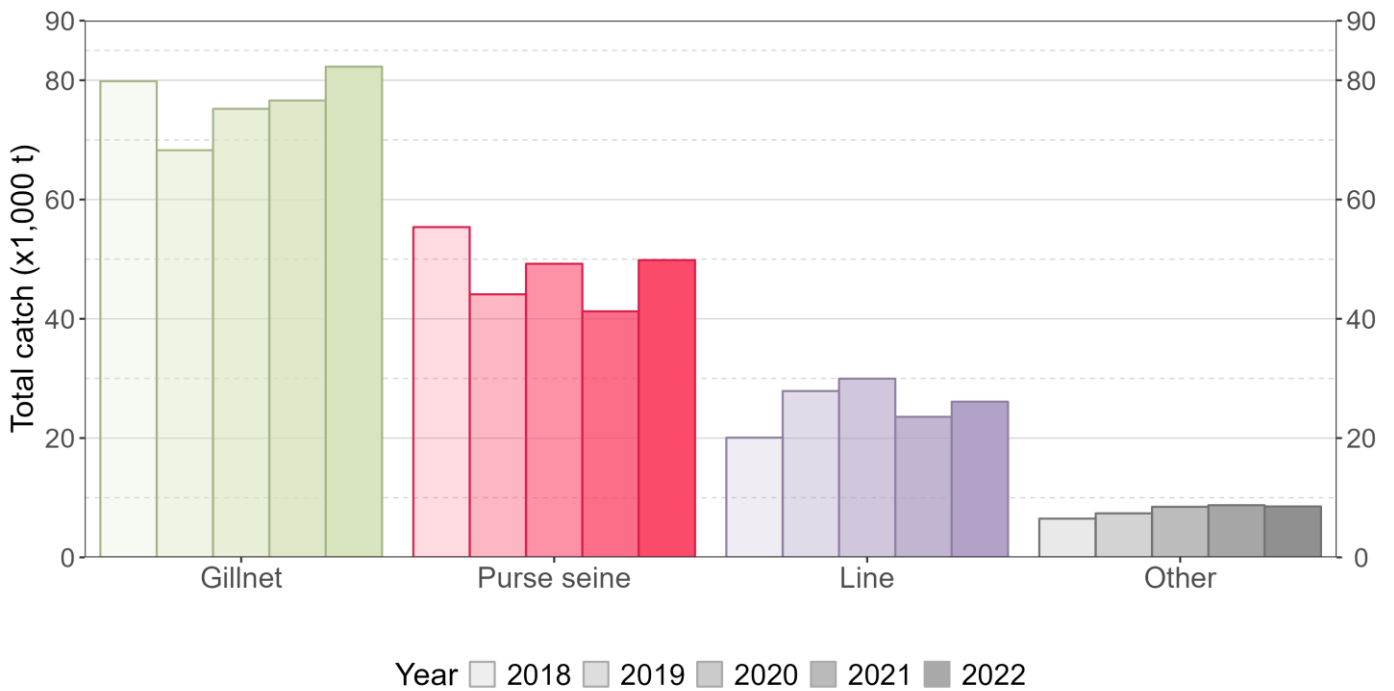


Figure 6: Annual trends in retained catch (metric tonnes; t) of kawakawa by fishery group between 2018 and 2022. Data source: [best scientific estimates of retained catches](#)

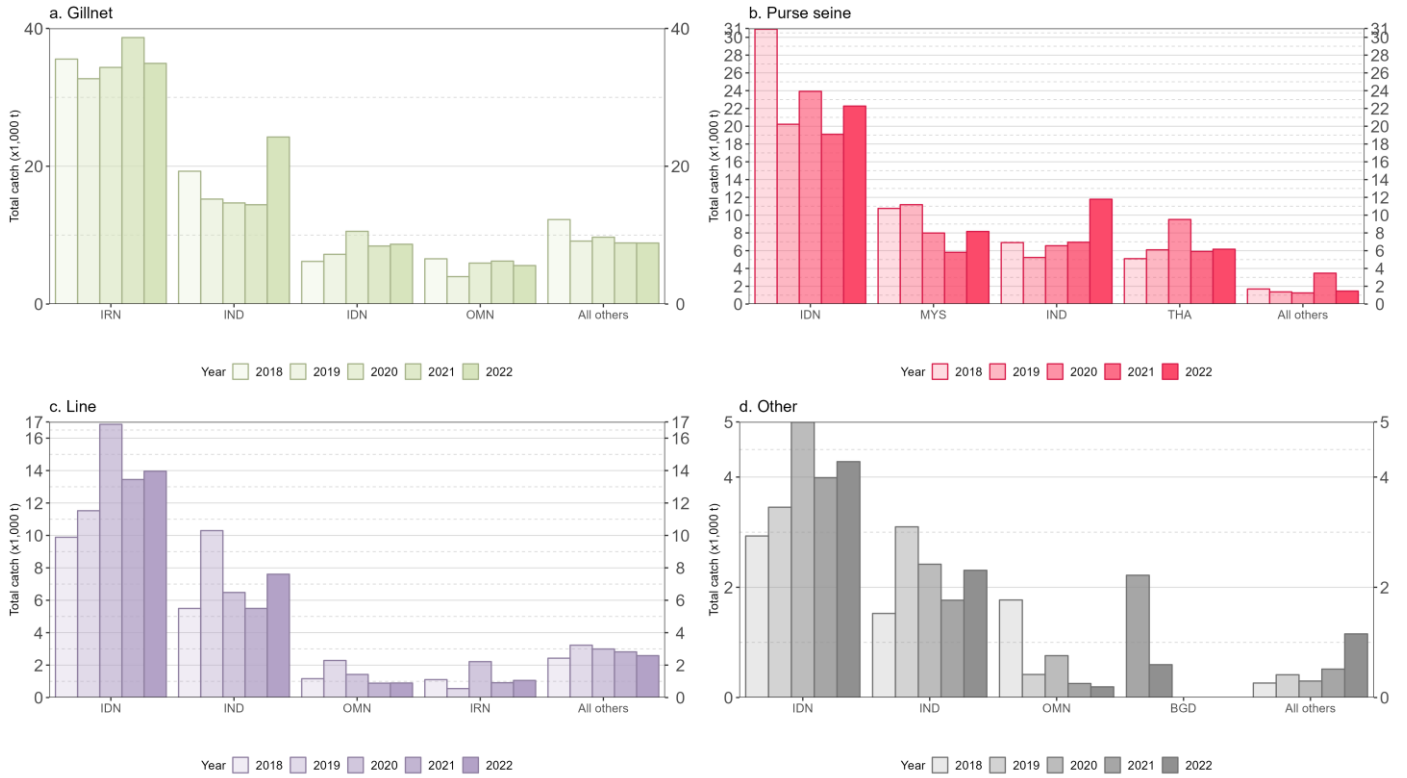


Figure 7: Annual trends in retained catch (metric tonnes; t) of kawakawa by fishery group and fleet between 2018 and 2022. Data source: [best scientific estimates of retained catches](#)

Changes from previous Working Party

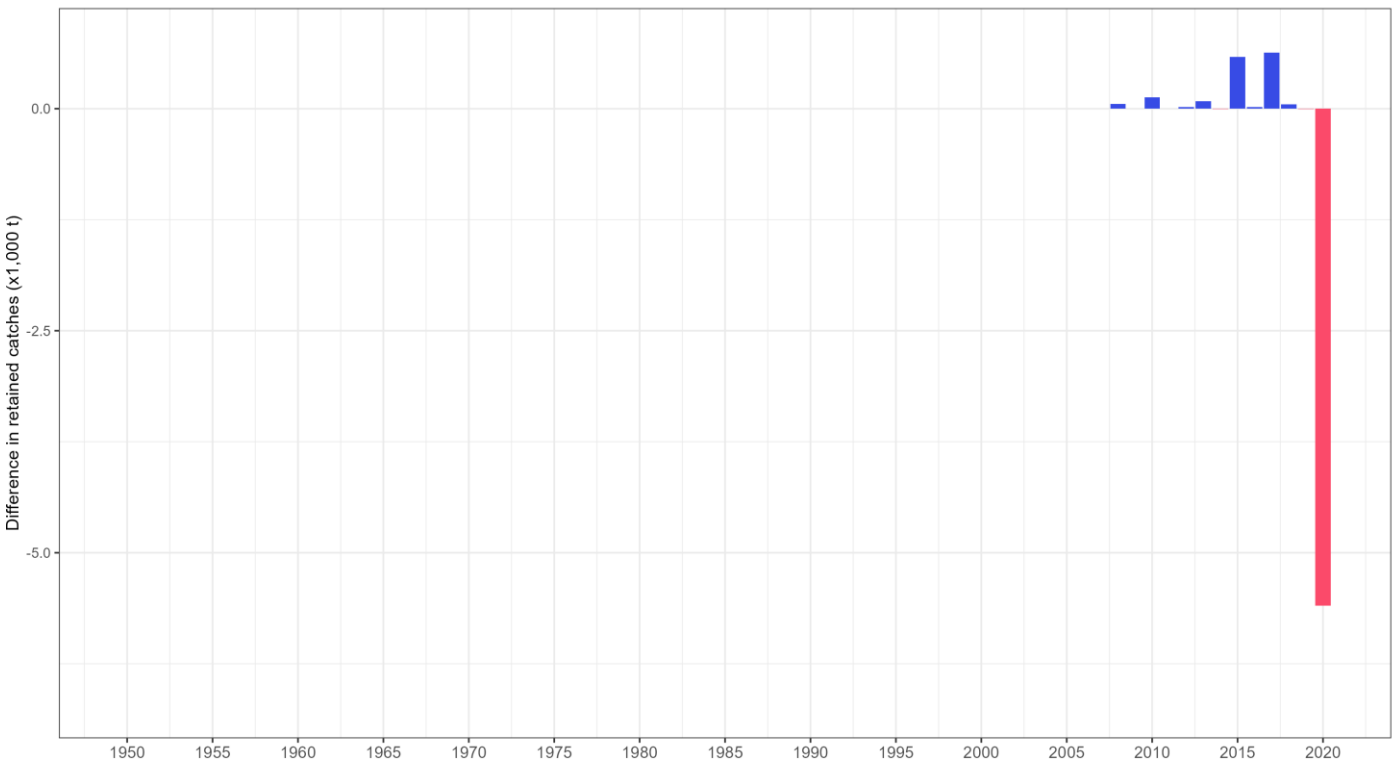


Figure 8: Differences in the annual retained catches (metric tonnes; t) of bullet tuna available at this WPNT and its previous session ([WPNT12](#) meeting held in July 2022). Details by year, fleet, fishery group, and Indian Ocean major area given in [Appendix II](#)

Uncertainties in retained catch data

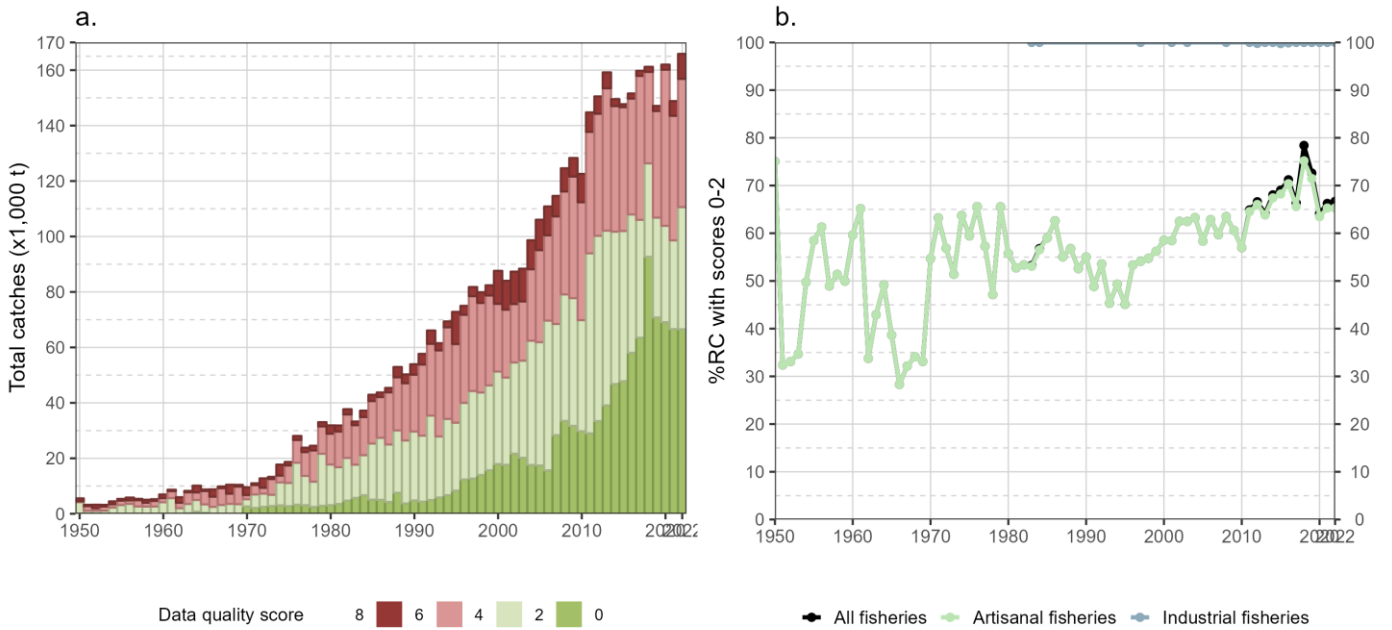


Figure 9: Annual time series of (a) cumulative retained catches (metric tonnes; t) estimated by quality score and (b) contribution of retained catches fully or partially reported to the IOTC Secretariat to all retained catches (percentage; %) of kawakawa for all fisheries and by type of fishery, for the period 1950-2022

Discards

Very little information is available on discards of neritic tunas in coastal and semi-industrial fisheries of the Indian Ocean. Discarding of neritic tunas has been shown to occur in large-scale longline and purse seine fisheries that target tropical tunas and billfish but the quantities are considered to be small ([Huang & Liu 2010](#), [Ruiz et al. 2018](#)). The implementation of [IOTC Res. 19/05](#) on the retention of bycatch onboard purse seiners since late 2019 is assumed to have resulted in a reduction of the discards of kawakawa in this fishery.

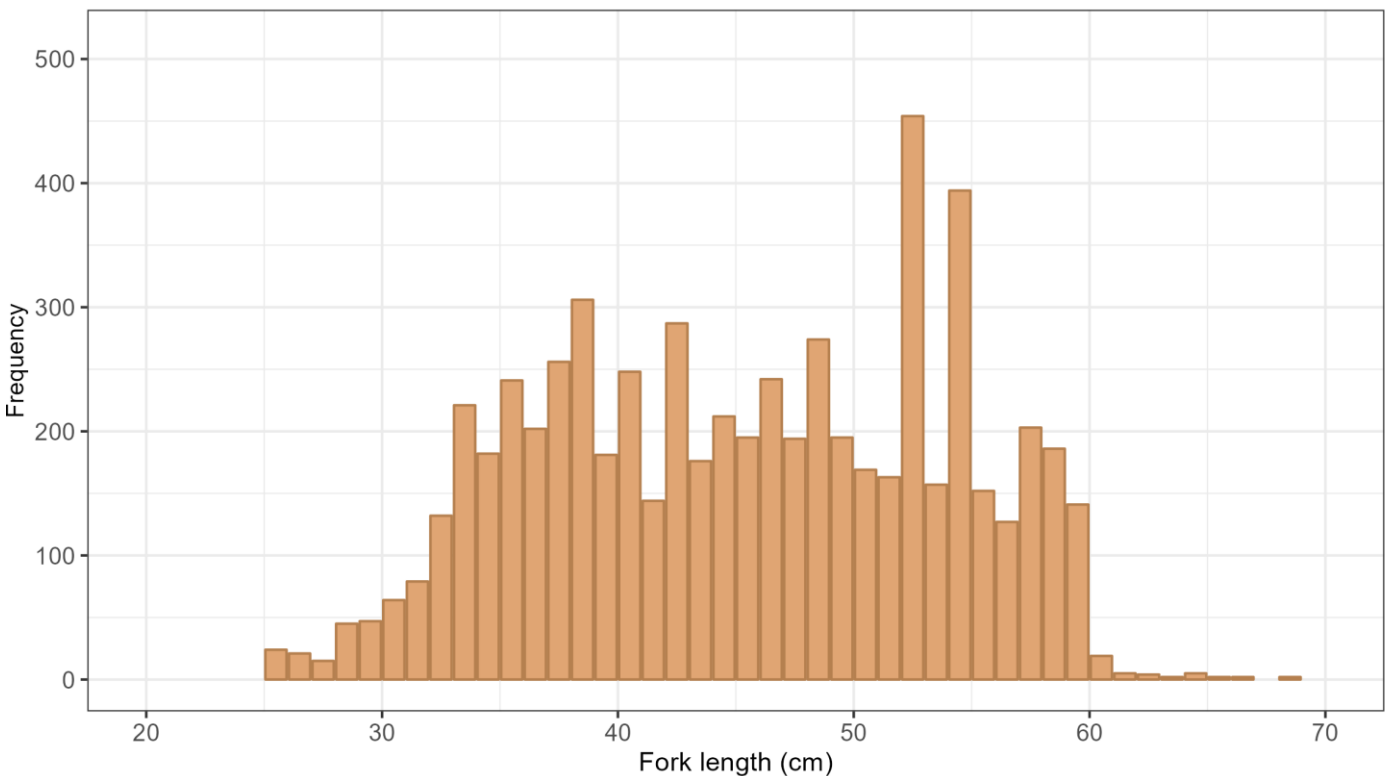


Figure 10: Size-frequency distribution of kawakawa discarded at sea in purse seine fisheries as available in the ROS regional database

Spatial distribution of catch

Geo-references catches

Geo-referenced catches by fishery and decade (1950-2009)

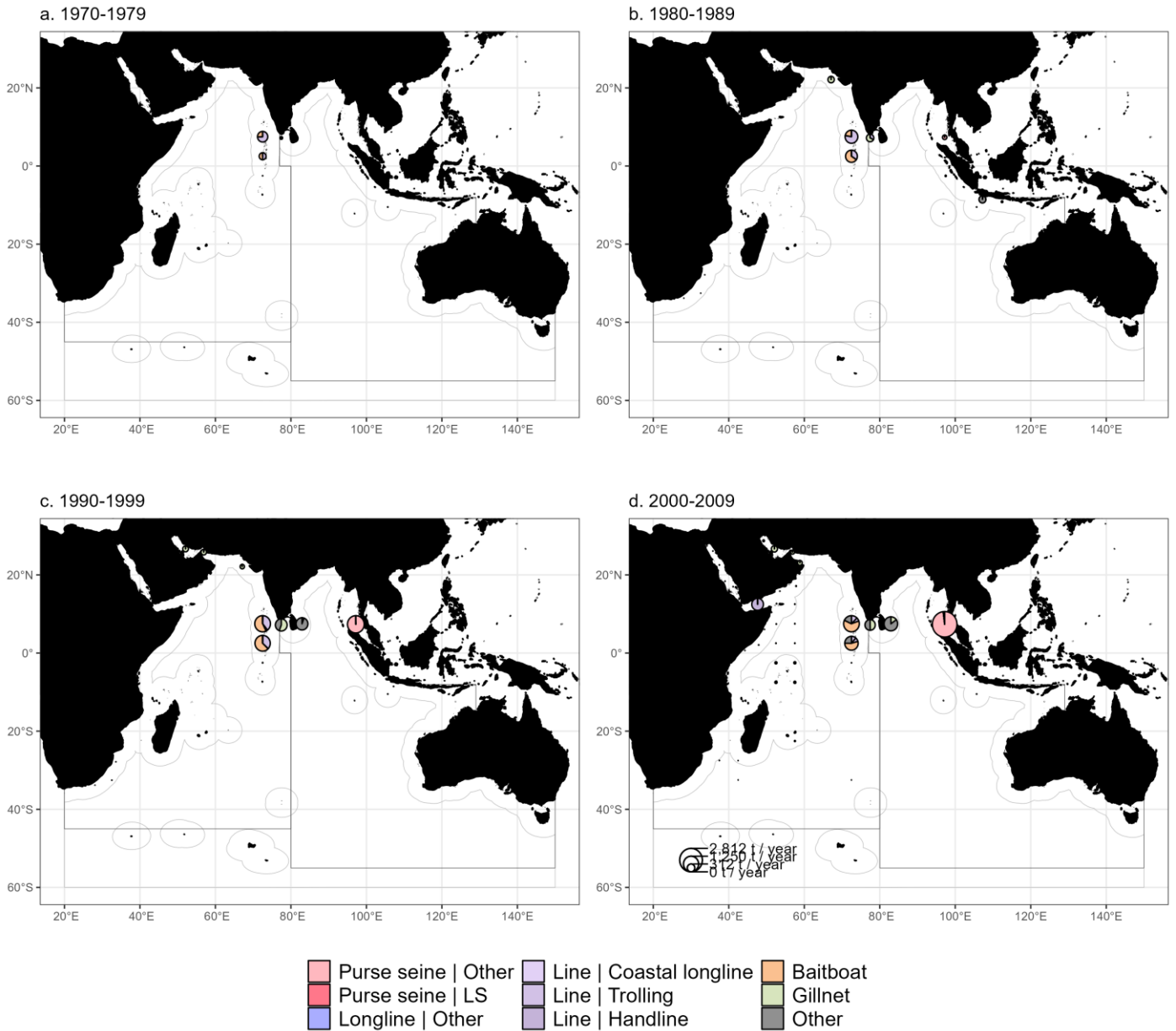


Figure 11: Mean annual time-area catches (metric tonnes; t) of kawakawa, by decade, 5-degree grid area, and fishery. Light grey solid lines delineate areas beyond national jurisdiction. Data source: [time-area catches](#)

Geo-referenced catches by fishery, last years (2018-2022) and decade (2010-2019)

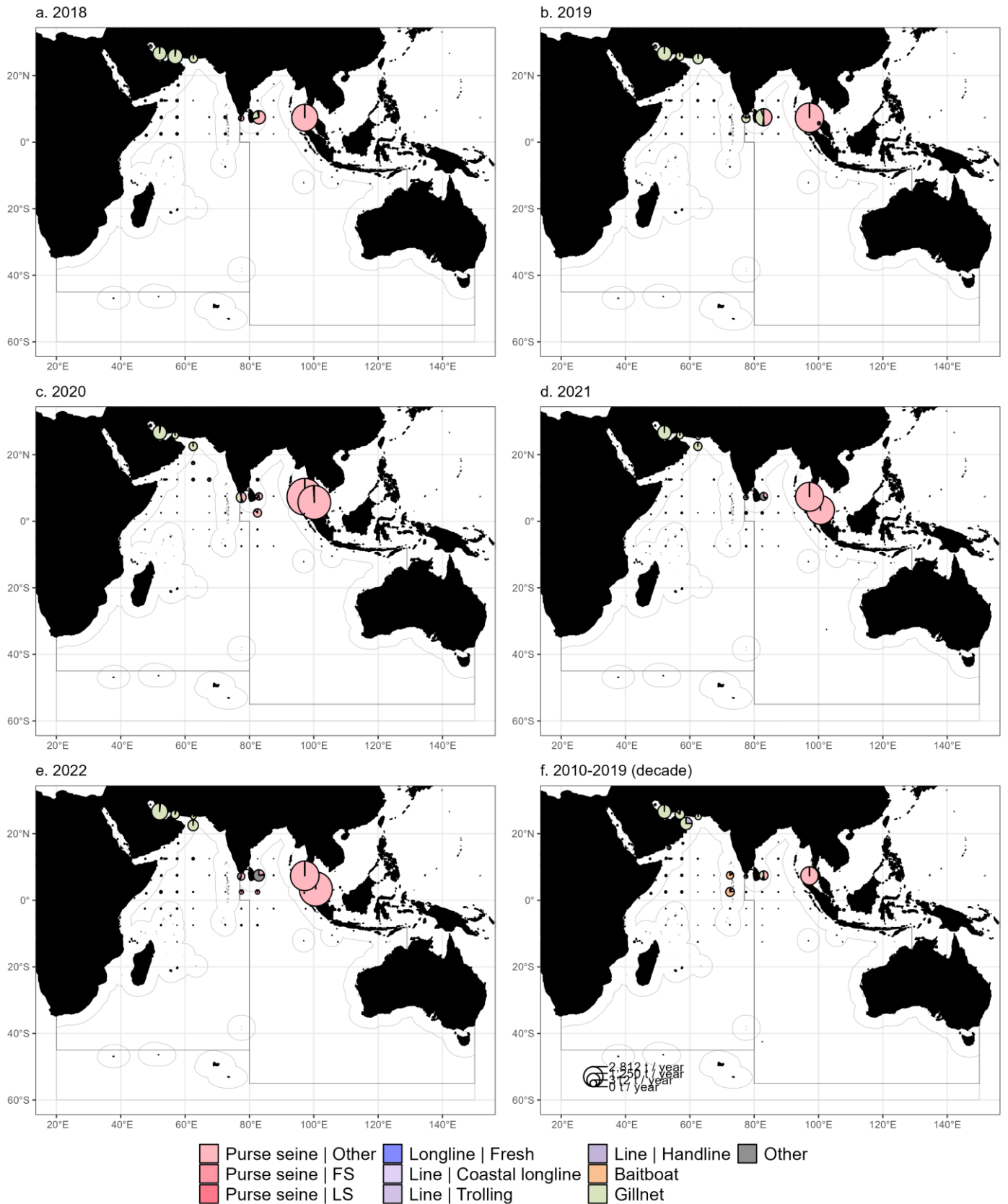


Figure 12: Mean annual time-area catches (metric tonnes; t) of kawakawa, by year and decade, 5-degree grid area, and fishery. Light grey solid lines delineate areas beyond national jurisdiction. Data source: [time-area catches](#)

Domestic catches within areas under national jurisdiction (2018-2022)

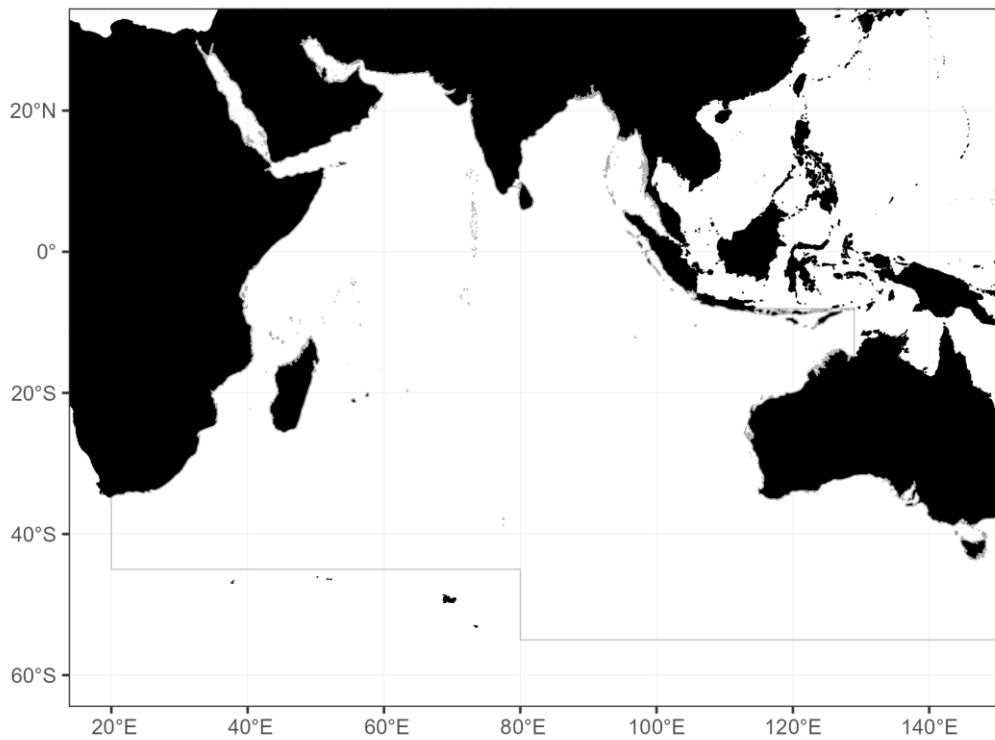


Figure 13: Mean annual density of catch (t km⁻²) of kawakawa reported for domestic fisheries operating in areas under national jurisdiction of IOTC coastal states between 2018 and 2022. Data source: [best scientific estimates of retained catches](#)

Uncertainties in geo-referenced catch and effort data

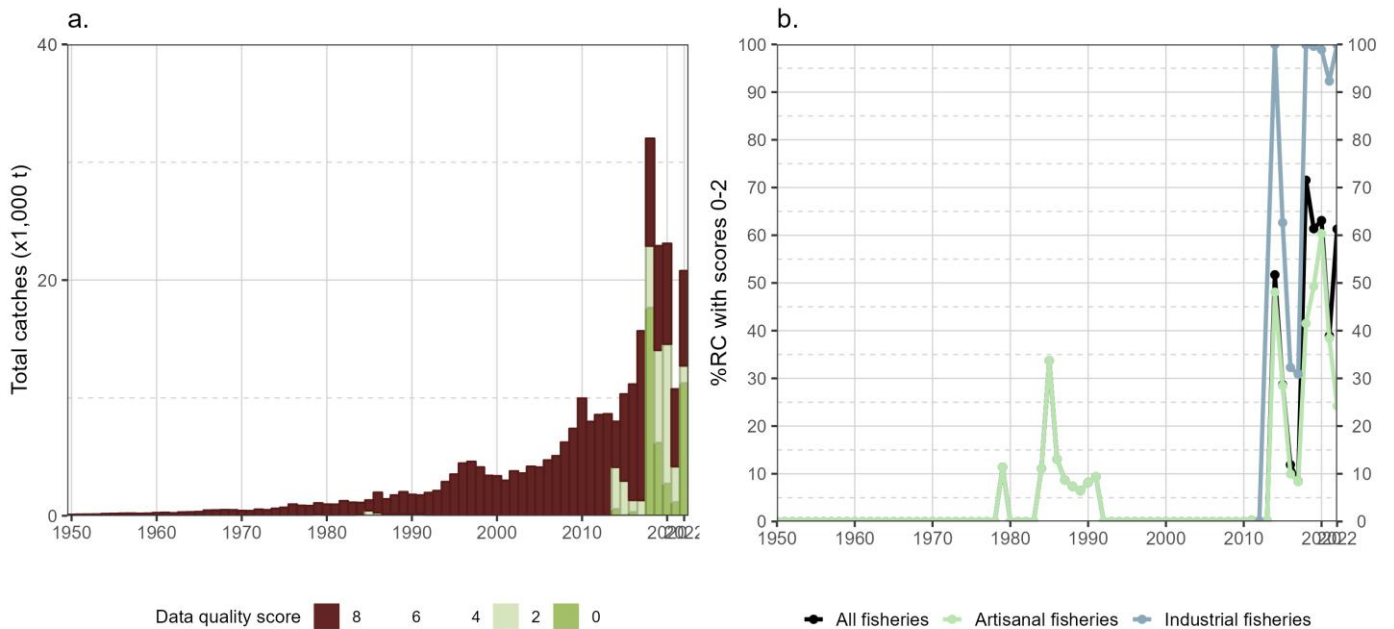


Figure 14: Annual time series of (a) cumulative retained catches (metric tonnes; t) estimated by quality score and (b) contribution of retained catches (percentage; %) with corresponding geo-referenced catch and effort data reported to the IOTC Secretariat in agreement with the requirements of Res. 15/02) to all retained catches of kawakawa for all fisheries and by type of fishery, for the period 1950-2022

Size composition of the catch

Samples availability

By fishery group

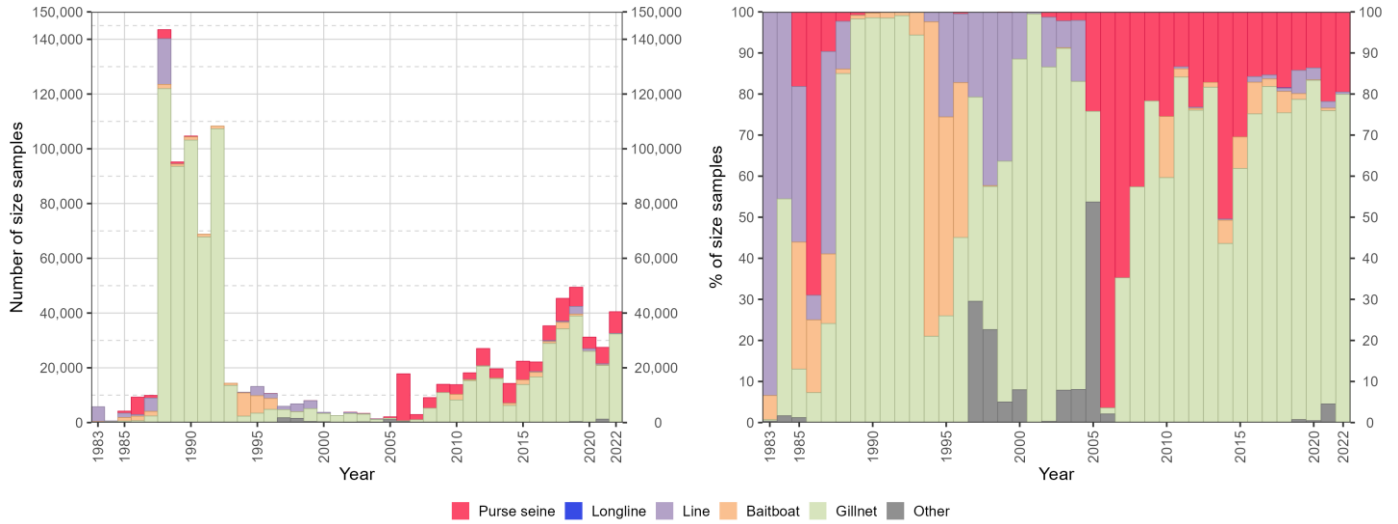


Figure 15: Availability of size-frequency data for kawakawa as (left) absolute and (right) relative number of samples per year and fishery group. Data source: [standardized size-frequency dataset](#)

Purse seine fisheries

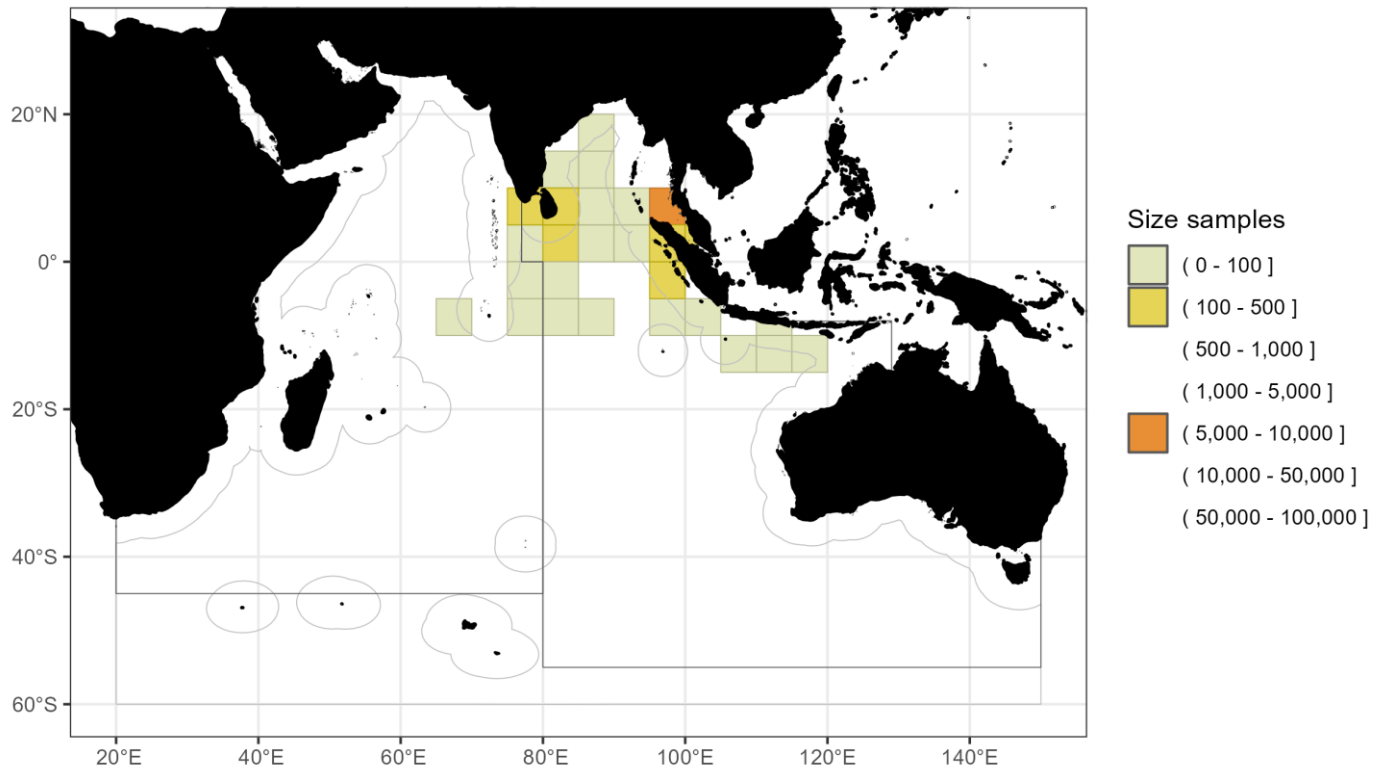


Figure 16: Spatial distribution (mean annual number of samples per 5-degree grid area) of available size-frequency data for kawakawa caught in purse seine fisheries during 2018-2022. Light grey solid lines delineate areas beyond national jurisdiction. Data source: [standardized size-frequency dataset](#)

Gillnet fisheries

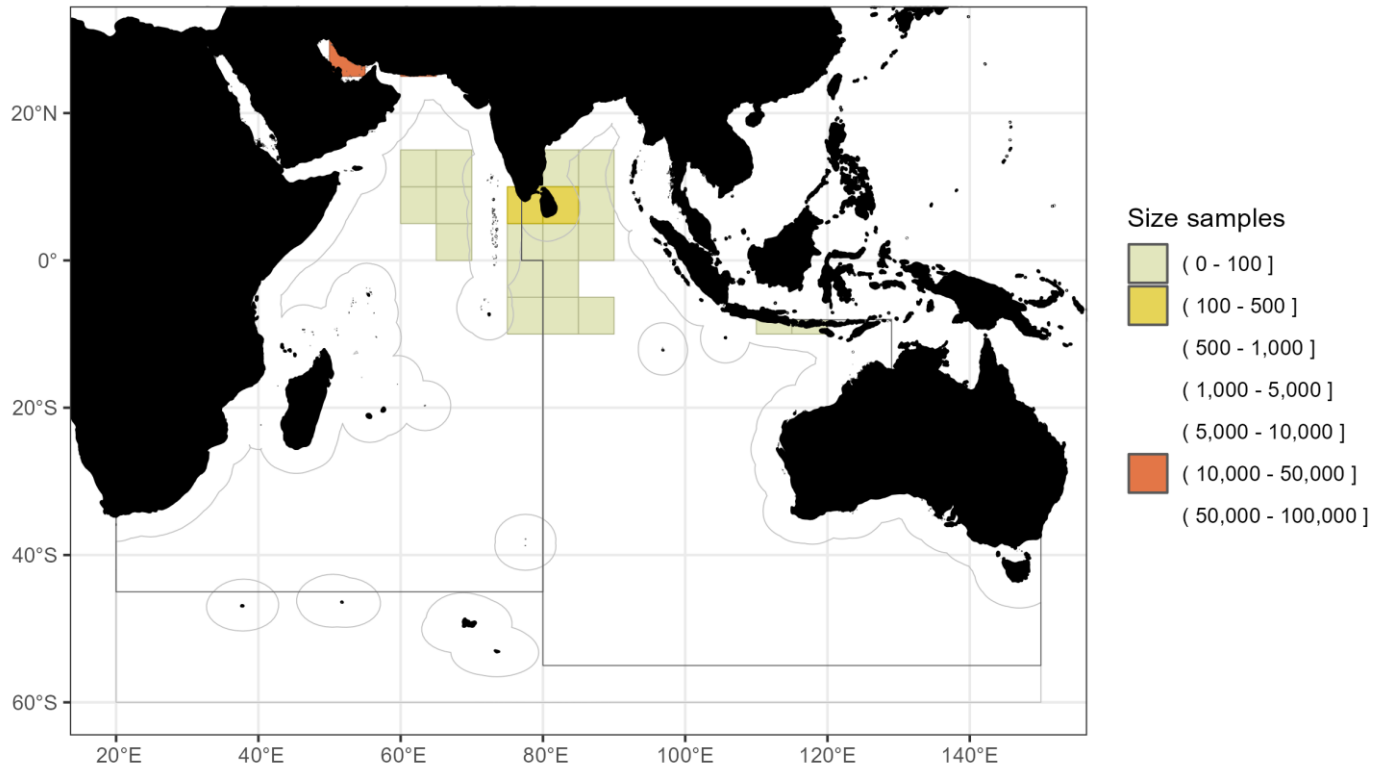


Figure 17: Spatial distribution (mean annual number of samples per 5-degree grid area) of available size-frequency data for kawakawa caught in gillnet fisheries during 2018-2022. Light grey solid lines delineate areas beyond national jurisdiction. Data source: [standardized size-frequency dataset](#)

Line fisheries

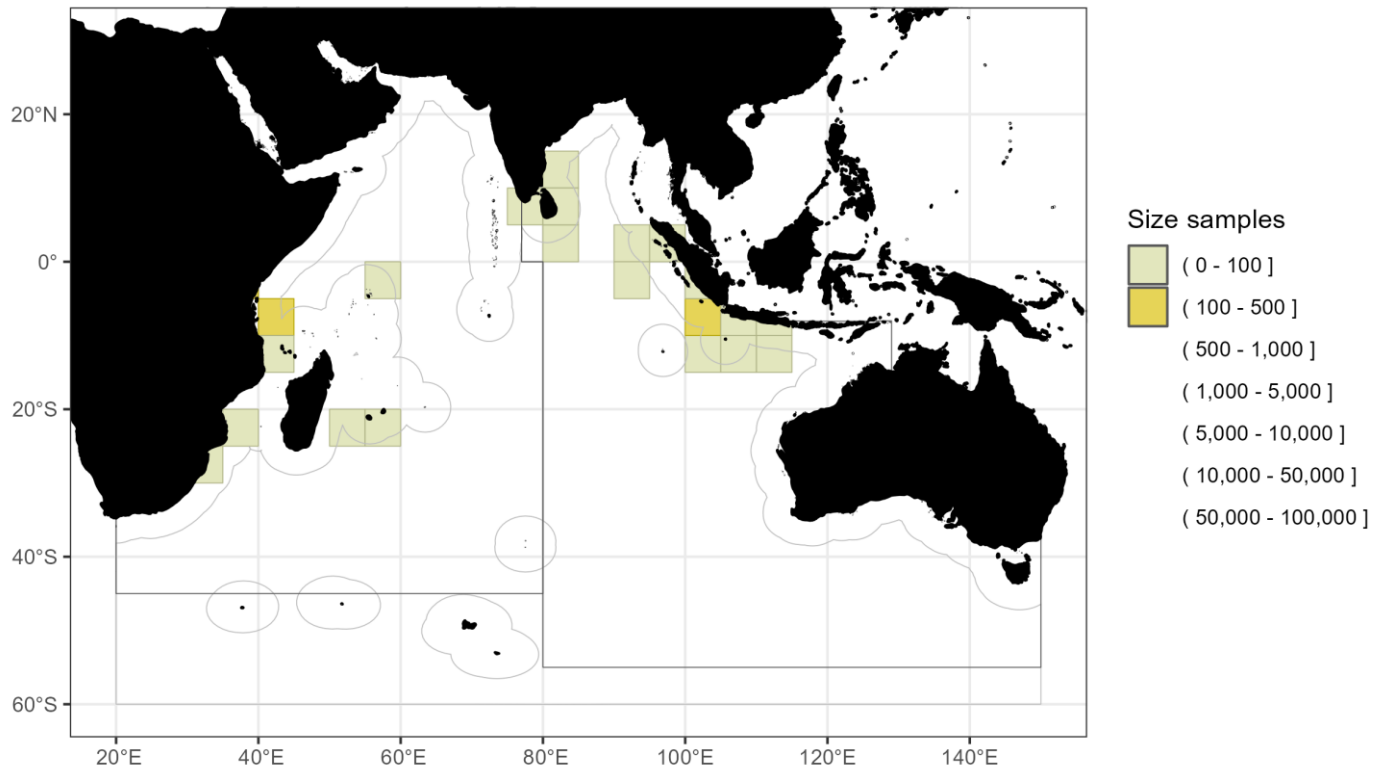


Figure 18: Spatial distribution (mean annual number of samples per 5-degree grid area) of available size-frequency data for kawakawa caught in line fisheries during 2018-2022. Light grey solid lines delineate areas beyond national jurisdiction. Data source: [standardized size-frequency dataset](#)

Other fisheries

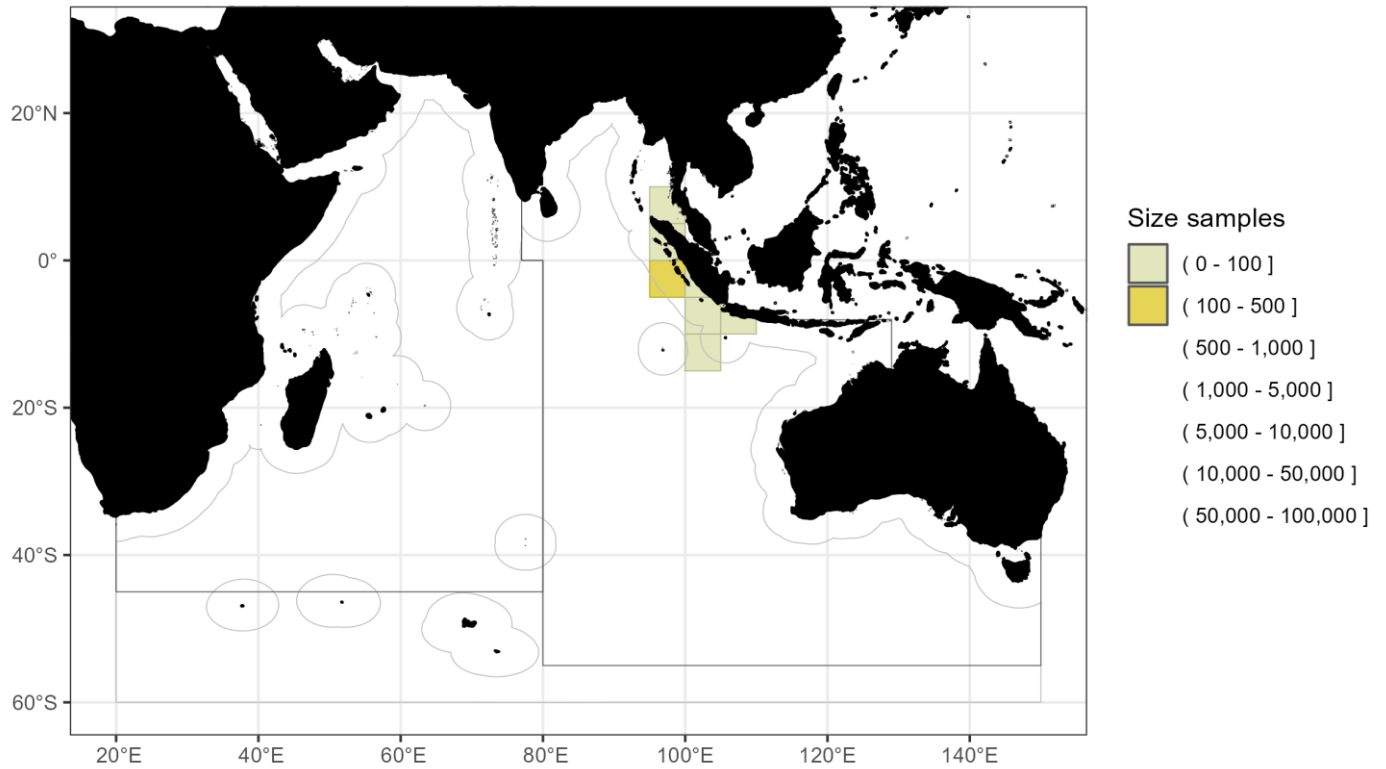


Figure 19: Spatial distribution (mean annual number of samples per 5-degree grid area) of available size-frequency data for kawakawa caught in 'other' fisheries (beach seine, liftnet, unclassified) during 2018-2022. Light grey solid lines delineate areas beyond national jurisdiction. Data source: [standardized size-frequency dataset](#)

By fishery

Purse seine fisheries

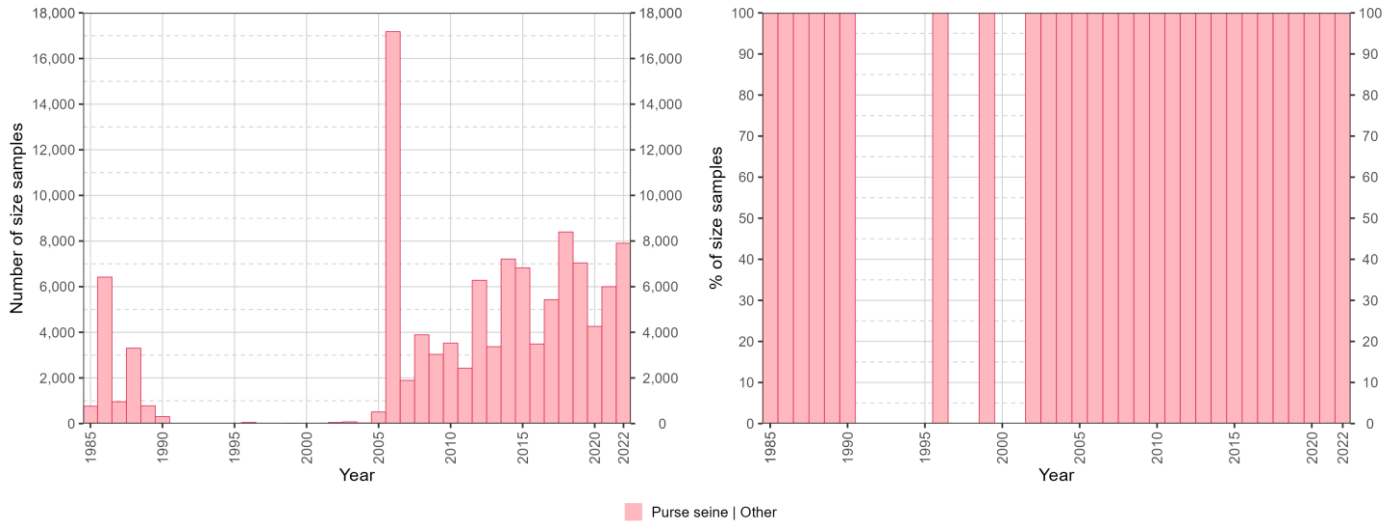


Figure 20: Availability of size-frequency data for kawakawa as (left) absolute and (b) relative number of samples per year and type of purse seine fishery. Data source: [standardized size-frequency dataset](#)

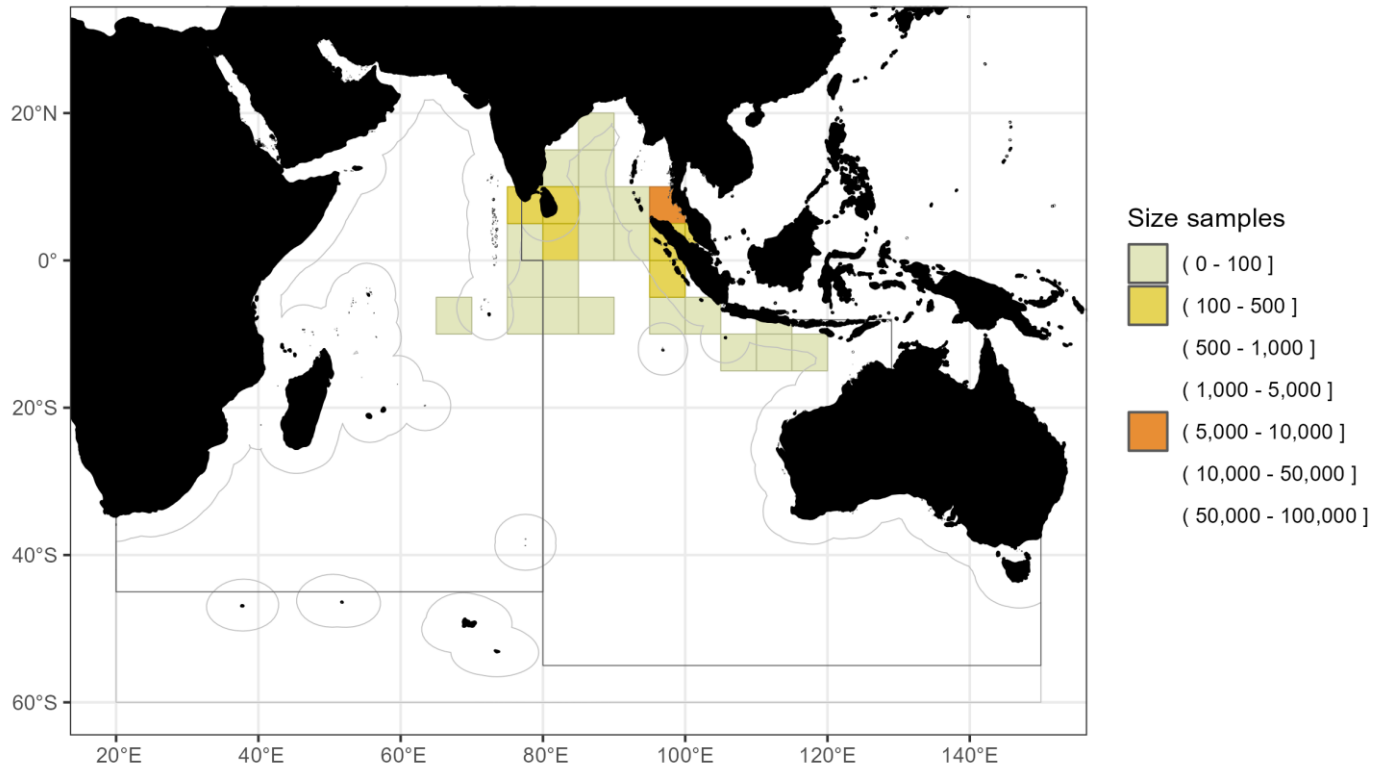


Figure 21: Spatial distribution (mean annual number of samples per 5-degree grid area) of available size-frequency data for kawakawa caught in coastal and ringnet purse seine fisheries (Purse seine|Other) during 2018-2022. Light grey solid lines delineate areas beyond national jurisdiction. Data source: [standardized size-frequency dataset](#)

Gillnet fisheries

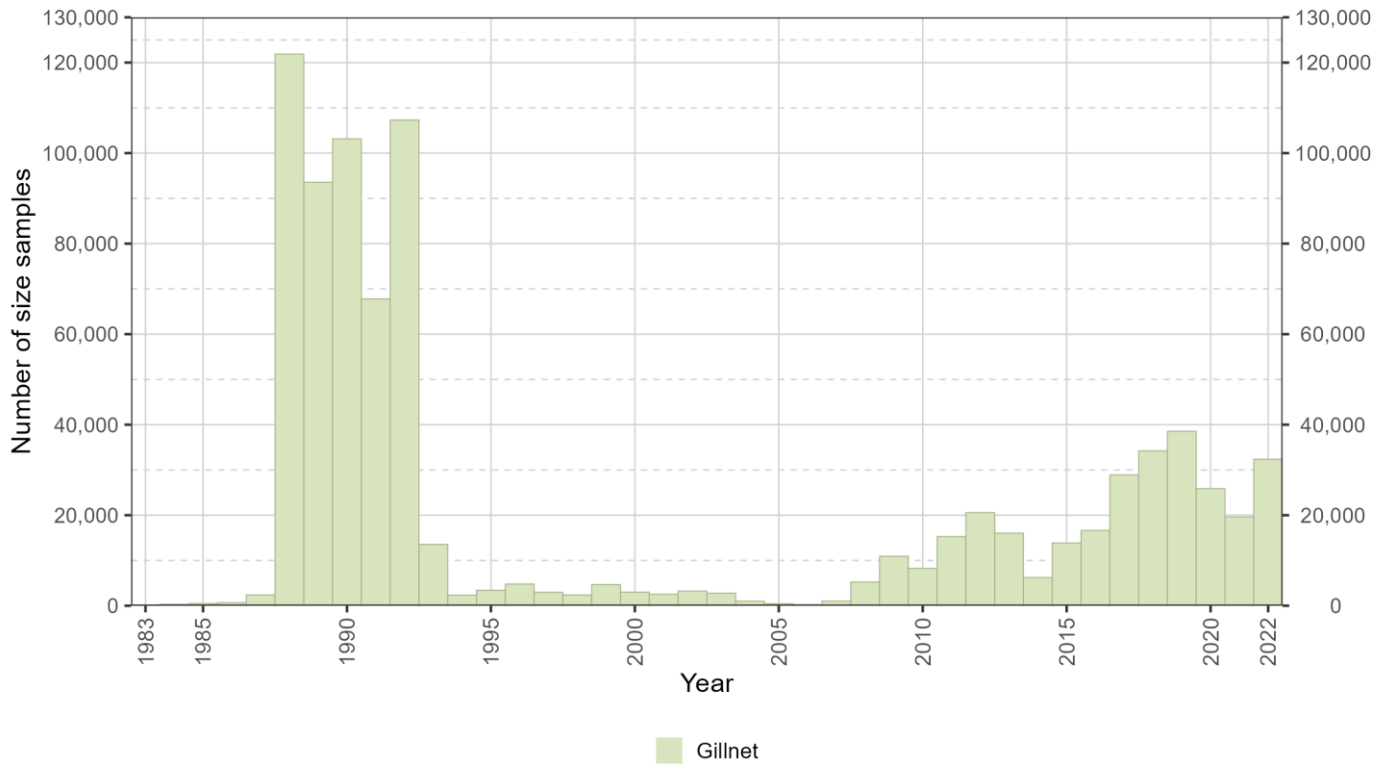


Figure 22: Availability of size-frequency data for kawakawa as absolute number of samples per year in gillnet fisheries. Data source: [standardized size-frequency dataset](#)

Line fisheries

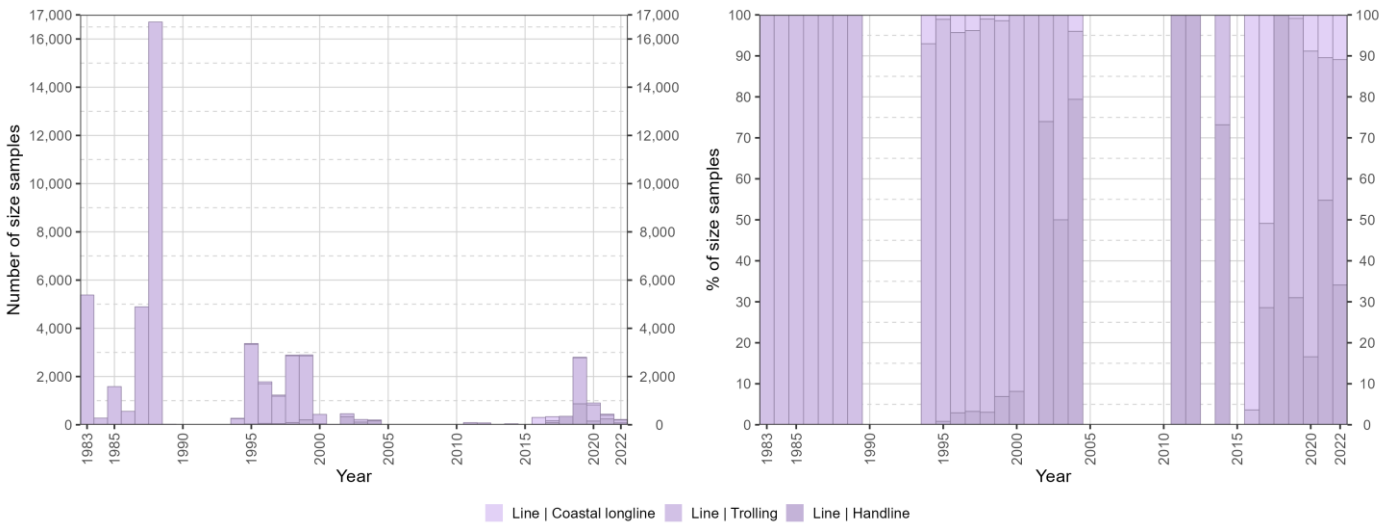


Figure 23: Availability of size-frequency data for kawakawa as (left) absolute and (right) relative number of samples per year and line fishery type. Data source: [standardized size-frequency dataset](#)

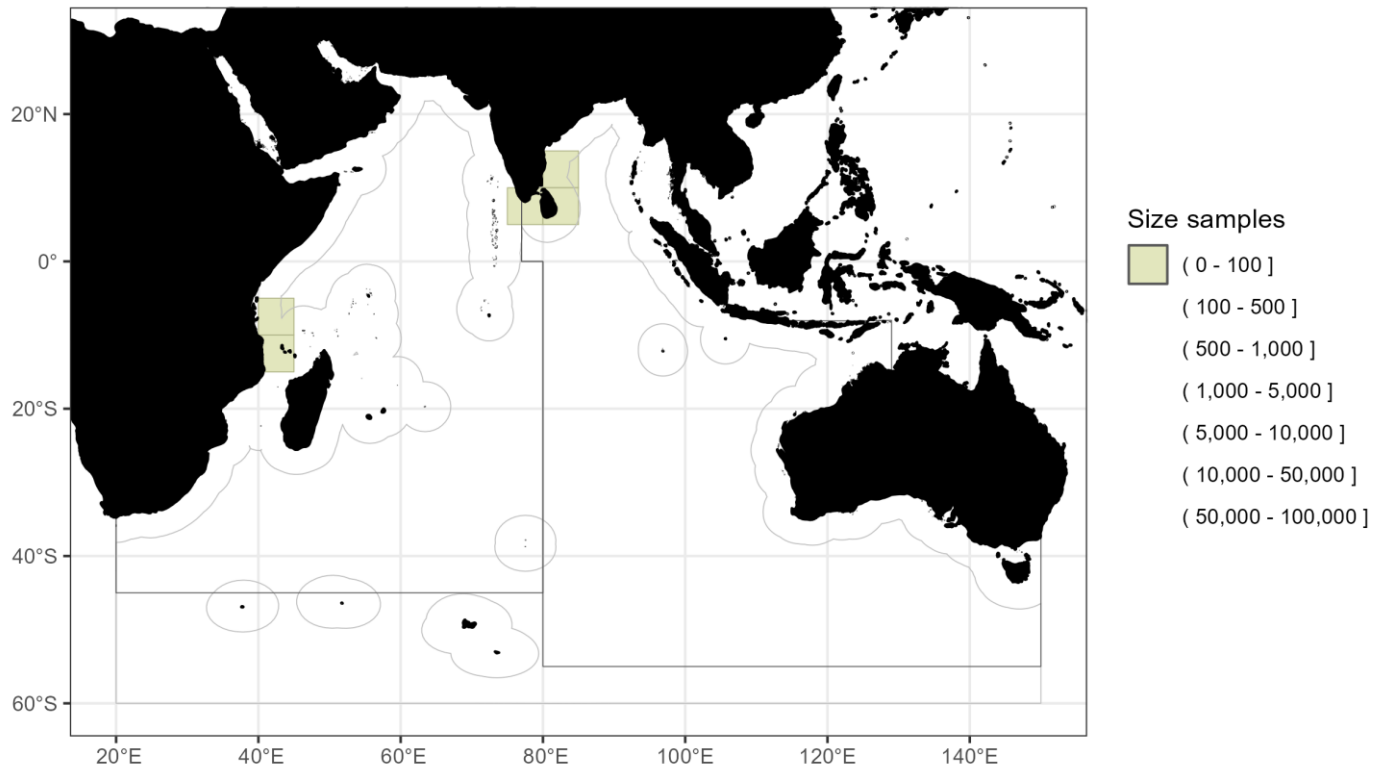


Figure 24: Spatial distribution (mean annual number of samples per 5-degree grid area) of available size-frequency data for kawakawa caught in coastal longline fisheries during 2018-2022. Light grey solid lines delineate areas beyond national jurisdiction. Data source: [standardized size-frequency dataset](#)

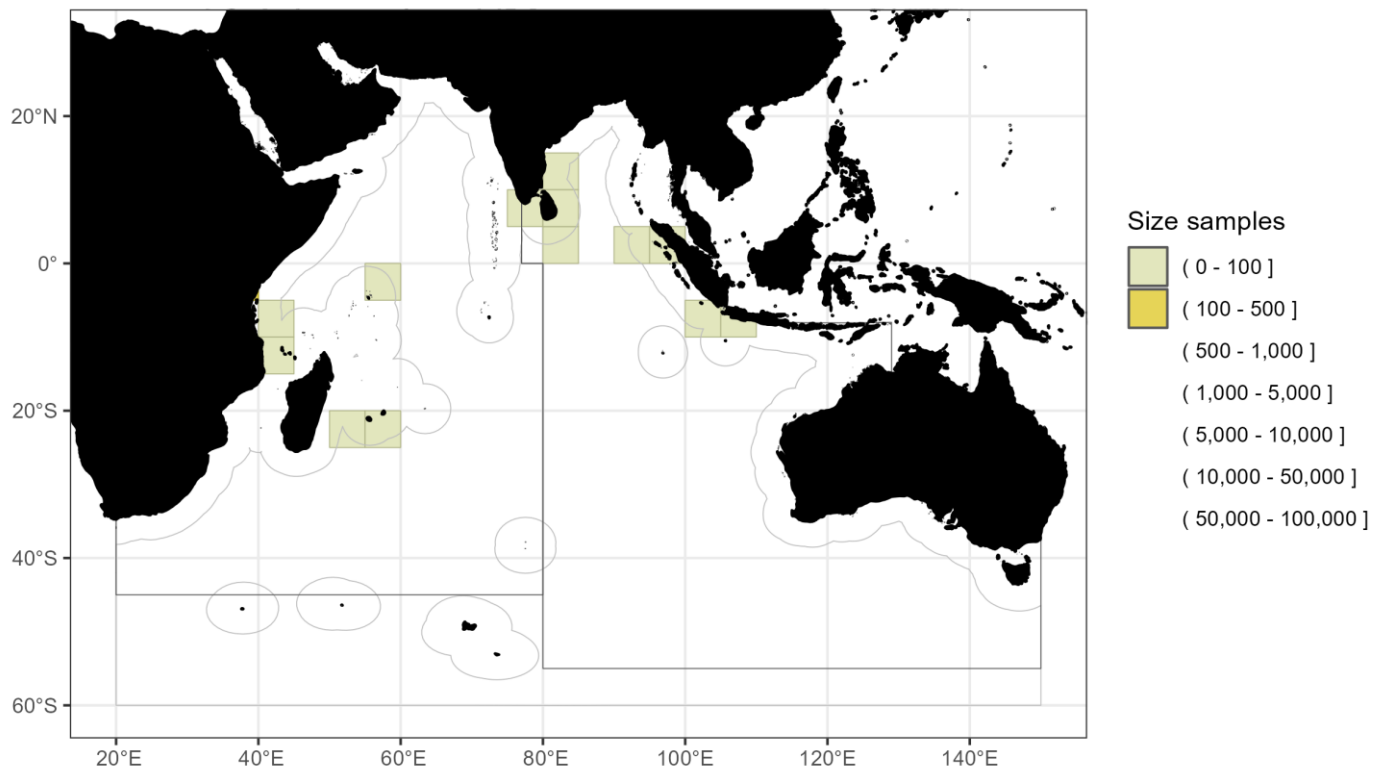


Figure 25: Spatial distribution (mean annual number of samples per 5-degree grid area) of available size-frequency data for kawakawa caught in handline fisheries during 2018-2022. Light grey solid lines delineate areas beyond national jurisdiction. Data source: [standardized size-frequency dataset](#)

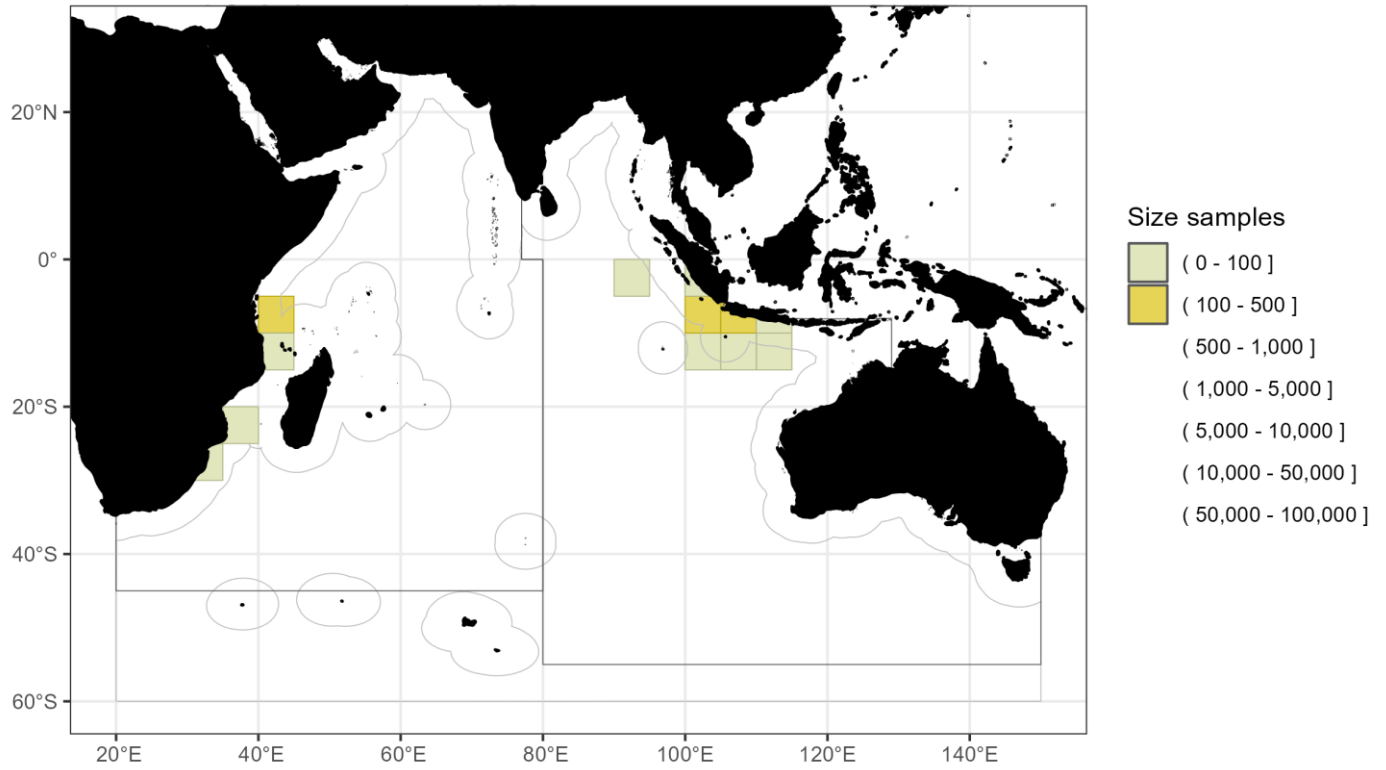


Figure 26: Spatial distribution (mean annual number of samples per 5-degree grid area) of available size-frequency data for kawakawa caught in trolling fisheries during 2018-2022. Light grey solid lines delineate areas beyond national jurisdiction. Data source: [standardized size-frequency dataset](#)

Other fisheries

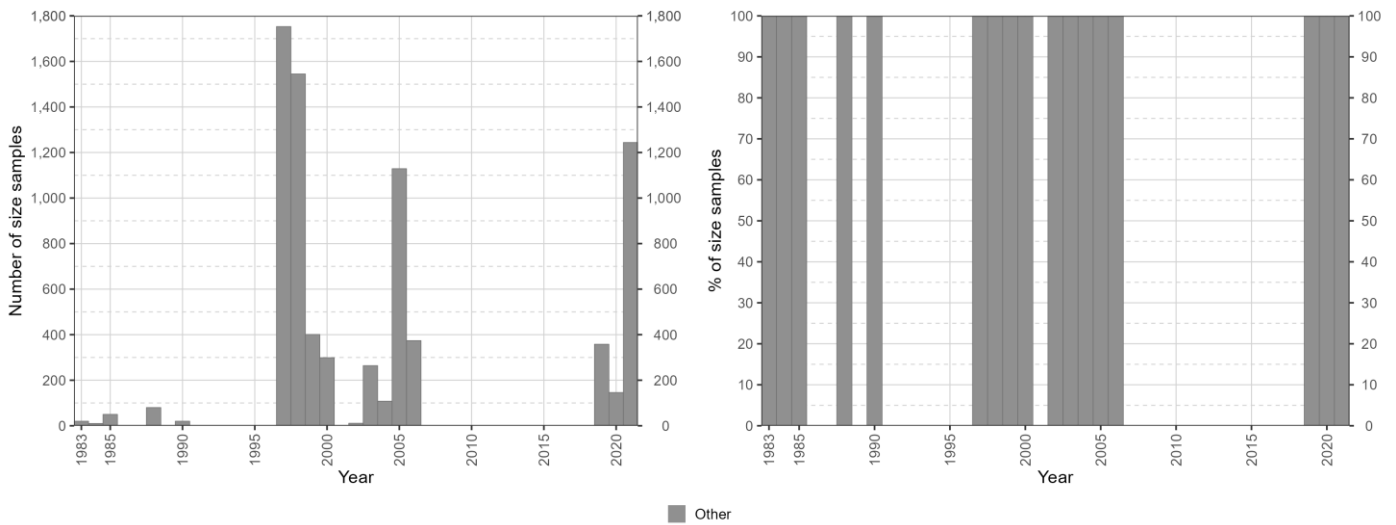


Figure 27: Availability of size-frequency data for kawakawa as (left) absolute and (right) relative number of samples per year for 'other' fishery types (beach seine, liftnet, unclassified). Data source: [standardized size-frequency dataset](#)

Temporal patterns and trends in size distributions

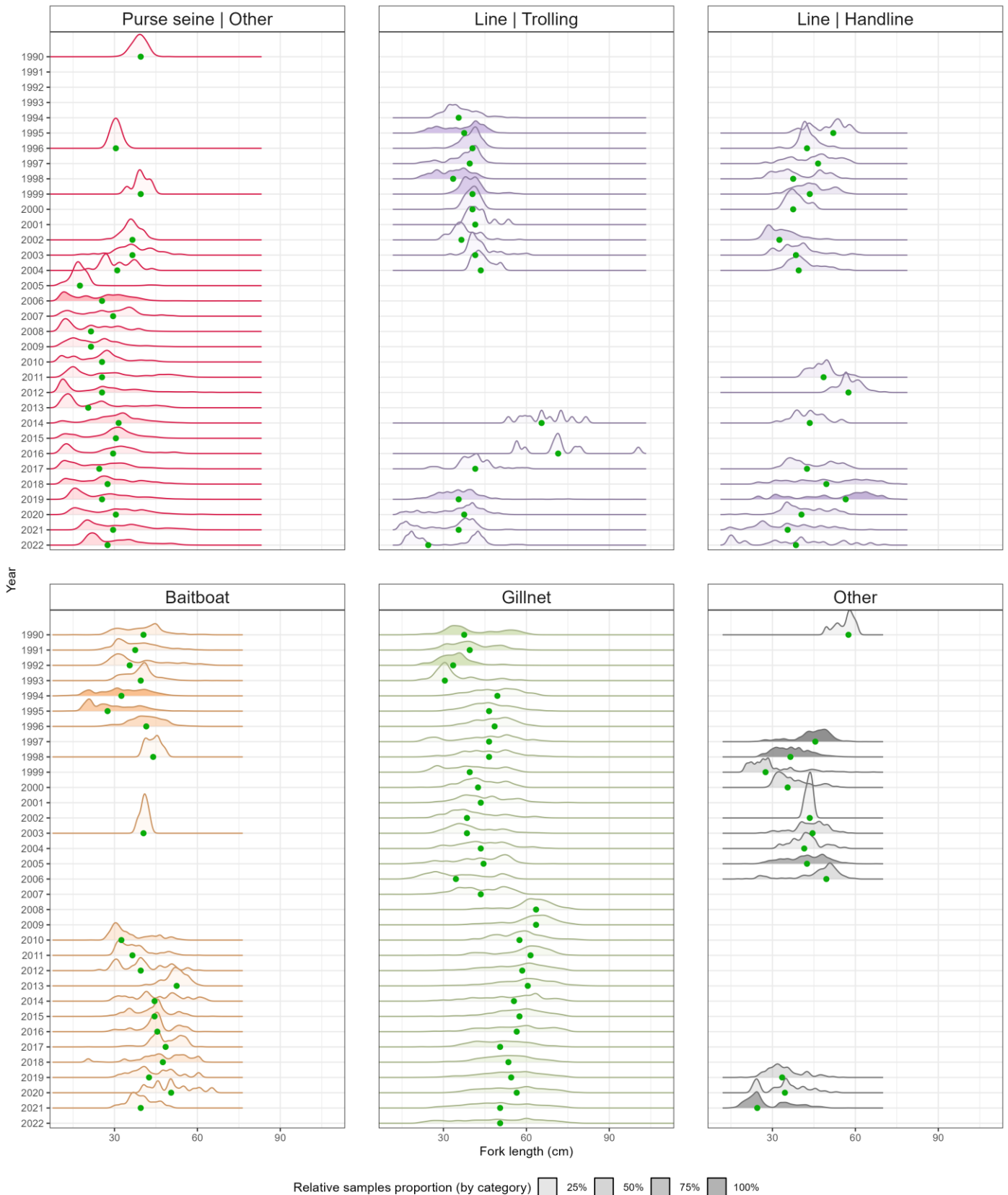


Figure 28: Relative size distribution (fork length; cm) of kawakawa caught in coastal and ringnet purse seine fisheries (Purse seine|Other), gillnet fisheries, and ‘other’ fisheries (beach seine, liftnet, unclassified). Fill intensity is proportional to the number of samples recorded for the year, while the green dot corresponds to the median value. Data source: [standardized size-frequency dataset](#)

Size distribution by fishery and fleet

Purse seine fisheries (other)

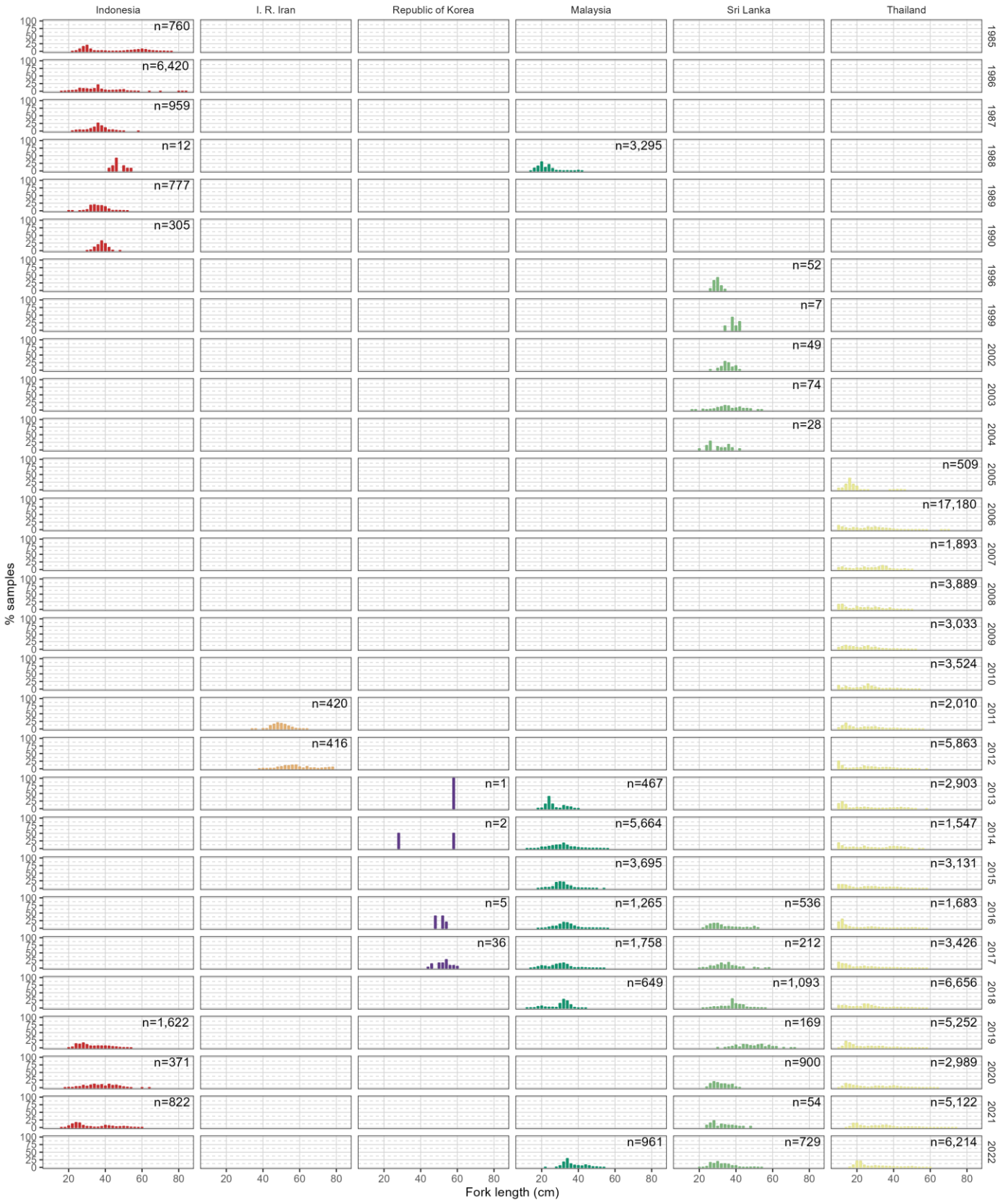


Figure 29: Relative size distribution of kawakawa (fork length; cm) caught in coastal purse seine and ringnet fisheries (Purse seine | Other) by year and main fleet. Data source: [standardized size-frequency dataset](#)

Gillnet fisheries

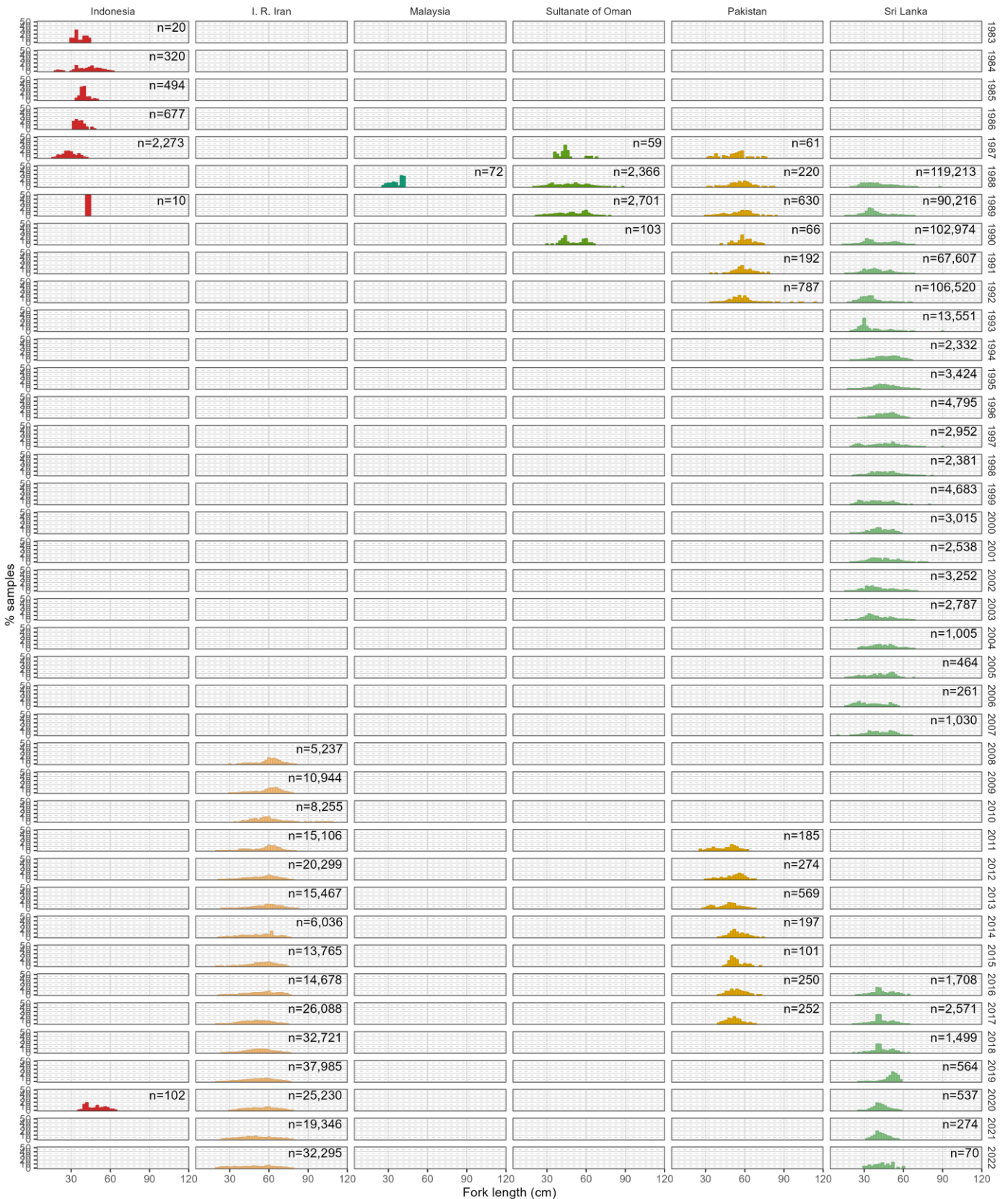


Figure 30: Relative size distribution of kawakawa (fork length; cm) caught in gillnet fisheries by year and main fleet. Data source: [standardized size-frequency dataset](#)

Uncertainties in geo-referenced size-frequency data

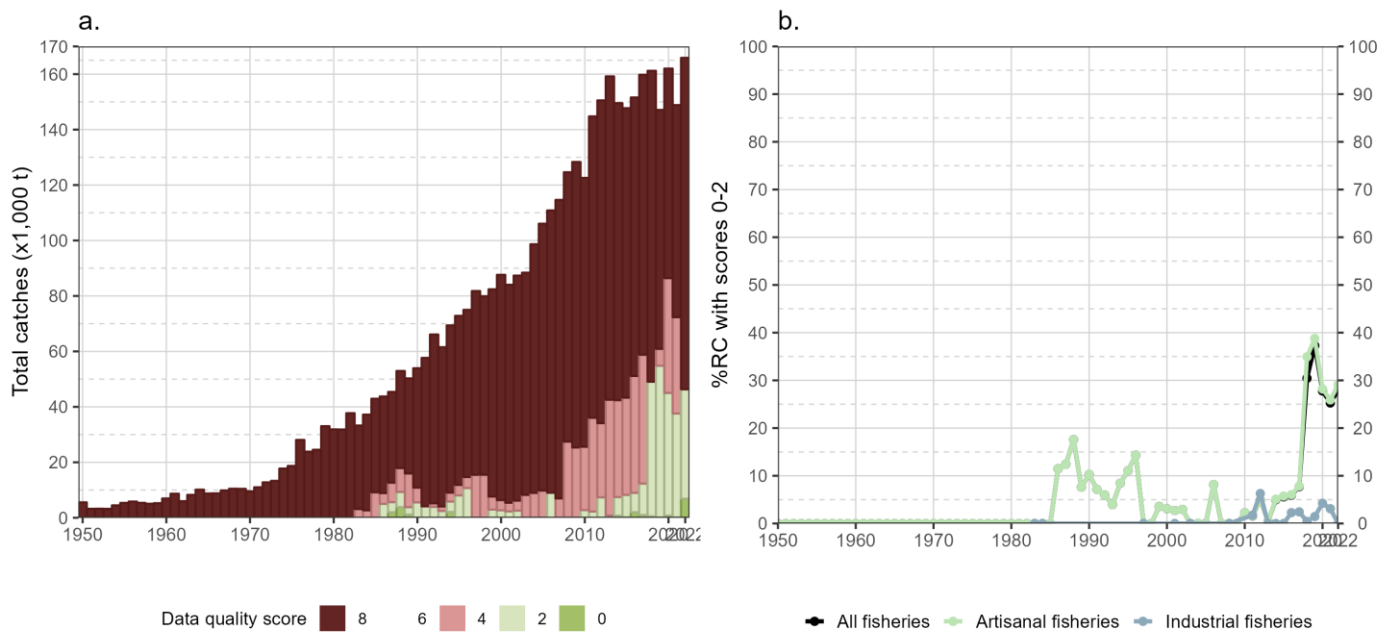


Figure 31: Annual time series of (a) cumulative retained catches (metric tonnes; t) estimated by quality score and (b) contribution of retained catches with corresponding geo-referenced size-frequency data reported to the IOTC Secretariat in agreement with the requirements of Res. 15/02 to all retained catches (percentage; %) of kawakawa for all fisheries and by type of fishery, for the period 1950-2022

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Ruiz J, Abascal F, Bach P, Baez J-C, Cauquil P, Grande M, Krug I, Lucas J, Murua H, Lourdes Alonso ML, Sabarros PS (2018) [Bycatch of the european, and associated flag, purse seine tuna fishery in the indian ocean for the period 2008-2017](#). IOTC, Cape Town, South Africa, 10-17 September 2018, p 15

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Appendix II: Changes in best scientific estimates of retained catches from previous WPNT

Table 4: Changes in best scientific estimates of annual retained catches (metric tonnes; t) of kawakawa by fleet, fishery group, and main Indian Ocean area, limited to absolute values higher than 10 t

Year	Fleet	Fishery group	Area	Current (t)	Previous (t)	Difference (t)
2021	ARE	Gillnet	Western Indian Ocean	205	0	205
		Line	Western Indian Ocean	33	0	33
	BGD	Other	Eastern Indian Ocean	2,219	0	2,219
	DJI	Gillnet	Western Indian Ocean	191	0	191
	EGY	Gillnet	Western Indian Ocean	496	0	496
		Line	Western Indian Ocean	25	0	25
		Purse seine	Western Indian Ocean	38	0	38
	EUFRA	Purse seine	Western Indian Ocean	39	0	39
	EUMYT	Line	Western Indian Ocean	16	0	16
	IDN	Gillnet	Eastern Indian Ocean	8,421	0	8,421
		Line	Eastern Indian Ocean	13,448	0	13,448
		Other	Eastern Indian Ocean	3,986	0	3,986
		Purse seine	Eastern Indian Ocean	19,097	0	19,097
	IND	Baitboat	Western Indian Ocean	574	0	574
		Gillnet	Eastern Indian Ocean	2,148	0	2,148
		Gillnet	Western Indian Ocean	12,267	0	12,267
		Line	Eastern Indian Ocean	2,772	0	2,772
		Line	Western Indian Ocean	2,724	0	2,724
		Other	Eastern Indian Ocean	573	0	573
		Other	Western Indian Ocean	618	0	618
		Purse seine	Eastern Indian Ocean	42	0	42
		Purse seine	Western Indian Ocean	6,910	0	6,910
	IRN	Gillnet	Western Indian Ocean	38,677	0	38,677
		Line	Western Indian Ocean	914	0	914
	JOR	Gillnet	Western Indian Ocean	22	0	22
	KEN	Gillnet	Western Indian Ocean	42	0	42
		Line	Western Indian Ocean	20	0	20
		Purse seine	Western Indian Ocean	42	0	42

Year	Fleet	Fishery group	Area	Current (t)	Previous (t)	Difference (t)	
	LKA	Gillnet	Eastern Indian Ocean	36	0	36	
		Line	Eastern Indian Ocean	27	0	27	
		Other	Eastern Indian Ocean	384	0	384	
		Purse seine	Eastern Indian Ocean	327	0	327	
		Purse seine	Western Indian Ocean	20	0	20	
	MDG	Line	Western Indian Ocean	1,077	0	1,077	
	MDV	Line	Western Indian Ocean	12	0	12	
	MOZ	Line	Western Indian Ocean	105	0	105	
		Purse seine	Western Indian Ocean	2,976	0	2,976	
	MYS	Other	Eastern Indian Ocean	32	0	32	
		Purse seine	Eastern Indian Ocean	5,817	0	5,817	
	OMN	Gillnet	Western Indian Ocean	6,231	0	6,231	
		Line	Western Indian Ocean	887	0	887	
		Other	Western Indian Ocean	255	0	255	
	PAK	Gillnet	Western Indian Ocean	1,578	0	1,578	
	QAT	Gillnet	Western Indian Ocean	586	0	586	
	SAU	Gillnet	Western Indian Ocean	2,096	0	2,096	
		Line	Western Indian Ocean	865	0	865	
		Other	Western Indian Ocean	68	0	68	
		Purse seine	Western Indian Ocean	27	0	27	
	THA	Purse seine	Eastern Indian Ocean	5,916	0	5,916	
	TWN	Longline	Western Indian Ocean	20	0	20	
	TZA	Gillnet	Western Indian Ocean	765	0	765	
	YEM	Gillnet	Western Indian Ocean	2,836	0	2,836	
		Line	Western Indian Ocean	626	0	626	
	2020	ARE	Gillnet	Western Indian Ocean	280	255	25
		EGY	Gillnet	Western Indian Ocean	990	1,017	-27
Line			Western Indian Ocean	106	78	28	
IRN		Gillnet	Western Indian Ocean	34,341	34,549	-208	
	Line	Western Indian Ocean	2,215	1,108	1,107		

Year	Fleet	Fishery group	Area	Current (t)	Previous (t)	Difference (t)
	KEN	Gillnet	Western Indian Ocean	51	0	51
		Line	Western Indian Ocean	24	0	24
		Purse seine	Western Indian Ocean	51	0	51
	MOZ	Gillnet	Western Indian Ocean	18	59	-41
		Purse seine	Western Indian Ocean	3	100	-97
	SAU	Gillnet	Western Indian Ocean	1,713	1,446	268
		Line	Western Indian Ocean	705	604	101
	2019	IDN	Purse seine	Eastern Indian Ocean	20,222	20,234
IRN		Gillnet	Western Indian Ocean	32,706	32,822	-116
		Line	Western Indian Ocean	554	428	126
SAU		Gillnet	Western Indian Ocean	1,412	1,486	-73
		Line	Western Indian Ocean	586	621	-34
2018	IRN	Gillnet	Western Indian Ocean	35,551	36,006	-456
	SAU	Gillnet	Western Indian Ocean	1,916	1,514	403
		Line	Western Indian Ocean	794	632	162
		Other	Western Indian Ocean	64	52	11
2017	IDN	Gillnet	Eastern Indian Ocean	9,746	7,807	1,939
		Line	Eastern Indian Ocean	15,565	12,469	3,096
		Other	Eastern Indian Ocean	4,613	3,696	918
		Purse seine	Eastern Indian Ocean	21,987	17,614	4,374
	IRN	Gillnet	Western Indian Ocean	38,253	38,311	-57
	SAU	Gillnet	Western Indian Ocean	1,766	1,383	384
		Line	Western Indian Ocean	730	577	152
2016	IDN	Line	Eastern Indian Ocean	12,480	12,469	11
		Purse seine	Eastern Indian Ocean	17,630	17,614	16
	IRN	Gillnet	Western Indian Ocean	33,640	33,677	-37
	KEN	Line	Western Indian Ocean	43	27	16
		Purse seine	Western Indian Ocean	89	0	89
	QAT	Gillnet	Western Indian Ocean	434	0	434
	SAU	Gillnet	Western Indian Ocean	1,984	1,383	601

Year	Fleet	Fishery group	Area	Current (t)	Previous (t)	Difference (t)
		Line	Western Indian Ocean	820	577	242
		Other	Western Indian Ocean	65	48	17
2015	IRN	Gillnet	Western Indian Ocean	27,805	27,877	-72
	QAT	Gillnet	Western Indian Ocean	441	0	441
2014	IDN	Gillnet	Eastern Indian Ocean	8,367	8,381	-14
		Line	Eastern Indian Ocean	13,363	13,386	-23
		Purse seine	Eastern Indian Ocean	18,876	18,909	-32
	IRN	Gillnet	Western Indian Ocean	28,885	28,936	-51
	QAT	Gillnet	Western Indian Ocean	356	0	356
2013	IDN	Gillnet	Eastern Indian Ocean	9,499	9,203	296
		Line	Eastern Indian Ocean	15,170	14,697	473
		Other	Eastern Indian Ocean	4,496	4,356	140
		Purse seine	Eastern Indian Ocean	21,429	20,761	668
	IRN	Gillnet	Western Indian Ocean	28,131	28,377	-246
2012	IDN	Gillnet	Eastern Indian Ocean	8,130	8,063	68
		Line	Eastern Indian Ocean	12,985	12,877	108
		Other	Eastern Indian Ocean	3,849	3,817	32
		Purse seine	Eastern Indian Ocean	18,342	18,190	152
	IRN	Gillnet	Western Indian Ocean	25,719	25,984	-265
2011		Gillnet	Western Indian Ocean	21,924	22,091	-167
2010	IDN	Gillnet	Eastern Indian Ocean	7,920	7,870	50
		Line	Eastern Indian Ocean	12,648	12,569	79
		Other	Eastern Indian Ocean	3,749	3,725	23
		Purse seine	Eastern Indian Ocean	17,867	17,755	112