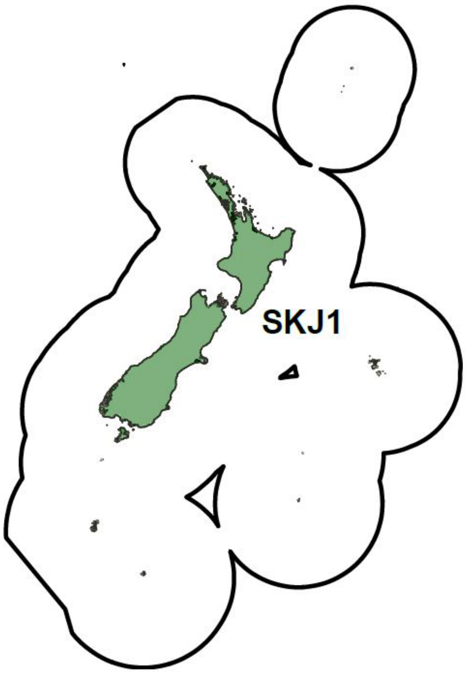
SKIPJACK TUNA (SKJ)

(Katsuwonus pelamis)
Aku



1. FISHERY SUMMARY

Management of skipjack tuna throughout the western and central Pacific Ocean (WCPO) is the responsibility of the Western and Central Pacific Fisheries Commission (WCPFC). Under this regional convention New Zealand is responsible for ensuring that the management measures applied within New Zealand fisheries waters are compatible with those adopted by the Commission.

At its annual meeting in 2014 the WCPFC approved CMM 2014-01. The aim of this CMM for skipjack was to maintain the fishing mortality rate for skipjack at a level no greater than F_{MSY}. This measure was large and detailed with numerous exemptions and provisions. Controls on fishing mortality were attempted through seasonal Fish Aggregating Device (FAD) closures, effort limits or equivalent catch limits for purse seine fisheries within EEZs, high seas purse seine effort limits, as well as other methods. This measure was amended and updated in 2015 through CMM2015-06 and an interim target reference point established as 50% of the estimated recent average spawning biomass in the absence of fishing.

In 2017 WCPFC approved CMM2017-01 to provide for a robust transitional management regime ("bridging measure") that ensures the sustainability of bigeye (*Thunnus obesus*), skipjack, and yellowfin (*Thunnus albacares*) stocks during the development of Harvest Strategies for the key stocks in the WCPO. This CMM reaffirmed the interim target reference point adopted for skipjack in 2016 as well as a number of other management measures from the suite adopted in CMM2014-01.

In 2018 CMM 2018-01 was approved which again reaffirmed the interim target reference point for skipjack and further strengthened other existing management measures. This was further updated in 2021 in CMM 2021-01.

In 2023, WCPFC adopted CMM 2023-01, which superseded CMM 2021-01 and came into effect in February 2024. This measure continues to provide a robust transitional management regime for bigeye, yellowfin, and skipjack tuna in the Western and Central Pacific Ocean.

In December 2022, WCPFC adopted CMM 2022-01, which established an interim Management Procedure for WCPO skipjack tuna. This measure superseded CMM 2015-06 and is effective until February 2030. This marked a major milestone as WCPO skipjack became the first tuna stock in the WCPFC to implement a harvest strategy using Management Strategy Evaluation. In December 2024, WCPFC adopted a monitoring strategy for WCPO skipjack tuna, which continues to assess the effectiveness of the skipjack Management Procedure.

1.1 Commercial fisheries

Skipjack was the first commercially exploited tuna in New Zealand waters, with landings beginning in the 1960s in the Taranaki Bight and quickly extending to the Bay of Plenty. The fishery in New Zealand has been almost exclusively a purse seine fishery, although minor catches (less than 1%) are taken by other gear types (especially troll). The purse seine fishery through to 2000–01 was based on a few (5–7) medium-sized vessels under 500 GRT operating on short fishing trips assisted by fixed wing aircraft, acting as spotter planes, in Fishery Management Area (FMA 1, FMA 2, and occasionally FMA 9 during summer months). In addition, during the late 1970s and early 1980s a fleet of US purse seiners seasonally operated in New Zealand waters. During this period, total annual catches were about 9000 t. Beginning in 2001, New Zealand companies operated four large ex-US super seiners that fish for skipjack in the EEZ, on the high seas, and in the EEZs of various Pacific Island countries in equatorial waters. This number declined to one vessel in 2017. In 2021 the fleet consisted of this single super-seiner which operated both domestically and on the high seas, and three smaller purse seine vessels which operated domestically.

Figure 1 shows historical landings for SKJ fisheries. Domestic landings within the EEZ between 2001 and 2021 ranged between 4914 t and 13 312 t (Table 1), declined to 84 t in 2023, but increased to 914 t in 2024. New Zealand catches outside the EEZ are variable, ranging from over 22 000 t in 2007 to no catches reported between 2021 and 2024. Table 1 compares New Zealand landings with total catches from the WCPO stock, and Table 2 shows the catches reported on commercial log sheets and Monthly Harvest Returns. Catches from within New Zealand fisheries waters are very small (< 0.1% since 2021 compared with those from the greater stock in the WCPO).

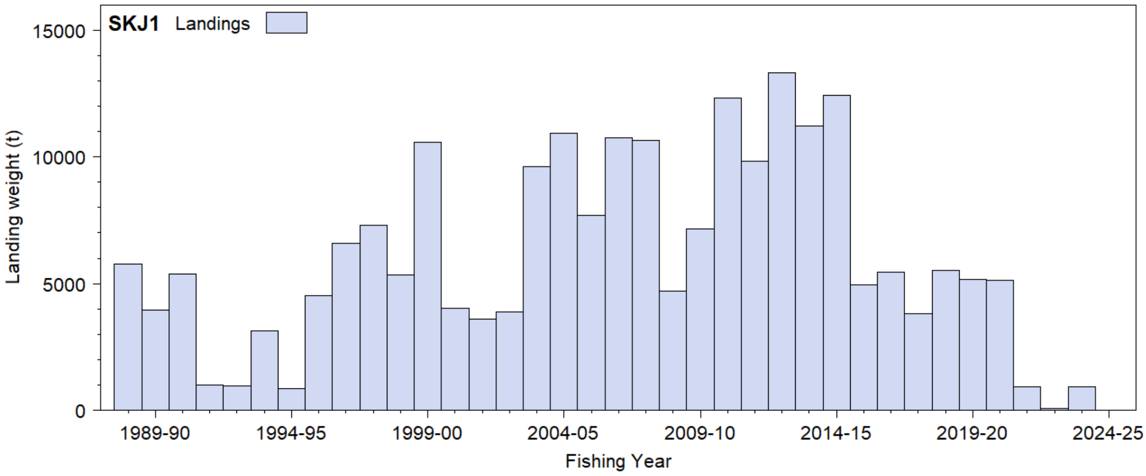


Figure 1: Skipjack purse seine catch from 1988–89 to present within New Zealand waters (SKJ 1), and 2001–02 to present in the equatorial Pacific by New Zealand vessels. [Continued on next page].

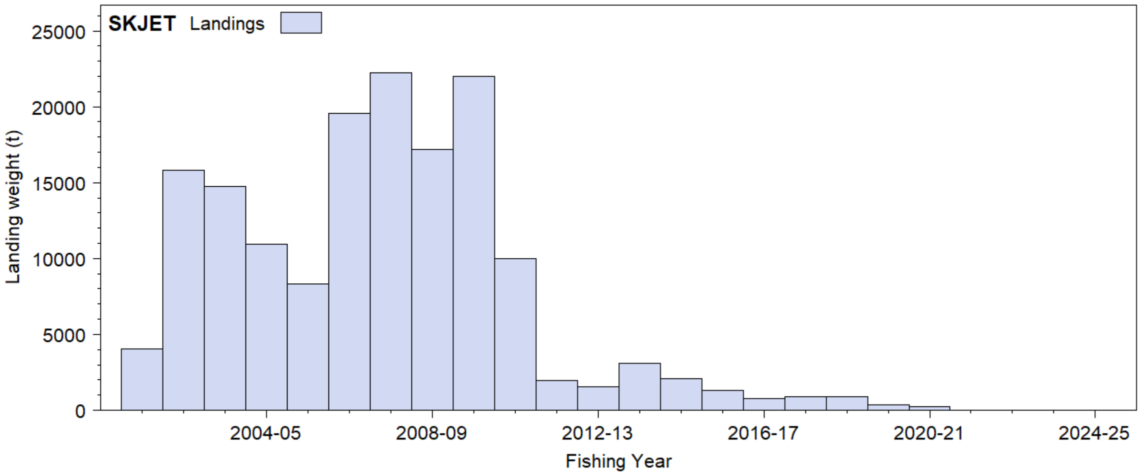


Figure 1 [continued]:

Table 1: Total New Zealand landings (t) both within and outside the New Zealand EEZ, and total landings from the western and central Pacific Ocean (t) of skipjack tuna by calendar year from 2001 to 2024.

	NZ landings (t)			All WCPO landings
Year	**Within NZ fisheries waters**	**Outside NZ fisheries waters***	**Total**	**Total landings (t)**
2001	4 261	4 069	8 330	1 100 714
2002	3 555	15 827	19 382	1 253 634
2003	3 828	14 769	18 597	1 245 155
2004	9 704	10 932	20 636	1 354 765
2005	10 819	8 335	19 154	1 418 105
2006	7 247	19 588	26 835	1 479 366
2007	11 392	22 266	33 659	1 663 353
2008	10 033	17 204	27 237	1 649 067
2009	4 685	21 991	26 676	1 761 272
2010	8 629	16 530	25 153	1 680 215
2011	10 840	9 999	20 839	1 536 806
2012	9 881	8 016	17 897	1 731 944
2013	13 312	10 207	23 520	1 831 413
2014	10 195	9 141	19 336	1 985 110
2015	12 223	6 362	18 585	1 788 545
2016	5 318	3 563	8 881	1 788 760
2017	5 120	3 673	8 793	1 609 970
2018	3 817	2 050	5 868	1 843 398
2019	5 519	3 792	9 311	2 044 477
2020	5 392	3 859	9 251	1 765 011
2021	4 914	0	4 914	1 716 185
2022	931	0	931	1 736 470
2023	84	0	84	1 699 341
2024	914	0	914	2 022 603

* Includes some catches taken in the EEZs of other countries under access agreements.
Source: Fisheries New Zealand Catch, Effort, Landing Returns, High Seas reporting system; OFP (2010); and Anon (2013).

Skipjack tuna is predominantly caught in a target purse seine fishery, although in 2024–25, blue mackerel (*Scomber australasicus*) made up the bulk of the catch and skipjack tuna accounted for less than 1% of the landed mass of the domestic purse seine fleet (Figure 2).

Skipjack tuna catch from the purse seine fishery is predominantly taken off the northwest coast of the North Island (WCNI), including from the Bay of Plenty (BPLE) and the east Northland coastal areas (ENLD). Catches of skipjack tuna are also intermittently taken off the west coast of the South Island (WCSI) (Figure 3). The spatial distribution of the annual catches varies considerably; annual catches from 2003–04 to 2005–06 and 2010–11 to 2012–13 were dominated by catches from the WCNI area, while annual catches from 2006–07 and 2014–15 were dominated by the ENLD area. In years of lower overall catch, the catches tend to be more evenly distributed among the three main areas of the fishery (BPLE, ENLD and WCNI). The WCSI area accounted for a significant proportion of the total catch in

2013–14. The timing of the fishery varies between the regions; the fishery generally commences in the ENLD and BPLE areas and is followed by the WCNI fishery from mid-February. The catches from the WCSI are primarily taken during March and April (Langley 2019).

Table 2: Reported commercial catches (t) within New Zealand fishing waters of skipjack by fishing year from catch effort data (mainly purse seine fisheries) and estimated landings from LFRRs (processor records) and Monthly Harvest Returns (MHRs).

Year	Total catches from catch/effort	LFRR	MHR
1988–89	0	5 769	
1989–90	6 627	3 972	
1990–91	7 408	5 371	
1991–92	1 000	988	
1992–93	1 189	946	
1993–94	3 216	3 136	
1994–95	1 113	861	
1995–96	4 214	4 520	
1996–97	6 303	6 571	
1997–98	7 325	7 308	
1998–99	5 690	5 347	
1999–00	10 306	10 561	
2000–01	4 342	4 020	
2001–02	3 840	3 487	3 581
2002–03	3 664	2 826	3 868
2003–04	9 892	9 225	9 606
2004–05	10 311	8 301	10 928
2005–06	7 220	7 702	7 702
2006–07	10 115	10 761	10 762
2007–08	10 116	10 665	10 665
2008–09	4 384	4 737	4 685
2009–10		8 020	7 141
2010–11		17 764	12 326
2011–12		11 814	9 866
2012–13		14 895	13 334
2013–14		14 275	11 206
2014–15		14 491	12 411
2015–16		6 245	4 959
2016–17		6 198	5 438
2017–18		4 708	3 821
2018–19		6 368	5 519
2019–20		5 549	5 179
2020–21		5 398	5 127
2021–22		924	924
2022–23		91	91
2023–24		913	913
2024–25		18	18

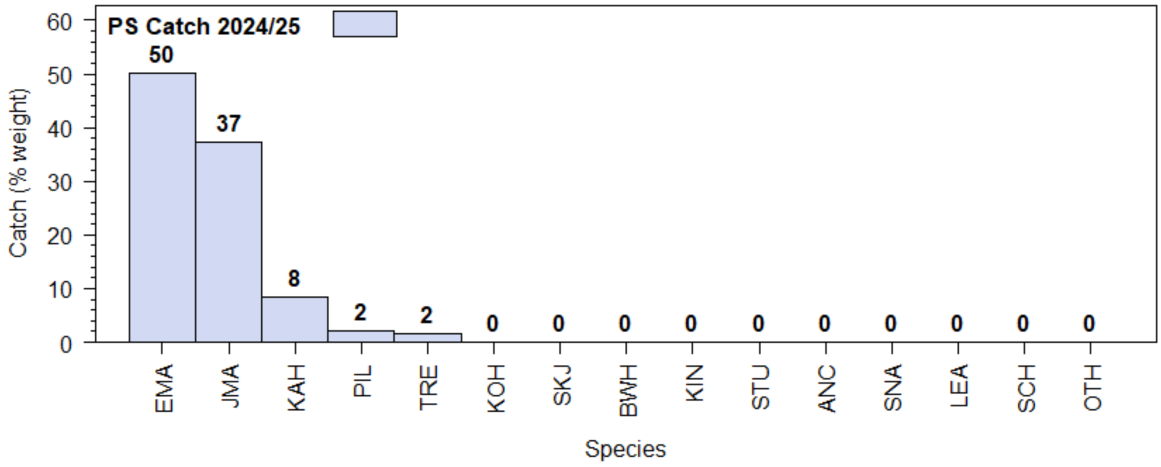


Figure 2: A summary of species composition for all domestic purse seine estimated catch for the most recent fishing year. The percentage by weight of each species is calculated for all domestic trips.

During 2001–09, fishing activity for skipjack tuna by New Zealand flagged vessels outside New Zealand fishery waters was generally limited to within the 10° S to 5° N latitudinal range (Figure 4). There are four main areas of international waters within the western equatorial Pacific. Of these areas, most of the fishing by the New Zealand fleet has been within the area of international waters surrounded by the national waters of Nauru, Kiribati (Gilbert Islands), Tuvalu, Solomon Islands, Papua New Guinea, and FSM (the so called 'high seas pockets', denoted A2 in Figure 4). The fleet also operated in the narrow strip of international waters between Tuvalu and the Phoenix Islands (Kiribati) (area A3) and intermittently in the eastern area of international waters between the Phoenix Islands and Line Islands (Kiribati) (area A4). Limited fishing occurred in the international waters between Papua New

Guinea and FSM (area A1). The distribution of fishing activity was largely constrained to areas of international waters ('high seas') and the national waters of those countries for which the fleet had established access arrangements (Langley 2011).

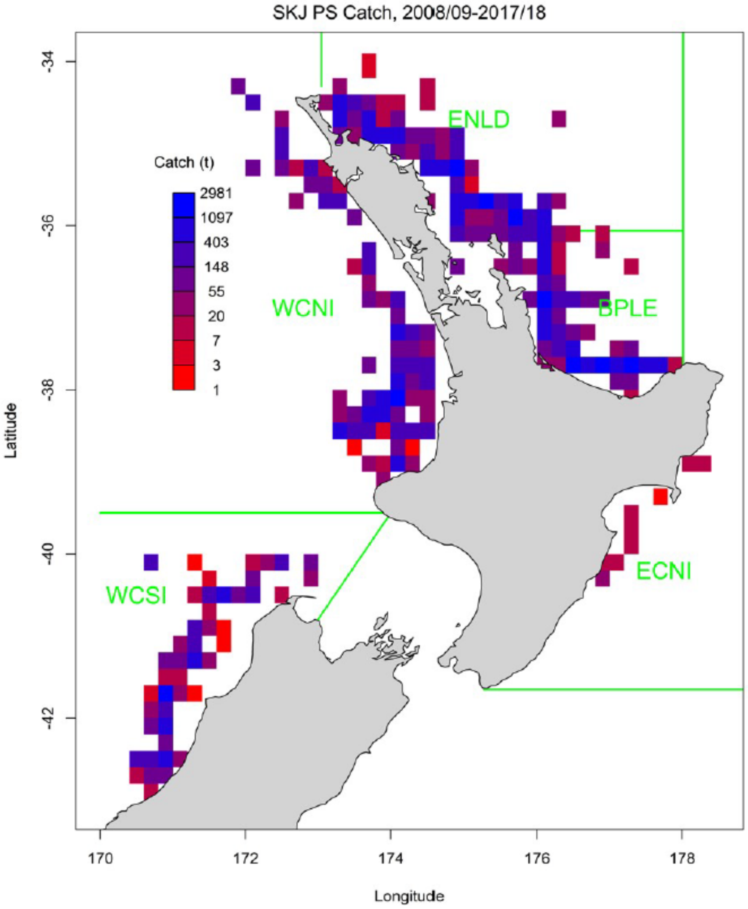


Figure 3: Total skipjack tuna purse seine catch by 0.2 degree latitude/longitude, aggregated for 2008–09 to 2017–18 (logarithmic scale).

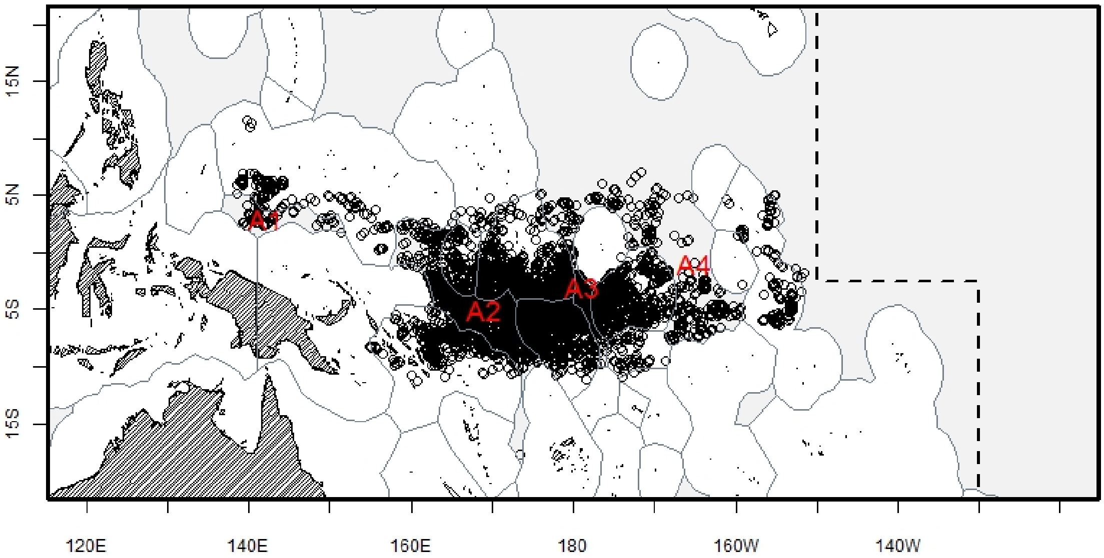


Figure 4: Distribution of purse seine set locations for New Zealand flagged vessels operating in the equatorial region of the western Pacific Ocean from 2001 to 2009. The red labels (A1–A4) denote the four areas of international waters referred to in the text.

Since the mid-2010s fishing effort and catch have fallen to low levels as the number of large New Zealand purse seine vessels has substantially reduced. Fishing in the equatorial Pacific by New Zealand vessels in particular reduced to very low levels after the fishing year 2010–11 (Figure 1).

1.2 Recreational fisheries

Skipjack by virtue of its wide distribution in coastal waters over summer is a seasonally important recreational species (the fourteenth most frequently caught finfish species by number in 2011–12). It is taken by fishers targeting it predominantly for use as bait, but it is also targeted as a food species. Skipjack are also frequently taken as bycatch when targeting other gamefish. Skipjack do not comprise part of the voluntary recreational gamefish tag-and-release programme.

Skipjack are taken almost exclusively using rod and reel (over 93% of National Panel Survey harvest estimates) and from trailer boats (59–79% of National Panel Survey harvest estimates) and launches (18–37% of National Panel Survey harvest estimates They are caught predominantly around the upper North Island in FMAs 1 and 9 (over 80% of National Panel Survey harvest estimates). Bag frequencies ranged from 1 to 21 fish, with 81% of bags in 2011–12 being 1–4 fish.

1.2.1 Management controls

There are no specific controls in place to manage recreational harvests of skipjack.

1.2.2 Estimates of recreational harvest

No estimates of recreational harvest of skipjack were generated from the telephone-diary surveys conducted in 1994, 1996, and 2000 because so few were reported. A national panel survey was conducted for the first time throughout the 2011–12 fishing year. The panel survey used face-to-face interviews from a random sample of 30 390 New Zealand households to recruit a panel of fishers and non-fishers for a full year (Wynne-Jones et al. 2014). The panel members were contacted regularly about their fishing activities and harvest information was collected in standardised phone interviews. The national panel survey was repeated during the 2017–18 and 2022–23 fishing years using very similar methods to produce directly comparable results (Wynne-Jones et al. 2019, Heinemann & Gray 2024). Recreational catch estimates from the three national panel surveys are given in Table 3. Note that national panel survey estimates do not include recreational harvest taken on charter vessel trips or under s111 general approvals.

Table 3: Recreational harvest estimates (in numbers of fish) for skipjack (Wynne-Jones et al. 2014, 2019, Heinemann & Gray 2024). Amateur charter vessel (ACV) and recreational take from commercial vessels under s111 general approvals as reported, with Total the sum of NPS, ACV and s111.

			NPS			ACV	s111	Total
Stock	**Year**	**Method**	**Number of fish**	**NPS harvest (t)**	**CV**	**(t)**	**(t)**	**(t)**
SKJ 1	2011–12	Panel survey	33 907	75.82	0.21	0.97	0.55	77.33
	2017–18	Panel survey	29 070	53.32	0.18	0.25	0.50	53.07
	2022–23	Panel survey	20 928	43.60	0.41	0.35	0.17	44.12

1.3 Customary non-commercial fisheries

There is no information on the customary take, but it is considered to be low.

1.4 Unreported catch

There is no known unreported catch of skipjack tuna.

1.5 Other sources of mortality

Skipjack tuna are occasionally caught as bycatch in the tuna longline fishery in small quantities; because of their low commercial value this bycatch is often discarded.

2. BIOLOGY

Skipjack tuna are epipelagic opportunistic predators of fish, crustaceans, and cephalopods found within the upper few hundred metres of the surface. Individual tagged skipjack tuna are capable of movements of over several thousand nautical miles but also exhibit periods of residency around islands in the central and western Pacific, resulting in some degree of regional fidelity. Skipjack are typically a schooling species with juveniles and adults forming large schools at or near the surface in tropical and warm-temperate waters to at least 40º S in New Zealand waters. Individuals found in New Zealand waters are mostly juveniles, which also occur more broadly across the Pacific Ocean, in both the northern and southern hemispheres. Spawning takes place in equatorial waters across the entire Pacific Ocean throughout the year, in tropical waters spawning is almost daily. Recruitment shows a strong positive correlation with periods of El Niño.

The maximum age of skipjack tuna is thought to be around 8–10 years, although most fish captured by the industrial purse seine and pole-and-line fisheries are thought to be less than 4 years old. They can reach sexual maturity by approximately 40–50 cm FL (i.e., within 6 months age) (Ashida et al. 2017, Ohashi et al. 2019) and may reach a maximum size of 90–100 cm.

Estimates of natural mortality rate (*M*) have previously been obtained using a size-structured tag attrition model (Hampton 2000), which indicated that *M* is substantially larger for small skipjack (21–30 cm FL, M=0.8 mo^{-1}) compared with larger skipjack (51–70 cm FL, M=0.12–0.15 mo^{-1}).

Skipjack growth is rapid compared to yellowfin, albacore (*Thunnus alalunga*), and bigeye tuna. Approximate age estimates from counting daily rings on otoliths suggest that growth may vary between areas of the Pacific. A range of von Bertalanffy growth parameters has therefore been estimated for skipjack in the western and central Pacific Ocean, depending on the area and the size of skipjack studied (Table 4). For the WCPO region, samples from the north Pacific region were estimated to reach approximately 40 cm fork length (FL) by 300 days age (Tanabe et al. 2003), whereas fish sampled closer to the equator, near Papua New Guinea, were estimated to reach 42 cm FL in around 150 days (Leroy 2000). Despite these earlier studies, growth remains a significant biological uncertainty for skipjack (Ochi et al. 2016), largely because there is no method that can reliably estimate growth across their lifespan. There are no clear validated annual increment structures in skipjack otoliths and daily increments cannot be confidently interpreted beyond about 1 year of age. Ageing from spines is also not considered reliable and analysis of tag-recapture growth increments is typically restricted to the portion of the growth curve that includes the sizes at which fish are large enough to be caught by hook and line and the predominant sizes of recaptured fish by purse seine fishery (i.e., 35–60 cm FL) (Castillo-Jordan et al. 2022).

Table 4: The range in L_∞ and k by country or area.

Country/Area	L_∞ (cm)	k
Hawaii	84.6 to 102.0	1.16 to 0.55
Indonesia	79.0 to 80.0	1.10 to 0.95
Japan	144.0	0.185
Papua New Guinea	65.0 to 74.8	0.92 to 0.52
Philippines	72.0 to 84.5	0.70 to 0.51
Taiwan	104.0	0.30 to 0.43
Vanuatu	62.0	1.10
Western Pacific	61.3	1.25
Western tropical Pacific	65.1	1.30

3. STOCKS AND AREAS

Skipjack tuna inhabit tropical and sub-tropical regions across all major ocean basins, with each ocean's population believed to represent distinct stocks (Artetxe-Arrate et al., 2021). Within the Pacific Ocean, skipjack tuna maintain a continuous distribution from east to west, although genetic analyses and tagging research indicate broad stock differentiation between the Western Central Pacific Ocean

(WCPO) and the Eastern Pacific Ocean (EPO) populations (Moore et al., 2020). Throughout the western Pacific, warm currents flowing poleward near Japanese and Australian waters cause seasonal extension of skipjack range to approximately 40°N and 40°S latitudes. These boundaries generally align with the 20°C sea surface temperature contour.

Skipjack migration patterns show considerable variability and appear to be shaped by large-scale oceanographic phenomena (Lehodey et al., 1997, 2008). The ENSO cycle significantly affects distribution patterns along the equator, with La Niña conditions causing warm water accumulation westward, thereby concentrating skipjack populations in the western Pacific. During El Niño events, skipjack distribution extends more centrally as elevated surface temperatures spread toward the central and eastern Pacific regions (Senina et al., 2016, 2025).

The finer details of skipjack population structure within the WCPO remain unclear, though researchers believe a 'metapopulation' structure exists (Grewe et al., 2019; Moore et al., 2020). Additional research into meta-population dynamics is necessary, particularly examining connections between East Asian skipjack populations and those inhabiting equatorial waters of the western and central Pacific.

4. ENVIRONMENTAL AND ECOSYSTEM CONSIDERATIONS

This summary is from the perspective of the skipjack tuna fishery; a more detailed summary of environmental and ecosystem considerations from an issue-by-issue perspective is available in the Aquatic Environment & Biodiversity Annual Review where the consequences are also discussed (Fisheries New Zealand 2021).

4.1 Role in the ecosystem

Skipjack tuna (*Katsuwonus pelamis*) average 45–60 cm length in New Zealand, reaching an upper maximum of around 70 cm (Paul 2000). Skipjack are prey of larger tuna, HMS sharks, and billfish.

4.2 Incidental catch in the purse seine fishery

Observers have been deployed on purse seine vessels since 2005 to determine levels of bycatch in the fishery that operates within New Zealand fishery waters. There were no observed purse seine trips in 2020; in 2021 40.5% of the New Zealand purse seine sets were observed (Table 5).

Table 5: Domestic purse seine sets targeting skipjack tuna observed as a percentage of sets made for 2005–2023.

Calendar year	No. sets observed	% sets observed	% SKJ catch
2005	37	4.7	4.5
2006	104	17.6	35.5
2007	77	14.8	25.2
2008	118	27.6	57.3
2009	83	10.4	33.1
2010	109	8.8	15.3
2011	125	11.9	23.8
2012	113	9.5	19.7
2013	112	9.2	19.8
2014	95	10.1	15.3
2015	102	19.6	17.5
2016	80	25.6	25.9
2017	69	23.7	21.2
2018	67	36.2	44.1
2019	36	13.7	10.4
2020	0	0	0
2021	70	40.5	38.9
2022	0	0	0
2023	3		

New Zealand purse seine vessels operating outside the New Zealand EEZ have 100% observer coverage. Records from observers from the Regional Observer Programme aboard the New Zealand purse seine vessels operating in the tropical Pacific are held by SPC.

The purse seine fishery in New Zealand fishery waters is based on free schools of skipjack, and bycatch is minimal (about 1% by mass) and consists mostly of teleosts (Table 6). The following interactions were reported by purse seine fishery observers in 2021:

- 34 spine-tailed devil rays were captured and released alive
- 3 seabirds were reported caught (one common diving petrel, one flesh-footed shearwater and one unidentified prion) and were released alive
- 4 common dolphins were reported caught and were released alive

Table 6: Catch composition from two observed purse seine trips targeting skipjack tuna operating within New Zealand fisheries waters in 2021.

Common name	Scientific name	Observed catch weight (kg)	% of catch
Skipjack tuna	*Katsuwonus pelamis*	1 541 319	95.3
Blue Mackerel	*Scomber australasicus*	60 009	3.7
Jellyfish		7 820	0.5
Sunfish	*Mola mola*	4 078	0.3
Jack Mackerel	*Trachurus novaezelandiae*	3 300	0.2
Striped Marlin	*Kajikia audax*	620	<0.1
Porcupine Fish	*Allomycterus jaculiferus*	111	<0.1
Bronze Whaler Shark	*Carcharhinus brachyurus*	110	<0.1
Hammerhead Shark	*Sphyrna zygaena*	85	<0.1
Salp		82	<0.1
Blue Shark	*Prionace glauca*	40	<0.1
Jack Mackerel	*Trachurus* spp.	32	<0.1
Albacore Tuna	*Thunnus alalunga*	30	<0.1
Yellowfin Tuna	*Thunnus albacares*	15	<0.1
Electric Ray	*Torpedo fairchildi*	14	<0.1
Unicornfish	*Lophotus capellei*	10	<0.1
Longtailed Stingray	*Dasyatis thetidis*	8	<0.1
Flying Fish	Exocoetidae	7	<0.1
Seaweed		5	<0.1
Globefish	*Contusus richei*	3	<0.1
John Dory	*Zeus faber*	2	<0.1
Brown Stargazer	*Xenocephalus armatus*	1	<0.1
Rough Skate	*Dipturus nasutus*	1	<0.1
Bobtail squid	*Sepioloidea* spp.	1	<0.1

5. STOCK ASSESSMENT

The most recent stock assessment of skipjack tuna in the western and central Pacific Ocean (WCPO) was carried out in 2025 (Teears et al. 2025). An additional three years of data were available since the previous assessment in 2022, and the model is extended to the end of 2024. Key new developments to the stock assessment include:

- Natural mortality-at-age (Mage) was assumed to be inversely proportional to mean length-at-age (Lorenzen, 1996). The scaling of M was estimated internally.
- An orthogonal polynomial recruitment (OPR) system was used to parameterise recruitment, replacing the previously used recruitment deviations approach, in order to more efficiently parameterise recruitment variability.
- Effort creep was incorporated into the pole-and-line CPUE indices, utilising the results of Nishimoto et al. (2024).
- Not all growth parameters could be estimated internally; therefore, the von Bertalanffy growth coefficient k was fixed at 0.3 quarter^{-1} in the diagnostic case model and sampled from uniform distribution (0.2–0.4 quarter^{-1}) in the model ensemble. All other growth parameters, including two offset parameters for age-classes 2 and 3, were estimated internally.
- The early Skipjack Survey and Assessment Programme (SSAP) tagging data was excluded from the assessment (as suggested by the 2025 PAW) in order to moderate a likely negative bias in early recruitment and resulting biomass.
- Length-based selectivity was used for all fisheries.
- The use of skipjack batch fecundity at size estimates (Ashida, 2020) to compute spawning potential.

5.1 Stock status and trends

Total skipjack catches in the WCPFC Convention Area have increased steadily since 1960, more than doubling during the 1980s, and continuing to increase in subsequent years. Annual catches have consistently exceeded 1.5 million metric (mt) tonnes over the last decade, and 2024 produced a record catch at just over 2.1million mt, of which just under 2 million mt came from the geographical area covered by the stock assessment (Figure 5). Pole-and-line fleets, primarily Japanese, initially dominated the fishery, with the catch peaking at 380 000 mt in 1984. The relative importance of the pole-and-line fishery has declined over the years primarily due to economic constraints. Skipjack catch increased during the 1980s due to growth in the international purse seine fleet, combined with increased catches by domestic fleets from Philippines and Indonesia. Catch in the purse seine fishery for 2024 (87%) was the main contributor to the record catch.

The 2025 stock assessment of skipjack adopts an eight-region spatial structure (Figure 5) similar to the structure adopted in previous skipjack assessments. The model estimates quarterly movement between the regions and assumes regionally varying recruitment, with 32 extraction fisheries (Table 7, 8).

The major structural uncertainties considered include drawing steepness from a beta distribution with mode 0.85, drawing growth coefficient *k* from a uniform distribution (range 0.2–0.4), drawing effort creep trajectories from a prior distribution, and applying various tag mixing scenarios based on dissimilarity of tagged and untagged populations (using the *K* statistic metric). These structural uncertainties were incorporated into the estimations of reference point values listed in Table 8.

Skipjack tuna comprises the largest component of the tuna fisheries throughout the WCPO and is caught using a wide variety of fishing gears. The annual catches show a general increase until 2009, with higher variability since that time (Figure 6).

The Japanese pole-and-line CPUE indices indicated relatively stable trends (Figure 7a). However, with the application of effort creep, each index shows a slight decline in relative abundance over time. Similarly, the purse seine CPUE indices (Figure 7b) indicated an overall decline in relative abundance. The region 8 purse seine CPUE index indicated high uncertainty in some time-steps due to very low sample sizes.

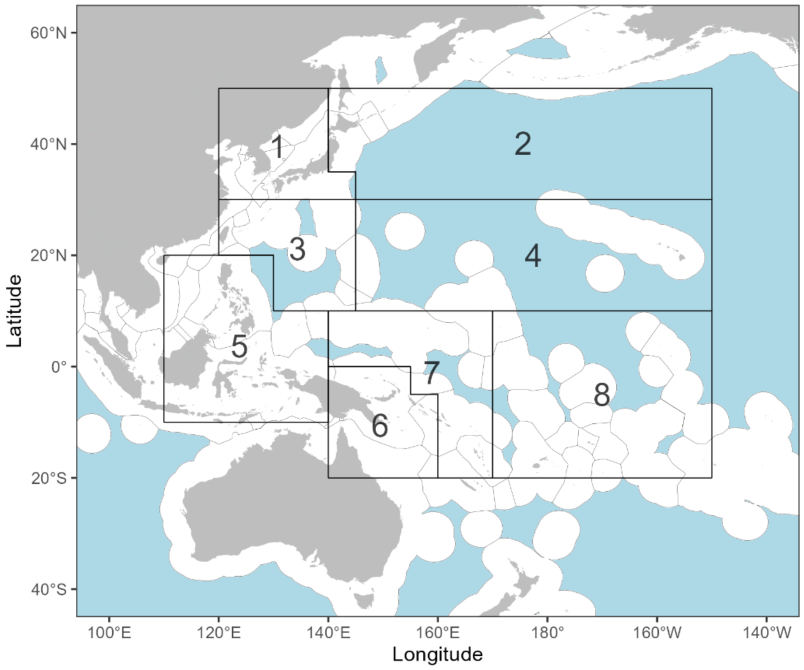


Figure 5: The geographical area covered by the stock assessment and the boundaries of the eight model regions used for the 2025 skipjack assessment.

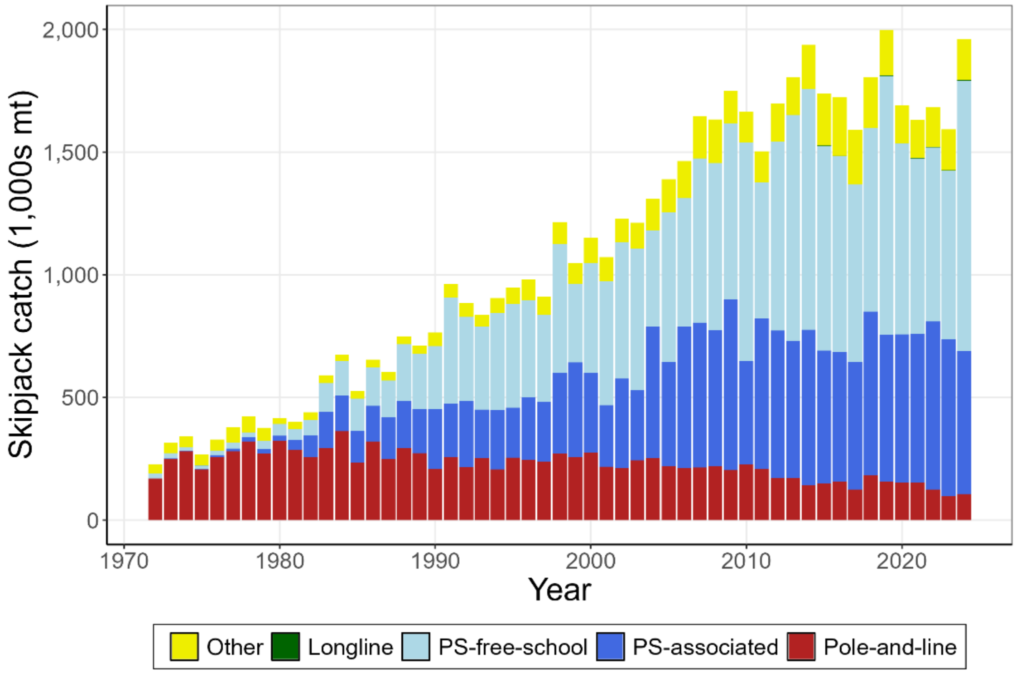


Figure 6: Time series of total annual catch (1000's mt) by fishing gear over the full assessment period.

Table 7: Definition of fisheries by gear, model region, flags, fishery type (extraction or CPUE indices), and proportion of total catch (Prop. Catch).

Fishery	Gear	Model Code-Fleets	Flags	Region	Fishery Type	Prop. Catch
1	PL	1.PL.ALL.1	ALL	1	Extraction	0.021
2	PS	2.PS.ALL.1	ALL	1	Extraction	0.005
3	LL	3.LL.ALL.1	ALL	1	Extraction	0
4	PL	4.PL.ALL.2	ALL	2	Extraction	0.039
5	PS	5.PS.ALL.2	ALL	2	Extraction	0.02
6	LL	6.LL.ALL.2	ALL	2	Extraction	0
7	PL	7.PL.ALL.3	ALL	3	Extraction	0.021
8	PS	8.PS.ALL.3	ALL	3	Extraction	0.001
9	LL	9.LL.ALL.3	ALL	3	Extraction	0
10	Dom	10.Z.PH.5	PH	5	Extraction	0.022
11	Dom	11.Z.ID.5	ID	5	Extraction	0.053
12	PS	12.S.PH.5	PH	5	Extraction	0.054
13	PS	13.S.ID.5	ID	5	Extraction	0.039
14	PL	14.PL.ALL.5	ALL	5	Extraction	0.062
15	PS.ASSOC	15.SA.DW.5	DW	5	Extraction	0.006
16	PS.UNASSOC	16.SU.DW.5	DW	5	Extraction	0.005
17	Dom	17.Z.VN.5	VN	5	Extraction	0.017
18	LL	18.LL.ALL.5	ALL	5	Extraction	0
19	PL	19.PL.ALL.6	ALL	6	Extraction	0.017
20	PS.ASSOC	20.SA.ALL.6	ALL	6	Extraction	0.046
21	PS.UNASSOC	21.SU.ALL.6	ALL	6	Extraction	0.057
22	LL	22.LL.ALL.6	ALL	6	Extraction	0
23	PL	23.PL.ALL.4	ALL	4	Extraction	0.015
24	LL	24.LL.ALL.4	ALL	4	Extraction	0
25	PL	25.PL.ALL.7	ALL	7	Extraction	0.016
26	PS.ASSOC	26.SA.ALL.7	ALL	7	Extraction	0.136
27	PS.UNASSOC	27.SU.ALL.7	ALL	7	Extraction	0.138
28	LL	28.LL.ALL.7	ALL	7	Extraction	0
29	PL	29.PL.ALL.8	ALL	8	Extraction	0.015
30	PS.ASSOC	30.SA.ALL.8	ALL	8	Extraction	0.112
31	PS.UNASSOC	31.SU.ALL.8	ALL	8	Extraction	0.083
32	LL	32.LL.ALL.8	ALL	8	Extraction	0
33	PL	33.PL.INDEX.JP.1	JP	1	CPUE Indices	
34	PL	34.PL.INDEX.JP.2	JP	2	CPUE Indices	
35	PL	35.PL.INDEX.JP.3	JP	3	CPUE Indices	
36	PL	36.PL.INDEX.JP.4	JP	4	CPUE Indices	
37	PS	37.PS.INDEX.PH.PH.5	PH	5	CPUE Indices	
38	PL	38.PL.INDEX.JP.7	JP	7	CPUE Indices	
39	PL	39.PL.INDEX.JP.8	JP	8	CPUE Indices	
40	PS.UNASSOC	40.PS.UNASSOC.INDEX.ALL.6	ALL	6	CPUE Indices	
41	PS.UNASSOC	41.PS.UNASSOC.INDEX.ALL.7	ALL	7	CPUE Indices	
42	PS.UNASSOC	42.PS.UNASSOC.INDEX.ALL.8	ALL	8	CPUE Indices	

The estimated recruitment aggregated across all regions (Figure 8a) shows high inter-annual variation throughout the 1970s and 1980s and reduced variability, thereafter. Mean recruitment declines during the 1970s and 1980s, increases from 1990 until the mid-2000s, and is stable thereafter. The trend of the regional recruitment series (Figure 8b) varies strongly and suggests substantial changes in regional distribution through time.

The 2025 diagnostic model predicted that spawning potential (Figure 9a, b) declined steadily with strong seasonality throughout the time-series for regions 1–4, with regions 3 and 4 showing a slow increase in the last five years. However, regions 5–8 indicated less monotonic trends. Region 5 indicated the highest overall biomass with an initial decline until the 1980s, a stable trend until the early 2000s when biomass rose sharply, followed by a steady decline until the early 2020s. Region 6 indicated an overall slight declining trend with periodically sharp increases through the early 2000s and then less variability thereafter. Regions 7 and 8 demonstrated similar patterns with seasonality and a slow decline until approximately 1990 when spawning potential dropped sharply, recovered slightly in the mid-1990s, and then slowly increased with variability until the terminal year. The aggregated spawning potential (over all regions) indicated an initial increase in the early 1970s and a steady decline to a minimum in the early 1990s, after which spawning potential increased and then stabilized until the terminal year.

Table 8: Summary of stock assessment configuration and key sources of uncertainty in the WCPO skipjack tuna stock assessment by the MFCL.

TYPE	RATIONALE	UNCERTAINTY	IMPACT	CONFIDENCE
DATA				
CPUE	Best available standardised indices, incorporating operational data, multiple indices.	Potential hyperstability in PS CPUE indices	Abundance estimates could be biased from 2010–2024	High
Catch	Best available information	ID catches may be biased high or low	Sensitivity indicated low impact	High
Size	Representative sampling	Good certainty, mandatory length reporting	Selectivity may vary temporally	Medium
Tag				
MODEL				
MFCL	Commonly used platform for WCPO tuna stocks	Robust platform for modelling length and tagging data	Low impact	High
SPATIAL ASSUMPTIONS				
8 regions	Based on regional processes informed by size and tagging data	Low uncertainty; informed by the literature	Low impact	High
KEY PARAMETER UNCERTAINTY				
Growth coefficient *k*	Not estimable	Uniform distribution (0.2–0.4)	Influential on MSY-based reference points	High
Steepness	Not estimable	Beta distribution (mode of 0.85)	Influential on MSY-based reference points	High
STRUCTURAL UNCERTAINTIES				
Mixing period *K* statistic	External estimates	*K* statistic (0.1, 0.2, 0.3)	Highly influential in ensemble	Medium
Effort creep	External estimates	Effort creep trajectories randomly sampled from prior	Low influence	High
Estimation uncertainty				
Estimation uncertainty	Monte-Carlo model ensemble	Estimated	Estimation uncertainty replaces structural uncertainty	High
Other source of uncertainty				
Data conflict	Likelihood profile indicates length conflicts with CPUE and tag data	Conflict in scaling of biomass	Not considered	Low

Average fishing mortality rates for juvenile and adult age classes (Figure 10) indicated variability in trends spatially as well as temporally. Overall, juveniles and adults showed similar trends, with the exception of region 7 and all regions combined, where juveniles indicated less severe increases in fishing mortality. Regions 1–4 demonstrated relatively stable trends over time in fishing mortality, but with periods of high variability, and regions 3 and 4 indicated fishing mortality to be much lower in scale compared to other regions. Juveniles in region 1 experienced higher fishing mortality than adults. Regions 5–8 and the combined regions indicated overall increasing trends in fishing mortality, with regions 6 and 7 being much higher in scale than region 8, and all regions combined (with the exception of juveniles in region 7), with differing periods of high variability. Regions 5, 6, and 7 had the highest fishing mortality, and region 4 had the lowest. Region 5 shows a very strong increase in fishing mortality from around 2000.

Estimates of F/F_{MSY} indicate a steady increase over time with a sharp decline in the early 2020s, followed by a similar increase in the terminal year (Figure 11). All estimates (and confidence intervals) were below 0.4 over the time series.

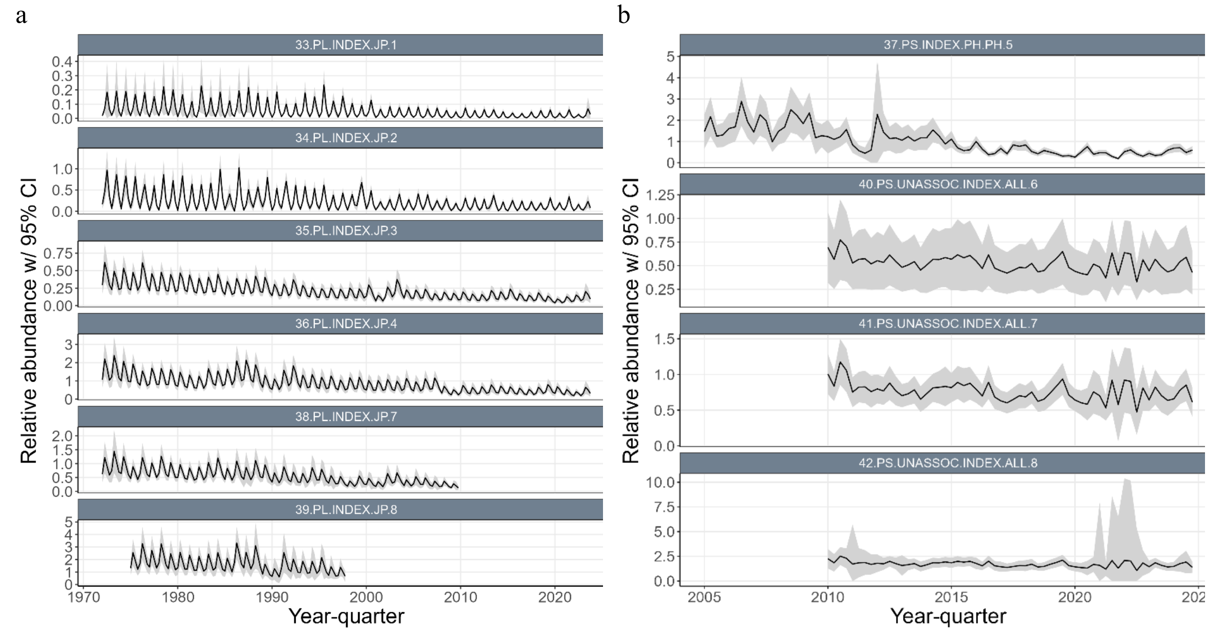


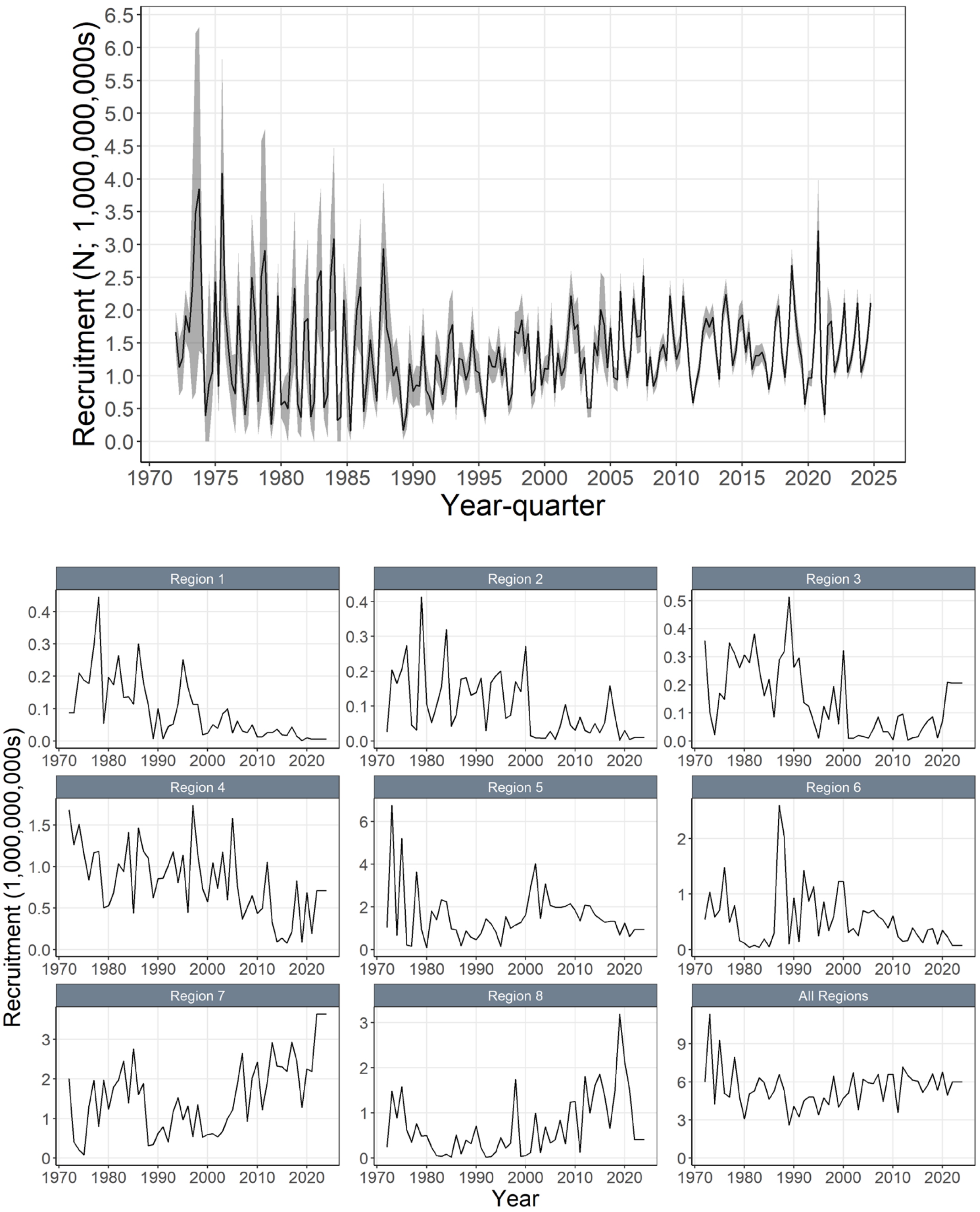
Figure 7: (a) Time series of standardized CPUE with 95% confidence intervals (CI) for the Japanese pole-and-line with effort creep adjustment and confidence intervals derived from bi-regionally grouped models (i.e., region1 with 2, region3 with 4, and region7 with 8). (b) Time series of standardized CPUE with 95% confidence intervals (CI) for the 'unassociated' purse seine CPUE indices in region 6, 7 and 8, and the Philippines purse seine index in region5. Fishery labels indicate fishery number, gear type, flags, and region, respectively.

The 2025 diagnostic model predicted that spawning depletion ($SB_{recent}/SB_{F=0}$; Figure 12) had a similar pattern to the spawning potential with overall declines in regions 1–4 and high seasonality. However, there were stronger increases in spawning depletion (i.e., less depleted status) in the last 5–10 years of the model. Region 5 indicated less seasonality with high uncertainty in the 1980s and an overall decline with periods of stability from 1990 through 2010 and an increase in the early 2020s. Region 6 showed an overall decline, but with high variability. Region 7 indicated strong declines until around 2000, followed by a relatively stable period until around 2010, and then an increasing trend until the end of the model period. Region 8 indicated a similar trend to region 6, with overall declining spawning depletion with periods of temporary recovery. The aggregated spawning depletion (over all regions) estimates suggested a steady decline until approximately the early 2020s, when spawning depletion increased until the terminal year, when it decreased slightly. Uncertainty in regions 1–3 was higher compared to regions 4–8, with region 5 indicating higher uncertainty between the 1980s and 2000. Overall, the uncertainty was moderate throughout the time series.

The model convergence is better than for the 2022 assessment, as seen from the convergence criteria.

However, jitter analyses indicate the presence of multiple local minima. Likelihood profiles indicate some conflict in the data regarding scaling. Specifically, the length data indicates a better likelihood at higher biomass, whereas the CPUE and tagging data indicate better likelihood at lower biomass.

This assessment is an improvement over the previous assessment in 2022. In contrast to previous assessments, recruitment is estimated to have been more variable and above average but declining slightly prior to 1990. Recruitment increased from 1990 to around 2005, after which there has been no particular trend. There is some evidence of high recruitment in recent years. The lack of a persistently increasing trend in recruitment that was estimated in previous assessments is due to the exclusion of the SSAP tagging data and some early size data, and the admission of effort creep in the pole-and-line CPUE indices.


(a)

(b)

Figure 8: (a) Annual time series of estimated quarterly recruitment (including estimation error) summed across regions with 95% confidence interval for the diagnostic model. (b) Annual time series of estimated annual recruitment (without estimation error) among regions for the diagnostic model.

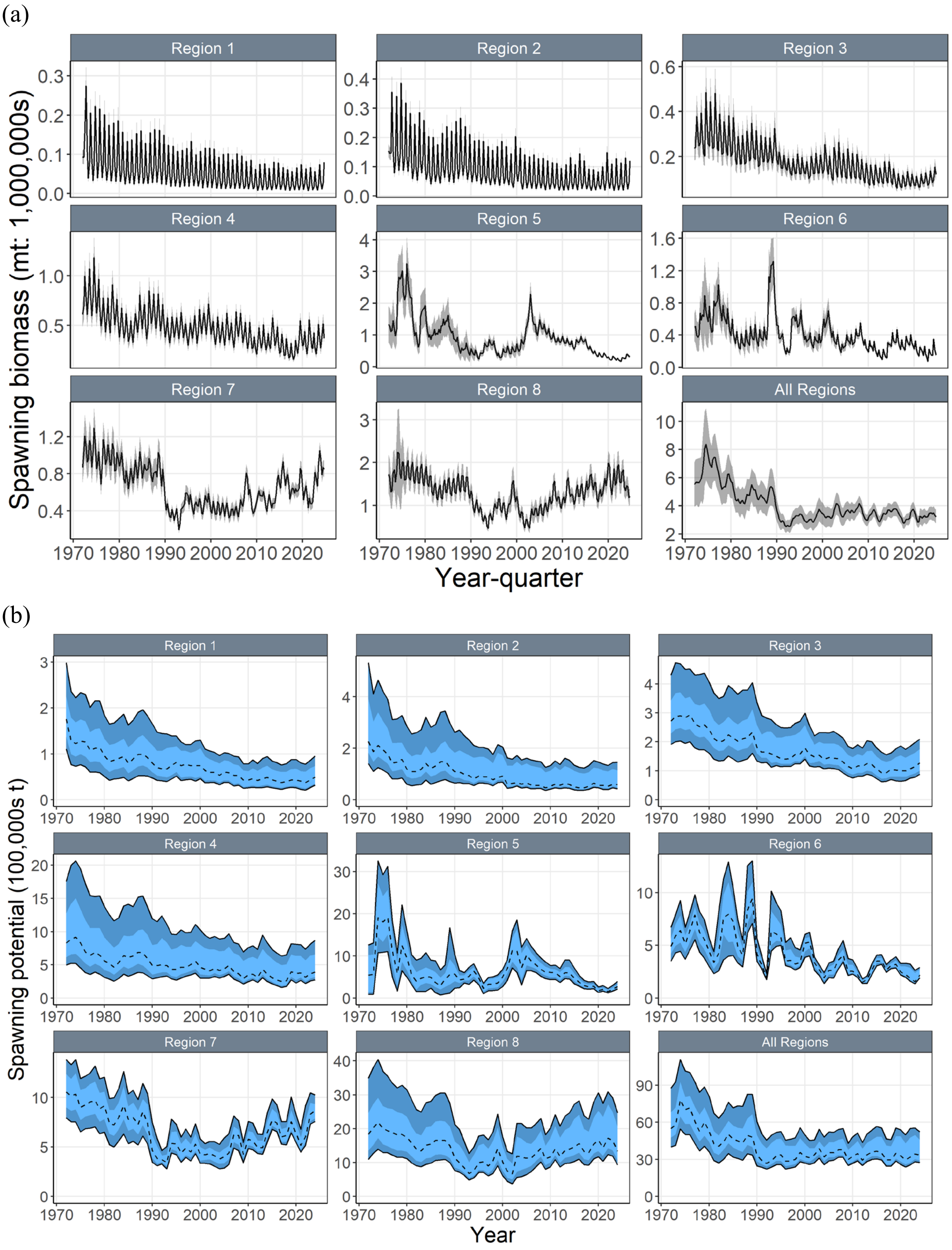


Figure 9: (a) Time series of estimated quarterly spawning potential by region with 95% confidence interval for the diagnostic model, including estimation error. (b) Time series of annual estimated 90% (dark blue) and 75% (light blue) quantiles of spawning potential by region from the model ensemble. The dashed line indicates the median. Estimation uncertainty was not included.

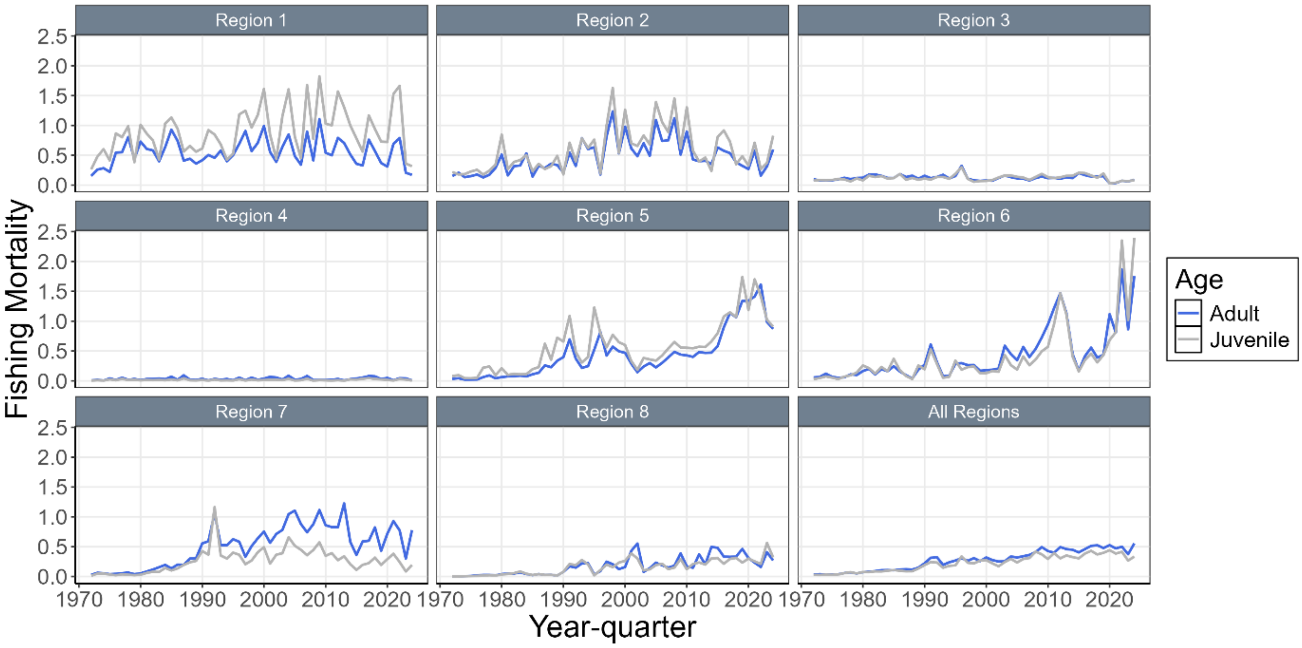


Figure 10: Time series of annual estimated fishing mortality for adults and juveniles by regions for the diagnostic model.

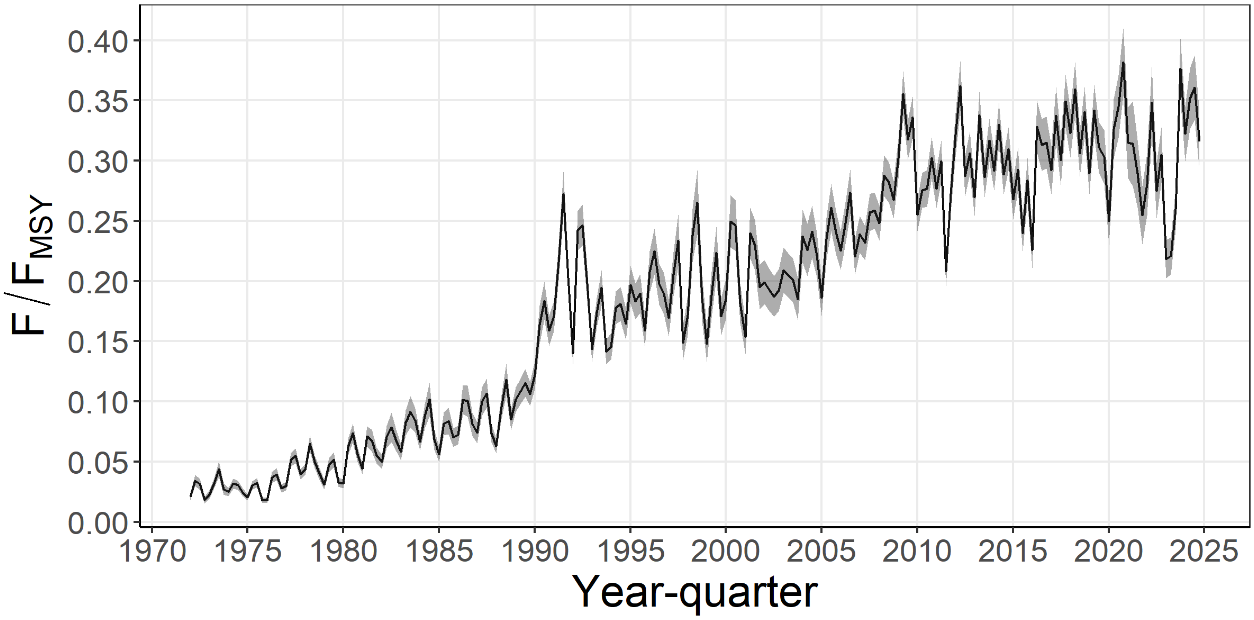


Figure 11: Time series of estimated F/FMSY with 95% estimation error for the diagnostic model.

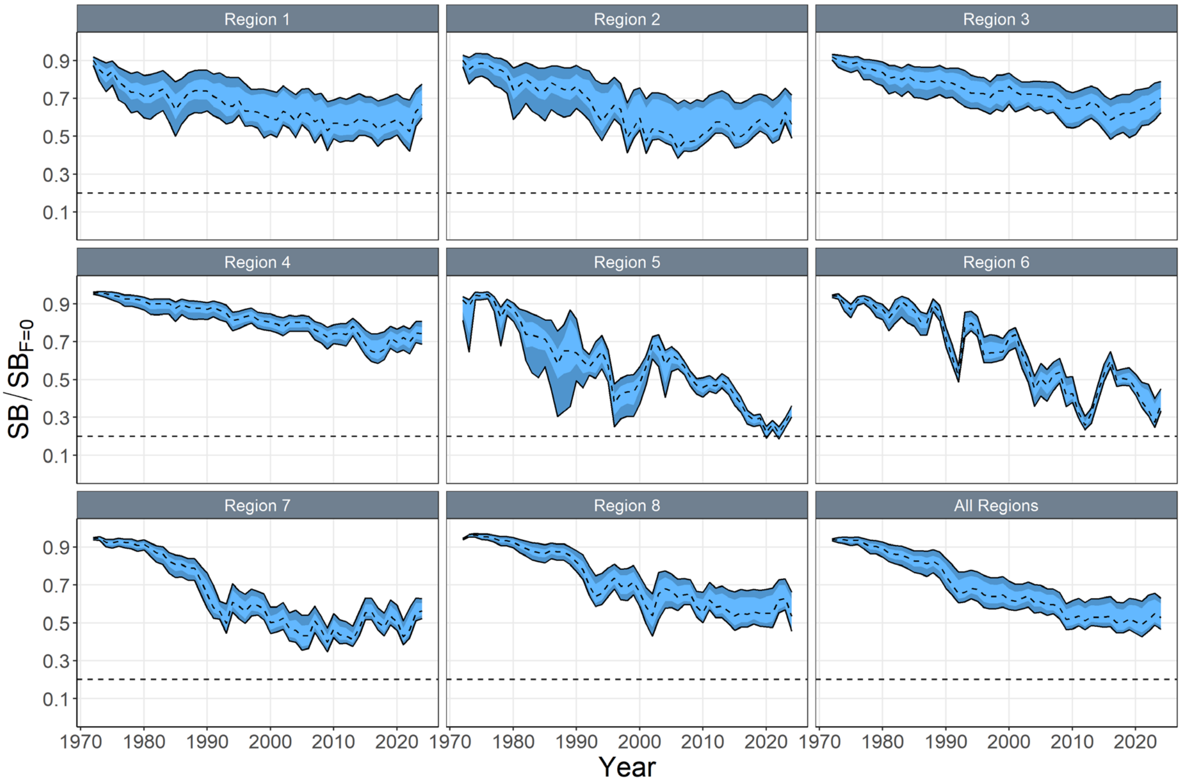


Figure 12: Time series of annual estimated 90% (dark blue) and 75% (light blue) quantiles of SB/SBF=0 by region from the model ensemble. The dashed line within the interval indicates the median. Estimation uncertainty not included.

Estimation uncertainty was incorporated by applying a Monte-Carlo model ensemble approach. Estimates of $SB_{recent}/SB_{F=0}$ and F_{recent}/F_{MSY} indicated that tag mixing period assumptions (i.e., dissimilarity K statistic) had the largest impact on estimates of stock status.

The models from the ensemble indicated the probability that $SB_{recent}/SB_{F=0} < 0.2$ (LRP) was 0, the probability that $F_{recent}/F_{MSY} > 1$ was 0. The dynamic Majuro and Kobe plots indicated that for all time periods, the $SB_{recent}/SB_{F=0}$ was > 0.2, SB_{recent}/SB_{MSY} was > 1, and the F_{recent}/F_{MSY} was < 1 (Figure 13). Similarly, all models in the ensemble for the recent period (2021–2024) indicated that the $SB_{recent}/SB_{F=0}$ was > 0.2, SB_{recent}/SB_{MSY} was > 1 and the F_{recent}/F_{MSY} was < 1. As in the previous stock assessment, results indicate that the skipjack stock in the WCPO is not overfished, and overfishing is not occurring (Table 9, 10).

The projected stock depletion levels under recent conditions are presented in Figure 14. The year 2024 represents the first year of application of the skipjack interim management procedure (CMM 2022-01). The stock is on average at 98% of the recalibrated TRP (0.94 – 1.01). This is within the range expected through the MSE testing of the adopted interim skipjack MP.

Table 9: WCPO Skipjack stock status summary table.

Skipjack			
Year: 2025	**Spawning Potential**	Exceptionally unlikely (<1%) to be below the LRP	Stock is not overfished
	Fishing mortality	Exceptionally unlikely (<1%) to be above F_{MSY}	Overfishing is not occurring
	Projection	The stock is on average at 98% of the recalibrated interim TRP (iTRP) as defined in CMM 2022-01	Depletion is in the range expected through the MSE testing of the adopted interim skipjack MP (CMM 2022-01)
	Recommendation	The stock has had stable spawning potential, spawning potential depletion ($SB/SB_{F=0}$) and fishing mortality since around 2010. The Stock and fishing mortality are well above the LRPs for depletion and fishing mortality, respectively.	
Reference points/MP		**Estimate [10%--90%]**	**Comment**
iTRP (interim Target Reference Point)	iTRP recalibrated based on 2025 stock assessment	0.52 [0.47 – 0.64]	The calculation method for the iTRP is described in CMM 2022-01. The iTRP depletion value requires recalibration for each new stock assessment. Stock status is reported below as the ratio of the $SB_{recent}/SB_{F=0}$ of the new stock assessment to the corresponding recalibrated iTRP value.
iTRP (interim Target Reference Point)	iTRP	0.98 [0.94 – 1.01]	
Depletion	LRP ($0.2SB_{F=0}$)	0.51 [0.45 – 0.63]	
Fishing Mortality	F_{MSY}	0.28 [0.25 – 0.32]	
Recent estimates			Recent trend/projection
SB depletion (w/ estimation uncertainty)	$SB_{recent}/SB_{F=0}$	0.51 [0.45 – 0.63]	The iTRP is recalibrated for each assessment according to the definition in CMM 2022-01 – Reference Points. The ratio presented here is the ratio of the $SB_{recent}/SB_{F=0}$ from the current stock assessment to the recalibrated iTRP value.
Fishing mortality	F_{recent}	0.10 [0.07 – 0.12]	LRP based on $SB_{recent}/SB_{F=0}$ is the adopted LRP for tuna stocks by the WCPFC.
SB depletion (w/o estimation uncertainty)	$SB_{recent}/SB_{F=0}$	0.51 [0.45 – 0.63]	F_{MSY} is the upper-level limit reference point for fishing mortality used by WCPFC for tuna stocks.
Status			**Likelihood**
Ratio of SB depletion:iTRP	$SB_{recent}/SB_{F=0}$: iTRP	0.98 [0.94 – 1.01]	Within the range expected through the MSE testing of the adopted interim skipjack MP
SB depletion (w/ estimation uncertainty)	$SB_{recent}/SB_{F=0}$	0.51 [0.45 – 0.63]	<1% probability < 0.2 (LRP)
SB depletion with respect SB_{MSY} (w/estimation uncertainty)	SB_{recent}/SB_{MSY}	3.90 [2.95 – 5.61]	<1% probability < SB_{MSY}
Fishing mortality	F_{recent}/F_{MSY}	0.35 [0.24 – 0.45]	<1% probability > F_{MSY}

Table 10: Summary of reference points over the model ensemble, along with results incorporating estimation uncertainty. Note that these values do not include estimation uncertainty, unless otherwise indicated.

	Mean	Median	Min	10%	90%	Max
F_{MSY}	0.28	0.28	0.22	0.25	0.32	0.37
F_{mult}	3.01	2.85	1.88	2.25	4.12	5.42
F_{recent}/F_{MSY}	0.35	0.35	0.18	0.24	0.44	0.53
MSY	2 506 046	2 374 800	1 819 600	2 090 400	3 200 800	4 204 000
SB_{latest}	3 715 913	3 365 822	2 320 595	2 747 472	5 231 863	5 801 571
SB_{recent}	3 681 316	3 248 438	2 337 134	2 641 802	5 337 579	6 023 691
$SB_{F=0}$	6 844 279	6 466 725	5 102 043	5 753 337	8 444 739	9 440 668
$SB_{latest}/SB_{F=0}$	0.54	0.53	0.42	0.46	0.62	0.82
SB_{latest}/SB_{MSY}	4.17	3.91	2.24	3.07	5.62	8.92
SB_{MSY}	924 241	893 900	399 400	624 900	1 232 000	1 908 000
$SB_{MSY}/SB_{F=0}$	0.13	0.14	0.07	0.10	0.16	0.20
$SB_{recent}/SB_{F=0}$	0.53	0.51	0.40	0.45	0.63	0.68
SB_{recent}/SB_{MSY}	4.11	3.91	2.14	2.98	5.60	8.92
$Y_{Frecent}$	440 394	438 000	362 400	398 500	486 800	562 600
$20\%SB_{F=0}$	1 368 856	1 293 345	1 020 409	1 150 667	1 688 948	1 888 134
$SB_{recent}/SB_{F=0}$:iTRP	0.98	0.98	0.83	0.94	1.01	1.05
Including estimation uncertainty						
F_{recent}/F_{MSY}	0.35	0.35	0.16	0.24	0.45	0.59
$SB_{recent}/SB_{F=0}$	0.53	0.51	0.37	0.45	0.63	0.74
SB_{recent}/SB_{MSY}	4.11	3.90	1.92	2.95	5.61	10.73

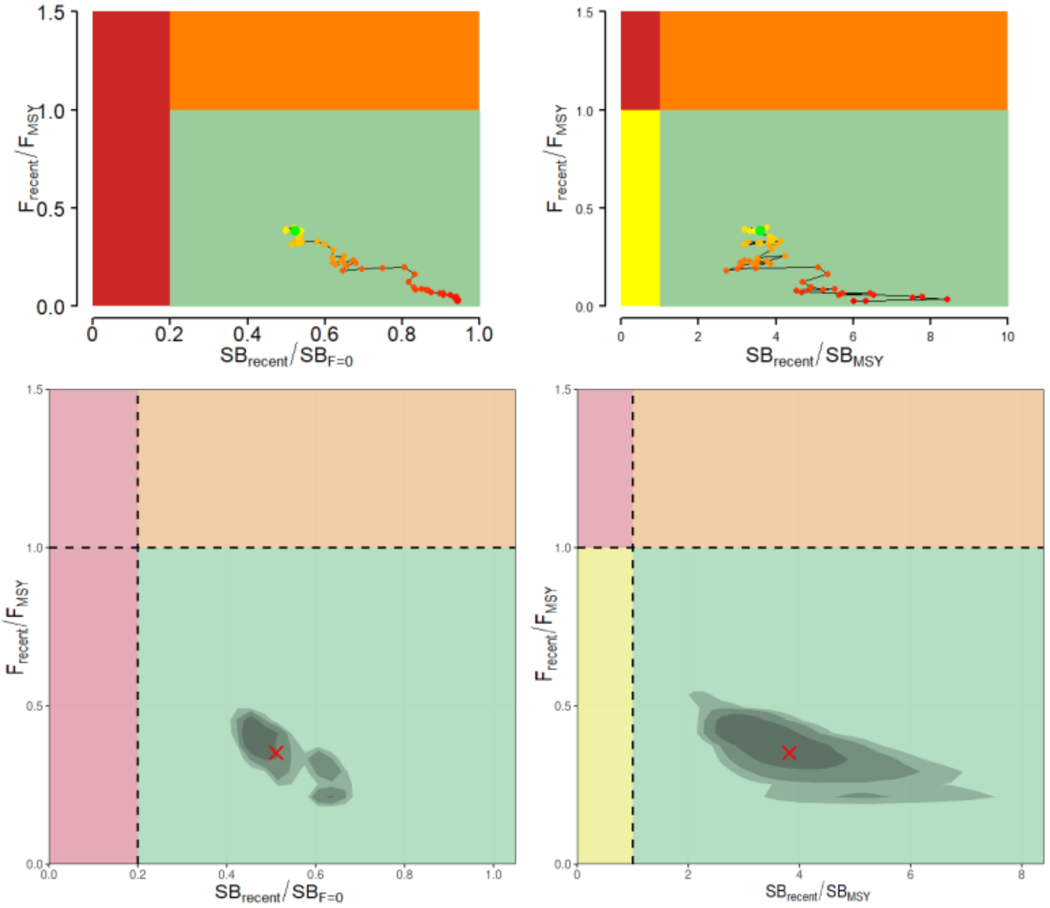


Figure 13: Majuro plots (left) and Kobe plots (right) summarizing the results for the dynamic MSY analysis (top; 4 years window moving back in time) and the Monte-Carlo random draws from the model ensemble (i.e., including estimation uncertainty) for the recent period (2021–2024; right). Colours for dynamic MSY go from red to green over time. Shading of model ensemble results indicate 50th, 80th, and 90th highest density regions. The red X in model ensemble represents the median. F_{msy} calculated as $1/F_{mult}$.

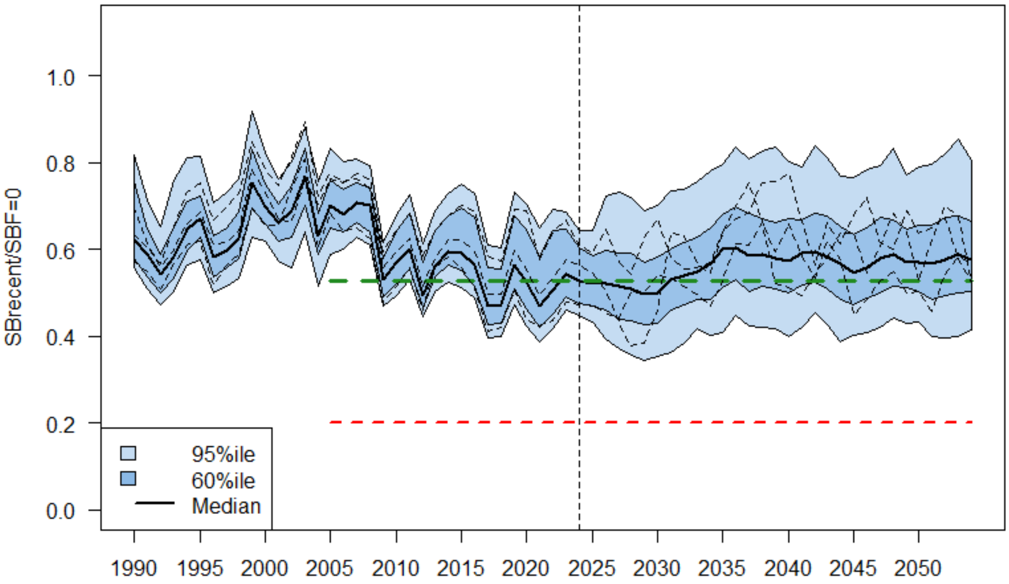


Figure 14: WCPO skipjack tuna spawning biomass depletion from the uncertainty grid of assessment model runs for the period 1990 to 2024 (the vertical line at 2024 represents the last year of the assessment), and stochastic projection results for the period 2025 to 2054, assuming 2024 catch and effort levels. Prior to 2025 the data represent the 60th and 95th percentiles of the uncertainty grid from the assessment models and the median. During the projection period (2025–2054), levels of recruitment variability estimated over the period used to estimate the stock-recruitment relationship (1984–2020) are assumed to continue. The dashed lines indicate 3 example trajectories (chosen randomly out of 8100) from the model grid. The red dashed line represents the WCPFC agreed LRP (0.20). The green dashed line represents the re-calibrated skipjack TRP level.

While acknowledging that ongoing improvements to the modelling are still needed, the SC21 accepted the 2025 skipjack stock assessment results and considered that they in general support the continued application of the skipjack management procedure (MP).

5.2 Estimates of fishery parameters and abundance

There are no fishery-independent indices of abundance for skipjack tuna. Unlike other pelagic tunas, the low selectivity of skipjack tuna to longline gear means that no relative abundance information is available from longline catch per unit effort data.

As was done in the previous assessment, the catch-conditioned approach (Davies et al. 2022) was applied in the 2025 stock assessment which allows the specification of ‘CPUE indices’ that are used to provide standardised indices of abundance. Ten CPUE indices were selected, six based on standardised Japanese pole-and-line CPUE (Nishimoto et al. 2025) in regions 1-4, 7 and 8, and four based on standardised purse seine CPUE in regions 5–8 (Teears et al. 2025; Nishimoto et al. 2025). The purse seine CPUE index in region 5 is based on a generalised linear model (GLM) standardised CPUE of the smaller Philippines based vessels that operate differently from the more industrial fleets operating in regions 6–8 for which a spatiotemporal CPUE model was developed. These CPUE indices cover varying periods of time depending on the availability and coverage of data (Teears et al. 2025).

5.3 Yield estimates and projections

No estimates of Maximum Constant Yield (*MCY*) and Current Annual Yield (*CAY*) are available.

5.4 Other factors

One area of concern with fisheries for skipjack tuna relates to the potential for significant bycatch of juvenile bigeye and yellowfin tunas in the purse seine fishery in equatorial waters. Juveniles of these species occur in mixed schools with skipjack tuna broadly through the equatorial Pacific Ocean and are vulnerable to large-scale purse seine fishing when sets are made on floating objects (FADs). The fishery in New Zealand fisheries waters is on single-species free schools.

Although the skipjack resource within New Zealand waters is considered to represent a component of the wider WCPO stock, the extent of the interaction between the domestic fishery and the fisheries in the equatorial region is unclear. Catches within New Zealand waters vary inter-annually due to prevailing oceanographic conditions. A review of domestic purse seine catch and effort data and associated aerial sightings data from the skipjack tuna fishery did not reveal any temporal trend in the availability of skipjack to the domestic fishery (Langley 2011). Recent analyses suggest that the oceanographic conditions that prevail during El Niño conditions may limit the availability of skipjack tuna to the New Zealand fishery (Langley 2019).

5.5 Research recommendations

SC21 identified a wide range of areas for improvement and suggested the following items for consideration in the development of the next stock assessment:

- Potential effort creep in purse seine CPUE.
- Data conflicts that affect assessment outcomes, and approaches to resolving them.
- Impact of tagging data on population scale.
- Tag diagnostics: Models that fit to tagging data require diagnostic plots that indicate a) the degree of mixing for the tags included in the model, b) the likelihood profile on the SSB scale by tagging programme, and c) tag mixing scenarios.
- Tag reporting rate priors.
- Tag mixing period: more appropriately modelling the tagging data externally using the approach being developed in collaboration with DTU to develop external abundance indices for the tagging data.
- Meta population structure: improve understanding of linkages between east Asian waters and WCPFC area; and east-west linkages across the Pacific.
- Growth and age structure research: conduct research to explore the epigenetic approach.

6. STATUS OF THE STOCK

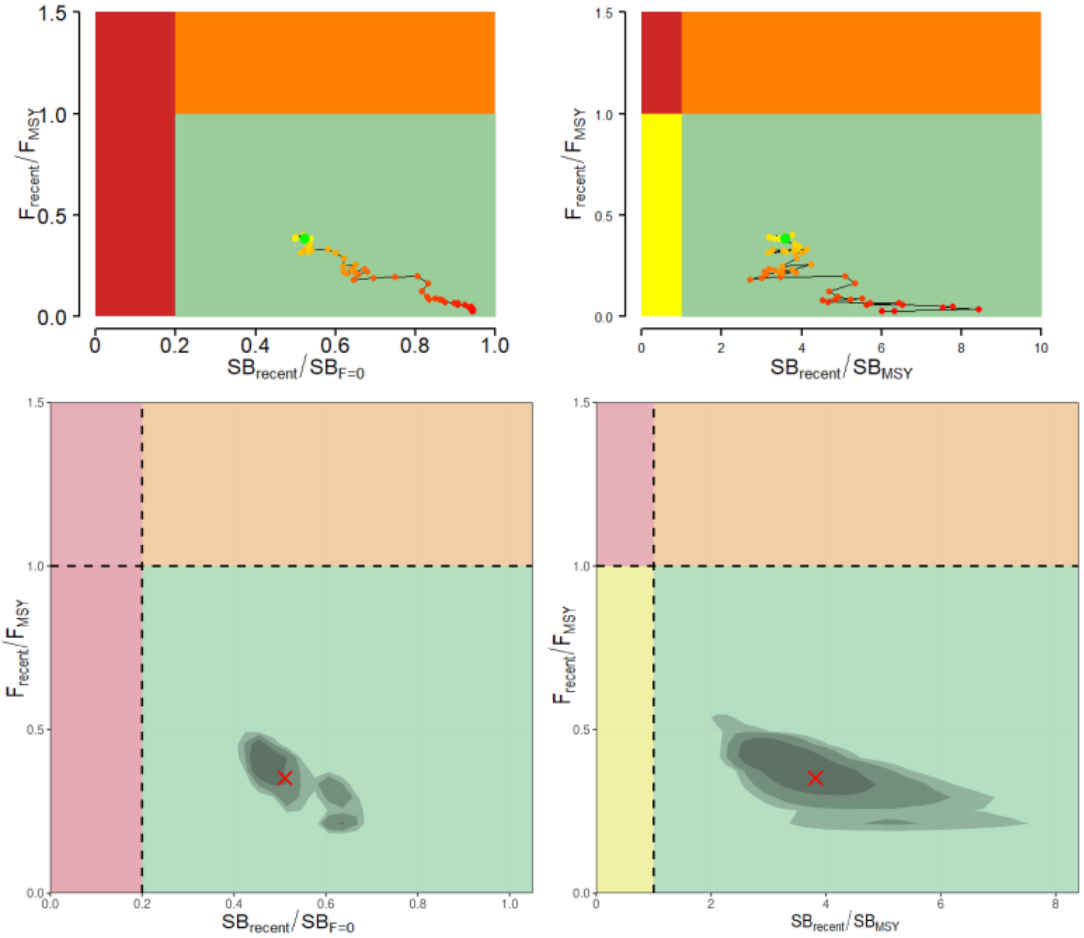
Stock structure assumptions

Skipjack tuna are considered to be a single stock in the western and central Pacific Ocean.

Stock Status		
Most Recent Assessment Plenary Publication Year	2025	
Intrinsic productivity level	High	
Catch in most recent year of assessment	Year: 2024	Catch: 914 t
Assessment Runs Presented	Diagnostic case and structural uncertainty grid	
Reference Points	Target: Agreed interim biomass-related target reference point (iTRP) of 52% SB_0 (recalibrated based on 2025 stock assessment) Soft Limit: Limit reference point of 20% SB_0 established by WCPFC equivalent to the HSS default soft limit of 20% SB_0 Hard Limit: Not established by WCPFC; but evaluated using HSS default of 10% SB_0 Overfishing threshold: F_{MSY}	
Status in relation to Target	About as Likely as Not (40–60%) at to be or at or above the interim biomass-related target	
Status in relation to Limits	Soft Limit: Exceptionally Unlikely (< 1%) to be below Hard Limit: Exceptionally Unlikely (< 1%) to be below	
Status in relation to Overfishing	Overfishing is Exceptionally Unlikely (< 1%) to be occurring	

Fishery and Stock Trends	
Recent Trend in Biomass or Proxy	The aggregated spawning biomass estimates suggested a steady decline until approximately the early 2020s when spawning biomass increased until the terminal year when it decreases slightly.
Recent Trend in Fishing Intensity or Proxy	Estimates of F/F_{MSY} indicate a steady increase over time with a sharp decline in the early 2020s followed by a sharp increase to the previous high level in the terminal year. All estimates (and confidence interval) were below 0.4 over the time-series.
Other Abundance Indices	-
Trends in Other Relevant Indicator or Variables	The estimated recruitment aggregated across all regions shows high inter-annual variation throughout the 1970s and 1980s and reduced variability, thereafter. Mean recruitment declines during the 1970s and 1980s, increases from 1990 until the mid-2000s, and is stable thereafter.

Historical Stock Status Trajectory and Current Status



Majuro plots (left) and Kobe plots (right) summarizing the results for the dynamic MSY analysis (top; 4 years window moving back in time) and the Monte-Carlo random draws from the model ensemble (i.e., including estimation uncertainty) for the recent period (2021–2024; right). Colours for dynamic MSY go from red to green over time. Shading of model ensemble results indicate 50th, 80th, and 90th highest density regions. The red X in model ensemble represents the median. F_{msy} calculated as $1/F_{mult}$.

Projections and Prognosis	
Stock Projections or Prognosis	Spawning biomass depletion is predicted to remain at current levels over the next five years at current levels of catch
Probability of Current Catch or TACC causing Biomass to remain below or to decline below Limits	Very Unlikely (< 10%)
Probability of Current Catch or TACC causing Overfishing to continue or to commence	Very Unlikely (< 10%)

Assessment Methodology and Evaluation		
Assessment Type	Level 1 – Fully Quantitative Stock Assessment	
Assessment Method	The assessment uses the stock assessment model MULTIFAN-CL.	
Assessment Dates	Latest assessment Plenary publication year: 2025	Next assessment: 2028
Overall assessment quality rank	1 – High Quality	

Main data inputs	- CPUE indices for pole-and-line and purse seine index fisheries - median estimated change in catchability over time applied to Japanese pole and line fishery for first time - reweighted length frequency data from purse seine and pole-and-line fisheries - data from Tagging Programmes	1 – High Quality (all)
Data not used (rank)	N/A	

Changes to Model Structure and Assumptions	– The application of the orthogonal polynomial recruitment parameterisation – The application of Lorenzen natural mortality parameterisation (Lorenzen, 1996) – The removal of tagging data from the Skipjack Survey and Assessment Program (SSAP) – The application of effort creep correction to the Japanese pole-and-line (JPPL) index fisheries – Changes to growth parameter estimation – The application of length-based selectivity – The application of updated fecundity estimates
Major Sources of Uncertainty	- Tagging data and associated model settings (tag mixing scenarios used) - CPUE uncertainty including potential hyperstability and effort creep (purse seine effort creep was not included in model runs) - Data conflicts that may be affecting assessment outcomes (CPUE indicates that biomass declined from 1990 to 2005, but the tagging programmes indicate stable biomass) - Assumptions related to the parameterisation of key model settings - Fits to size data and statistical weight given in model

Qualifying Comments
Model scaling from tag data - The SKJ assessment is built around data from Tagging Programmes (TPs). The tagging data, and the assumptions that go into modelling tags, strongly determine the

biomass estimated during each TP period. The effect of tagging data is evident in the model development series: the biomass trend from the 1970s to 1990 is fixed until the SSAP is removed. Once the SSAP data is removed the early biomass trend becomes much more responsive, such as when pole and line effort creep is included.

However, the biomass trend after 1990 stays largely the same, even when effort creep is added. This may be due to the constraining effects of the Regional Tuna Tagging Project (RTTP) in the early 1990s, and subsequently the Pacific Tuna Tagging Programme (PTTP) - from 2005 to the present.

7. FOR FURTHER INFORMATION

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