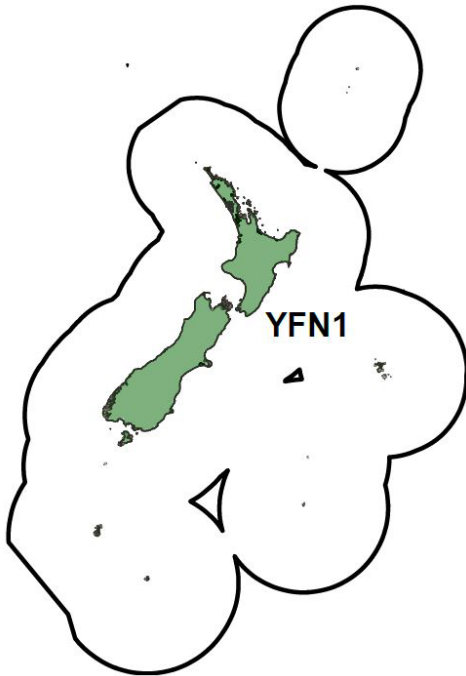


**YELLOWFIN TUNA (YFN)***(Thunnus albacares)***1. FISHERY SUMMARY**

Yellowfin tuna were introduced into the Quota Management System (QMS) on 1 October 2004 under a single Quota Management Area, YFN 1, with allowances, Total Allowable Commercial Catch (TACC), and Total Allowable Catch (TAC) given in Table 1.

**Table 1: Recreational and customary non-commercial allowances, TACC, and TAC (all in t) for yellowfin tuna.**

Fishstock	Recreational allowance	Customary non-commercial allowance	Other mortality	TACC	TAC
YFN 1	60	30	5	263	358

Yellowfin tuna was added to the Third Schedule of the 1996 Fisheries Act with a TAC set under s14 because yellowfin tuna is a highly migratory species, and it is not possible to estimate *MSY* for the part of the stock that is found within New Zealand fisheries waters.

Management of the yellowfin stock 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 of the Commission.

At its second annual meeting (2005) the WCPFC passed a Conservation and Management Measure (CMM) (this is a binding measure that all parties must abide by throughout the convention area including EEZs) relating to conservation and management of tunas. Key aspects of this resolution were presented in the 2006

Plenary document. A number of subsequent CMMs that impact on the catches of yellowfin have since been approved by the WCPFC.

At its annual meeting in 2014 the WCPFC approved CMM 2014-01. The aim of this CMM for yellowfin is to maintain the fishing mortality rate for yellowfin at a level no greater than  $F_{MSY}$ , although there are numerous exemptions and provisions. Controls on fishing mortality are being attempted through seasonal Fish Aggregating Device (FAD) closures, yellowfin purse seine catch limits, high seas purse seine effort limits, yellowfin longline catch limits, as well as other methods. This measure was amended and updated in 2017 through CMM2017-01.

In 2018, CMM 2018-01 (commonly referred to the “The Tropical Tuna Measure”) was approved; this stated that pending agreement on a target reference point for yellowfin, the spawning biomass depletion ratio ( $SB/SB_{F=0}$ ) is to be maintained at or above the average  $SB/SB_{F=0}$  for 2012–2015. These measures were subsequently amended and further strengthened in CMM 2020-01 and CMM 2021-01.

### 1.1 Commercial fisheries

Most of the commercial catch of yellowfin takes place in the equatorial western Pacific Ocean (WPO) where they are taken primarily by purse seine and longline. In New Zealand waters commercial catches of yellowfin tuna began in 1962 by distant water Asian longliners. Catches during the 1960s averaged 283 t. Yellowfin were not a target species for these fleets, and catches remained small and seasonal. Domestic tuna longline vessels began targeting bigeye tuna (*Thunnus obesus*) in 1990–91 in northern waters of Fishery Management Area (FMA) 1, FMA 2, and FMA 9 (Table 2). Catches of yellowfin increased with increasing longline effort, but, because yellowfin availability fluctuates dramatically between years, catches have been variable. In addition, small catches of yellowfin are made by trolling (2 t in 2022). In the past small amounts of catches were taken purse seine, handline, and pole and line, but no landings were recorded in 2022. Figure 1 shows historical landings and longline fishing effort for the YFN stock inside and outside New Zealand waters.

**Table 2: Reported catches or landings (t) of yellowfin tuna by fleet and fishing year. JPNFL, Japanese foreign licensed vessels; KORFL, foreign licensed vessels from the Republic of Korea; NZ, New Zealand domestic and charter fleet; MHR, Monthly Harvest Return Data from 2001–02 onwards; LFRR, estimated landings from Licensed Fish Receiver Returns. [Continued on next page]**

Fishing year	YFN 1 (all FMAs)				LFRR
	JPNFL	KORFL	NZ/MHR	Total	
1979–80	10.1			10.1	
1980–81	79.1	29.9		109	
1981–82	89.4	6.7		96.1	
1982–83	22.4	6.6		29	
1983–84	46.1	12.8		58.9	
1984–85	21.3	64.5		85.8	
1985–86	92.5	3.3		95.8	
1986–87	124.8	29		153.8	
1987–88	35.2	37.3		72.5	
1988–89	11.5	1.8		13.3	19
1989–90	29.1		4.3	33.4	6.3
1990–91	7.4		10.7	18.1	19.9
1991–92	0.2		16.1	16.3	11.8
1992–93			10.1	10.1	69.7
1993–94			50.5	50.5	114.4
1994–95			122.2	122.2	193.4
1995–96			251.6	251.6	156.7
1996–97			144.1	144.1	105.3
1997–98			93.6	93.6	174.7
1998–99			136.1	136.1	100.6
1999–00			77.8	77.8	168
2000–01			123.5	123.5	62.5
2001–02			64.5	56.7	61.9

Table 2: [Continued]

Fishing year	YFN 1 (all FMAs)				LFRR
	JPNFL	KORFL	NZ/MHR	Total	
2002–03			41.8	39.7	42.1
2003–04			57.7	21.1	21.4
2004–05			36.0	36.0	41.4
2005–06			9.2	9.2	8.8
2006–07			18.9	18.9	19.7
2007–08			22.2	22.2	22.3
2008–09			5.4	43.6	43.3
2009–10			6.2	6.2	48.2
2010–11			2.8	2.8	234.8
2011–12			2.2	2.2	742.6
2012–13			0.6	0.6	249.1
2013–14			1.4	1.4	200.8
2014–15			14.1	14.1	129.3
2015–16			57.6	57.6	73.4
2016–17			7.6	7.6	31.0
2017–18			23.1	23.1	81.7
2018–19			4.9	4.9	20.9
2019–20			10.2	10.2	42.0
2020–21			24.6	24.6	24.4
2021–22			3.2	3.2	3.0
2022–23			38.8	38.8	38.7
2023–24			9.2	9.2	9.2
2024–25			75.6	75.6	75.6

Catches from within New Zealand fisheries waters are very small (0.003% for the period 2015–2024 of the WCPO total) compared with those from the greater stock in the WCPO (Table 3). In contrast to New Zealand, where yellowfin within the EEZ has been taken exclusively by domestic longline since 2020 (Kendrick 2025), about half of the WCPO catches of yellowfin tuna were taken by troll in 2022, 12% by longlines, and 3% by pole and line.

In 2024–25, for all longline fisheries, southern bluefin tuna (*Thunnus maccoyii*) made up the bulk of the catch (24%) and yellowfin tuna made up 11% of the catch (Figure 2). Surface longline fishing effort is distributed off the east coast of the North Island and the south-west coast of the South Island. The south-west coast South Island fishery predominantly targets southern bluefin tuna, whereas the east coast North Island fishery targets a range of species including bigeye, swordfish (*Xiphias gladius*), and southern bluefin tuna.

From 2014–15 to 2020–21, more than 70% of yellowfin tuna were alive when brought to the side of domestic longline vessels (Table 4). During the same period between 86% and 100% of yellowfin tuna catch was retained (Table 5).

YELLOWFIN TUNA (YFN) – Nov 2025

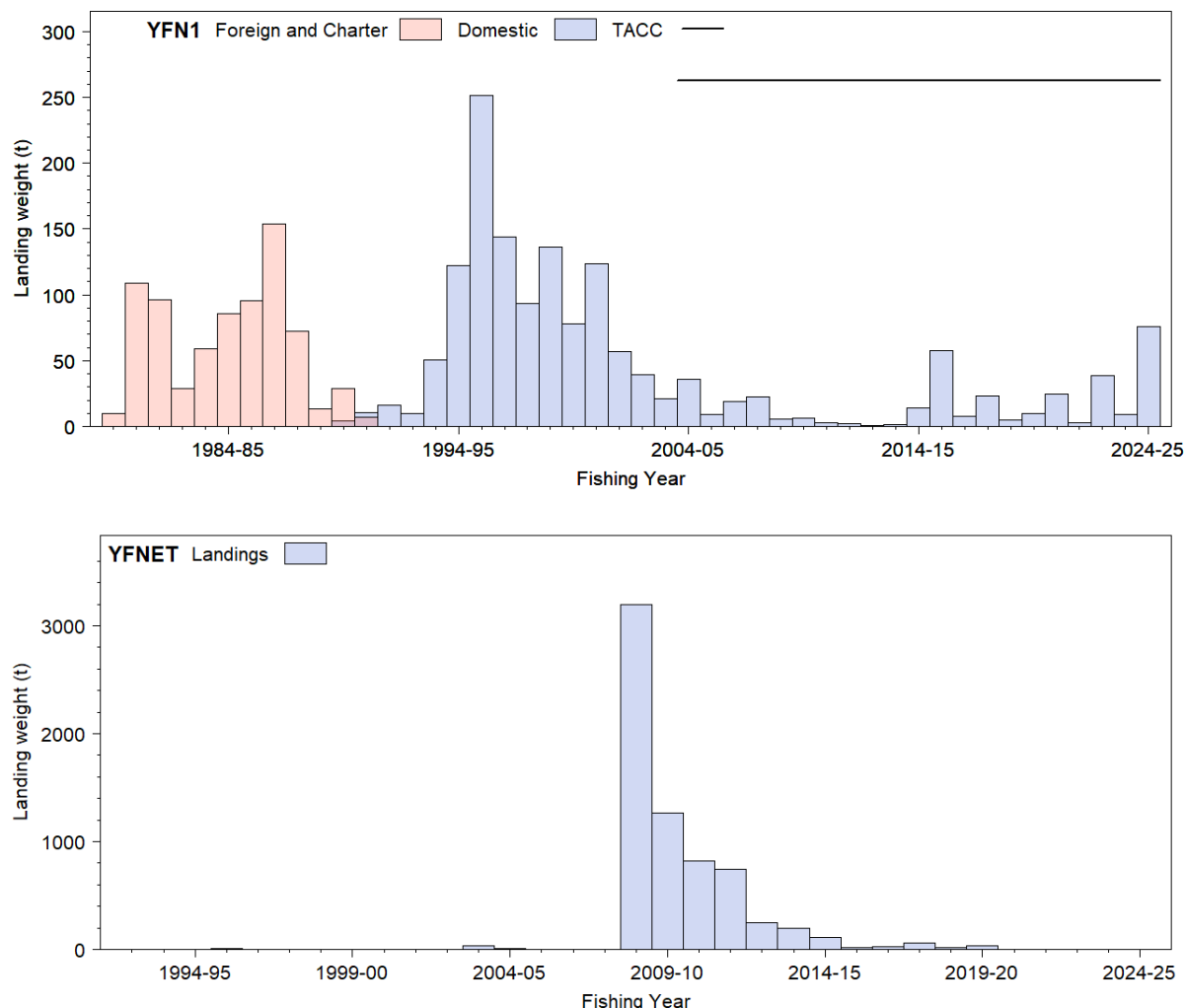


Figure 1: [Top] Yellowfin catch by foreign licensed and New Zealand vessels from 1979–80 to present within New Zealand waters (YFN 1). [Bottom] Yellowfin catch by foreign licensed and New Zealand vessels from 1992–93 to present on the high seas (YFN ET).

Table 3: Reported total New Zealand (within EEZ) landings, catch made by New Zealand vessels outside New Zealand fisheries waters (NZ ET)\*, and WCPO landings (t) of yellowfin tuna from 1991 to present.

Year	NZ landings (t)	NZ ET landings (t)	WCPO landings (t)	Year	NZ landings (t)	NZ ET landings (t)	WCPO landings (t)
1991	6	–	460 490	2008	12	3 200	644 365
1992	20	–	456 509	2009	3	1 264	558 914
1993	34	–	418 098	2010	6	818	564 607
1994	53	–	449 222	2011	3	966	530 946
1995	141	–	442 805	2012	2	1 042	625 697
1996	198	–	425 669	2013	1	837	578 467
1997	143	–	481 019	2014	1	199	618 262
1998	127	–	536 845	2015	14	115	589 128
1999	154	–	474 648	2016	57	74	660 291
2000	107	–	506 028	2017	10	369	710 202
2001	138	–	504 501	2018	20	964	696 706
2002	25	–	489 995	2019	5	167	682 704
2003	38	–	563 926	2020	11	171	726 851
2004	20	–	595 888	2021	22	41	758 208
2005	36	2 486	551 822	2022	8	0	676 012
2006	14	2 679	537 076	2023	36	0	712 822
2007	25	2 329	565 930	2024	12	0	646 330

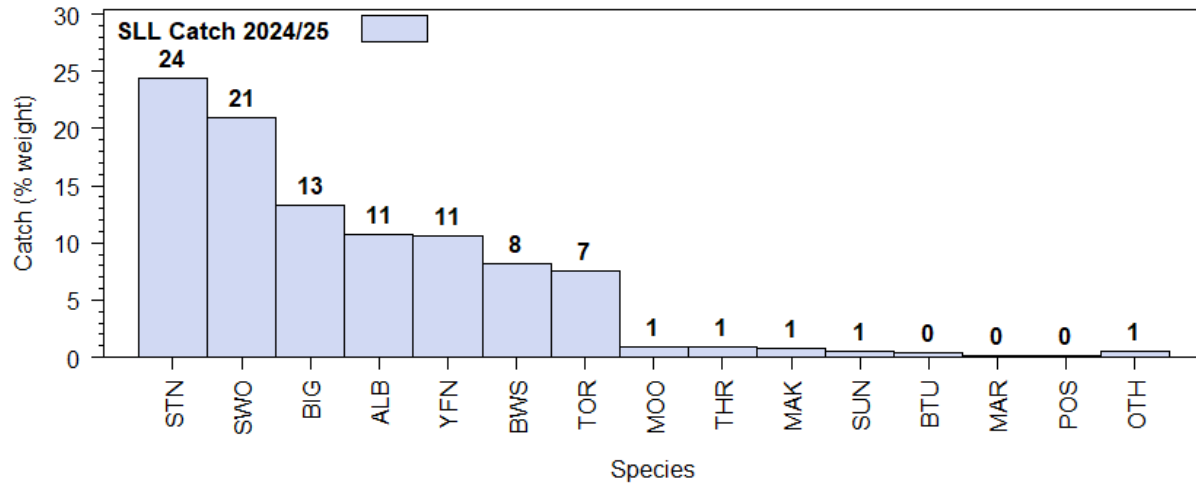


Figure 2: A summary of species composition of the surface longline estimated catch for the most recent fishing year. The percentage by weight of each species is calculated for all surface longline trips.

Table 4: Percentage of yellowfin tuna (including discards) that were alive or dead when arriving at domestic longline vessels and observed during 2014–15 to 2020–21 (Griggs et al. 2021, Griggs et al. 2024).

Year	% alive	% dead	Number
2014–15	81.0	19.0	21
2015–16	77.2	22.8	79
2016–17	72.7	27.3	22
2017–18	80.8	19.2	78
2018–19	82.3	17.7	62
2019–20	75.4	24.6	114
2020–21	78.0	22.0	182

Table 5: Percentage yellowfin that were retained, or discarded or lost, when observed on a longline vessel 2014–15 to 2020–21; –, small sample or none caught (Griggs et al. 2021, Griggs et al. 2024).

Year	% retained	% discarded or lost	Number
2014–15	100.0	0.0	21
2015–16	96.2	3.8	79
2016–17	100.0	0.0	22
2017–18	85.9	14.1	78
2018–19	–	–	6
2019–20	96.8	3.2	62
2020–21	90.4	9.6	114

### 1.2 Recreational fisheries

Recreational fishers used to make regular catches of yellowfin tuna particularly during summer months and especially in FMA 1 and FMA 2 where the recreational fishery targeted yellowfin as far south as the Wairarapa coast. Yellowfin is taken by fishers targeting it predominantly as a gamefish and is prized for food. Yellowfin comprise part of the voluntary recreational gamefish tag and release programme and an average of 15 fish have been tagged per year over the last decade (2012–13 to 2021–22). Although the magnitude of the recreational catch is unknown, number of fish weighed at sport fishing clubs dropped from over 1000 fish per year in the 1990s to only 8 fish per year during 2011–14 and has fluctuated between about 50 and 550 fish per year since this time.

### 1.2.1 Management controls

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

### 1.2.2 Estimates of recreational harvest

No estimates of recreational harvest of yellowfin tuna were generated from the telephone-diary surveys conducted in 1994, 1996, and 2000 because few yellowfin tuna 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 of 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). Note that national panel survey estimates do not include recreational harvest taken on charter vessel trips or under s111 general approvals. The national panel survey results do not include estimates for yellowfin tuna because the surveys did not capture information on the fishers and fishing activity for the large gamefish species well.

### 1.3 Customary non-commercial fisheries

An estimate of the current customary catch is not available.

### 1.4 Unreported catch

There is no known unreported catch of yellowfin tuna in the EEZ. Estimates of unreported catch are not available but are probably insignificant.

### 1.5 Other sources of mortality

Discard rates averaging 6.6% were observed in the longline fishery for yellowfin tuna over the period 2018–19 to 2020–21 (Griggs et al. 2024).

## 2. BIOLOGY

Yellowfin tuna are epipelagic opportunistic predators of fish, crustaceans, and cephalopods. Yellowfin tuna are found from the surface to depths where low oxygen levels are limiting (about 250 m in the tropics but probably deeper in temperate waters). Individuals found in New Zealand waters are mostly adults that are distributed in the tropical and temperate waters of the western and central Pacific Ocean. Adults reach a maximum size of 200 kg and length of 239 cm (fork length, FL). Maturity is reached at 60 to 80 cm (1 to 2 years old), and the size at 50% maturity is estimated to be 105 cm. The maximum reported age is 8 years. Spawning takes place at the surface at night mostly within 10° of the equator when temperatures exceed 24 °C. Spawning takes place throughout the year, but the main spawning season is November to April. Yellowfin are serial spawners, spawning every few days throughout the peak of the season.

Natural mortality is assumed to vary with age. A range of von Bertalanffy growth parameters has been estimated for yellowfin in the Pacific Ocean depending on area (Table 6).

**Table 6: von Bertalanffy growth parameters for yellowfin tuna by country or area.**

Country/Area	$L_{\infty}$ (cm)	$K$	$t_0$
Philippines	148.0	0.420	
Mexico	162.0	0.660	
Western tropical Pacific	166.0	0.250	
Japan	169.0	0.564	
Mexico	173.0	0.660	
Hawaii	190.0	0.454	
Japan	191.0	0.327	-1.02

Females predominate in the longline catch of yellowfin tuna in the New Zealand EEZ (0.25:0.75 males:females).

In 2020, age data for 1567 yellowfin were obtained for growth analysis, consisting of 119 daily age estimates and 1448 annual age estimates as reported by SC16-SA-WP-02. Otoliths were selected for analysis from the WCPFC Tuna Tissue Bank using a 1-cm length-stratified approach. Most otoliths were from fish between 30 and 160 cm FL; however, only 62 otoliths were available from fish  $\geq 150$  cm FL and only nine of those were from fish  $\geq 160$  cm FL. All otoliths were sectioned and read by Fish Ageing Services Pty Ltd (FAS). A new algorithm was developed to estimate decimal (fractional) age using the counts of opaque zones and otolith measurements. The algorithm does not rely on a single assumed birth date for all fish, otolith edge type, or increment formation period and provides a more sensible conversion of zone count to age, particularly for species with protracted spawning, such as yellowfin tuna and bigeye tuna.

The longevity of yellowfin tuna was found to be at least 15 years, although 89% of fish were  $< 6$  years old. Limited direct age validation is available for yellowfin tuna in the WCPO; however, analysis of two chemically marked otoliths (Farley et al. 2019), and edge type analysis, indicates that one opaque zone is deposited annually in yellowfin tuna otoliths.

The new decimal age algorithm produced age estimates that are consistent with the daily age data and exhibit much less variability in length at age, particularly at young ages ( $< 3-4$  years). Parameter estimates for standard von Bertalanffy and Richards growth models were obtained from the combined daily and annual age estimates, with the Richards model preferred based on statistical tests and residuals analysis. The resulting Richards model parameter estimates using only high readability age determinations were  $L_{\infty}=152.0$  cm FL,  $K = 0.40 \text{ y}^{-1}$ ,  $b = 0.85$ , and  $t_0 = -0.55 \text{ y}$ .

No significant differences were found in growth between sexes, but there was some evidence of longitudinal differences, with yellowfin tuna sampled between  $140^{\circ}$  E and  $180^{\circ}$  growing to a larger size-at-age than those sampled to the east and west.

### 3. STOCKS AND AREAS

Yellowfin tuna in New Zealand waters are part of the western and central Pacific Ocean stock that is distributed throughout the north and south Pacific Ocean west of about  $150^{\circ}$  W. New Zealand is on the margins of yellowfin distribution and therefore will be impacted by any range contraction associated with stock decline or changed environmental conditions.

### 4. ENVIRONMENTAL AND ECOSYSTEM CONSIDERATIONS

This summary is from the perspective of yellowfin tuna but there are no directed fisheries for this species.

#### 4.1 Role in the ecosystem

Yellowfin tuna are large pelagic predators, so they are likely to have a ‘top down’ effect on the fish, crustaceans, and squid they feed on.

#### 4.2 Non-target fish catch

Observer records indicate that a wide range of species are landed by the longline fleets in New Zealand fisheries waters. Blue sharks (*Prionace glauca*) are the most commonly landed species (by number), followed by lancetfish (*Alepisaurus* spp.), and Ray’s bream (*Brama brama*) (Table 7).

The major fish bycatch species can be divided into three groups: species that are typically discarded and are usually alive (e.g., sunfish and pelagic stingray), species that are typically discarded and are usually dead (e.g., dealfish and lancetfish), and species that are typically retained but may be returned to the sea (e.g., rudderfish). For species listed in the QMS (e.g., mako shark and porbeagle shark), dead releases count against a fisher’s quota. Blue, mako, and porbeagle sharks have usually been discarded since finning was banned in New Zealand, with the proportion alive highest for blue sharks and lowest for porbeagle sharks.

In 2022, the following observations were made for shark, ray, and mammal captures in longline fisheries.

- No manta rays were observed caught.
- No silky, oceanic whitetip, great white, or whale sharks were observed caught.
- One orca was observed caught but released alive without injuries. No other marine mammals were observed caught.

**Table 7: Total estimated catch (numbers of fish) of common bycatch species in the New Zealand surface longline fishery as estimated from observer data from 2017 to 2022. Observer data too limited to raise to the fleet for 2023. Also provided is the percentage of these species retained (2022 data only) and the percentage of fish that were alive when discarded, N/A (none discarded).**

Species	2017	2018	2019	2020	2021	2022	% retained (2022)	discards % alive (2022)
Blue shark	49 924	63 618	89 377	37 093	39 524	65 277	0	91.9
Porbeagle shark	3 101	2 594	2 883	1 320	2 248	2 810	0	29.2
Lancetfish	13 274	13 163	18 747	11 457	4 211	2 212	0	2.1
Butterfly tuna	406	419	348	120	388	663	96.0	0
Moonfish	2 022	2 698	1 975	1 834	1 033	526	100.0	N/A
Oilfish	227	602	417	1 149	504	510	0	74.3
Pelagic stingray	1 798	2 949	526	1 721	3 182	508	0	97.1
Ray’s bream	2 421	1 579	1 949	3 211	2 514	494	90.0	10.0
Mako shark	1 391	2 721	1 138	859	933	310	0	72.2
Striped marlin	290	247	157	279	426	175	0	66.7
Escolar	300	594	488	808	388	146	0	30.0
Skipjack tuna	57	184	8	134	110	117	100.0	N/A
Rudderfish	680	253	186	164	221	80	66.7	33.3
Dealfish	72	25	23	69	18	80	0	33.3
Sunfish	1 648	3 648	1 982	1 618	1 537	56	0	100.0
Big scale pomfret	17	34	0	52	17	53	0	50.0
School shark	59	187	116	29	64	27	100.0	N/A
Deepwater dogfish	32	6	90	29	42	27	0	100.0
Thresher shark	260	253	193	269	161	15	0	0

#### 4.3 Benthic interactions

There are no known interactions with benthic habitats in this fishery.

## 5. STOCK ASSESSMENT

With the establishment of WCPFC in 2004, stock assessments of the WCPO stock of yellowfin tuna are undertaken by the Oceanic Fisheries Programme (OFP) of the Secretariat of the Pacific Community (SPC) under contract to WCPFC.

No assessment is possible for yellowfin within the New Zealand EEZ because the proportion of the stock found within New Zealand fisheries waters is unknown and is likely to vary from year to year.

The yellowfin stock assessment was updated by the SPC in 2023 in WCPFC-SC19-2023/SA-WP-04 (Magnusson et al. 2023) and reviewed by the WCPFC Scientific Committee (SC19) in August 2023. The paper described the 2023 stock assessment of yellowfin tuna *Thunnus albacares* in the western and central

Pacific Ocean. The model time period now extends to the end of 2021, adding a further three years of data since the last stock assessment was conducted in 2020. The assessment moved to a new 5-region spatial structure with improved convergence properties, and which achieved a positive definite Hessian solution, which was a requirement for future assessments from SC18. This change was made during the stepwise model development process. The 5-region model, given its superior convergence properties to the original 9-region model, is used as the basis for the structural uncertainty grid and stock status conclusions.

Additional new developments to the stock assessment, many of which have emanated from an independent peer review of the 2020 yellowfin assessment (Punt et al. 2023), include:

- Conversion from a catch-errors to a catch-conditioned approach, and the inclusion of a likelihood component for the CPUE from the index fisheries.
- Change from using VAST to sdmTMB to standardise the input CPUE series and the inclusion of additional covariates in the CPUE model.
- Different CPUE variances used for the CPUE associated with each index fishery, applying a new approach to estimate these variances.
- Internal estimation of natural mortality and application of the Lorenzen form of natural mortality at age.
- Additional procedures implemented for achieving more reliable model convergence, including jittering and checking positive definite Hessian status for all grid models.
- Integration of parameter estimation uncertainty with model-based uncertainty across the model grid for the key management reference points.
- Additional size composition filtering.
- Modifications to selectivity estimation settings, changes to fisheries with non-decreasing selectivity.
- Adoption of revised tagger effect modelling framework, reverting to assumptions similar to those used in 2017.
- Changes to size data weighting and down weighting the conditional age-at-length data for internal growth estimation.

The general conclusions of this assessment are as follows:

- The spawning potential of the stock has become more depleted across all model regions until around 2010, after which it has become more stable, or shown a slight increase.
- Average fishing mortality rates for juvenile and adult age classes have increased throughout the period of the assessment, although more so for juveniles which have experienced considerably higher fishing mortality than adults. In the recent period, a sharp increase in juvenile fishing mortality is estimated, while adult fishing mortality has stabilised.
- Overall, median depletion from the model grid for the recent period (2018–2021;  $SB_{recent}/SB_{F=0}$ ) is estimated at 0.47 (80 percentile range including estimation and structural uncertainty 0.42–0.52, full range 0.33–0.60).
- No models from the uncertainty grid, including estimation uncertainty, estimate the stock to be below the LRP of  $20\%SB_{F=0}$ .
- CMM 2021-01 contains an objective to maintain the spawning biomass depletion ratio above the average of 2012–2015,  $SB_{2012-2015}/SB_{F=0}$ , which is a value of 0.44 calculated across the unweighted grid. Based upon the estimates of  $SB_{recent}/SB_{F=0}$  of 0.47, this objective has currently been met.
- Recent (2017–2020) median fishing mortality ( $F_{recent}/F_{MSY}$ ) was 0.50 (80 percentile range, including estimation and structural uncertainty 0.41–0.62, full range 0.26–0.78).
- Assessment results suggest that the yellowfin stock in the WCPO is not overfished, nor undergoing overfishing.

SC19 noted that the SPC made significant improvements to the WCPO yellowfin tuna assessment based upon the recommendations from the peer review of the 2020 yellowfin tuna assessment, and from several recent CAPAM (Centre for the Advancement of Assessment Modelling) meetings. Nevertheless, SC19 noted several research recommendations for the further development and improvement of the WCPO yellowfin tuna assessment.

- Exploration into the conflict between the length and weight composition data, if unresolved this conflict should be reflected within future structural uncertainty grids.
- Exploration of a simplification of the spatial structure by using a single area, with ‘areas-as-fleets’.
- Exploration of alternative approaches to modelling of tagging data, including consideration of the most appropriate mixing periods for different regions and development of stand-alone tagging (mark-recapture) models.
- Exploration of which parameters are most sensitive to initial model starting values, and taking steps to reduce the impact of starting values on the results in future assessments; this could include simplification of models and/or systematic use of jittering.
- Further research to improve estimates of catches (both historical and recent) in the fisheries of Indonesia, the Philippines, and Vietnam through the continued funding of the WPEA monitoring project.
- An exploration of seasonal and regional growth traits for the stock assessment.
- A study on longline CPUE standardisation process considering effort creep.
- Developing alternative CPUE scenarios with different implied regional weightings.

### 5.1 Stock status and trends

The 2023 WCPO yellowfin tuna assessment provides stock status based upon a 54-model structural uncertainty grid with four axes: steepness with three levels, tag mixing period with two levels, and size and age composition data with three levels each, as given in Table 8. SC19 recommended that the proposed axes of uncertainty be accepted and that all models should be weighted equally. An important improvement in the characterisation of uncertainty was the inclusion of estimation uncertainty for each of the models in the grid and that the most influential axis of uncertainty in the grid was steepness.

The spatial structure used in the 2023 stock assessment is shown in Figure 3; the simplification of the model from 9 regions to 5 regions improved the convergence of the model.

The time series of total annual catch by fishing gear over the full assessment period is shown in Figure 4. The time series of total annual catch by fishing gear and assessment region is shown in Figure 5. Estimated annual average recruitment, spawning potential, and total biomass by model region is shown in Figure 6. Estimated trends in spawning potential depletion ( $SB/SB_{F=0}$ ) for the 54 models in the structural uncertainty grid are shown in Figure 7, and juvenile and adult fishing mortality rates from the diagnostic model are shown in Figure 8. Estimates of the reduction in spawning potential due to fishing by region are shown in Figure 9. Estimated trends in spawning potential for the 54 models are shown in Figure 10. Majuro and Kobe plots summarising the results for each of the 54 models in the structural uncertainty grid are shown in Figure 11. A comparison of the dynamic  $MSY$  for the diagnostic model compared with annual catch by the main gear types is shown in Figure 12.

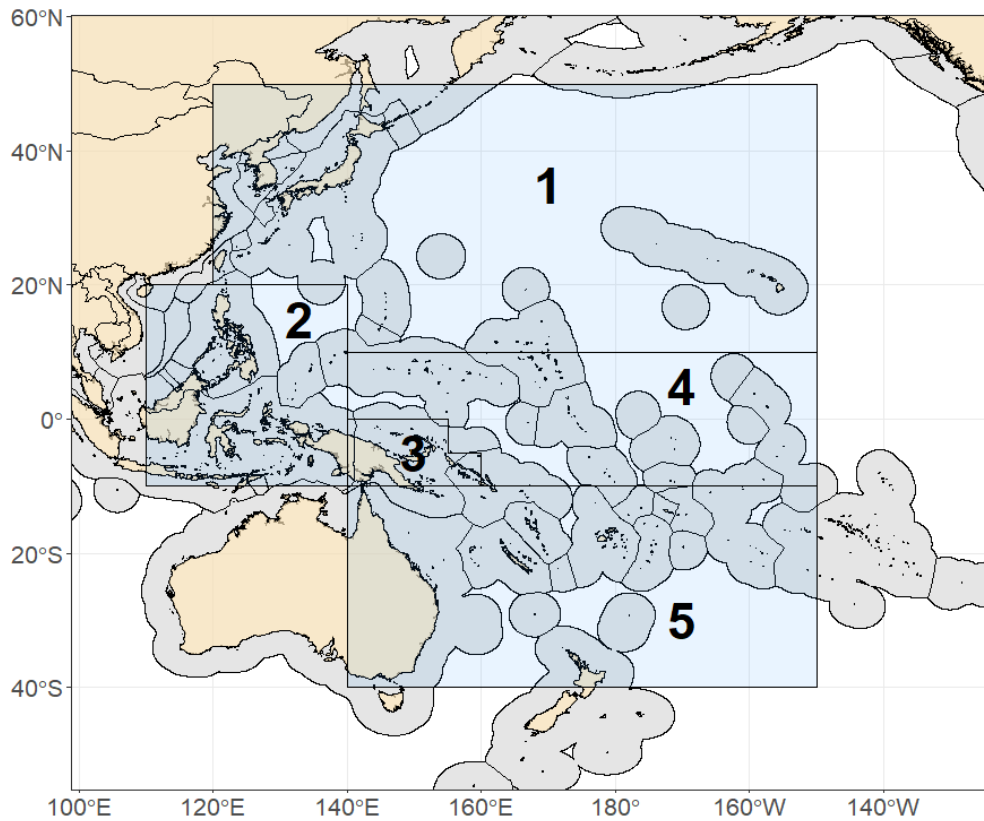
The preliminary estimate of total catch of WCPO yellowfin tuna for 2022 was 721 169 mt which was lower than the 2021 level. Longline catch in 2022 (84 232 mt) was higher than the 2021 catch but lower than the recent 10-year average. Purse seine catch in 2022 (379 715 mt) was similar to the 2021 catch and higher than the recent 10-year average (Figure 4).

**Table 8: Summary of reference points over the 54 individual models in the structural uncertainty grid, along with results incorporating estimation uncertainty.**

	Mean	Median	Min	10%ile	90%ile	Max	Diagnostic model
$C_{latest}$	751 657	751 856	750 785	750 860	752 268	752 337	751 908
$F_{MSY}$	0.07	0.07	0.06	0.06	0.09	0.09	0.07
$F_{mult}$	1.96	2.00	1.47	1.64	2.38	2.50	1.89
$F_{recent}/F_{MSY}$	0.51	0.50	0.40	0.42	0.61	0.68	0.53
$MSY$	697 874	700 400	616 800	644 320	739 560	771 600	671 600
$SB_0$	5 761 796	5 729 000	4 455 000	4 817 200	6 640 900	7 279 000	5 216 000
$SB_{F=0}$	5 633 743	5 603 267	4 624 645	4 907 798	6 280 841	6 825 888	5 173 954
$SB_{latest}/SB_0$	0.49	0.50	0.41	0.44	0.54	0.56	0.49
$SB_{latest}/SB_{F=0}$	0.50	0.50	0.41	0.45	0.55	0.58	0.49
$SB_{latest}/SB_{MSY}$	2.49	2.48	1.78	1.91	3.11	3.16	2.44
$SB_{MSY}$	1 177 733	1 160 500	740 400	838 260	1 538 200	1 707 000	1 044 000
$SB_{MSY}/SB_0$	0.20	0.20	0.17	0.17	0.23	0.24	0.20
$SB_{MSY}/SB_{F=0}$	0.21	0.21	0.16	0.17	0.24	0.25	0.20
$SB_{recent}/SB_{F=0}$	0.47	0.47	0.38	0.42	0.52	0.54	0.46
$SB_{recent}/SB_{MSY}$	2.31	2.30	1.68	1.77	2.89	2.94	2.27
$Y_{Recent}$	157 188	155 300	141 400	145 150	172 270	173 300	152 500

	Mean	Median	Min	10%ile	90%ile	Max
$SB_{recent}/SB_{F=0}$	0.47	0.47	0.36	0.42	0.52	0.59
$F_{recent}/F_{MSY}$	0.51	0.50	0.26	0.41	0.62	0.78
$SB_{recent}/SB_{MSY}$	2.31	2.28	0.93	1.73	2.95	3.59



**Figure 3: The geographical area covered by the stock assessment and the boundaries of the model regions for the 5-region structure used for 2023 WCPO yellowfin tuna assessment.**

YELLOWFIN TUNA (YFN) – Nov 2025

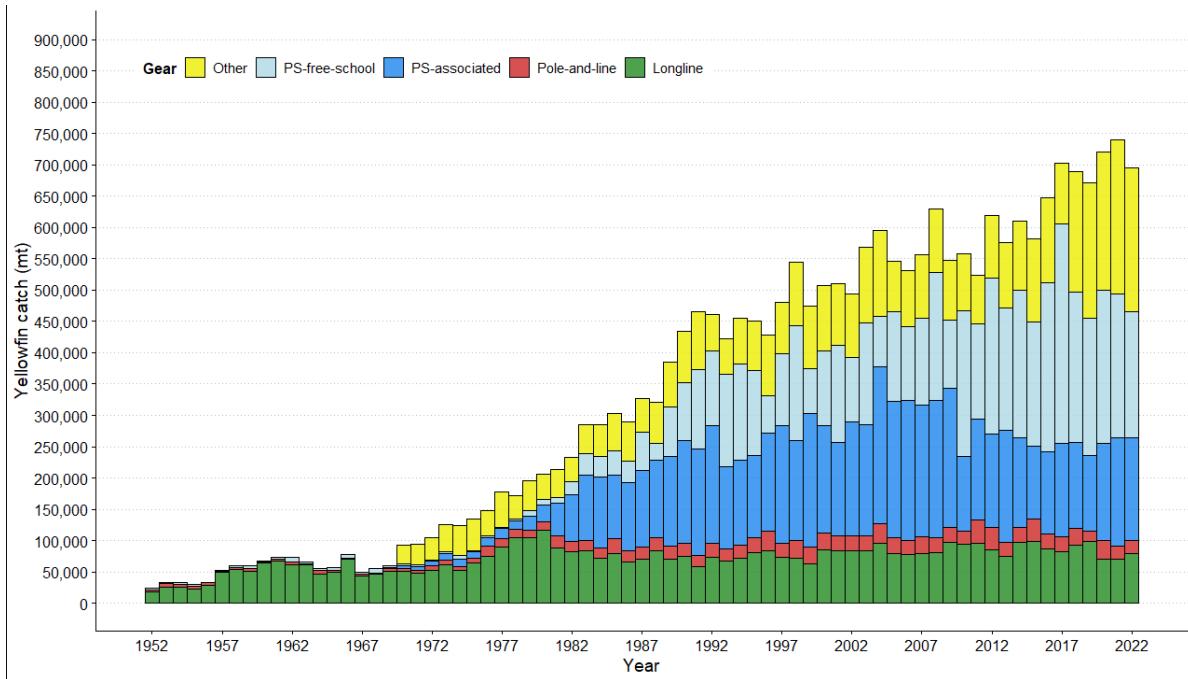


Figure 4: Annual catches of yellowfin by gear type in the WCPO area covered by the assessment.

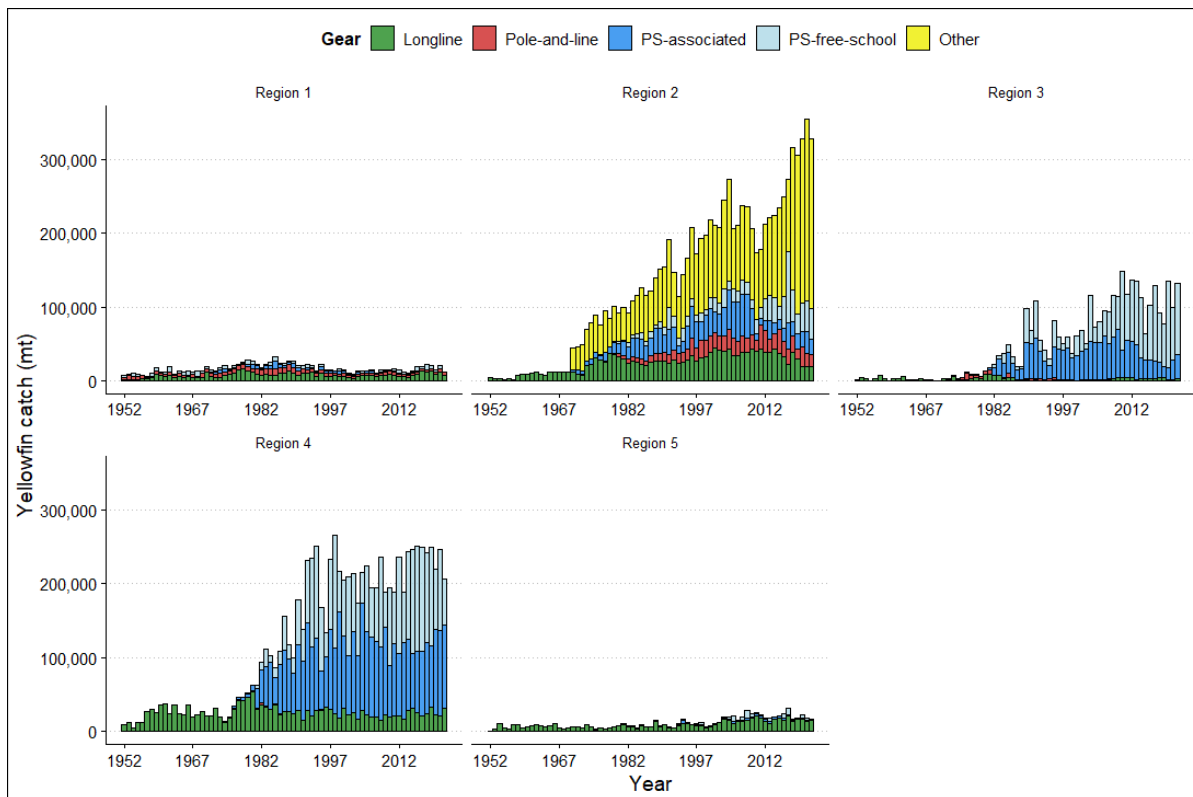
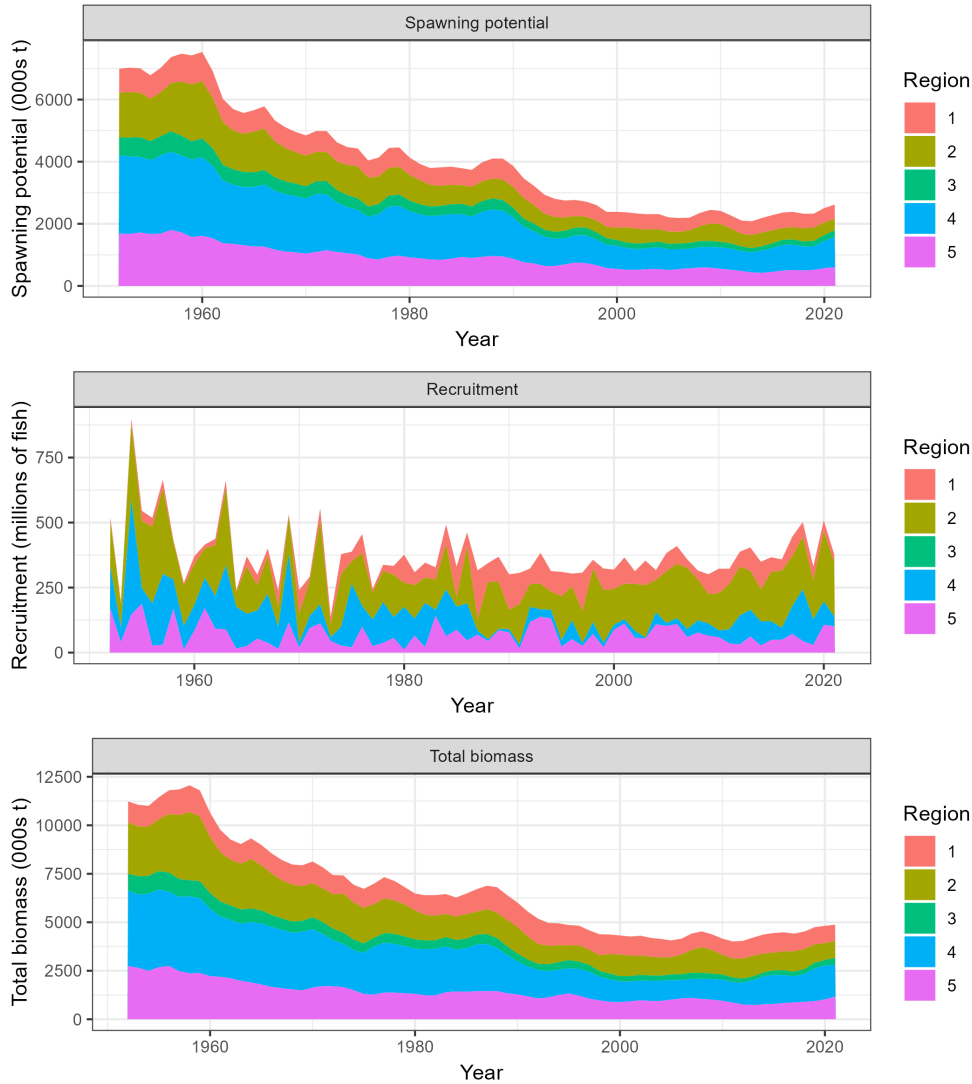


Figure 5: Annual catches of yellowfin by gear type for each of the five model regions.



**Figure 6: Time series of estimated annual spawning potential, recruitment, and total biomass by model region for the diagnostic model, showing the relative proportions among regions. Note the data represent the averages of the quarterly model time steps for each year for spawning potential and total biomass and the sum of the quarterly recruitment estimates for annual recruitment.**

The 2023 WCPO yellowfin tuna stock assessment median depletion from the model grid for the recent period (2018–2021;  $SB_{recent}/SB_{F=0}$ ) was estimated at 0.47 (10th to 90th percentile interval of 0.42 to 0.52, including estimation and structural uncertainty). For all models in the grid  $SB_{recent}/SB_{F=0}$  was above the biomass limit reference point. The recent median fishing mortality (2017–2020;  $F_{recent}/F_{MSY}$ ) was 0.50 (10th to 90th percentile interval of 0.41 to 0.62, including estimation and structural uncertainty, Table 9). For all models in the grid,  $F_{recent}/F_{MSY}$  was less than one.

The spawning potential of the stock became more depleted across all model regions until around 2010, after which it has become more stable or shown a slight increase.

Average fishing mortality rates for juvenile and adult age classes have increased throughout the period of the assessment, although more so for juveniles, which have experienced considerably higher fishing mortality than adults. In the recent period (2015–2021), a sharp increase in juvenile fishing mortality was estimated, while adult fishing mortality stabilised.

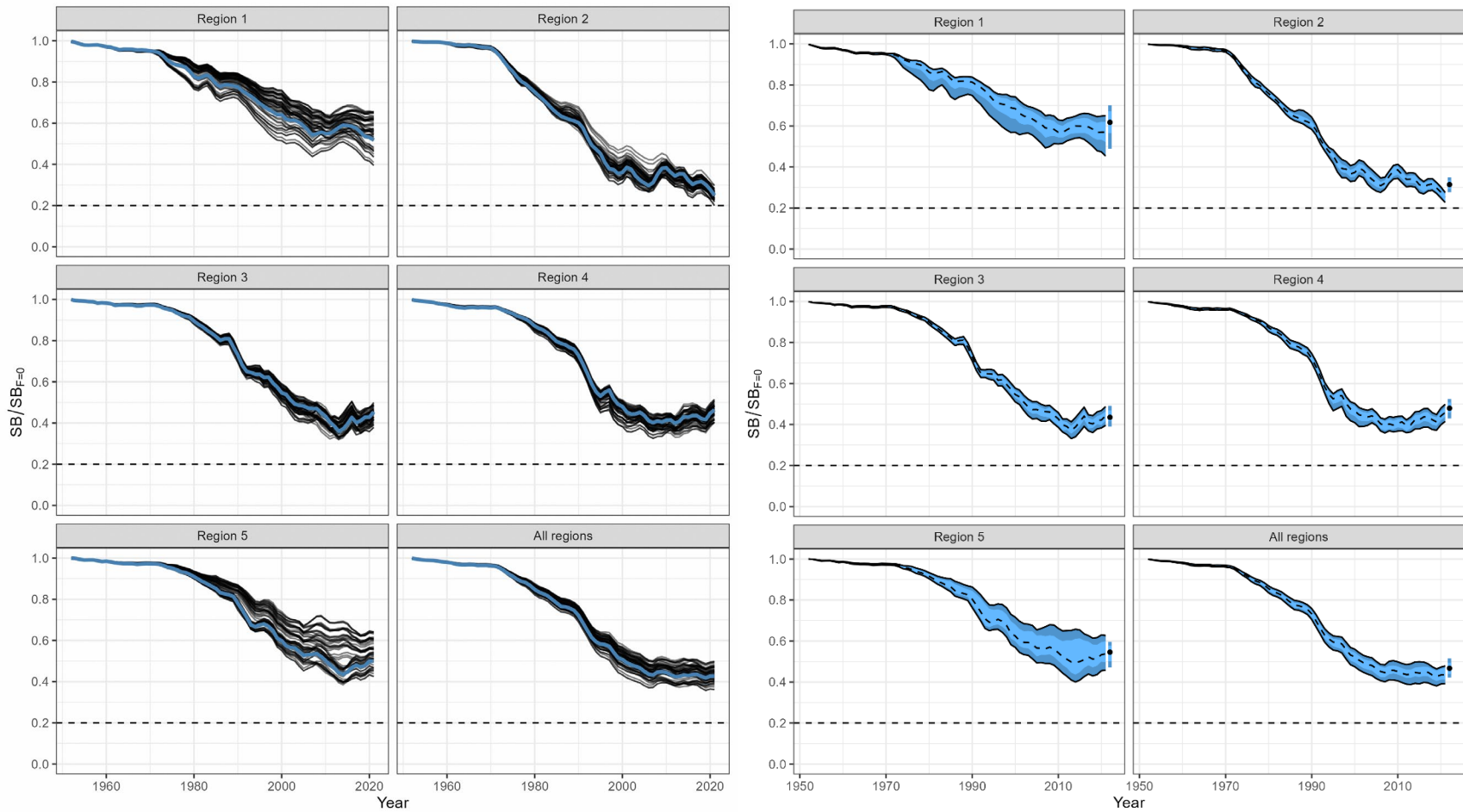


Figure 7: (Left) Trajectories of spawning potential depletion for the individual model runs included in the structural uncertainty grid over the period 1952–2021. (Right) Estimated spawning depletion across all models in the structural uncertainty grid over the period 1952–2021. The dashed line represents the median, the lighter band shows the 25th and 75th percentiles, and the dark band shows the 10<sup>th</sup> and 90<sup>th</sup> percentiles of the model estimates. The bar at the right of each ribbon indicates the median (black dots) with the 10<sup>th</sup> and 90<sup>th</sup> percentiles for  $SB_{recent}/SB_{F=0}$ .

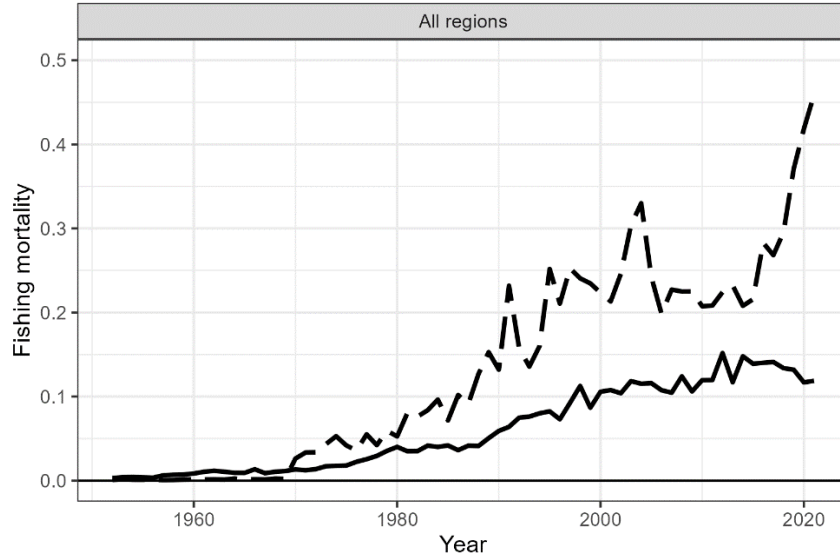


Figure 8: Estimated annual average adult (solid line) and juvenile (dashed line) fishing mortality for the diagnostic model.

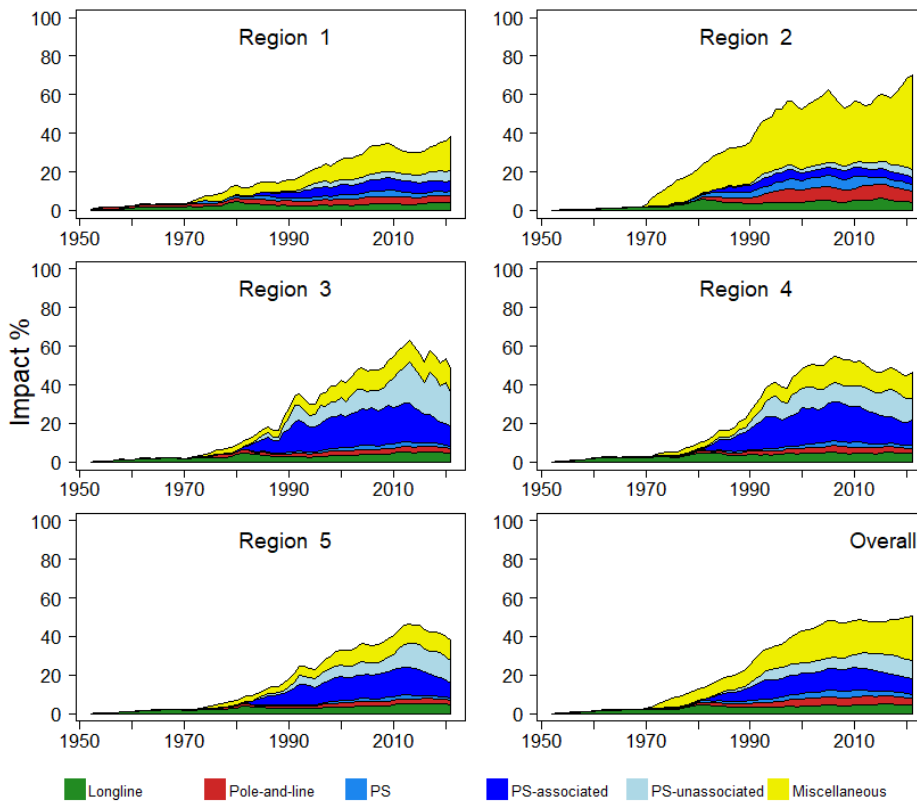


Figure 9: Estimates of reduction in spawning potential due to fishing (Fishery Impact =  $1 - SB_t/SB_{t,F=0}$ ) by region, and over all regions (lower right panel), attributed to various fishery groups for the diagnostic model.

YELLOWFIN TUNA (YFN) – Nov 2025

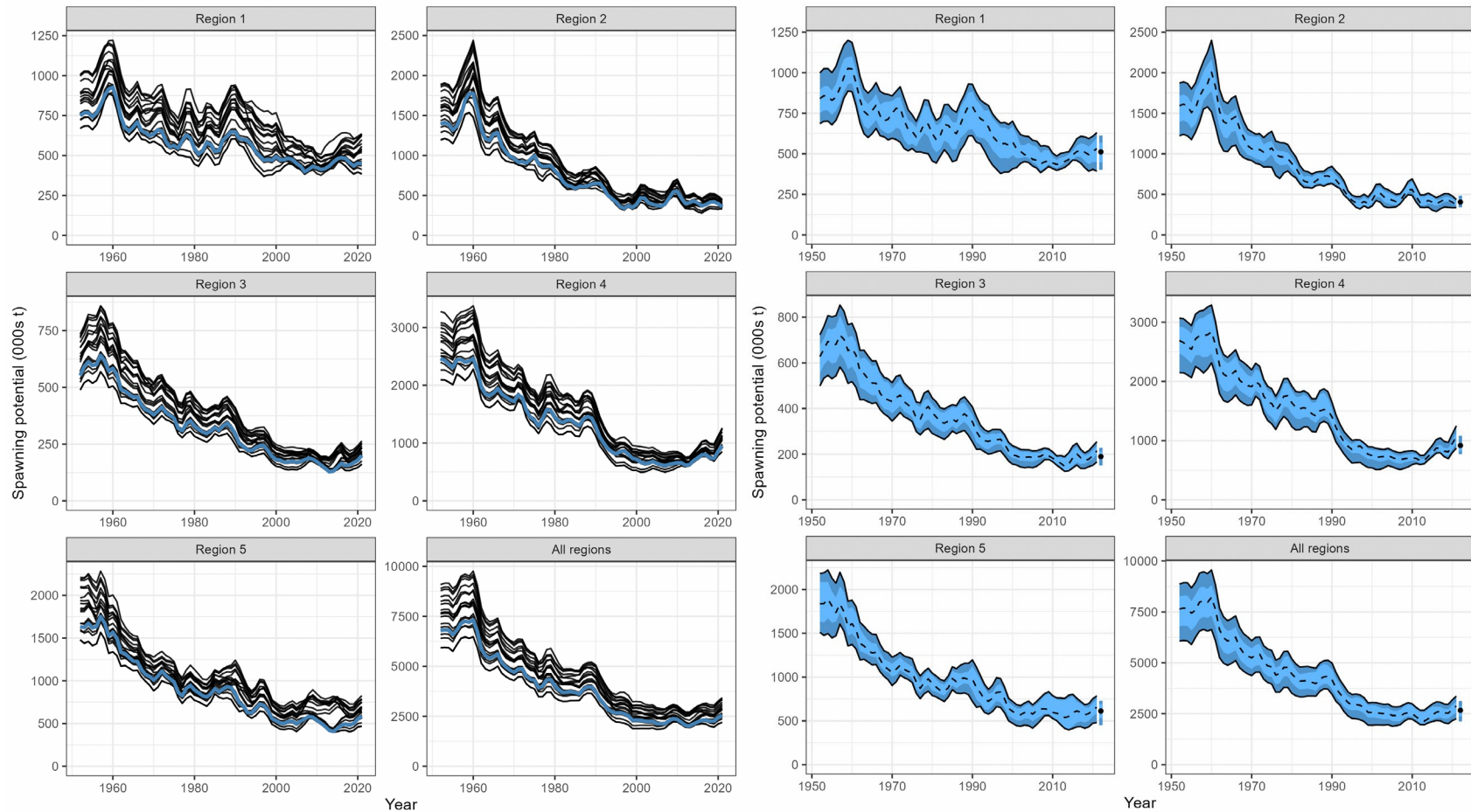
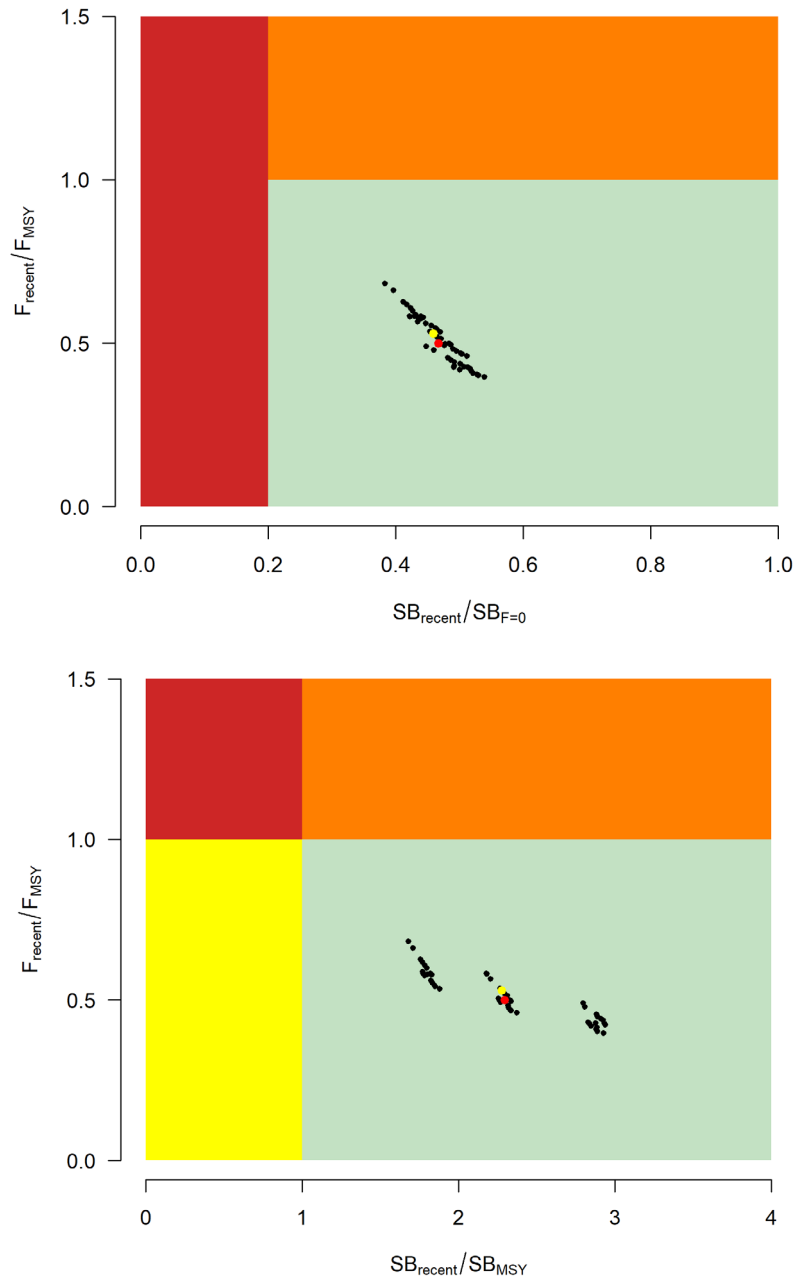


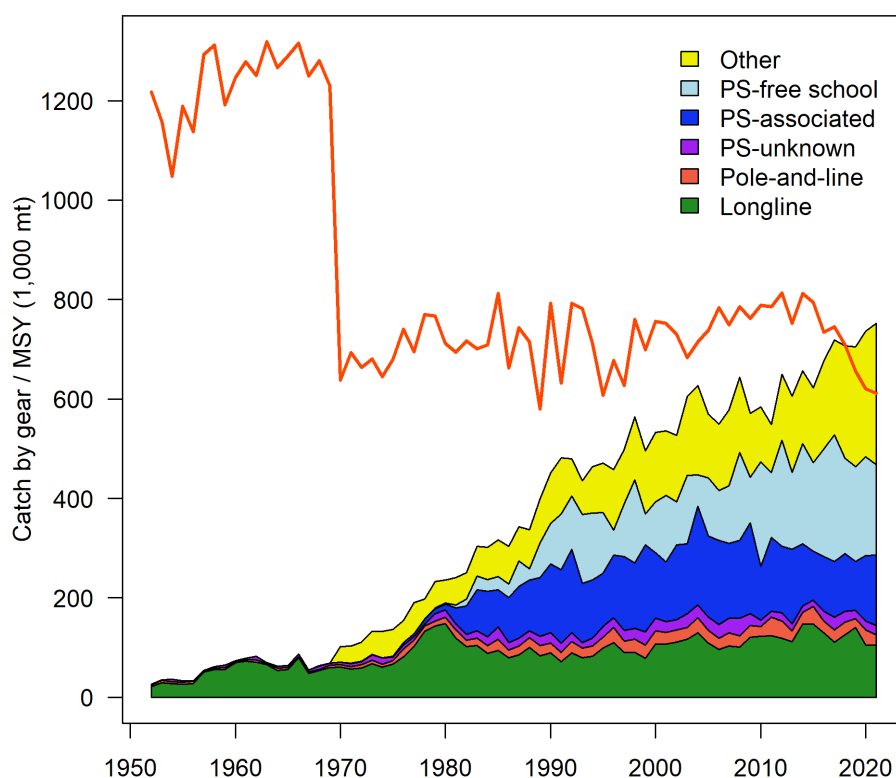
Figure 10: (Left) Trajectories of spawning potential for the individual model runs included in the structural uncertainty grid over the period 1952–2021. (Right) Estimated spawning potential across all models in the structural uncertainty grid over the period 1952–2021. The dashed line represents the median, the lighter band shows the 25th and 75th percentiles, and the dark band shows the 10<sup>th</sup> and 90<sup>th</sup> percentiles of the model estimates. The bar at the right of each ribbon indicates the median (black dots) with the 10<sup>th</sup> and 90<sup>th</sup> percentiles for  $SB_{recent}$ .



**Figure 11: Majuro plot (top) and Kobe plot (bottom) summarising the results for each of the models in the structural uncertainty grid for the recent period (2018–2021). The yellow point is the 2023 diagnostic model, and the red point is the median.**

**Table 9: Structural uncertainty grid for the 2023 WCPO yellowfin tuna stock assessment. Bold values indicate settings for the diagnostic model.**

Axis	Levels	Option 1	Option 2	Option 3
Steepness	3	0.65	<b>0.8</b>	0.95
Tag mixing (# quarters)	2	1	<b>2</b>	
Size data weighting divisor	3	10	<b>20</b>	40
Age data weighting	3	0.5	<b>0.75</b>	1



**Figure 12: History of the annual estimates of  $MSY$  (red line) for the diagnostic model compared with annual catch by the main gear types. Note that this is a ‘dynamic’  $MSY$ .**

The WCPO yellowfin tuna spawning biomass is above the limit reference point (LRP) and ‘recent  $F$ ’ is below  $F_{MSY}$  based on the uncertainty grid. The stock is not experiencing overfishing (100% probability  $F_{recent} < F_{MSY}$ ) and is not in an overfished condition (0% probability  $SB_{recent}/SB_{F=0} < LRP$ ).

The objective for yellowfin tuna in CMM 2021-01 (the Tropical Tuna Measure) to maintain the spawning biomass depletion ratio at or above the average  $SB/SB_{F=0}$  for 2012–2015 is being achieved.  $SB_{recent}/SB_{F=0}$  (47%) exceeds the average  $SB/SB_{F=0}$  for 2012–2015 (44% calculated across the unweighted grid).

SC19 noted a continuous downward trend in spawning potential ratio over the recent decade in region 2 in the westernmost equatorial region, mainly due to the miscellaneous gear fisheries within this region, whereas other regions have been relatively stable over this period. This is the impact of artisanal (small-scale) fisheries other than longline and purse seine fisheries within this region.

SC19 also noted that there is evidence that the overall stock status is buffered with spawning biomass kept at a more elevated level overall by low exploitation in the temperate regions (1 and 5). The assessment model estimates spawning biomass to be divided between the tropical (59%) and temperate (41%) regions, but the vast majority of catch occurred in the tropical (94%) region.

## 5.2 Estimates of fishery parameters and abundance

There are no fisheries-independent indices of abundance for the yellowfin tuna stock. Relative abundance information is available from longline catch per unit effort data; details on the analysis of catch and effort data for longline fisheries to provide regional abundance indices are given by Tears et al. (2023). Returns from large-scale tagging programmes undertaken in the early 1990s and 2000s also provide information on rates of fishing mortality, which in turn leads to improved estimates of abundance.

## 5.3 Biomass estimates

The estimated total biomass and spawning potential declined steadily from 1960 to 2000, followed by a relatively stable population size since then. In 1960, the total biomass and spawning potential,

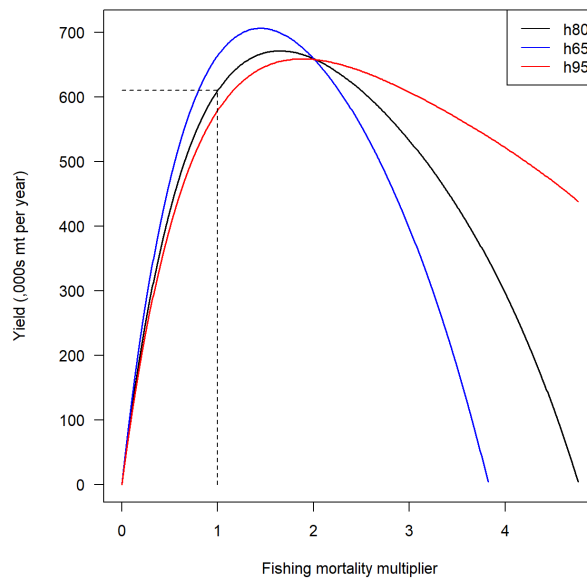
averaged across quarters, are estimated to have been 10.6 and 7.5 million tonnes, respectively, and by 2000 they had declined to 4.3 and 2.4 million tonnes. In 2021, the final year of the assessment, the total biomass and spawning potential are estimated at 4.9 and 2.6 million tonnes, respectively.

The long-term trends vary between regions, with most regions having a current spawning potential that is close to one third of the 1960 levels. The exception is region 1, which is around two thirds of the 1960 levels. These trends match the observed long-term CPUE trends in each region.

#### 5.4 Yield estimates and projections

The yield analysis conducted in the 2023 yellowfin stock assessment incorporates the spawner recruitment relationship into the equilibrium biomass and yield computations. Importantly, in the diagnostic model, the steepness of the SRR was fixed at 0.8 so only the scaling parameter was estimated. Other models in the one-off sensitivity analyses and structural uncertainty analyses assumed steepness values of 0.65 and 0.95.

The yield distributions under different values of fishing effort relative to the current effort are shown in Figure 13 for select models representing different axes of the structural uncertainty grid (specifically, different levels of steepness). For the diagnostic model, it is estimated that *MSY* would be achieved by increasing fishing mortality by a factor of 1.65, although the resulting increase in yield would be relatively small (10%). The different example yield curves under the alternative steepness assumptions display a similar pattern over the scale of fishing mortality although the absolute value of the yield curve and behaviour of the descending limb differs significantly.



**Figure 13: Estimated yield as a function of fishing mortality multiplier for the diagnostic model and a few of the one-off sensitivity models. The red dashed line indicates the equilibrium yield at current fishing mortality.**

The yield analysis also enables an assessment of the *MSY* level that would be theoretically achievable under the different patterns of age-specific fishing mortality observed through the history of the fishery (Figure 12). Prior to 1970, the WCPO yellowfin fishery was almost exclusively conducted using longline gear, with a low exploitation of small yellowfin. Fisheries other than longline were known to operate in the region before 1970, but no catch estimates are available. The associated age-specific selectivity pattern resulted in a much higher *MSY* in the early period compared with the recent estimates. A pronounced decline occurred after the expansion of the juvenile fisheries in region 2 and, soon after, the rapid expansion of the purse seine fishery which shifted the age composition of the catch toward younger fish.

No estimates of *MCY* and *CAY* are available.

## 5.5 Reference points

The unfished spawning potential ( $SB_{F=0}$ ) in each time period was calculated given the estimated recruitments and the Beverton-Holt SRR. This offers a basis for comparing the exploited population relative with the population subject to natural mortality only. The WCPFC adopted 20%  $SB_{F=0}$  as a limit reference point (LRP) for the yellowfin stock where  $SB_{F=0}$  for this assessment is calculated as the average over the period 2012–2021.

There is no agreed WCPFC target reference point for the yellowfin tuna stock however CMM 2021-01 states in para 11 “Pending agreement of a target reference point the spawning biomass depletion ratio ( $SB/SB_{F=0}$ ) is to be maintained at or above the average  $SB/SB_{F=0}$  for 2012–2015”. Stock status was referenced against these points by calculating the reference points;  $SB_{recent}/SB_{F=0}$  and  $SB_{latest}/SB_{F=0}$  where  $SB_{F=0}$  is calculated over 2012–2021 and  $SB_{recent}$  and  $SB_{latest}$  are the mean of the estimated spawning potential over 2018–2021, and 2021, respectively.

The other key reference point,  $F_{recent}/F_{MSY}$ , is the estimated average fishing mortality at the full assessment area scale over a recent period of time ( $F_{recent}$ ; 2017–2020 for this stock assessment) divided by the fishing mortality producing  $MSY$  which is a product of the yield analysis.

## 5.6 Other factors

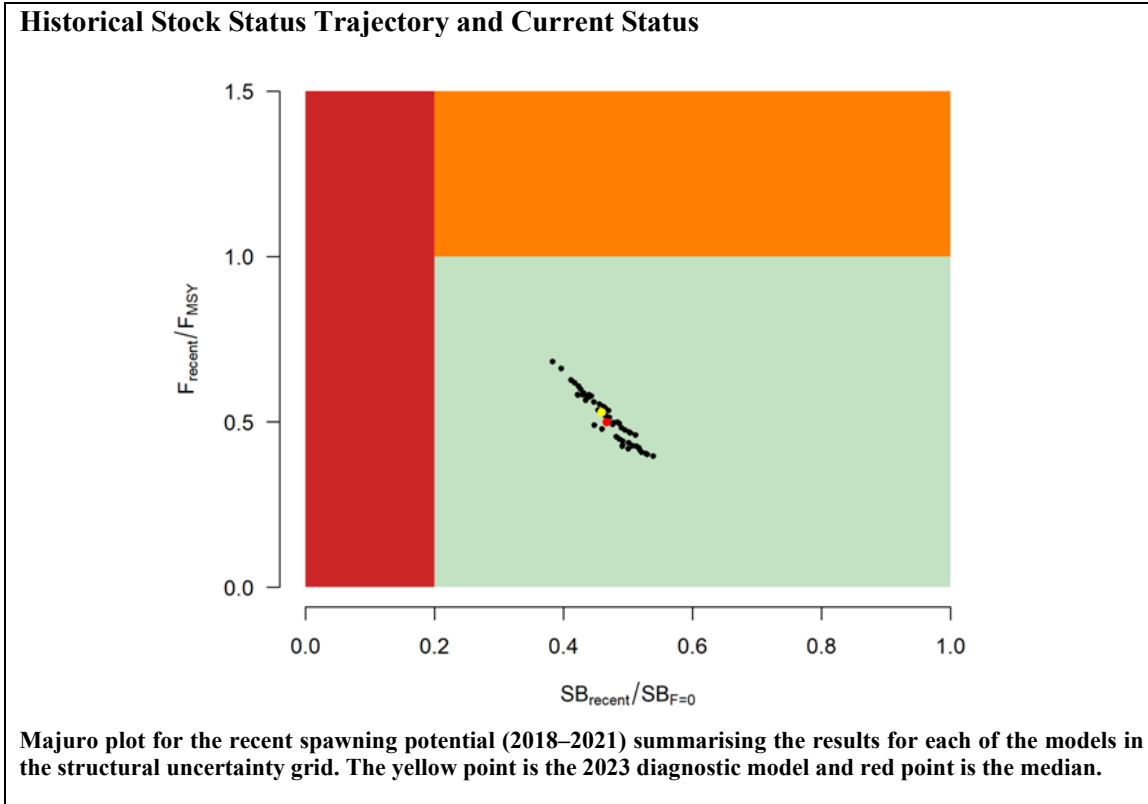
It is thought that large numbers of small yellowfin tuna are taken in surface fisheries in Indonesia and the Philippines using a variety of small-scale gear types (e.g., pole-and-line, ringnet, gillnet, handline, and seine net). Small to medium sized purse seiners based in those countries also catch fish of sizes more typical of the purse seine fisheries elsewhere. There are considerable uncertainties in the exact catches and these lead to uncertainties in the assessment. Programmes are in place to improve the collection of catch statistics in these fisheries.

## 6. STATUS OF THE STOCKS

### Stock structure assumptions

The stock is considered to cover the western and central Pacific Ocean.

Stock Status	
Most Recent Assessment Plenary Publication Year	2023
Intrinsic productivity level	
Catch in most recent year of assessment	Year: 2022      Catch: 751 857 t
Assessment Runs Presented	Median of the structural uncertainty grid incorporating estimation uncertainty and 80% Probability Intervals (PI)
Reference Points	There is no agreed WCPFC target reference point for the yellowfin tuna stock; however CMM 2021-01 states “Pending agreement of a target reference point the spawning biomass depletion ratio ( $SB/SB_{F=0}$ ) is to be maintained at or above the average $SB/SB_{F=0}$ for 2012–2015”; which is 44% $SB_0$ Limit reference point of 20% $SB_0$ established by WCPFC equivalent to the HSS default 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	Recent levels of spawning biomass (2018–2021) are 47% $SB_0$ ; About as Likely as Not (40–60%) to be at or above the target level
Status in relation to Limits	Soft Limit: Very Unlikely (< 10%) to be below Hard Limit: Very Unlikely (< 10%) to be below
Status in relation to Overfishing	Overfishing is Very Unlikely (< 10%) to be occurring



<b>Fishery and Stock Trends</b>	
Recent trend in Biomass or Proxy	<p>The estimated spawning potential depletion <math>SB/SB_{F=0}</math> declined to about 2005 and is relatively stable after that. The estimated <math>SB/SB_{F=0}</math> for all regions combined in the final year of 2021 is 0.43. This pattern varies regionally, as the current level of <math>SB/SB_{F=0}</math> is around 0.50 in regions 1, 3, 4, and 5 but a substantially lower level of 0.25 in region 2.</p> <p>The steepest decline in <math>SB/SB_{F=0}</math> occurred from 1990 to 2000, especially in regions 2 and 4, corresponding to higher levels of annual catches in that decade compared with previous decades. The current level of <math>SB/SB_{F=0}</math> is similar to the year 2010 in regions 1, 3, 5, while region 4 shows a gradual increase in this recent period. Region 2 shows a substantial recent decline from 0.39 in 2010 down to 0.25 in 2021.</p>
Recent Trend in Fishing Intensity or Proxy	<p>Average fishing mortality rates for juvenile and adult age classes have increased throughout the period of the assessment, although more so for juveniles which have experienced considerably higher fishing mortality than adults. In the recent period, a sharp increase in juvenile fishing mortality is estimated, while adult fishing mortality has stabilised.</p>
Trends in Other Relevant Indicator or Variables	<p>The estimated recruitment aggregated across all regions shows interannual variation, especially in the earlier decades of the assessment period that does not have size data to inform recruitment estimation. The long-term trend is that the estimated recruitment is somewhat higher in the first decade and last five years (but these are also the periods where recruitment estimates are least reliable).</p>

Other Abundance Indices	-	
<b>Projections and Prognosis</b>		
Stock Projections or Prognosis	“Status quo” stochastic stock projections for WCPO yellowfin tuna were not presented at SC19.	
Probability of Current Catch or TACC causing Biomass to remain below or to decline below Limits	Not estimated	
Probability of Current Catch or TACC causing Overfishing to continue or commence	Not estimated	
<b>Assessment Methodology and Evaluation</b>		
Assessment Type	Level 1 – Fully Quantitative Stock Assessment	
Assessment Method	MULTIFAN-CL	
Assessment Dates	Latest assessment Plenary publication year: 2023	Next assessment: 2026
Overall assessment quality rank	1 – High Quality	
Main data inputs (rank)	- Catch and effort data - Size data - Growth data and - Tagging data	1 – All High Quality
Data not used (rank)	N/A	
Changes to Model Structure and Assumptions	Key changes from the 2020 assessment include: - Estimating natural mortality internally in the model. - Reducing the spatial complexity from 9 regions to 5 regions. - Using a Lorenzen functional form of natural mortality. - Changing to a catch-conditioned model and estimating a likelihood for CPUE. - Revising the treatment of tagging data included in the model. - Incorporating estimation uncertainty to the structural uncertainty grid.	
Major Sources of Uncertainty	- Assumed tag mixing period - Steepness of the stock recruitment relationship - Weighting of the size composition data - Data conflicts between size and weight data - Initial model starting values - Influence of effort creep	
<b>Qualifying Comments</b>		
-		

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