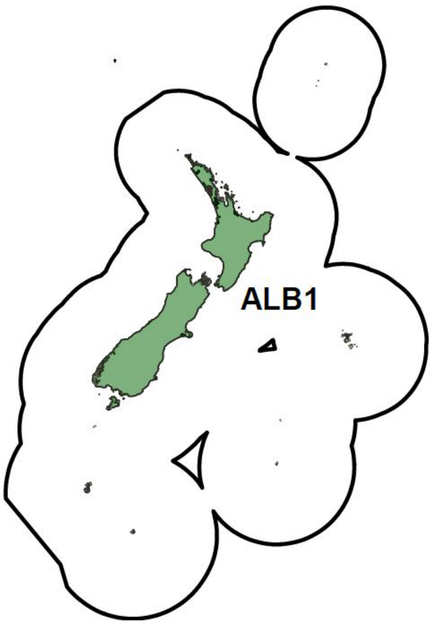
# ALBACORE (ALB)

(*Thunnus alalunga)*
Ahipataha




## 1. FISHERY SUMMARY

Albacore is currently outside the Quota Management System.

The albacore stock throughout the South Pacific is managed by two Regional Fisheries Management Organisations (RFMOs); the Inter-American Tropical Tuna Commission (IATTC) manages the eastern part of the stock, while the western part is managed under the Western and Central Pacific Fisheries Commission (WCPFC). Under the WCPFC 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 seventh annual meeting in 2011 the WCPFC passed a Conservation and Management Measure (CMM) (this is a binding measure that all parties must abide by), CMM2010-05, relating to conservation and management measures for South Pacific albacore tuna. Key aspects of this CMM are below:

1. Commission Members, Cooperating Non-Members, and participating Territories (CCMs) shall not increase the number of their fishing vessels actively fishing for South Pacific albacore in the Convention Area south of 20° S above current (2005) levels or recent historical (2000–04) levels.
2. The provisions of paragraph 1 shall not prejudice the legitimate rights and obligations under international law of small island developing State and Territory CCMs in the Convention Area for whom South Pacific albacore is an important component of the domestic tuna fishery in waters under their national jurisdiction, and who may wish to pursue a responsible level of development of their fisheries for South Pacific albacore.
3. CCMs that actively fish for South Pacific albacore in the Convention Area south of the equator shall cooperate to ensure the long-term sustainability and economic viability of the fishery for South Pacific albacore, including cooperation and collaboration on research to reduce uncertainty with regard to the status of this stock.

4. This measure will be reviewed annually on the basis of advice from the Scientific Committee on South Pacific albacore.

In 2015 the WCPFC passed CMM2015-02, which reaffirmed CMM2010-05 and added an additional clause as follows:

> "CCMs shall report annually to the Commission the annual catch levels taken by each of their fishing vessels that has taken South Pacific albacore, as well as the number of vessels actively fishing for South Pacific albacore, in the Convention area south of 20° S. Catch by vessel shall be reported according to the following species groups: albacore tuna, bigeye tuna, yellowfin tuna, swordfish, other billfish, and sharks. Initially this information will be provided for the period 2006–2014 and then updated annually. CCMs are encouraged to provide data from periods prior to these dates."

Work on the development of harvest strategies across the four key tuna stocks managed by WCPFC is currently ongoing; WCPFC19 adopted CMM 2022-01 on an Interim Management Procedure for WCPO skipjack tuna in December 2022. The adoption of revised South Pacific albacore management objectives, a target reference point (TRP), and a management procedure are scheduled for December 2024.

## 1.1 Commercial fisheries

The South Pacific albacore catch was 64 929 t in 2024 and the New Zealand catch was 1381 t, about 2% of the entire South Pacific albacore catch. Albacore are landed in a number of fisheries but primarily from longline (95.5%) and troll (4.1%) fisheries, with 89% of the troll catch and <1% of the longline catch coming from New Zealand fishery waters in 2024.

In New Zealand the albacore troll fishery is in the summer, primarily off the west coasts of the North Island and South Island. The New Zealand albacore fishery, especially the troll fishery, has been characterised by periodic poor years that have been linked to poor weather or colder than average summer seasons. In 2024 about 96% of New Zealand albacore catch was taken by troll. Albacore are also caught throughout the year by longline and sporadically in the pole and line fishery. Total annual landings between 2000 and 2024 ranged between 933 and 6744 t (Table 1). Figure 1 shows the historical landings and fishing effort for albacore stocks.

**Table 1: Reported total New Zealand landings (t) and landings (t) from the South Pacific Ocean (SPO) of albacore tuna from 1972 to present. Source: LFRR and MHR and SC21-ST-IP-01.**

| Year | NZ fisheries waters | SPO | Year | NZ fisheries waters | SPO | Year | NZ fisheries waters | SPO |
|---|---|---|---|---|---|---|---|---|
| 1972 | 240 | 39 521 | 1990 | 3 011 | 36 062 | 2008 | 3 720 | 63 577 |
| 1973 | 432 | 47 326 | 1991 | 2 450 | 35 600 | 2009 | 2 216 | 84 688 |
| 1974 | 898 | 34 049 | 1992 | 3 481 | 38 668 | 2010 | 2 292 | 84 415 |
| 1975 | 646 | 23 600 | 1993 | 3 327 | 35 438 | 2011 | 3 205 | 65 954 |
| 1976 | 25 | 29 076 | 1994 | 5 255 | 42 318 | 2012 | 2 990 | 87 737 |
| 1977 | 621 | 38 731 | 1995 | 6 159 | 38 443 | 2013 | 3 142 | 87 982 |
| 1978 | 1 686 | 34 667 | 1996 | 6 320 | 34 259 | 2014 | 2 466 | 68 543 |
| 1979 | 814 | 27 055 | 1997 | 3 628 | 39 526 | 2015 | 2 537 | 72 254 |
| 1980 | 1 468 | 32 516 | 1998 | 6 525 | 50 364 | 2016 | 2 274 | 74 039 |
| 1981 | 2 085 | 34 782 | 1999 | 3 903 | 40 647 | 2017 | 2 141 | 94 499 |
| 1982 | 2 434 | 30 780 | 2000 | 4 428 | 49 980 | 2018 | 2 514 | 81 430 |
| 1983 | 720 | 25 073 | 2001 | 5 349 | 65 636 | 2019 | 2 752 | 77 823 |
| 1984 | 2 534 | 24 685 | 2002 | 5 566 | 77 856 | 2020 | 3 042 | 72 604 |
| 1985 | 2 941 | 32 316 | 2003 | 6 744 | 65 395 | 2021 | 3 485 | 70 329 |
| 1986 | 2 044 | 36 590 | 2004 | 4 459 | 65 470 | 2022 | 2 460 | 89 054 |
| 1987 | 1 236 | 25 052 | 2005 | 3 459 | 67 016 | 2023 | 933 | 66 045 |
| 1988 | 672 | 37 867 | 2006 | 2 542 | 67 641 | 2024 | 1381 | 64 929 |
| 1989 | 4 884 | 49 076 | 2007 | 2 092 | 60 199 | | | |

The earliest known commercial catch of tuna (species unknown, but probably skipjack tuna) was by trolling and was landed in Auckland in the year ending March 1943. Regular commercial catches of tuna, however, were not reported until 1961. Prior to 1973 the albacore troll fishery was centred off the North Island (Bay of Plenty to Napier and New Plymouth) with the first commercial catches off

Greymouth and Westport in 1973. The expansion of albacore trolling to the west coast of the South Island immediately followed experimental fishing by the *W. J. Scott*, which showed substantial quantities of albacore off the Hokitika Canyon and albacore as far south as Doubtful Sound. Tuna longlining was not established as a fishing method in the domestic industry until the early 1990s.

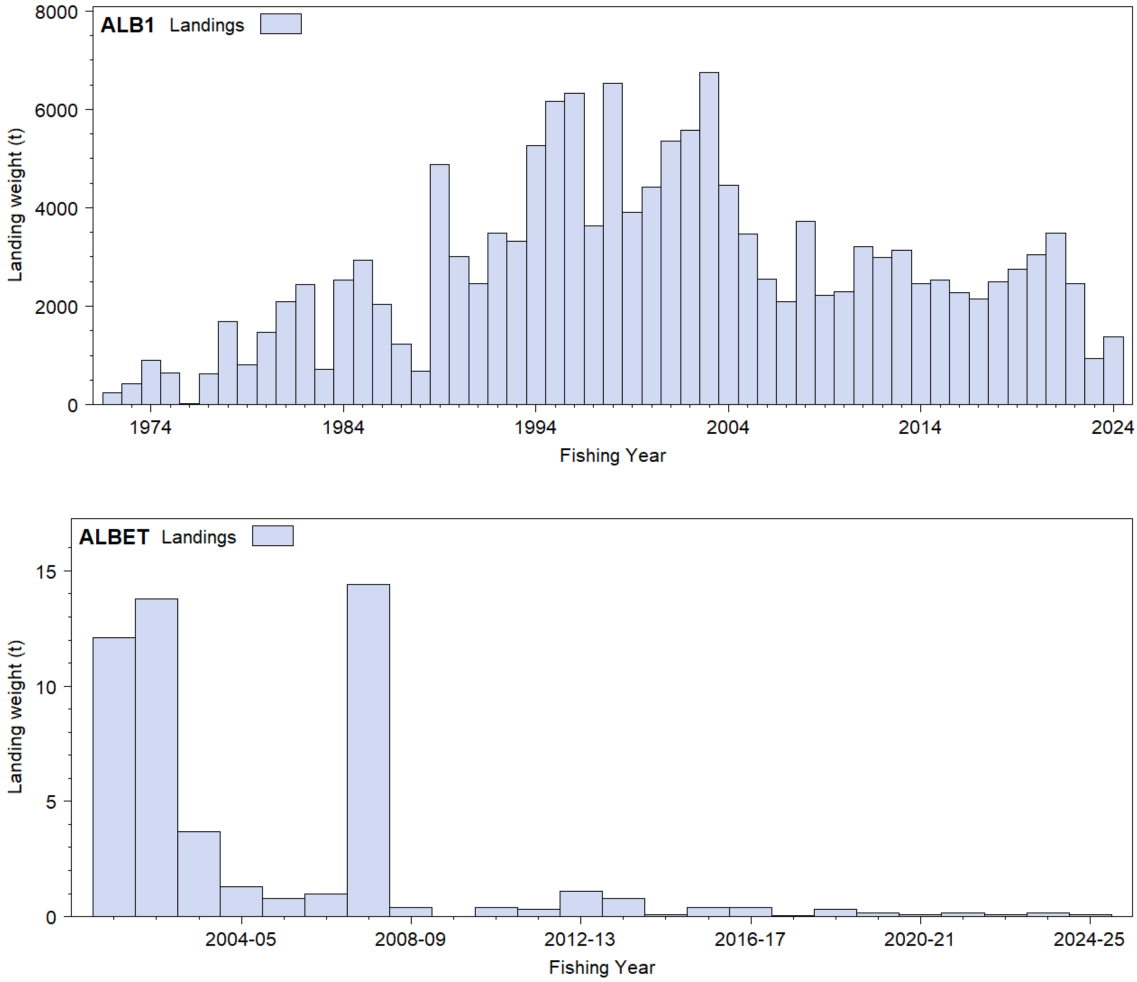



**Figure 1: [Top] Albacore catch from 1972 to present within New Zealand waters (ALB 1) and [Bottom] 2001–02 to present on the high seas (ALB ET).**

Most albacore troll fishery catches are in the first and second quarters of the calendar year, with the fourth quarter important in some years. Most of the troll fishery catch comes from Fishery Management Area (FMA) 7 off the west coast of the South Island although FMAs 1, 2, 8, and 9 have substantial catches in some years. High seas troll catches have been infrequent and a minor component (maximum catch of 42.2 t in 1991) of the New Zealand fishery over the 1991 to 2022 period. Albacore are caught by longline throughout the year as a bycatch on sets targeting bigeye (*Thunnus obesus*) and southern bluefin tuna (*T. maccoyii*). Most of the longline albacore catch is reported from FMAs 1 and 2 with lesser amounts caught in FMA 9. Although albacore are caught regularly by longline in high seas areas, New Zealand effort and catches are small. Albacore made up 11% of the catch in the surface longline fisheries in 2023–24 (Figure 2).

Across all fleets in the 2020–21 longline fishery, 30.1% of albacore tuna were alive when brought to the side of the vessel (Table 2), with 95.5% of fish retained (Table 3).

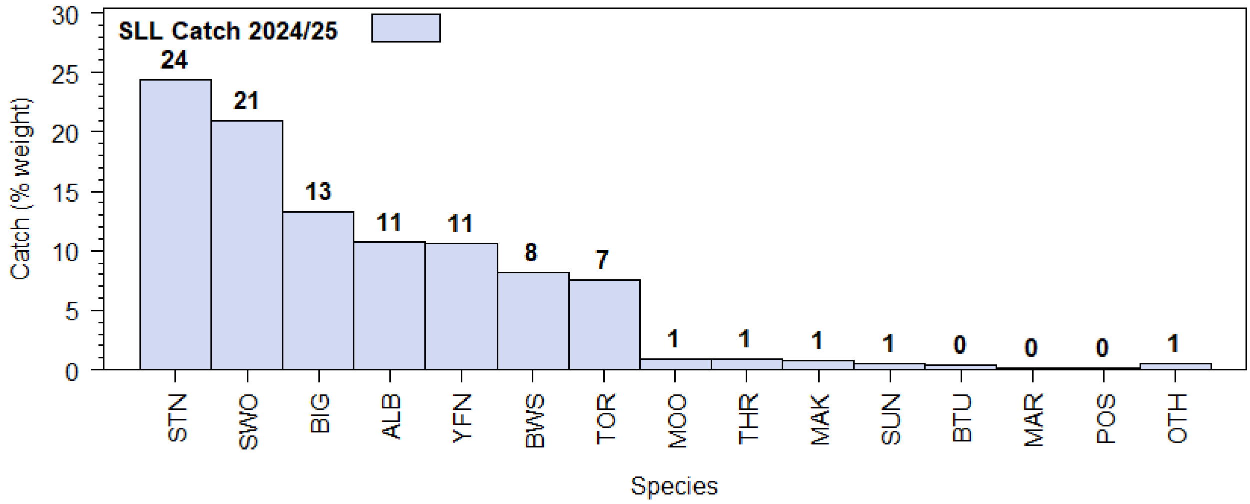



**Figure 2: A summary of species composition by weight of the surface-longline estimated catch for most recent fishing year.**

**Table 2: Percentage of albacore (including discards) that were alive or dead when arriving at the longline vessel and observed from 2006–07 to 2020–21, by fishing year, fleet, and region. Small sample sizes (number observed < 20) were omitted (Griggs & Baird 2013, Griggs et al. 2018, Griggs et al. 2021, Griggs et al. 2024). Only the New Zealand domestic fleet operated after 2014–15. [Continued on next page]**

| Year | Fleet | Region | % Alive | % Dead | Number |
|---|---|---|---|---|---|
| **2006–07** | Australia | North | 21.5 | 78.5 | 79 |
| | Charter | North | 61.2 | 38.8 | 784 |
| | | South | 77.3 | 22.7 | 587 |
| | Domestic | North | 28.1 | 71.9 | 1 880 |
| | **Total** | | **44.4** | **55.6** | **3 330** |
| **2007–08** | Charter | South | 71.3 | 28.7 | 167 |
| | Domestic | North | 22.7 | 77.3 | 1 765 |
| | **Total** | | **26.9** | **73.1** | **1 932** |
| **2008–09** | Charter | North | 84.6 | 15.4 | 410 |
| | | South | 79.5 | 20.5 | 112 |
| | Domestic | North | 33.7 | 66.3 | 1 986 |
| | **Total** | | **44.0** | **56.0** | **2 511** |
| **2009–10** | Charter | South | 82.1 | 17.9 | 78 |
| | Domestic | North | 28.8 | 71.2 | 1 766 |
| | | South | 42.9 | 57.1 | 42 |
| | **Total** | | **31.3** | **68.7** | **1 886** |
| **2010–11** | Charter | South | 87.0 | 13.0 | 54 |
| | Domestic | North | 25.8 | 74.2 | 3 717 |
| | **Total** | | **26.8** | **73.2** | **3 781** |
| **2011–12** | Charter | North | 70.8 | 29.2 | 48 |
| | | South | 78.0 | 22.0 | 91 |
| | Domestic | North | 33.8 | 66.2 | 942 |
| | | South | 42.2 | 57.8 | 211 |
| | **Total** | | **39.6** | **60.4** | **1 292** |
| **2012–13** | Charter | North | 61.8 | 38.2 | 408 |
| | | South | 84.0 | 16.0 | 100 |
| | Domestic | North | 27.8 | 72.2 | 905 |
| | **Total** | | **41.4** | **58.6** | **1 419** |
| **2013–14** | Charter | South | 85.7 | 14.3 | 482 |
| | Domestic | North | 16.7 | 83.3 | 1464 |
| | | South | 28.3 | 71.7 | 205 |
| | **Total** | | **33.2** | **66.8** | **2 151** |
| **2014–15** | Charter | South | 81.9 | 18.1 | 216 |
| | Domestic | North | 19.1 | 80.9 | 435 |
| | | South | 8.9 | 91.1 | 112 |
| | **Total** | | **35.4** | **64.6** | **763** |
| **2015–16** | Domestic | North | 28.5 | 71.5 | 2 981 |
| | | South | 33.9 | 66.1 | 1 060 |
| | **Total** | | **29.9** | **70.1** | **4 041** |
| **2016–17** | Domestic | North | 24.3 | 75.7 | 2 532 |
| | | South | 26.0 | 74.0 | 608 |
| | **Total** | | **24.6** | **75.4** | **3 140** |

**Table 2 [Continued]:**

| Year | Fleet | Region | % Alive | % Dead | Number |
|---|---|---|---|---|---|
| **2017–18** | Domestic | North | 28.4 | 71.6 | 2 539 |
| | | South | 21.6 | 78.4 | 491 |
| | **Total** | | **27.3** | **72.7** | **3 030** |
| **2018–19** | **Domestic** | **North** | **44.3** | **55.7** | **531** |
| | | **South** | **33.7** | **66.3** | **202** |
| | **Total** | | **41.3** | **58.7** | **733** |
| **2019–20** | **Domestic** | **North** | **29.9** | **70.1** | **834** |
| | | **South** | **33.5** | **66.5** | **170** |
| | **Total** | | **30.5** | **69.5** | **1 004** |
| **2020–21** | **Domestic** | **North** | **28.9** | **71.1** | **598** |
| | | **South** | **35.4** | **64.6** | **127** |
| | **Total** | | **30.1** | **69.9** | **725** |

**Table 3: Percentage albacore that were retained, or discarded or lost, when observed on a longline vessel from 2006–07 to 2020–21, by fishing year and fleet. Small sample sizes (number observed < 20) omitted (Griggs & Baird 2013, Griggs et al. 2018, Griggs et al. 2021, Griggs et al. 2024). Only the New Zealand domestic fleet operated after 2014–15.**

| Year | Fleet | % retained | % discarded or lost | Number |
|---|---|---|---|---|
| **2006–07** | Australia | 92.4 | 7.6 | 79 |
| | Charter | 97.7 | 2.3 | 1 448 |
| | Domestic | 96.1 | 3.9 | 1 882 |
| | **Total** | **96.7** | **3.3** | **3 409** |
| **2007–08** | Charter | 98.8 | 1.2 | 170 |
| | Domestic | 95.9 | 4.1 | 1 769 |
| | **Total** | **96.1** | **3.9** | **1 939** |
| **2008–09** | Charter | 99.7 | 0.3 | 605 |
| | Domestic | 97.8 | 2.2 | 1 993 |
| | **Total** | **98.2** | **1.8** | **2 598** |
| **2009–10** | Charter | 100.0 | 0.0 | 89 |
| | Domestic | 97.2 | 2.8 | 1 814 |
| | **Total** | **97.3** | **2.7** | **1 903** |
| **2010–11** | Charter | 100.0 | 0.0 | 68 |
| | Domestic | 96.6 | 3.4 | 3 755 |
| | **Total** | **96.7** | **3.3** | **3 823** |
| **2011–12** | Charter | 100.0 | 0.0 | 151 |
| | Domestic | 95.8 | 4.2 | 1 175 |
| | **Total** | **96.3** | **3.7** | **1 326** |
| **2012–13** | Charter | 97.6 | 2.4 | 509 |
| | Domestic | 96.1 | 3.9 | 925 |
| | **Total** | **96.7** | **3.3** | **1 434** |
| **2013–14** | Charter | 98.5 | 1.5 | 532 |
| | Domestic | 87.0 | 13.0 | 1 739 |
| | **Total** | **89.7** | **10.3** | **2 271** |
| **2014–15** | Charter | 98.2 | 1.8 | 226 |
| | Domestic | 95.5 | 4.5 | 551 |
| | **Total** | **96.3** | **3.7** | **777** |
| **2015–16** | **Total (Domestic)** | **96.0** | **4.0** | **4 057** |
| **2016–17** | **Total (Domestic)** | **93.6** | **6.4** | **3 150** |
| **2017–18** | **Total (Domestic)** | **93.9** | **6.1** | **3 054** |
| **2018–19** | **Total (Domestic)** | **84.6** | **15.4** | **736** |
| **2019–20** | **Total (Domestic)** | **87.3** | **12.7** | **1 004** |
| **2020–21** | **Total (Domestic)** | **95.5** | **4.5** | **736** |

## 1.2 Recreational fisheries

Albacore by virtue of its wide distribution in coastal waters over summer is seasonally locally important as a recreational species. It is taken by fishers targeting it predominantly for food, but it is also frequently taken as bycatch when targeting other gamefish. Albacore do not comprise part of the voluntary recreational gamefish tag and release programme. Albacore are taken almost exclusively using rod and reel (over 99% of the 2022–23 harvest) and from trailer boats (over 98% of the 2022–23 harvest). They are caught around the North Island and upper South Island, more frequently off the west coast, with harvest by area in 2022–23 being: FMA 1 (20.5%), FMA 2 (6.3%), FMA 5 (10.1%), FMA 7 (30.0%), FMA 8 (7.0%), and FMA 9 (26.0%).

### 1.2.1 Management controls
There are no specific controls in place to manage recreational harvests of albacore.

### 1.2.2 Estimates of recreational harvest
No estimates of recreational harvest of albacore 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 4. Note that national panel survey estimates do not include recreational harvest taken on charter vessel trips or under s111 general approvals.

**Table 4: Recreational harvest estimates for albacore (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.**

| Stock | Year | Method | Number of fish | NPS harvest (t) | NPS CV | ACV (t) | s111 (t) | Total (t) |
|---|---|---|---|---|---|---|---|---|
| ALB 1 | 2011–12 | Panel survey | 21 375 | 89.90 | 0.22 | 0.67 | 1.20 | 91.75 |
| | 2017–18 | Panel survey | 12 463 | 56.74 | 0.22 | 0.46 | 0.75 | 57.95 |
| | 2022–23 | Panel Survey | 4 745 | 34.6 | 0.30 | 1.38 | 0.75 | 36.71 |

## 1.3 Customary non-commercial fisheries
It is uncertain whether albacore were caught by early Māori, although it is clear that they trolled lures (for kahawai) that are very similar to those still used by Tahitian fishermen for various small tunas. Given the number of other oceanic species known to Māori, and the early missionary reports of Māori regularly fishing several miles from shore, albacore were probably caught by early Māori. An estimate of the current customary catch is not available.

## 1.4 Unreported catch
There is no known unreported catch of albacore in the EEZ or adjacent high seas.

## 1.5 Other sources of mortality
Discarding of albacore has not been reported in the albacore troll fishery (based on limited observer coverage in the 1980s). Discard rates averaging 7.2% have been observed in the longline fishery over the period 2018–19 to 2020–21; 65.4% of the discarded albacore tuna were dead on recovery during the same period (Griggs et al. 2024).

# 2. BIOLOGY

Albacore within the New Zealand fishery waters are part of the South Pacific Ocean stock which is distributed from the equator south to about 50°S, and from the Australian east coast to the South American west coast.

The troll fishery catches juvenile albacore typically 5 to 8 kg in size, whilst longline fleets typically catch much larger sub-adult and adult albacore over a broader size range, with variation occurring as a function of latitude and season. The smallest longline-caught albacore are those caught in May to June immediately north of the Sub-tropical Convergence Zone, whilst fish further north at this time and fish caught in the New Zealand EEZ in autumn and winter are larger.

Sampling of troll-caught albacore has been carried out annually (except 2008–09) since the 1996–97 fishing year. Initially the programme aimed to sample 1000 fish per month in each port. From 2010 the sample targets were changed, and the programme aimed to sample approximately 5000 fish per year with the sample targets distributed throughout the season to reflect the fishing effort distribution. Sampling designs are reviewed annually in order to ensure that sampling is representative of the fishery, both spatially and temporally; as a minimum at least 100 fish are sub-sampled for length and weight in each port, each month. The monthly sample targets by sampling port for the fishing season 2022–23 are shown in Table 5.

A key feature of the length compositions of New Zealand troll-caught albacore (Figure 3) is its tri-modal composition, corresponding to approximately one-year-old to three-year-old fish. Cohort mean length has been estimated at 51.52 cm, 61.27 cm, and 71.11 cm for ages 1–3, respectively (Neubauer & Hill-Moana, 2024).

**Table 5: Catch sample targets for length measurements in the New Zealand troll sampling programme in 2023–24 as reported in Griggs et al. (2025).**

| Month | Target | Greymouth | Nelson | Total |
|---|---|---|---|---|
| **December** | 200 | | | 0 |
| January | 1 700 | 1 100 | 400 | 1 500 |
| February | 1 900 | 1 600 | 100 | 1 700 |
| March | 1 100 | 560 | | 560 |
| April | 200 | | | 0 |
| Total | 5 000 | 3 260 | 500 | 3 760 |

Sex ratios appear to vary with fishery, at 1:1 (male:female) in the New Zealand troll and longline fishery, and 2:1 to 3:1 in the Tonga-New Caledonia longline fishery. Histological gonadosomatic index analysis has shown that female albacore from New Caledonian and Tongan waters spawn during November–February.

Farley et al. (2012, 2013a) completed a comprehensive analysis of South Pacific albacore biology. They found that otoliths were more reliable as ageing material than vertebrae. Their work using otoliths (validated by direct marking with oxytetracycline and indirect methods) showed that the longevity of albacore was found to be at least 14 years, with significant variation in growth between sexes and across longitudes. They found that growth rates were similar between sexes up until age 4, after which the growth for males was on average greater than that for females, with males reaching an average maximum size more than 8 cm larger than females. Farley et al. (2012) suggest that the different growth rates between sexes may be responsible for the observed dominance of males among fish in the larger size classes (greater than 95 to 100 cm fork length). This study shows that growth rates are also consistently greater at more easterly longitudes than at westerly longitudes for both females and males. Although the study was not able to identify the determinants of the longitudinal variation in growth of albacore, the authors suggest that variation in oceanography, particularly the depth of the thermocline, may affect regional productivity and therefore play a role in modifying growth of South Pacific albacore. Estimates of length-weight relationships are given in Table 6 and growth parameters from Farley et al. (2012) are presented in Table 7.

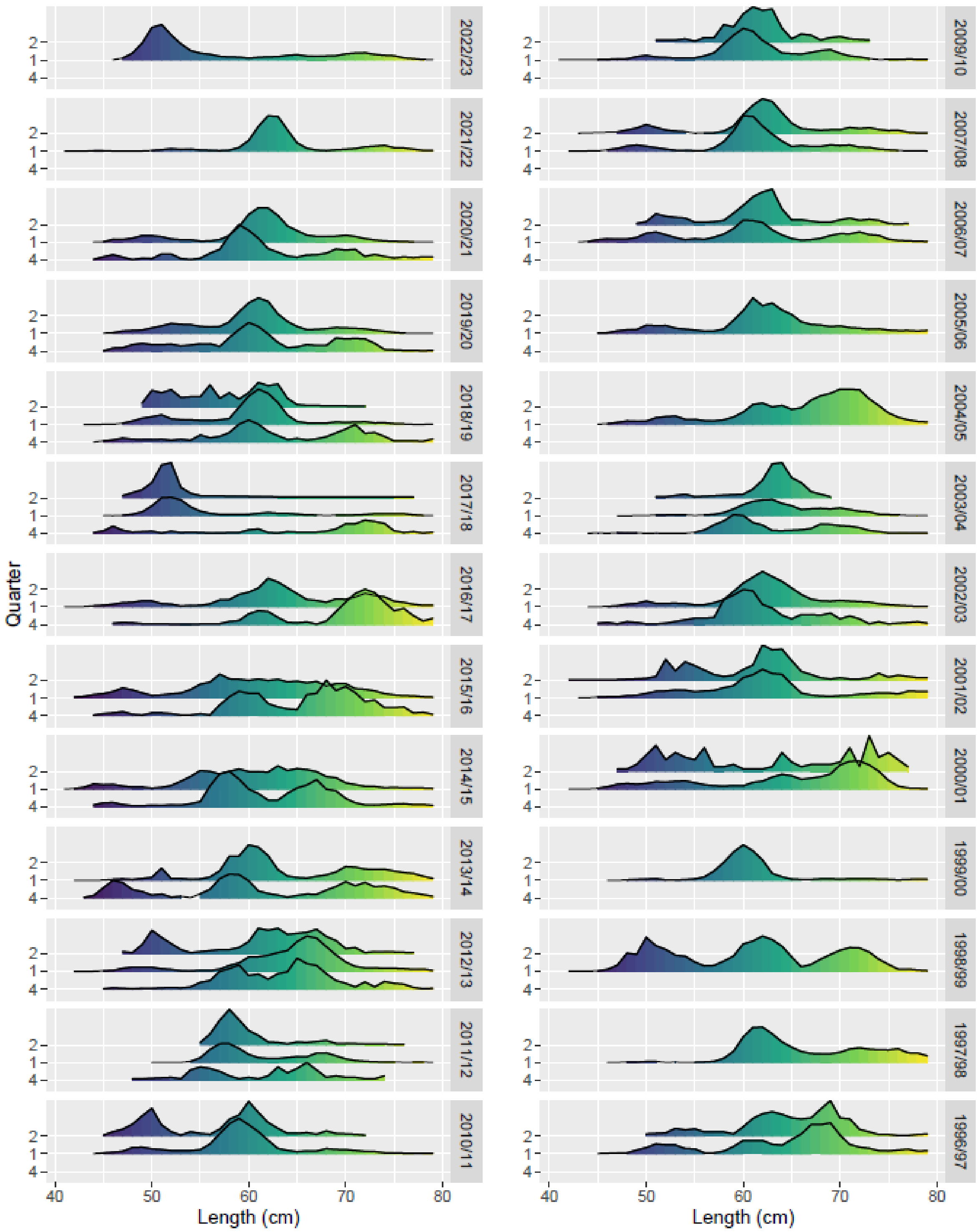



**Figure 3: Unscaled length composition data for albacore by fishing year and quarter from the New Zealand troll catch sampling programme, 1996–97 to 2022–23 (Neubauer & Hill-Moana, 2024).**

**Table 6: The ln(length)/ln(weight) relationships of albacore [ln(greenweight) = $b_0$ + $b_1$ * ln(fork length)]. Weight is in kilograms and length in centimetres.**

| | n | $b_0$ | SE $b_0$ | $b_1$ | SE $b_1$ | $R^2$ |
|---|---|---|---|---|---|---|
| Males | 160 | -10.56 | 0.18 | 2.94 | 0.04 | 0.97 |
| Females | 155 | -10.10 | 0.26 | 2.83 | 0.06 | 0.93 |
| Troll caught | 320 | -10.44 | 0.16 | 2.91 | 0.03 | 0.95 |
| Longline caught | 21 824 | -10.29 | 0.03 | 2.90 | 0.01 | 0.91 |

**Table 7: Parameter estimates (± standard error) from five candidate growth models fitted to length-at-age data for South Pacific albacore. Parameter estimates are also given for the logistic model, fitted separately to female and male length-at-age data. The small-sample, bias-corrected form of Akaike's information criterion AICc is provided for each model fit, and Akaike differences ΔAICc and Akaike weights $w_i$ are given for the fit of the five candidate models to all data. Note that the parameters *k* and *t* are defined differently in each model (see text for definitions), such that values are not comparable across models (Farley et al. 2012).**

| Sex | Model | $L_\infty$ | k | t | p | δ | γ | ν | AICc | ΔAICc | $w_i$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All | VBGM | 104.52 | 0.40 | -0.49 | | | | | 11 831.67 | 23.89 | 0 |
| | | (0.44) | (0.01) | (0.05) | | | | | | | |
| | Gompertz | 103.09 | 0.50 | 0.47 | | | | | 11 811.54 | 3.77 | 0.08 |
| | | (0.37) | (0.01) | (0.03) | | | | | | | |
| | Logistic | 102.09 | 0.61 | 1.12 | | | | | 11 807.77 | 0.00 | 0.53 |
| | | (0.33) | (0.01) | (0.03) | | | | | | | |
| | Richards | 102.30 | 0.58 | 0.98 | 1.32 | | | | 11 809.40 | 1.63 | 0.24 |
| | | (0.49) | (0.04) | (0.24) | (0.68) | | | | | | |
| | Schnute- | 101.52 | 0.05 | | | -0.97 | 3.54 | 2.07 | 11 810.25 | 2.48 | 0.15 |
| | Richards | (0.60) | (0.08) | | | (0.08) | (2.65) | (0.76) | | | |
| Female | Logistic | 96.97 | 0.69 | 0.99 | | | | | 5 746.90 | | |
| | | (0.37) | (0.02) | (0.03) | | | | | | | |
| Male | Logistic | 105.34 | 0.59 | 1.25 | | | | | 5 729.26 | | |
| | | (0.44) | (0.02) | (0.04) | | | | | | | |

Farley et al. (2021) applied a new decimal age algorithm (developed for WCPO Pacific bigeye and yellowfin) to obtain updated decimal age estimates for albacore. The updated growth estimates based on these data were used in the 2021 assessment (Figure 4).

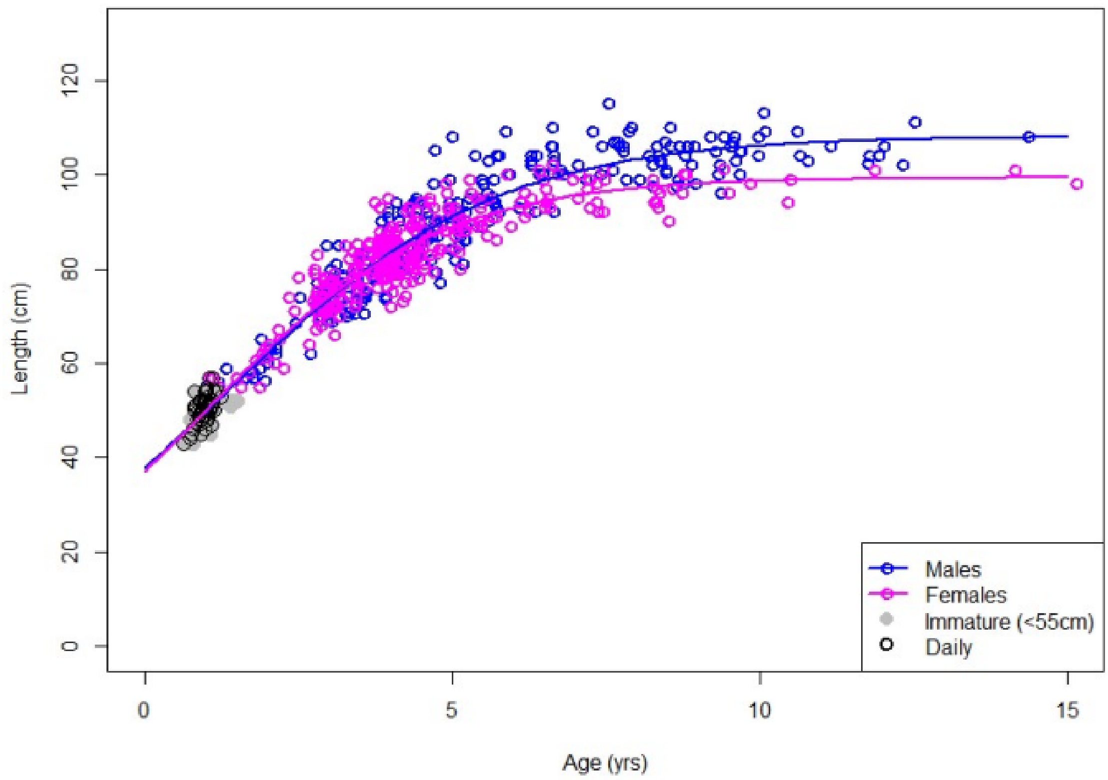



**Figure 4: Sex-specific growth curves for all areas combined using a logistic growth model. Males: $L_{inf}$=108.13, *k*=0.46, $a_0$=1.34, sigma=4.39. Females: $L_{inf}$=99.43, *k*=0.53, $a_0$=0.97, sigma=3.89 (Farley et al. 2021).**

The instantaneous natural mortality (*M*) rate is thought to be between 0.2 and 0.5 per year, with significant numbers of fish living 10 years or more. A recent meta-analysis of mortality for the North Pacific stock indicated that *M* should be closer to 0:4, higher for females, and age-specific. The value of *M* is an important biological uncertainty that is estimated again for the 2021 assessment (Castillo-Jordan et al. 2021) based on the revised age-at-length data by Farley et al. (2021). For this assessment an approach for specifying natural mortality-at-age (*M*-at-age) that uses a combination of life history information and *M*-at-age theory was adopted. The parameters from the two approaches for growth estimation were used to generate two *M*-at-age options.

## 3. STOCKS AND AREAS

Two albacore stocks (North Pacific and South Pacific) are recognised in the Pacific Ocean based on location and seasons of spawning, low longline catch rates in equatorial waters, and tag recovery information. The South Pacific albacore stock is distributed from the coast of Australia and archipelagic waters of Papua New Guinea eastward to the coast of South America south of the equator to at least 50º S. However, there is some suggestion of gene flow between the North Pacific and South Pacific stocks based on an analysis of genetic population structure.

Most catches occur in longline fisheries in the EEZs of other South Pacific states and territories and in high seas areas throughout the geographical range of the stock.

In the South Pacific, the stock structure is not fully resolved. Tag recapture data for releases in the southern region of the Western and Central Pacific Ocean (WCPO, refers to west of 130° W) show a high level of latitudinal mixing, and provide some evidence of individual movements from the WCPO to the southern Eastern Pacific Ocean (EPO) (Castillo-Jordán et al. 2021). However, whilst tagging research has shown the capacity for large movements, the actual level of mixing between the WCPFC and Inter-American Tropical Tuna Commission (IATTC) convention areas is poorly known. Analyses of genetic markers (Anderson et al. 2019), otolith microchemistry (Macdonald et al. 2013), growth variability (Farley et al. 2021) and gonad development (Farley et al. 2013b) all indicate a degree of population differentiation between the WCPO and EPO. These results are further supported by the most recent analyses of otolith shape and genetic data from individuals captured in French Polynesia and New Caledonia (Macdonald et al. 2024) as well as the latest SEAPODYM modelling results for the South Pacific albacore stock that estimate limited exchange of individuals between the WCPO and the EPO (Teears et al. 2024). However, studies to date have been constrained by a lack of spatial and temporal sampling resolution. A Close Kin Mark Recapture (CKMR) project is currently being rolled out across the Pacific (SPC-OFP and CSIRO 2024), which should address the remaining uncertainty around stock structure.

## 4. ENVIRONMENTAL AND ECOSYSTEM CONSIDERATIONS

This section was updated for the November 2025 Fishery Assessment Plenary. This summary is from the perspective of the albacore troll and longline fishery; a more detailed summary from an issue-by-issue perspective is available in the Aquatic Environment and Biodiversity Annual Review where the consequences are also discussed (Aquatic environment and biodiversity annual review (AEBAR) | NZ Government (mpi.govt.nz)).

### 4.1 Role in the ecosystem

Albacore (*Thunnus alalunga*) are apex predators, found in the open waters of all tropical and temperate oceans, feeding opportunistically on a mixture of fish, crustaceans, and squid, and juveniles also feed on a variety of zooplankton and micronecton species.

### 4.2 Incidental catch and non-target catch

#### 4.2.1 Troll fishery
The majority of the albacore catch in New Zealand waters is from troll fishing (96% in 2024). The observer coverage of the troll fleet was ongoing between 2006–07 and 2011–12 and coverage averaged 0.7% of the effort during that time. Observer coverage was suspended after 2011–12 due to the difficulties experienced in placing observers on the small vessels in this fishery.

From 2006 to 2012 the target albacore troll fishery catch averaged 93% albacore, with the remaining 7% made up mostly of teleosts. No incidental captures of protected species have been observed in this fishery.

#### 4.2.2 Longline fishery
Recorded effort in the New Zealand target albacore longline fishery declined considerably in the early 2000s from almost 1.9 million hooks in 2002–03 to 60 000 hooks in 2005–06 and has varied at levels below 50 000 hooks since this time, with no effort recorded in a number of years. Observer coverage was low between 2003–04 and 2010–11, and there has been no observer coverage since this time. Albacore are caught by longline throughout the year as a bycatch on sets targeting bigeye tuna, southern bluefin tuna, and swordfish (see these chapters for environmental and ecosystem considerations for these fisheries).

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

## 5. STOCK ASSESSMENT

No assessment is possible for albacore within New Zealand fisheries waters because the proportion of the greater stock found within New Zealand fisheries waters is unknown and is likely to vary from year to year. With the establishment of WCPFC in 2004, stock assessments of the South Pacific Ocean (SPO) stock of albacore tuna are now undertaken by the Oceanic Fisheries Programme (OFP) of Secretariat of the Pacific Community (SPC) under contract to WCPFC.

Teears et al. (2024) presented SC20-SA-WP-02, which described the 2024 stock assessment of South Pacific albacore, updating the stock status through to 2022. The South Pacific-wide stock assessment model was simplified (compared to the previous 2021 assessment) to a two-region structure (Figure 5) using an areas-as-fleets approach (Figure 6) informed by a regression tree analysis based on longline length data.

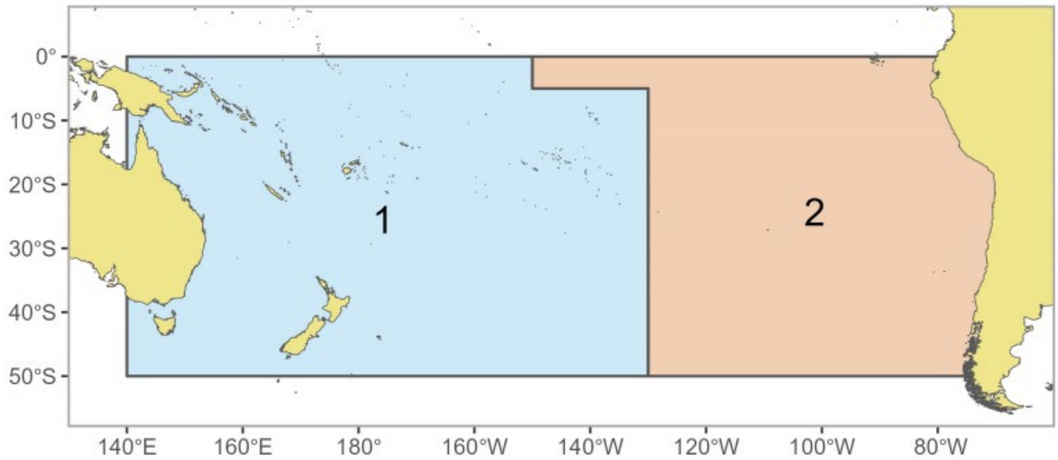



**Figure 5: The geographical area covered by the stock assessment and the boundaries of the two model regions used for the South Pacific-wide 2024 albacore assessment.**

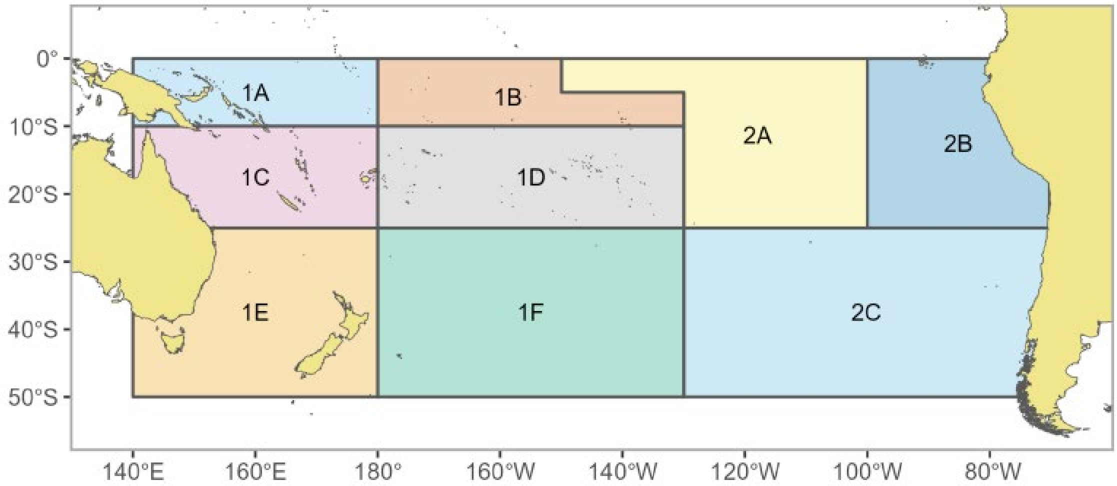



**Figure 6: The geographical area boundaries of the nine fisheries areas used for the South Pacific-wide 2024 albacore assessment.**

Recruitment frequency was changed from quarterly to annual. Growth was estimated internally, informed by the conditional age-at-length and length frequency data, with von Bertalanffy offsets for ages 2–4 years. Tagging data were relatively uninformative, therefore movement and recruitment distribution were informed by SEAPODYM (Senina et al., 2020). Three annual relative abundance indices were developed; two from longline data in the WCPFC Convention Area (WCPFC-CA) north of 25°S and Eastern Pacific Ocean (EPO) and one juvenile troll index (New Zealand). Length data was weighted using the Francis weighting approach. Natural mortality (M)-at-age followed a Lorenzen (1996) curve scaled by the Hamel & Cope (2022) max-age based approach. Fits to the data and other diagnostics (likelihood profile, jitter analysis, retrospectives, age-structure production model, catch-curve analysis, sensitivities) indicated a well-behaved model. M-at-age and stock recruitment relationship steepness parameter significantly impacted results and were included in the Monte Carlo model ensemble approach applied to estimate stock status.

## 5.1 Stock status and trends

Catch data for the 2024 assessment by gear and model region are shown in Figure 7. The data used extended to 2022 (since data for 2023 was still considered preliminary). By flag, China and Chinese Taipei had the highest catch estimates of South Pacific albacore in recent years taken on the high seas. Four flag states (Canada, the Cook Islands, USA and New Zealand) reported troll catch within the WCPFC-CA during the period from 2000 to 2022 (Figure 8). The preliminary estimates of 2023 albacore tuna catch within the southern part of the WCPFC-CA (64 996 t) was lower than the 2022 level. Longline catch in 2023 (63 804 t) as well as troll catch (1192 t) were lower than the 2022 catch and lower than the recent 10-year average.

Spawning biomass shows a sharp decline from the beginning of the model period until the mid-1970s after which it stabilizes (Figure 9). The stock status, as indicated by the spawning biomass depletion ($SB/SB_{F=0}$), shows a more gradual long-term decline from the beginning of the model period (Figure 10 and 11). Although spawning biomass estimates for recent years should be interpreted with caution, the terminal decline in spawning biomass depletion that was the focus of the previous assessment has moderated in the new assessment, and there are recent indications that the overall stock status has improved.

Recruitment shows similar interannual variability across years, with an increasing trend from the late 1990s becoming more apparent in the estimates (Figure 12). The 20th WCPFC Scientific Committee (SC20) used the troll CPUEs (from 1992 to 2022) to inform stock-wide recruitment and provide some constraints on recruitment variability, although the fit of the troll index was relatively poor in the 1990s and in the final decade.

Fishing mortality on adults continues to increase, while fishing mortality on juveniles remains low. Fishing mortality has increased sharply in the EPO since 2010 as the longline catches have increased but has remained stable in the WCPFC-CA over a similar period (Figure 13).

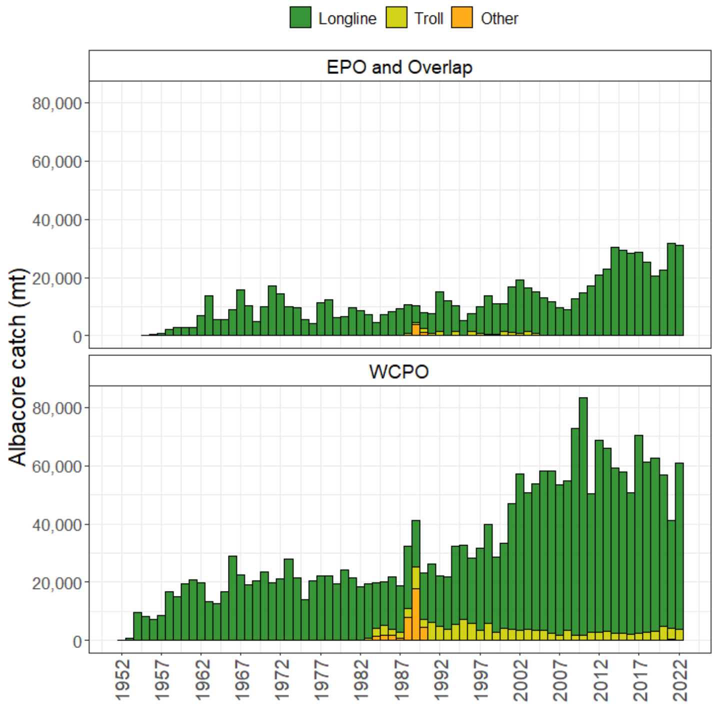



**Figure 7: Historical catches (tonnes) of South Pacific albacore in each model region (WCPFC-CA = region 1, EPO = region 2) from 1952-2022 by gear type.**

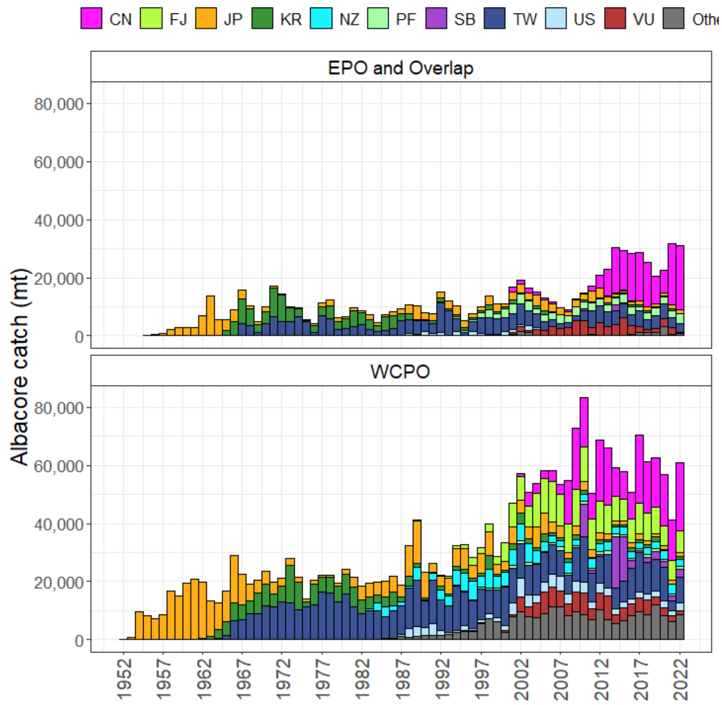



**Figure 8: Annual catches (tonnes) of South Pacific albacore from 1952–2022 separated by flag for the WCPFC-CA and the IATTC (EPO) regions.**

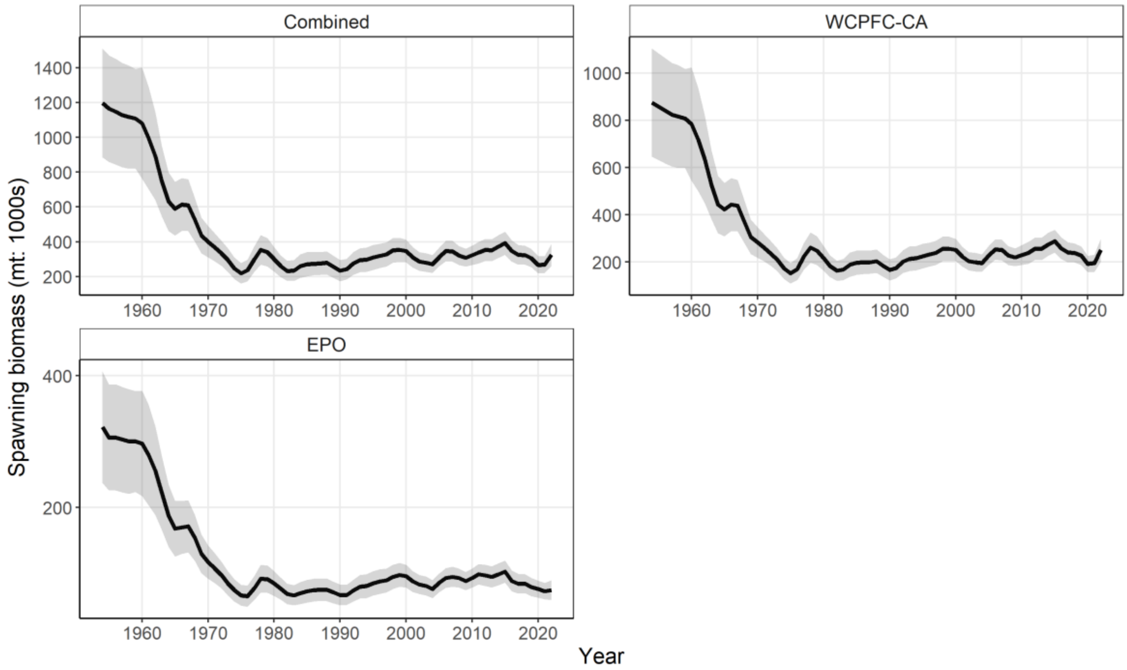



**Figure 9: Estimated annual spawning biomass with 95% confidence intervals by model region and for the South Pacific for the diagnostic case model.**

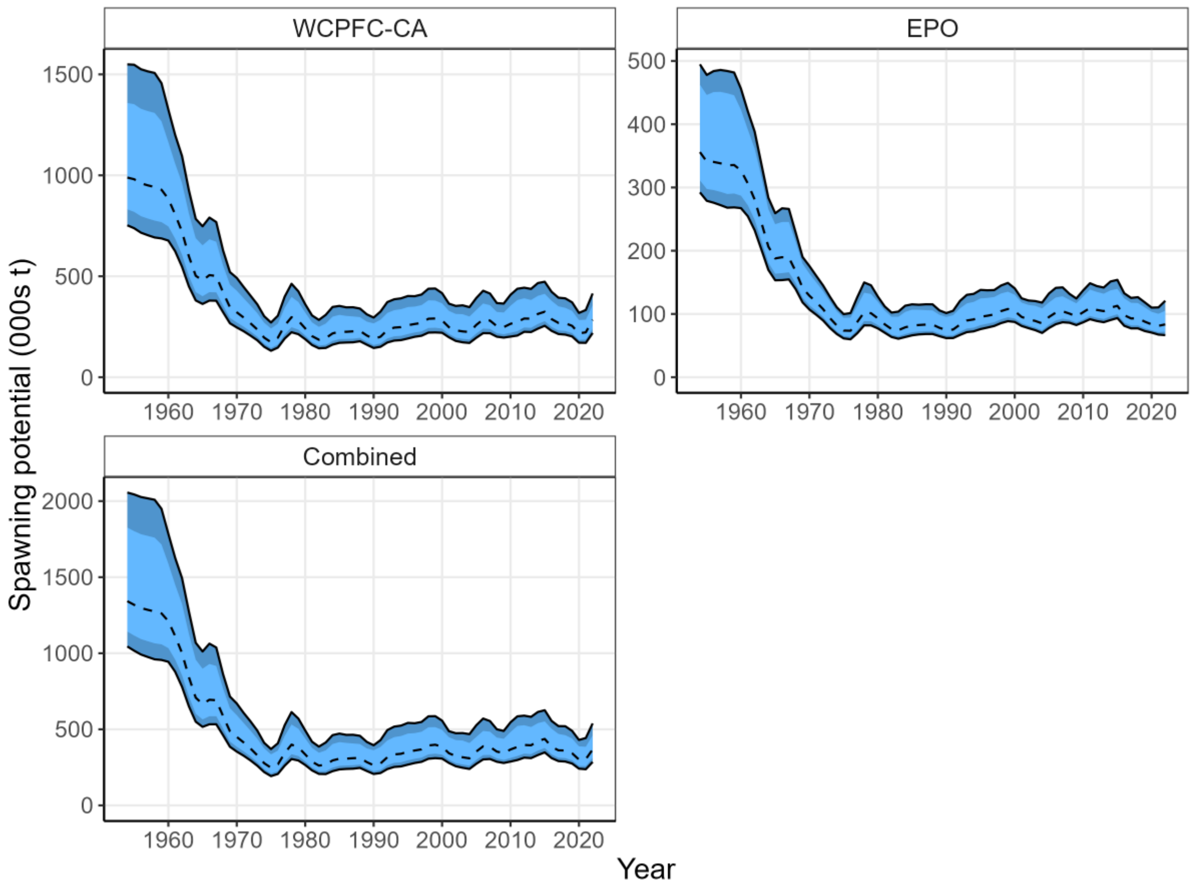



**Figure 10: Annual estimated 90% (dark blue) and 75% (light blue) quantiles of SB by region from the model ensemble. The dashed line indicates the median.**

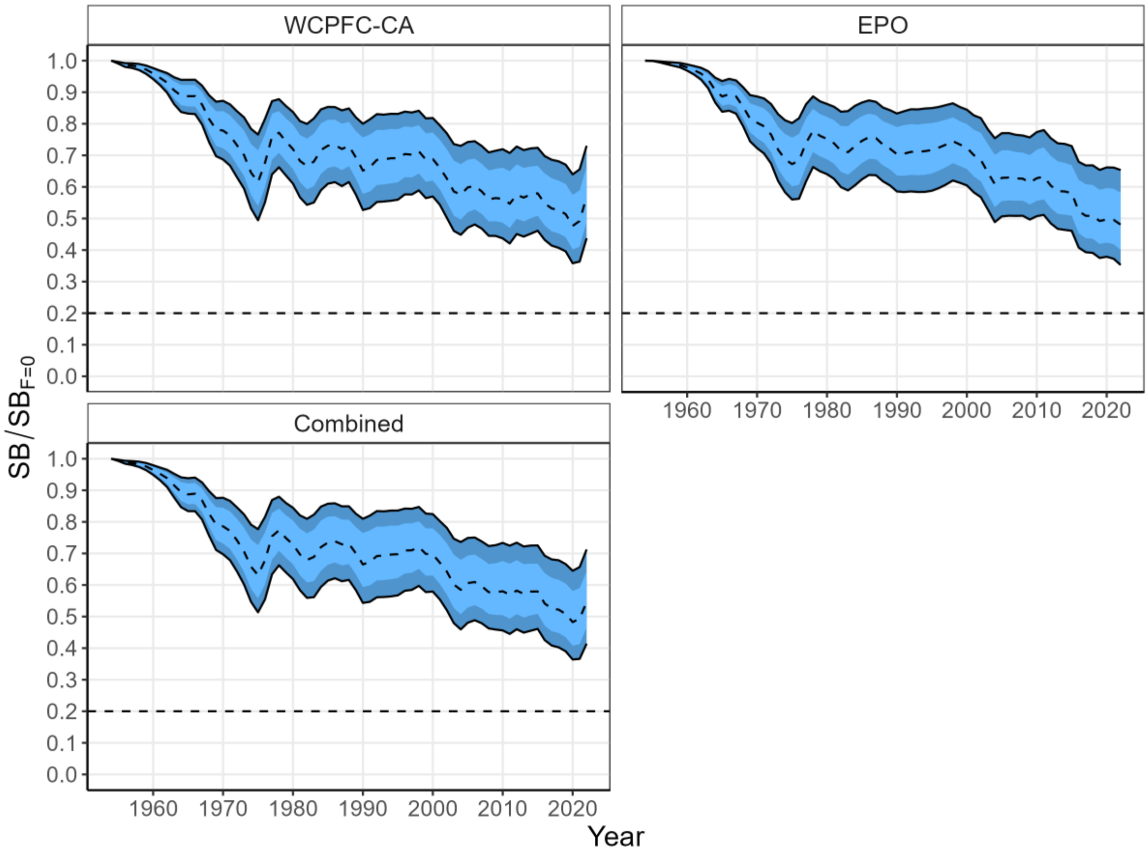



**Figure 11: Annual estimated 90% (dark blue) and 75% (light blue) quantiles of *SBt/SBF =0(t)* by region from the model ensemble. The dashed line within the interval indicates the median.**

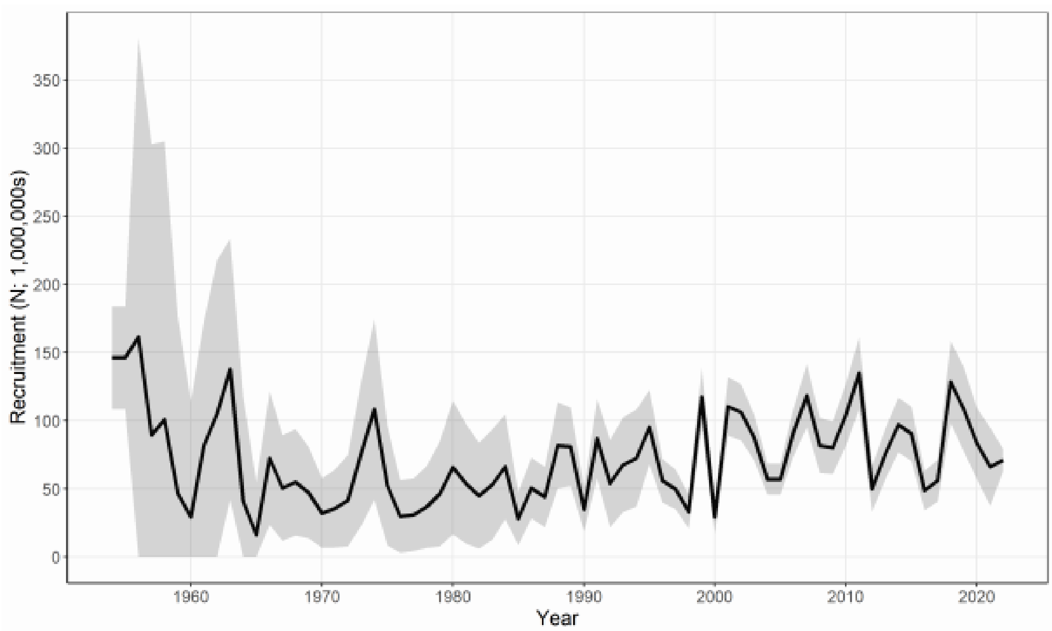



**Figure 12: Estimated annual recruitment with 95% confidence intervals across model regions for the diagnostic case model.**

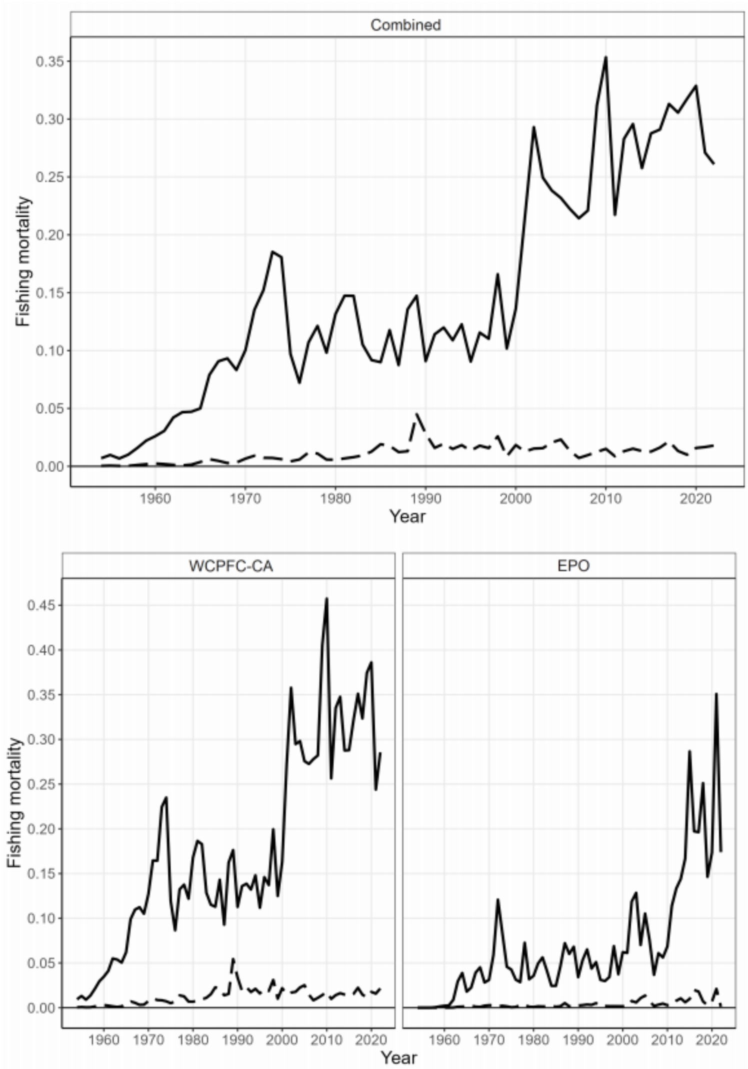



**Figure 13: Estimated annual juvenile (dashed line) and adult (solid line) fishing mortality for the diagnostic case model.**

## 5.2 Management advice and implications

The median depletion from the model ensemble with estimation uncertainty for the recent period (2019–2022; $SB_{recent}/SB_{F=0}$) was 0.48 (10th to 90th percentile interval of 0.36 to 0.62; Table 8), which is close to, but just below, the 0.5 re-estimated interim Target Reference Point (iTRP) for South Pacific albacore based on the 2024 assessment. For each model in the ensemble, the ratio of the $SB_{recent}/SB_{F=0}$ to the iTRP estimated for that model was calculated (Table 8). Across the 100 models, the median ratio of $SB_{recent}/SB_{F=0}$ to the iTRP was 0.952, ranging from 0.899 to 1.016, which is close to the iTRP.

The median recent spawning biomass from the model ensemble with estimation uncertainty is well above the spawning biomass to achieve MSY (median $SB_{recent}/SB_{MSY}$ = 3.02, 10th to 90th percentile interval of 2.04–5.21, full range 1.20–8.96; Table 8).

For all models in the uncertainty ensemble, $SB_{recent}/SB_{F=0}$ was above 0.2, the limit reference point (Figure 11) and the dynamic MSY analysis 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 14).

The stock is not overfished (0% probability $SB_{recent}/SB_{F=0}$ < LRP) and is not experiencing overfishing (100% probability $F_{recent}$ < $F_{MSY}$). These results are broadly consistent with the previous 2021 stock assessment.

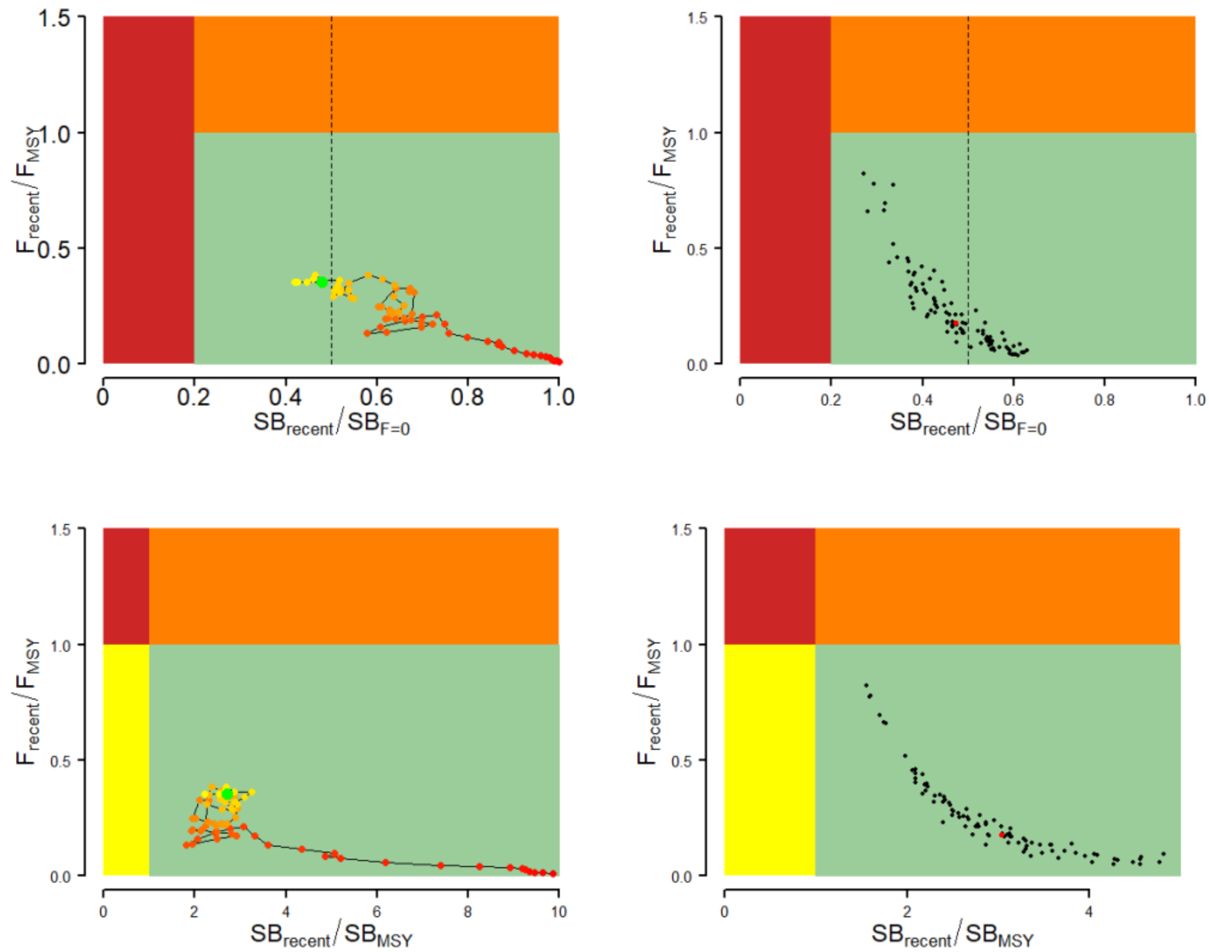



**Figure 14: Majuro plots (top) and Kobe plots (bottom) summarising the results for the dynamic MSY and depletion analysis for the diagnostic case model (left) and each of the models in the model ensemble for the recent period (2019– 2022; right). Majuro plots include a dashed line at the iTRP estimate (0.5), calculated from the current assessment (Pilling et al. 2024). Colors for dynamic MSY go from red to green over time. The red point in the model ensemble represents the median.**

**Table 8: Summary of reference points over the model ensemble, along with results incorporating estimation uncertainty; values do not include estimation uncertainty, unless otherwise indicated.**

| | Mean | Median | Min | 10% | 90% | Max |
|---|---|---|---|---|---|---|
| $F_{MSY}$ | 0.15 | 0.16 | 0.10 | 0.12 | 0.18 | 0.20 |
| $f_{mult}$ | 7.95 | 5.61 | 1.21 | 2.27 | 17.18 | 27.66 |
| $F_{recent}/F_{MSY}$ | 0.22 | 0.18 | 0.04 | 0.06 | 0.44 | 0.82 |
| MSY | 113 308 | 101 100 | 62 120 | 74 018 | 176 330 | 202 400 |
| $SB_0$ | 587 089 | 566 950 | 529 100 | 537 100 | 662 500 | 749 700 |
| $SB_{F=0}$ | 724 200 | 711 059 | 665 389 | 674 633 | 788 312 | 857 071 |
| $SB_{latest}/SB_0$ | 0.66 | 0.67 | 0.38 | 0.53 | 0.81 | 0.90 |
| $SB_{latest}/SB_{F=0}$ | 0.54 | 0.54 | 0.29 | 0.41 | 0.70 | 0.78 |
| $SB_{latest}/SB_{MSY}$ | 3.71 | 3.40 | 1.65 | 2.32 | 5.77 | 7.45 |
| $SB_{MSY}$ | 111 738 | 110 950 | 65 140 | 80 350 | 142 690 | 172 600 |
| $SB_{MSY}/SB_0$ | 0.19 | 0.20 | 0.11 | 0.13 | 0.24 | 0.27 |
| $SB_{MSY}/SB_{F=0}$ | 0.15 | 0.16 | 0.10 | 0.11 | 0.19 | 0.22 |
| $SB_{recent}/SB_{F=0}$ | 0.48 | 0.48 | 0.27 | 0.37 | 0.62 | 0.65 |
| $SB_{recent}/SB_{MSY}$ | 3.30 | 3.06 | 1.54 | 2.10 | 5.23 | 6.34 |
| $YF_{recent}$ | 74 531 | 74 375 | 61 760 | 67 731 | 83 023 | 86 180 |
| $SB_{latest}/SB_{F=0}$: iTRP | 1.065 | 1.051 | 0.961 | 1.015 | 1.139 | 1.213 |
| $SB_{recent}/SB_{F=0}$: iTRP | 0.952 | 0.952 | 0.899 | 0.924 | 0.986 | 1.016 |
| Including estimation uncertainty | | | | | | |
| $F_{recent}/F_{MSY}$ | 0.23 | 0.18 | 0.03 | 0.06 | 0.44 | 1.00 |
| $SB_{recent}/SB_{F=0}$ | 0.48 | 0.48 | 0.23 | 0.36 | 0.62 | 0.77 |
| $SB_{recent}/SB_{MSY}$ | 3.32 | 3.02 | 1.20 | 2.04 | 5.21 | 8.96 |

Note: Recalibrated value for iTRP= 0.50 (Pilling et al., 2024)

### 5.3 Estimates of fishery parameters and abundance

There are no fishery-independent indices of abundance for the South Pacific stock. Relative abundance information is available from catch per unit effort data. Returns from tagging programmes provide information on rates of fishing mortality; however, the return rates are very low and lead to highly uncertain estimates of absolute abundance.

### 5.4 Biomass estimates

Spawning biomass declined rapidly from 1950s until the late 1970s after which it stabilised and increased slightly in the WCPFC Convention Area until 2015 after which it declined again until the very recent years when another increase was estimated. The overall trend is relatively consistent in each model region despite the estimated levels of biomass associated with each region differing substantially. The 95% confidence intervals for SB are wider in the early years of the time series.

$SB_t/SB_{F=0(t)}$ has declined continuously since 1954 in both model regions and in 2022 is estimated to be at its lowest level in the Eastern Pacific Ocean. In the WCPFC-CA $SB_t/SB_{F=0(t)}$ reached a minimum in 2020 and has since increased sharply. The 95% confidence intervals for $SB_t/SB_{F=0(t)}$ begin at zero in 1954 (because of the unexploited population condition) but expand moving forward in time. At the end of the time series, the CV is approximately 0.05.

### 5.5 Yield estimates and projections

Preliminary "status quo" stochastic projections were performed using the 100 models developed in the model ensemble. Projections were run for 40 years, and therefore ran from 2023 through to 2062. Future catch levels in longline and troll fleets across the South Pacific were assumed to be the average catches across the period 2020–2022. Catchability of each fishery was assumed to remain constant in the projection period at the level estimated in the terminal period of the assessment model.

To be consistent with other analyses and noting recent increases in catch levels within the EPO region, future catch of fisheries within the "remainder of the EPO" (EPO excluding the overlap area where the WCPFC and IATTC Conventions overlap[1]) were scaled up to an equivalent of 22 500 t, the levels reported in 2021 and 2022.

Fifty stochastic projections were performed from each of the 100 assessment models. Future recruitment was defined by the estimated stock recruitment relationship, with variability around it defined by recruitment deviation estimates from the stock assessment over the period 1972 to 2020. Figure 15 presents the resulting South Pacific albacore depletion level of the stock within the WCPFC Convention Area. Depletion is calculated consistent with the guidance provided by WCPFC20 in terms of the calculation of the iTRP, reflecting the dynamic nature of this metric (WCPFC, 2024). Also included is a point denoting the calculation of $SB_{recent}/SB_{F=0}$.

[1] See https://www.iattc.org/GetAttachment/113a3fd0-1349-4e68-97f1-fd0089799f4f/B.%20Overlap%20area

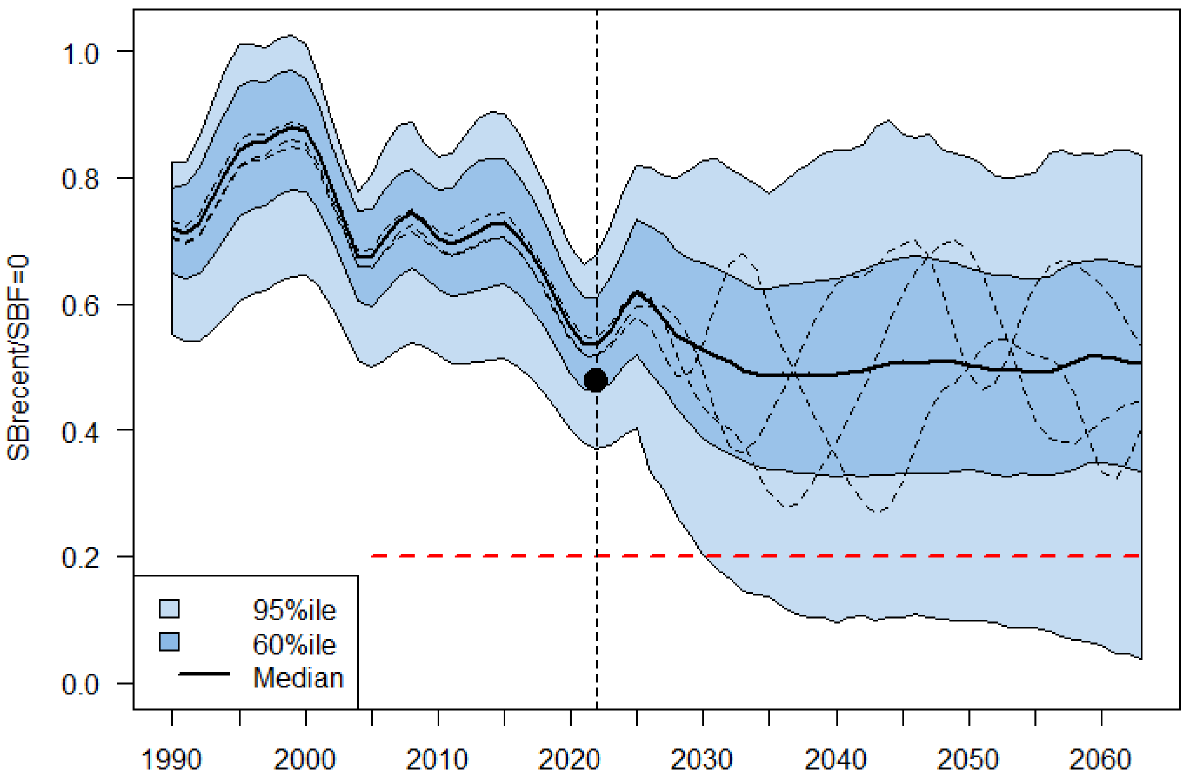



**Figure 15: South Pacific albacore SB depletion for the WCPFC Convention Area from the uncertainty grid of assessment model runs for the period 1990 to 2022 (the vertical line at 2022 represents the last year of the assessment), and stochastic projection results for the period 2023 to 2062 assuming actual catch and effort levels in 2022, and that 2022 fishing levels continued. Prior to 2022 the data represent the 60th and 95th percentiles of the uncertainty grid from the assessment models and the median. During the projection period (2023–2062) levels of recruitment variability estimated over the period used to estimate the stock-recruitment relationship (1972–2020) are assumed to continue in the future. The dashed lines indicate three example trajectories (chosen randomly out of 5000) from the model grid. The red dashed line represents the WCPFC agreed limit reference point (0.20). Point represents $SB_{recent}/SB_{F=0}$.**

## 6. STATUS OF THE STOCK

Stock status is summarised from Teears et al. (2024).

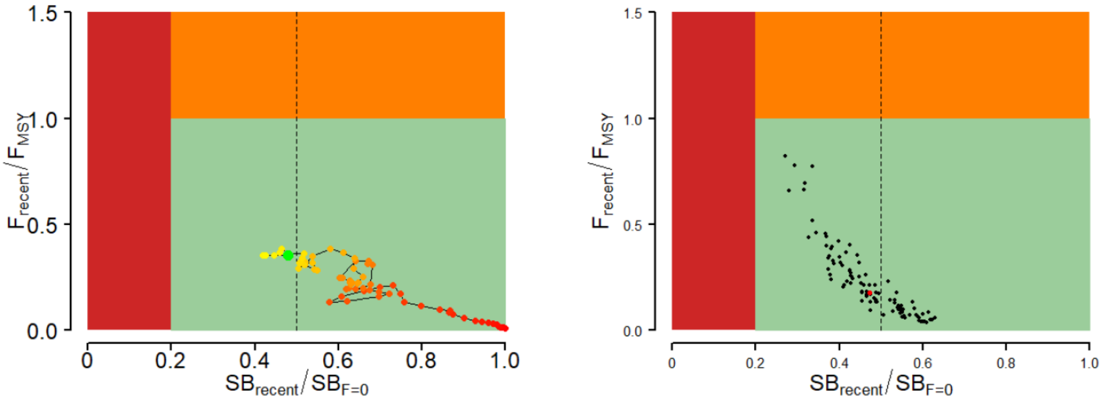
**Stock structure assumptions**

In the western and central Pacific Ocean, the South Pacific albacore stock is distributed from the coast of Australia and archipelagic waters of Papua New Guinea eastward to the coast of South America south of the equator to at least 50° S. However, there is some suggestion of gene flow between the North and South Pacific stocks based on an analysis of genetic population structure. All biomass estimates in this table refer to spawning biomass (*SB*).

| **Stock Status** | | |
|---|---|---|
| Most Recent Assessment Plenary Publication Year | 2024 | |
| Intrinsic productivity level | Medium | |
| Catch in most recent year of assessment | Year: 2022 | Catch: NZ: 2 460 t<br>South Pacific: 91 744 t |
| Assessment Runs Presented | Diagnostic case model, selected sensitivity runs, and the structural uncertainty grid | |

| | |
|---|---|
| Reference Points | Biomass-related target reference point (iTRP) agreed by WCPFC20 and calculated based on the current assessment as 50% $SB_0$<br>Soft Limit: Limit reference point of 20% $SB_0$ established by WCPFC equivalent to the HSS default of 20% $SB_0$<br>Hard Limit: Not established by WCPFC; but evaluated using HSS default of 10% $SB_0$<br>Overfishing threshold: $F_{MSY}$ |
| Status in relation to Target | Recent levels of spawning biomass ($SB_{2019-2022}/SB_{F=0}$ = 0.48) is About as Likely as Not (40–60%) to be at or above the agreed iTRP of 50% $SB_0$<br>Very Likely (> 90%) that $F < F_{MSY}$ |
| Status in relation to Limits | Soft Limit: Very Unlikely (< 10%) to be below<br>Hard Limit: Very Unlikely (< 10%) to be below |
| Status in relation to Overfishing | Overfishing is Very Unlikely (< 10%) to be occurring |

**Historical Stock Status Trajectory and Current Status**




**Majuro plots summarising the results for the dynamic MSY analysis (left) and each of the models in the model ensemble for the recent period (2019–2022; right). The dashed line is at the iTRP estimate (0.5), calculated from the current assessment. Colours for the dynamic MSY plot (left) go from red to green over time. The red point in the model ensemble plot (right) represents the median.**

| **Fishery and Stock Trends** | |
|---|---|
| Recent Trend in Biomass or Proxy | Spawning biomass has been steadily declining but is currently well above the spawning biomass to achieve the deterministic MSY (median $SB_{recent}/SB_{MSY}$ = 3.02) |
| Recent Trend in Fishing Intensity or Proxy | Fishing mortality on adults continues to increase, while fishing mortality on juveniles remains low. Fishing mortality has increased sharply since 2010 in the EPO as the longline catches have increased but has stabilised in the WCPFC-CA over a similar time period. The median recent fishing mortality from the model ensemble with estimation uncertainty is below the level for achieving MSY (median $F_{recent}/F_{MSY}$= 0.18). |
| Other Abundance Indices | In both the WCPFC-CA and EPO, the standardised trends in relative abundance based on longline data showed an overall decline from the early part of the time series to relatively stable trends since approximately the 1980s with recent estimates of relative abundance remaining below the long-term mean. The WCPFC-CA index indicated an increasing trend prior to 1960 when the EPO index indicated a decline. For the New Zealand troll data, the index is more variable at the beginning of the |

| | |
|---|---|
| | time-series (from 1992) however, the overall trend is relatively stable throughout. |
| Trends in Other Relevant Indicator or Variables | - |

| **Projections and Prognosis** | |
|---|---|
| Stock Projections or Prognosis | There is no indication that current levels of catch are causing recruitment overfishing. However, current levels of fishing mortality may be affecting longline catch rates of adult albacore. |
| Probability of Current Catch or TACC causing Biomass to remain below or to decline below Limits | Soft Limit: Very Unlikely (< 10%)<br>Hard Limit: 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: Full Quantitative Stock Assessment | |
| Assessment Method | MULTIFAN-CL (version 2.2.7.0) | |
| Assessment Dates | Latest assessment Plenary publication year: 2024 | Next assessment: 2027 |
| Overall assessment quality rank | 1 – High Quality | |
| Main data inputs (rank) | The model is age-structured and the catch, effort, size composition and tagging data used in the model are classified both spatially and temporally. | 1 – High Quality |
| Data not used (rank) | N/A | |
| Changes to Model Structure and Assumptions | - Collapsed the WCPFC-CA subregions to a single region<br>- Implementation of an areas-as-fleets approach for both the WCPFC-CA and the eastern Pacific Ocean (EPO)<br>- Conversion from a catch-errors to a catch-conditioned modelling framework, and the inclusion of a likelihood component for the CPUE from the index fisheries<br>- Change from quarterly to annual recruitment<br>- Development of annual indices from operational longline data, a WCPFC-CA juvenile index from New Zealand troll fishery data, and a full EPO index from operational longline data<br>- Growth estimation informed by conditional-age-at-length data<br>- Lorenzen natural mortality at age<br>- Effective sample sizes for size composition data calculated using the Francis weighting approach<br>- Movement and recruitment distribution fixed to values derived from SEAPODYM | |
| Major Sources of Uncertainty | - some lack of fit to the CPUE index and troll length frequency data remains<br>- natural mortality and steepness emerged from the sensitivity analyses as the key sources of model uncertainty impacting stock-assessment-related estimates | |

| Qualifying Comments |
|---|
| Important uncertainties such as stock structure were not considered; SC20 recommended that this be accounted for in the future, subject to the results of ongoing CKMR genetic research. |

# 7. FOR FURTHER INFORMATION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