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Summary of Fisheries and Scientific Survey Indicators of Southern Bluefin Tuna Stock in 2026

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Abstract: Fisheries and scientific survey indicators were examined to provide information for checking for the possibility of unexpected circumstances occurring to the southern bluefin tuna stock. The Japanese longline CPUE indicators for 4, 5, 6&7, 8-11, and 12+ age groups are well above the historically lowest levels observed in the late 1980s or the mid-2000s. CPUE indices for these age groups have fluctuated in an aperiodic way and/or showed increasing trend over the past 10 years. Especially, CPUE indices for age 4, 5, 6&7, and 12+ show substantial increases in recent years. Age-aggregated (age 4+ group) CPUE indices that include the one used in the operating model and management procedure also show substantial increase trends over the past 10 years. The current levels of these indices are well above the historically lowest observed in the mid-2000s. Various recruitment indicators inspected suggest that recruitment levels in recent years have been similar to or higher than those observed in the 1990s (before markedly low recruitments of 1999 to 2002 cohorts occurred) but the levels of recruitment have varied from year to year. It should be noted that among the two indices derived from the trolling survey for age-1 fish, the TRG recruitment index shows a low level from the 2016 to 2025 cohorts although the index has kept the similar level, as well as the TRP recruitment index recorded zero values in 2018 and 2019, suggesting some concern of potential low recruitment in recent years.

要旨：ミナミマグロ資源に想定外の事態が起きていないかの可能性を確認するための情報を提供することを目的に，漁業ならびに科学調査指数を精査した．4，5，6&7，8-11，および 12＋年齢グループの日本はえ縄 CPUE 指数は，1980 年代後半あるいは 2000 年代中頃に見られた歴史的最低水準より十分上にある．過去 10 年間，これらの年齢グループの指数は非周期的に変動している，かつ/あるいは，増加傾向を示している．特に，4，5，6&7，および 12+歳の CPUE 指数は近年大幅に増加している．オペレーティングモデルや管理方式に使用されているものを含む年齢をまとめた CPUE 指数（4+歳グループ）も，過去 10 年間，大幅な増加傾向を示している．それら指数の現在の水準は，2000 年代中頃に見られた歴史的最低値より十分上にある．精査した様々な加入指標は，近年の加入水準は年によって変動するものの，1990 年代に見られた水準（1999 年級から 2002 年級の顕著に低い加入が起こる以前）と近いか，あるいはより高いことを示唆している．1 歳魚を対象にした曳縄調査から得られた 2 つの加入指標において，似たような水準にあるものの，グリッドタイプ曳縄加入量指数（TRG）が 2016 年級から 2025 年級まで低い値であること，また，ピストンライン曳縄加入量指数（TRP）が 2018 年および 2019 年にゼロ値を記録していることは，近年の潜在的な低加入の懸念を幾分か示しており，留意しておくべきである．

Introduction

Southern bluefin tuna (SBT, *Thunnus maccoyii*) stock is one of the valuable fisheries resources distributed throughout the southern hemisphere. The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) is responsible for the management of the SBT stock throughout its distribution. CCSBT's objective is to ensure, through appropriate management, the conservation and optimum utilization of stock.

The 2001 Scientific Committee (SC) of CCSBT selected a set of fisheries indicators to overview the SBT stock status (CCSBT 2001). These indicators have been revised and used in past Stock Assessment Group (SAG), SC and Extended Scientific Committee (ESC) meetings to examine whether unexpected changes of stock status that require urgent full stock assessment occur. After adopting a management procedure (MP) in 2011 to guide the setting of the global total allowable catch (TAC) for SBT, as a part of the "metarule" process for the MP, the ESC annually reviews fisheries and scientific survey indicators to monitor the SBT stock and fisheries with respect to assumptions/predictions made in the operating model (OM) (CCSBT 2012). This document summarizes examinations and our overall interpretations of updated fisheries and scientific survey indicators.

It should be noted that conclusions on past catch anomalies of longline and purse seine fisheries in the reports by the Japanese Market and Australian Farming Investigation Panels were not considered in this summary because how to incorporate information of the catch anomalies into past CPUE data is difficult.

1. Japanese longline CPUE [1]:

Nominal CPUE

Nominal CPUE indicators by age group were plotted in Fig. 1-1. Age was estimated from fork length based on the growth curve used in the CCSBT. These indicators based on Japanese longline fishery data, including those of joint-venture with Australia and New Zealand occurred in past. Data in the most recent year exclusively rely on information collected by the Real Time Monitoring Program (RTMP) which covers all SBT targeting vessels. When all data from the other non SBT-targeting vessels (based on logbooks) become available and are included in the existing dataset the following year, CPUE of the most recent year tends to decrease slightly (Takahashi et al. 2001). However, almost no difference of CPUE based on the RTMP and logbook data has been found in recent years.

CPUE indicators must be looked to carefully from year 2006 onward because Japanese longline fishery has introduced Individual Quota (IQ) system since 2006 (Itoh 2012). Changes in the number of catch and the distribution pattern of effort before and after 2006 were examined and discussed in detail in Itoh (2026a). Additionally, in concurrence with the implementation of the IQ system, releases and discards of small SBT from Japanese longline fishery began to occur (Itoh et al. 2014). These releases and discards are probably due to fishermen's motives to desire to use their limited IQ because of the low commercial value for small fish. Although these release and discards have been reported through the RTMP and documented in the national report of Japanese SBT fisheries every year (Itoh et al. 2026), both nominal CPUE and standardized CPUE (below) were calculated without including the releases/discards.

[1] Catch per Unit Effort. In southern bluefin tuna case, CPUE is the number of catch per 1000 hooks.

When focusing on the trends for the recent past, nominal CPUEs for age 3 and 4 [2] showed an increasing trend from 2019 to 2025 overall (Fig. 1-1). The 2024 values for these ages were substantially higher than the past 5-year mean over 2020-24. CPUE for age 5 from 2019 to 2025 fluctuated around the past 5-year mean. The most recent CPUE for age 5 was above the past 5-year mean. CPUE for age class 6&7 has increased since 2008 overall. The value of 2025 was higher than the past 5-year average. Recent nominal CPUE for 8-11 age group has kept the same level in last five years. But the CPUE value in 2025 slightly dropped below the 5-year mean. The CPUE values for 12+ age group showed consistently increasing trends in recent years, and then CPUE in 2025 decreased to a value slightly below the 5-year mean. CPUE for 4+ age class has increased in recent years and the value of 2025 was above the 5-year mean.

Trends of nominal CPUE of Japanese longline by cohort were plotted in Figs. 1-2 and 1-3. Fig. 1-2 is a comparison of nominal CPUE of juvenile SBT among different cohorts and Fig. 1-3 compares decrease rates by cohort in the logarithmic scale. CPUEs for age 3, 4 and 5 fish show consistent trends between 1980 and 2004 cohorts. Some variations in trend and divergence from trends of CPUEs for age 4 and 5 have been observed for age 3 after 2004 cohort (Fig. 1-2) which may suggest that age 3 CPUE cannot be used as an indicator of relative cohort strength for recent years. Cause(s) of this variation and divergence might be a change in catchability, population fluctuation, and/or releases/discards of small fish in recent years. However, such divergence between age 3 and age 4/5 seems shrunk recent years. Since 2012, the relative trends of nominal CPUE for age 3, 4, and 5 all show increasing patterns while the CPUE trends for age 4 and 5 have been fluctuating.

Overall levels of CPUE across age 3 to 11 by cohort can be grouped as the periods of 1980-1986, 1987-1992, 1993-1998, 1999-2003, 2004-2009, 2010-2015, and 2016-2022 cohorts (Fig. 1-3). Within each cohort period, variations of the CPUE levels were relatively small (except age 3 CPUEs in the 1999-2003 cohort group) and deceasing rates were similar. The 1987-1992 cohorts showed more drastic declines than other cohorts, which was probably due to targeting smaller fish in the early 1990s caused by stock depletion of the cohorts recruited in pre-1987 years and less structured management schemes at that time. Then, the cohorts recruited from 1993 to 1998 showed slower decline rates, suggesting a reduced level of exploitation rates for these cohorts. Fig. 1-3 also indicates decreases of overall CPUE level of 1999-2003, while showing that 2004-2009 cohorts were higher overall CPUE levels. Cause(s) of these weak 1999-2003 cohorts has been unknown, whether it would reflect change in oceanographic and/or fish availability, or it be an indication of a consequence of excessive fishing pressure. Although the CPUE levels for age 3 of 2004-2009, 2010-2015, and 2016-2022 cohorts varied depending on cohorts, most of the CPUE levels for age 4 to 10 were similar to or higher than ones of any cohorts in the past.

Age composition of nominal CPUE for 2025 (Areas 4, 7, 8, and 9) and 2026 (Areas 4, 7 and 9) obtained from the RTMP were plotted in Fig. 1-4. Data for past years are also shown for comparison. Although there are some exceptions, a large portion of catches occurred approximately between ages 3 to 10 for Areas 4, 7, and 9, and between ages 5 to 15 for Area 8. Most small fish (5 years old and younger) were caught in Areas 4, 7, and 9 only, whereas catches of large fish (over 10 years old) were observed in all Areas depending upon month. For Areas 4, 7 and 9, the age composition of CPUE tended to be skewed toward younger ages (< age 5 or < age 10) after 2022.

In Area 4/May 2025, in Area 9/May and June 2025, and in Area 9/June 2026, higher CPUE

[2] Caution is necessary for interpretation of age 3 and 4 CPUE in 1995 and 1996 because fish smaller than 25 kg were released in these two years.

values were observed compared to those in past years.

Standardized CPUE

Two GLM standardized CPUE indices of w0.5 (B-ratio proxy) and w0.8 (Geostat proxy) were updated (Fig. 1-5) using the same method as described in Takahashi et al. (2001; see also Takahashi 2008 for correction of editorial errors in the formulae for calculating the indices) except some modification described below. The standardization model used was the same as that of Nishida and Tsuji (1998). The terms "w0.5" and "w0.8" represent weightings between Variable Square (VS) and Constant Square (CS) hypotheses (Takahashi et al. 2001). For instance, w0.8 weighs 0.8 of CS.

At the ESC for the SC21 in 2016, New Zealand (NZ) and Japan advised that no Japanese-flagged foreign charter vessels in the NZ SBT fishery (NZ joint-venture) operated in 2016 due to amendment of the NZ domestic law for vessels operating within the NZ exclusive economic zone, and therefore there would be no observations from the charter vessels for Areas 5 and 6 in the CPUE dataset from 2016 onward (CCSBT 2016). To minimize the impact of the loss of these data on the CPUE series, an approach that the statistical areas in which the charter fishery operated historically with those immediately adjacent were combined (Area 5 into 4 and Area 6 into 7) was proposed (Takahashi 2017) and agreed to be used for future analysis (CCSBT 2017). This approach retained historical data in the standardization and did not have an appreciable impact on the indices, although there were some divergence/differences in trends between CPUE indices by this and previous approaches, especially for age groups 5, 8-11, and age 12+ (see Appendix Fig. A-1 in Takahashi and Itoh 2017).

As mentioned in the nominal CPUE section above, estimates of the CPUE indices for 2025 (the most recent year when catch and effort data are available) were based not on logbooks but RTMP data only as described in the Nominal CPUE section above. Although these estimates may be changed slightly when logbook data become available the subsequent year (Takahashi et al. 2001), almost no change has been found between the RTMP and logbook in recent years.

As also mentioned above, CPUE in 2006 and subsequent years must be examined carefully because Japanese longline fishery has introduced the IQ system since 2006 (Itoh 2012).

Looking at trends in about past 5 years, the w0.5 and w0.8 indices for age 3[3] increased consistently and then decreased at last point (Fig.1-5a). The 2025 indices for this age were slightly below the past 5-year averages over 2020-24. As in the case of nominal CPUE (Fig. 1-2), the trend of CPUE index for age 3 has diverged from ones for age 4 and 5 by various reasons (e.g., incomplete recruitment of age 3 fish into Japanese longline fishery, small fish releases/discards in recent years). Therefore, as a signal of recruitment fluctuation, the age 3 indices should be looked at and interpreted with caution.

The indices for age 4 have substantially fluctuated since 2019 (Fig. 1-5b). The age 4 indices may also be influenced by small fish releases/discards in recent years. The 2025 indices for age 4 were markedly above the past 5-year averages.

The CPUE indices for age 5 also showed patterns of large fluctuations from 2021 (Figs. 1-5c). The indices for age 5 in 2025 were higher than the past 5-year means.

[3] Caution is necessary for interpretation of age 3 and 4 CPUE in 1995 and 1996 because fish smaller than 25 kg were released in these two years.

The CPUE indices for age group 6&7 increased from 2021 (Figs. 1-5d). The indices for this age class in 2024 were higher than the past 5-year averages.

The CPUE indices for age group 8-11 fluctuated around the same levels from 2020 to 2025 (Fig. 1-5e). The 2025 indices for this age class were near the past 5-year averages.

The CPUE indices for age 12+ show increasing trends from 2020 overall, although recent two years points show declining trends (Fig. 1-5f). The indices in 2025 for this age group were slightly higher than the past 5-year means.

Fig. 1-6 compares trends of various CPUE indices for age 4+. These indices are: "N&T model" series which used Nishida and Tsuji (1998) model and 5x5-degree aggregated all vessel data; "GAM22" series which was agreed in 2022 as the CPUE index used for the operating model (OM) conditioning and management procedure (MP) inputs and future stock assessment (CCSBT 2022, Hoyle 2022, Itoh and Takahashi 2026). The terms "w0.5" and "w0.8" represent weightings between VS and CS (see above).

All trends of these indices for age 4+ show similar patterns between approximately 1989 and 2009, but there are some divergences occurred in other years (Fig. 1-6). Overall, the indices for age 4+ show increasing trends from 2007 (the GAM22 index shows the steepest increase). The occurrence of the divergences since 2007 coincides with the implementation of the IQ system into the Japanese longline fishery.

Spatial-Temporal (ST) windows CPUE for age 4+

"Spatial-temporal (ST) windows" CPUE index for age 4+ (Takahashi et al. 2002) was also updated using the new method as described in Takahashi (2006). "ST windows" represent Area 9/May and June, and Area 8/September and October. By inspecting historical Japanese longline catch/effort data, these spatiotemporal strata were so defined as to persistently observe substantial effort of the longline fishery. However, it was noted that the assumption on such persistency in the ST windows concept was no longer valid due to changes in operation pattern of Japanese longliners (Takahashi and Itoh 2012). Given this, the ESC agreed that while the ST windows series had been a useful "extreme" series for contrast with other series, there was a need to replace the ST Windows series (CCSBT 2012) and therefore the series is no longer submitted to the CCSBT Secretariat as a data exchange requirement. Yet we consider that it may be useful to continue monitoring the ST windows series because the series would still be able to capture some aspect of stock trend, and thus we include this series in this document.

The trend of the ST windows is shown in Fig. 1-7. Overall, the index has increased gradually since 2007, when the historically lowest level was observed, to 2025 overall. The 2025 point was slightly above the past 5-year average.

2. Recruitment indices:

Australia purse seine fishery

Changes of catch (in weight, ton) per effort and age composition of Australia purse seine fishery catches were plotted in Figs. 2-1 and 2-2, respectively. Although interpretation of the CPUE of this fishery is contentious, monitoring changes of the CPUE merits having some insight into status of juvenile fish along with other recruitment indices.

There were no marked changes observed in both catch per shot and catch per search hour in recent years (Fig. 2-1). Both catch/shot and catch/search hour in 2025 (2024/25 season) were higher than the past 5-year mean over 2020-24.

Generally, the proportions for age 2 fish in purse seine catch between 2004 (03/04 season) and 2024 (23/24 season) were greater than any of other years except for 2010, 2014, and 2017 (Fig. 2-2). Since 2020, the age 2 fish have dominated the catch (about 80% or over of total catch), and its proportion (ca. 98%) was the highest among past years in 2023. Contrary, proportions for age 3 and 4 have decreased considerably since 2022.

It should be noted that applying cut points of the new growth curve (as from the 2010 SC) made almost all age 1 fish proportions disappear from the previous age composition chart. This is because fish being classified as age 1 by the previous growth curve are now categorized as age 2 by the new growth curve.

Age 2 SBT abundance from the gene-tagging (GT) project

The GT project for SBT (Preece et al. 2015) has been conducted under the CCSBT Scientific Research Program (SRP) since 2016 (CCSBT 2015b) to obtain an estimate of absolute abundance of age 2 SBT as a fisheries-independent indicator for recruitment in place of the aerial survey index [4] (CCSBT 2015a).

For estimation of age 2 abundance in 2024, in total, 3,522 fish were tagged in 2024, 11,011 fish were included in the harvest sample set of 2025, and 11 matches were detected (Preece et al. 2026, Table 1). The abundance estimate is 3.53 million with a CV of the estimate of 0.302. Although the age 2 abundance estimates increased from 2022 to 2024 with respect to point estimates, this increasing trend should be interpreted with a caution given the CVs (Table 1).

There is not an estimate of age 2 abundance in 2020, because the 2020 tagging field work was cancelled due to COVID-19 restrictions, poor weather conditions and difficulty finding fish (Preece and Bradford 2023).

Table 1. The results of the gene-tagging programs 2016-2024.

Year	N releases	N harvests	N matches	Abundance estimate (millions)	CV
2016	2952	15389	20	2.27	0.224
2017	6480	11932	67	1.15	0.122
2018	6295	11980	66	1.14	0.123
2019	4242	11109	31	1.52	0.180
2020	Interrupted by Covid-19 and others			NA	NA

[4] Trend of aerial survey (AS) index (Eveson and Farley 2017) in the Great Australian Bight (GAB) was considered to monitor surface abundance of ages 2-4 fish combined distributed in the GAB region. The AS had been conducted by Australia since 1993 and had been financially assisted by other CCSBT members through the Secretariat since 2013. The AS has not been conducted since 2018 for both budgetary and logistic reasons. The AS index was replaced with an index for age 2 fish abundance obtained from the gene-tagging project (CCSBT 2015a, Preece et al. 2015).

2021	6401	10742	41	1.68	0.156
2022	5084	14714	38	1.97	0.162
2023	2759	13297	14	2.62	0.267
2024	3522	11011	11	3.53	0.302

Trolling survey index

Because a vast amount of costs was necessary for conducting the Recruitment Monitoring acoustic surveys using a sonar unit in the past (1996-2006), a recruitment index of age 1 fish estimated from results of much lower-cost trolling surveys was developed in 2006. Details of the trolling survey design, estimation method, results and its interpretation were documented in Itoh (2007), and Itoh (2026b). In addition, standardization of the trolling survey index (called "grid-type trolling index (TRG)") was described in Itoh (2026c). The TRG was standardized by using all data which included those of trolling catch collected in past acoustic sonar surveys and those of trolling catch in past and current trolling surveys over the whole survey area containing survey-piston lines. Therefore, the TRG provides a single consistent indicator for age 1 SBT from 1996 to 2026. The trolling survey was not conducted in 2015 to use time for doing in-depth analyses of the data.

Fig. 3-1 compares trends between the trolling indices and the TRG. For the trolling indices, only the bootstrap estimates of median were plotted. The trolling index on piston line (TRP) for 2021 could not be estimated because the survey design for 2021 had to be modified (no piston line was surveyed) due to the COVID-19 situation.

The median relative trends of trolling index and TRG appear similar although there are some differences in trend due to standardization for the TRG. Both TRG and TRP indices increased from 2005 to 2008 and fluctuated afterward showing somewhat decreasing trends. It should be noted that levels of TRG in recent years are near 2003 and 2005 levels, and TRP values in 2018 and 2019 are zero, suggesting potentially low recruitment.

Fig. 3-2 compares relative historical trends between the TRG and other recruitment indicators including recruitment estimates from the OM (Hillary et al. 2023). The trend of TRG was similar to those of OM estimates and standardized CPUEs for age 4 and 5 up to the 2015 cohort. Those trends appear to consist of the medium level of the mid-1990s year classes, the low level of the 2000 to 2002 cohorts, and the high level of the 2005 to 2014 cohorts. The trends have diverged after the 2016-year class. TRG has been at a low level since the 2015 cohort, but has been fluctuating around the similar level. Compared to this, recruitment indicators based on Japanese longline CPUE for ages 4 and 5 since the 2018- and 2017-year classes are high. Estimates from gene-tagging suggest that the 2019 and later year classes are higher than the 2015- to 2017-year classes. Of the recruitment estimates from the OM, the 2018-year class is higher than previous cohorts. It should be noted that the OM recruitment estimation includes data of Japanese longline CPUE (GAM22 CPUE series, although different from the CPUE series for ages 4 and 5 used here) and data from gene-tagging, which means that the OM recruitment estimates are not independent from CPUE and gene-tagging. Contrary, TRG is not used for the recruitment estimation by the OM (reference set) and thus can be considered as an independent index. Cause(s) of inconsistency among indices is not clear. One possibility is that the distribution and migration

of age-1 SBT may have differed from those of other years. If this is true, it may have affected the age composition in the Great Australian Bight (Fig. 2-2) as well as the distribution and migration of age-2 fish and would affect estimates of gene-tagging. The status of other year classes beyond the 2022-year class are totally unknown except for TRG. It is necessary to continue to carefully monitor the status of recruitment in recent years by making full use of various information from scientific research as well as from fisheries.

3. Indonesian Catch (Spawning ground fishery):

Indonesian SBT catch both in number and weight as well as catches by two age groups, 8-16 and 17 and older, have varied from year to year (Fig. 4-1).

Catches for age class 17+ were higher than those for 8-16 ages throughout the 1990s. In contrast, many of yearly catches for the 17+ group have been similar to or lower than those for 8-16 ages since 2000/01 season. Spiky increases of catch in 2001/02, 2004/05, 2006/07, 2012/13, 2013/14, 2017/18, 2019/20, and 2023/24 seasons may be mainly due to large increase of younger age classes under 17 (also see Farley et al. 2021). Some earlier investigations suggested that the catch of small/young SBT was likely to have come from catches made in the south of the spawning ground, Area 2 (Farley et al. 2017). However, data which only included SBT catches by vessels predominantly operating in Area 1 (spawning ground) indicate that catches of small/young SBT came from the spawning ground (Farley et al. 2021). Since 2021 (calendar year), catches in Area 2 have been approximately 1.3 to 6.4 times larger than ones in Area 1 (Satria et al. 2026). There have been some uncertainties and concerns about Indonesian longline catches which should be resolved in future.

Catch amounts of both in number and in weight for age 8-16 and 17+ combined appear to vary depending on season recent years.

4. Overall Conclusion:

Fisheries indicators examined generally support the view that the current SBT stock levels for 4, 5, 6&7, 8-11, and 12+ age groups are well above the historically lowest levels observed in the late 1980s or the mid-2000s (Fig. 1-5). CPUE indices for all the age groups have fluctuated in an aperiodic way and/or showed increasing trends over the past 10 years. Especially, CPUE indices for age 4, 5, 6&7, and 12+ show substantial increases in recent years. Age-aggregated (age 4+ group) CPUE indices that include the one used in the operating model and management procedure also show substantial increase trends over the past 10 years (Fig. 1-6). The current levels of these 4+ indices are well above the historically lowest observed in the mid-2000s.

Various recruitment indicators inspected suggest that recruitment levels in recent years have been similar to or higher than those observed in the 1990s (before markedly low recruitments of 1999 to 2002 cohorts occurred) but the levels of recruitment have varied from year to year (Fig. 3-2). It should be noted that the TRG recruitment index shows somewhat a low level from 2017 to 2026, but has kept the similar level (2016 to 2025 cohorts), and the TRP recruitment index recorded zero values in 2018 and 2019, suggesting some concern of potential low recruitment. A high recruitment level, especially of the 2013 cohort detected

by the 2016 AS index [5] (Fig. 3-2) does not appear to be such a strong cohort comparing with longline CPUE indices by age (from 4 to 12+ years old) from 2017 to 2025 (Fig. 1-3 and Fig. 1-5). The age 2 GT abundance index from GT and TRG index show different trends between 2020 and 2022 cohorts (GT index has increased while TRG index has kept the similar level).

Fishery indicators for spawning stock based on Indonesian catch were difficult to interpret and thus no specific conclusion was drawn.

The trends of the recruitment indices and the CPUE-based indicators in recent years were summarized in Fig. 5-1 and Fig. 5-2, respectively.

Considering uncertainty inherent in all the indicators examined, both fishery-dependent and fishery-independent indicators should continue to be further monitored and carefully examined in a synthetic way.

References

Anon. (CCSBT). 2001. Report of the sixth meeting of the Scientific Committee, 28-31 August 2001 Tokyo, Japan. The Commission for the Conservation of Southern Bluefin Tuna, Canberra, Australia. 51 pp.

Anon. (CCSBT). 2012. Report of the seventeenth meeting of the Scientific Committee, 27-31 August 2012 Tokyo, Japan. The Commission for the Conservation of Southern Bluefin Tuna, Canberra, Australia. 87 pp.

Anon. (CCSBT). 2015a. Report of the twentieth meeting of the Scientific Committee, 5 September 2015 Incheon, South Korea. The Commission for the Conservation of Southern Bluefin Tuna, Canberra, Australia. 97 pp.

Anon. (CCSBT). 2015b. Report of the twenty second annual meeting of the Commission, 12-15 October 2015 Yeosu, South Korea. The Commission for the Conservation of Southern Bluefin Tuna, Canberra, Australia. 122 pp.

Anon. (CCSBT). 2016. Report of the twenty first meeting of the Scientific Committee, 10 September 2016 Kaohsiung, Taiwan. The Commission for the Conservation of Southern Bluefin Tuna, Canberra, Australia. 100 pp.

Anon. (CCSBT). 2017. Report of the eighth Operating Model and Management Procedure Technical Meeting, 19-23 June 2017 Seattle, Washington, USA. The Commission for the Conservation of Southern Bluefin Tuna, Canberra, Australia. 32 pp.

Anon. (CCSBT). 2022. Report of the twelfth Operating Model and Management Procedure Technical Meeting, 20-24 June 2022 Hobart, Australia. The Commission for the Conservation of Southern Bluefin Tuna, Canberra, Australia. 33 pp.

Eveson, P., and J. Farley. 2017. The aerial survey index of abundance: 2017 updated results. CCSBT-ESC/1708/06.

Farley, J., R. Sulistyaningsih, C. Proctor, P. Grewe, and C. Davies. 2017. Update on the length and age distribution of SBT in the Indonesian longline catch and close-kin tissue sampling

[5] About the AS index, see footnote 4 above.

and processing. CCSBT-ESC/1708/09.

Farley, J., R. Sulistyaningsih, B. Setyadji, S. Mardi, and C. Davies. 2021. Review of data to estimate the length and age distribution of SBT in the Indonesian longline catch. CCSBT-ESC/2108/07.

Hillary, R. M., A. L. Preece, N. Takahashi, C. R. Davies, and T. Itoh. 2023. The southern bluefin tuna stock assessment in 2023. CCSBT-ESC/2308/16.

Hoyle, S. 2022. Validating CPUE model improvements for the primary index of Southern Bluefin Tuna abundance. CCSBT-ESC/2208/BGD05 (*Previously* CCSBT-OMMP/2206/04).

Itoh, T. 2007. Some examination on the recruitment index of age 1 southern bluefin tuna derived from the trolling survey. CCSBT-ESC/0709/39.

Itoh, T. 2012. Change in operation pattern of Japanese SBT longliners in 2011 resulting from the introduction of the individual quota system in 2006. CCSBT-ESC/1208/34.

Itoh, T. 2026a. Change in operation pattern of Japanese southern bluefin tuna longliners in the 2024 fishing season. CCSBT- ESC/2608/BGD02 (*previously* CCSBT-OMMP/2606/05).

Itoh T. 2026b. Report of the trolling monitoring survey for the age-1 southern bluefin tuna recruitment index in 2026. CCSBT-ESC/2608/23.

Itoh T. 2026c. Trolling indices for age-1 southern bluefin tuna: update of the grid type trolling index in 2026. CCSBT-ESC/2608/25.

Itoh, T., T. Iwano, Y. Inoue, H. Matsushita, H. Kubota, K. Okamoto, Y. Semba, and D. Ochi. 2026. Review of Japanese Southern Bluefin Tuna Fisheries in 2025. CCSBT-ESC/2608/SBT Fisheries-Japan.

Itoh, T., K. Suzuki, and O. Sakai. 2014. Mortality estimation for southern bluefin tuna released and discarded from Japanese longline fishery. CCSBT-OMMP/1406/11.

Itoh, T. and N. Takahashi. 2026. Update of CPUE abundance index using GAM for southern bluefin tuna in CCSBT (GAM22) up to the 2025 data. CCSBT-ESC/2608/BGD03 (*previously* CCSBT-OMMP/2606/06).

Nishida, T., and S. Tsuji. 1998. Estimation of abundance indices of southern bluefin tuna (*Thunnus maccoyii*) based on the coarse scale Japanese longline fisheries data (1969-97). CCSBT/SC/9807/13.

Preece, A. L., and R. Bradford. 2023. Update on the gene-tagging program 2023 and RMA request. CCSBT-ESC/2308/09.

Preece, A. L., J. P. Eveson, J. R. Hartog, J. Dell, J. Aulich, N. Potter, S. Cooper, P. Grewe, M. Lansdell. 2026. Update on the SBT gene-tagging recruitment monitoring program 2026. CCSBT-ESC/2608/10.

Preece, A., P. Eveson, C. Davis, P. Grewe, R. Hillary, and M. Bravington. 2015. Report on gene-tagging design study. CCSBT-ESC/1509/18.

Satria, F., L. Sadiyah, B. Setyadji, A. Widodo, S. A. Raup, S. Mardi, P. Suadela, D. R. Slamet, A. Januar, Ed. S. Firmana, and Jimmy. 2026. Indonesia's tuna longline fishery interacted with Southern Bluefin Tuna in 2025. CCSBT-ESC/2608/SBT Fisheries - Indonesia.

Takahashi, N. 2006. Future use of "ST windows" index calculated by a new method: A proposal. CCSBT-ESC/0609/47.

Takahashi, N. 2008. Data and method used to calculate B-ratio Proxy (w0.5) and Geostat Proxy (w0.8) CPUE Series. A methodology document submitted to the CCSBT Secretariat on 27 June 2008.

Takahashi, N. 2017. A recommendation on the all vessels CPUE series considering loss of data from Japanese-flagged charter vessels in the New Zealand fishery. CCSBT-ESC/1708/BGD05 (*Previously* CCSBT-OMMP/1706/07, CCSBT-CPUE/1706/05(Rev1)).

Takahashi, N., and T. Itoh. 2012. Comparison between "ST windows" index and Core vessels CPUE indices by different Area/month combinations. CCSBT-ESC/1208/42.

Takahashi, N., and T. Itoh. 2017. Summary of fisheries indicators of southern bluefin tuna stock in 2017. CCSBT-ESC/1708/26.

Takahashi, N., H. Shono, and S. Tsuji. 2002. Some consideration on Japanese longline CPUE as a potential input to management procedures. CCSBT-CPUE/0203/09.

Takahashi, N., S. Tsuji, T. Itoh, and H. Shono. 2001. Abundance indices of southern bluefin tuna based on the Japanese longline fisheries data, 1969-2000, along the interim approach agreed for the 2001 assessment. CCSBT-SC/0108/28.

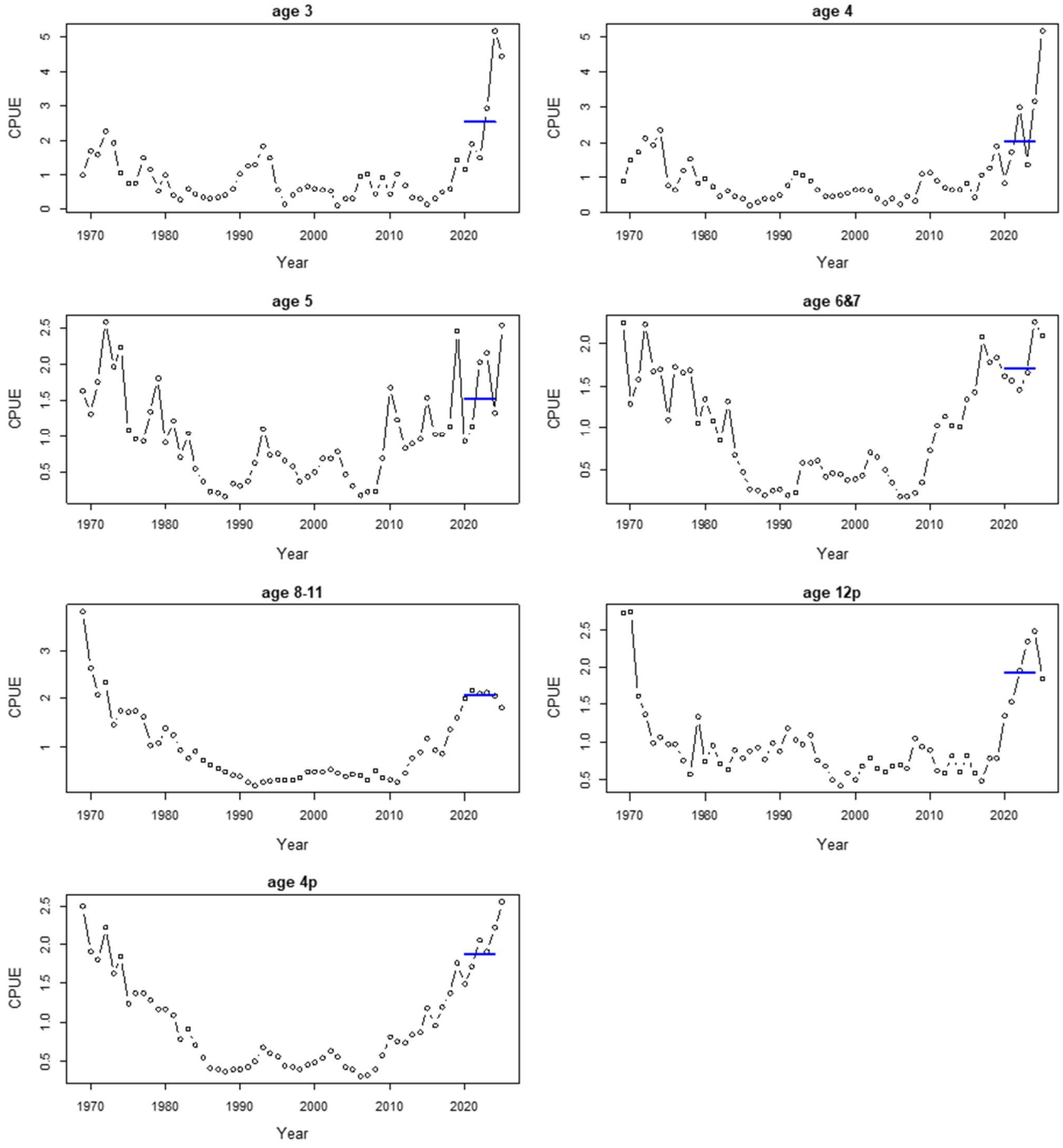


Fig. 1-1. Nominal CPUE of Japanese longline fishery by age groups. The horizontal lines indicate the recent past 5-year averages over 2020-24.

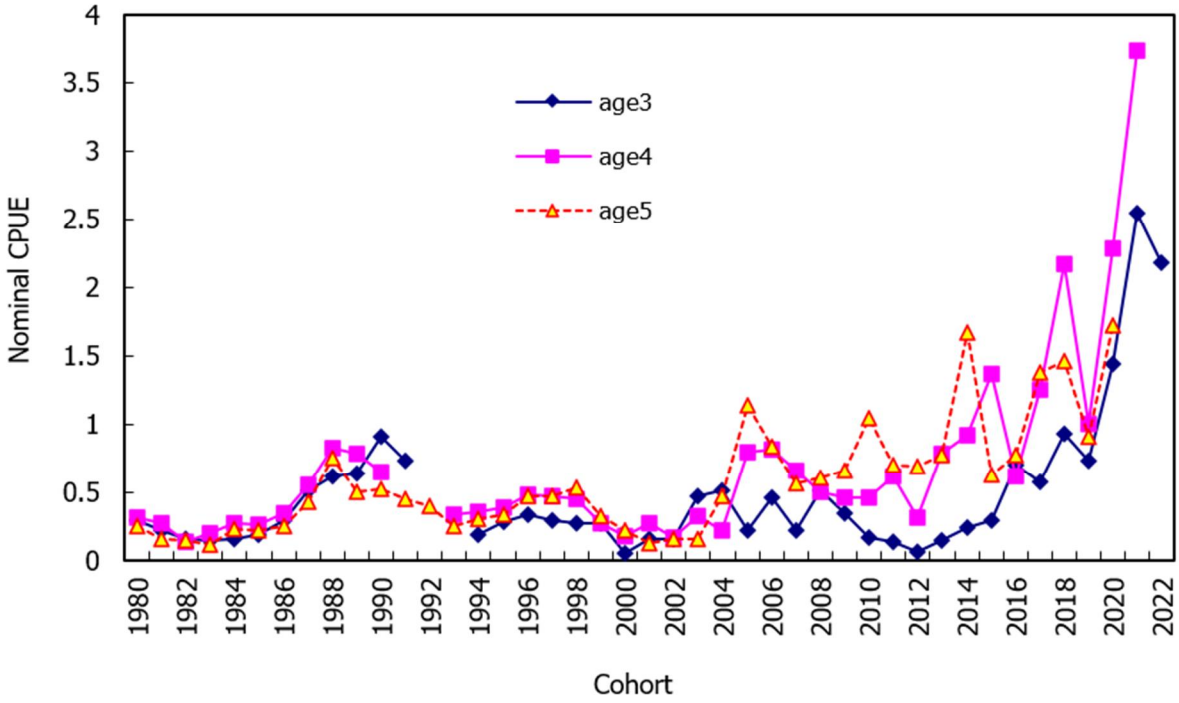


Fig. 1-2. Nominal CPUE of Japanese longline fishery by cohorts for age 3, 4, and 5.

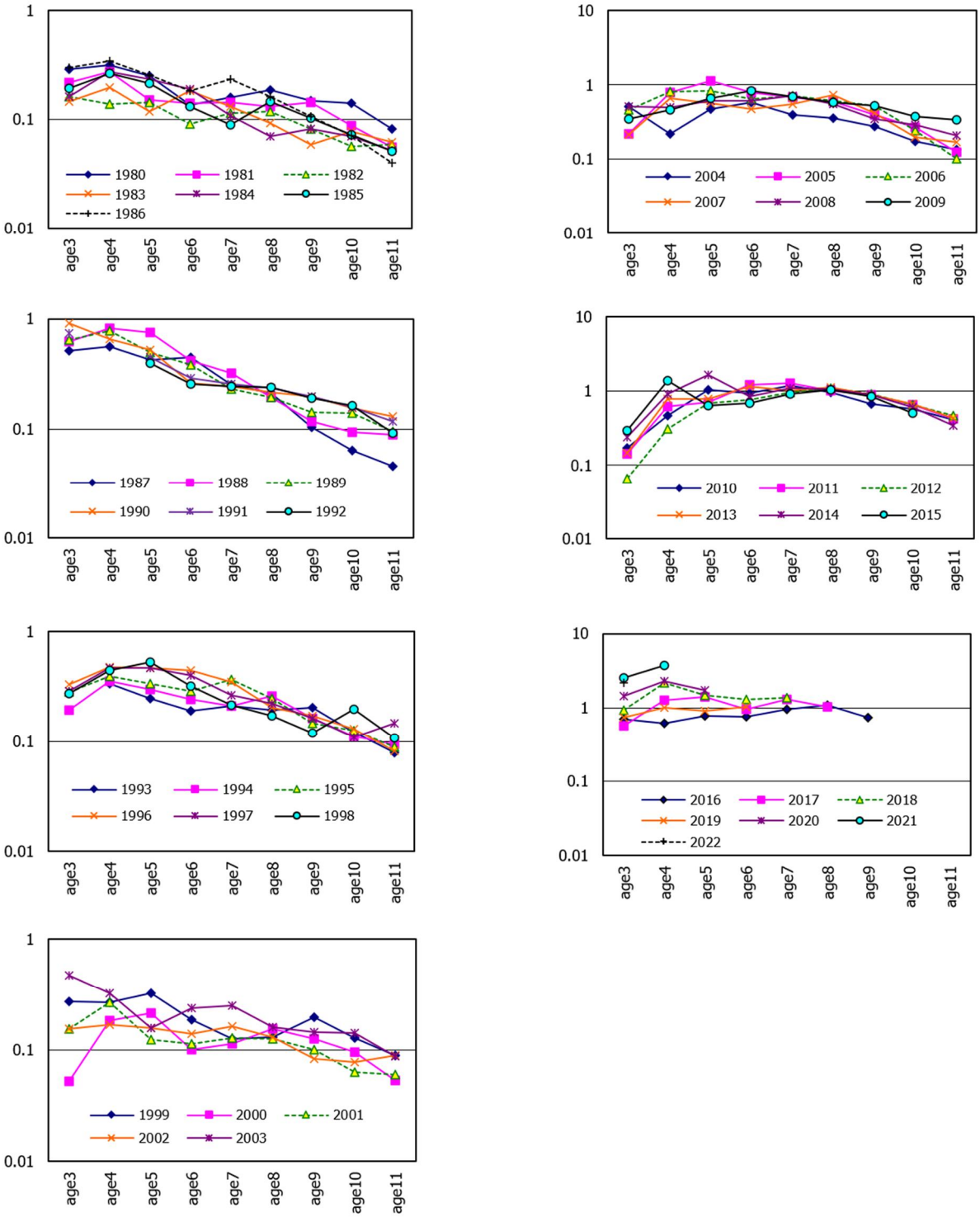


Fig. 1-3. Nominal CPUE of Japanese longline fishery by cohorts in log-scale.

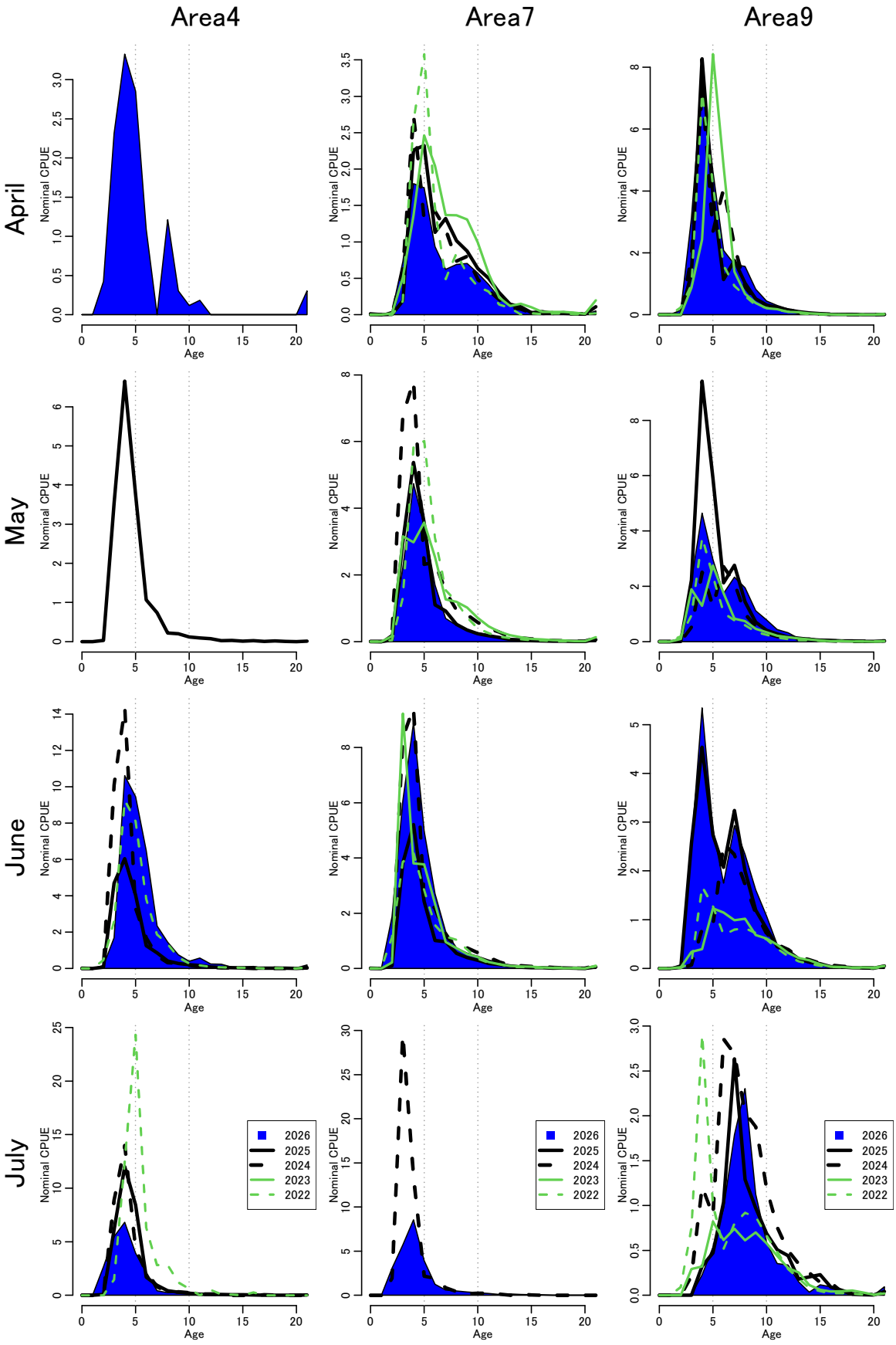


Fig. 1-4. Age composition of nominal CPUE of RTMP data for the recent five years by month and areas.

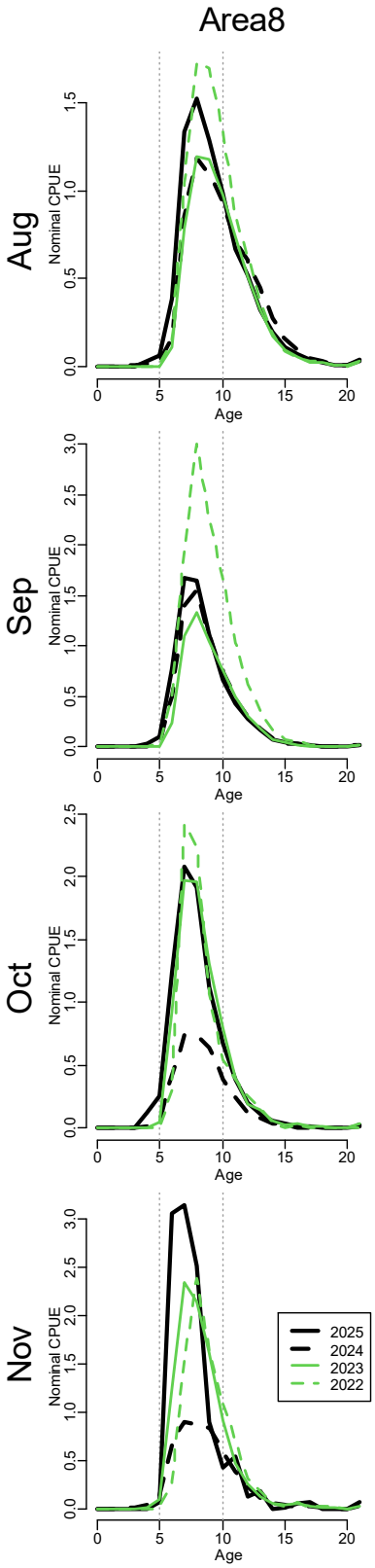
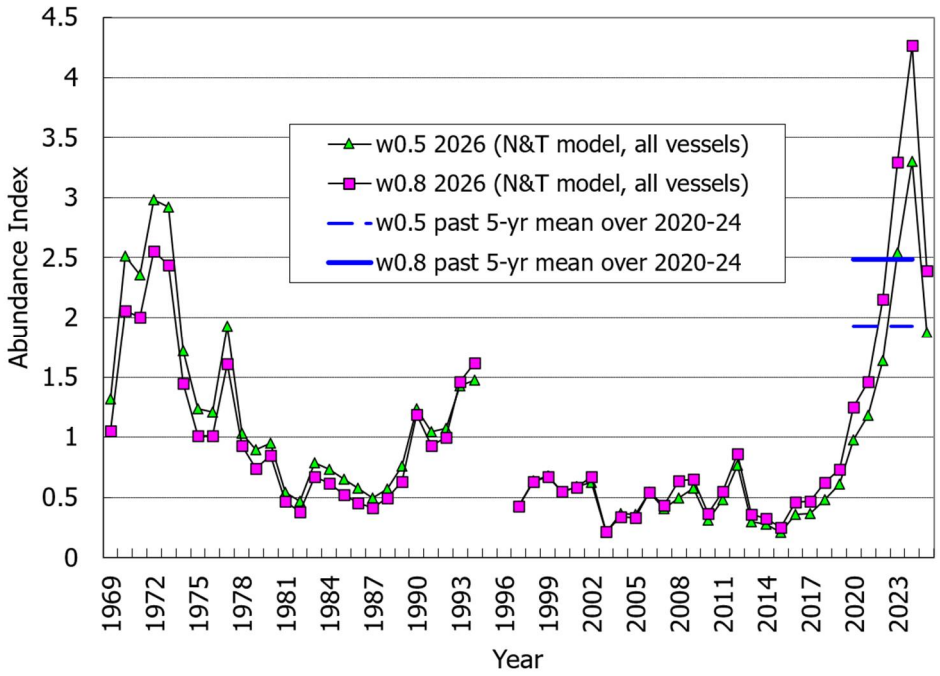


Fig. 1-4 (cont'd). Age composition of nominal CPUE of RTMP data for the past four years by month and areas.

(a) Age 3



(b) Age 4

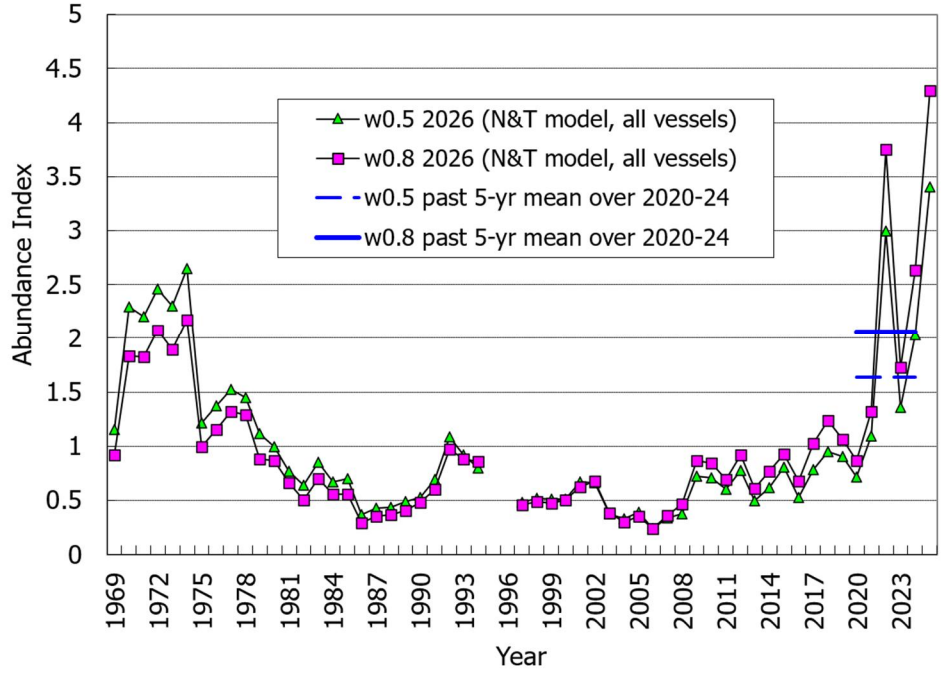
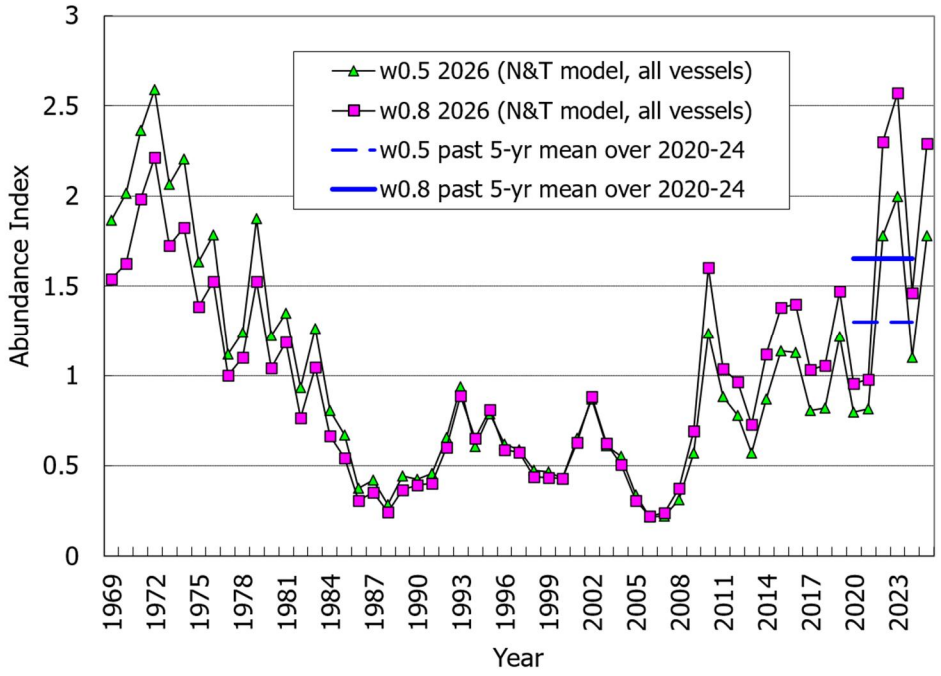


Fig. 1-5. Trends of normalized w0.5 (B-ratio proxy) and w0.8 (Geostat proxy) abundance indices. The standardization model used was the same as that of Nishida and Tsuji (1998).

(c) Age 5



(d) Age 6&7

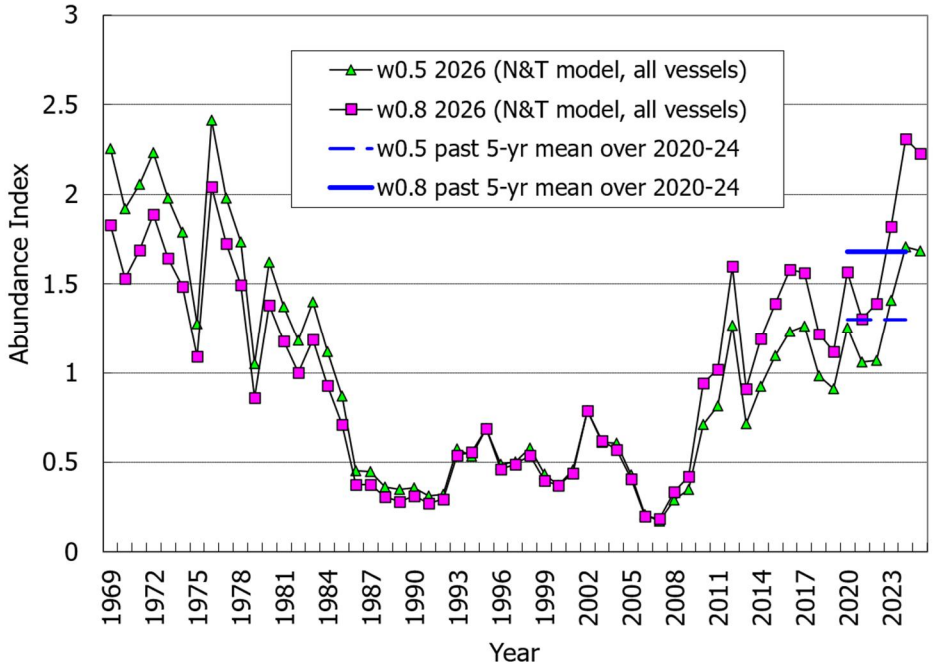
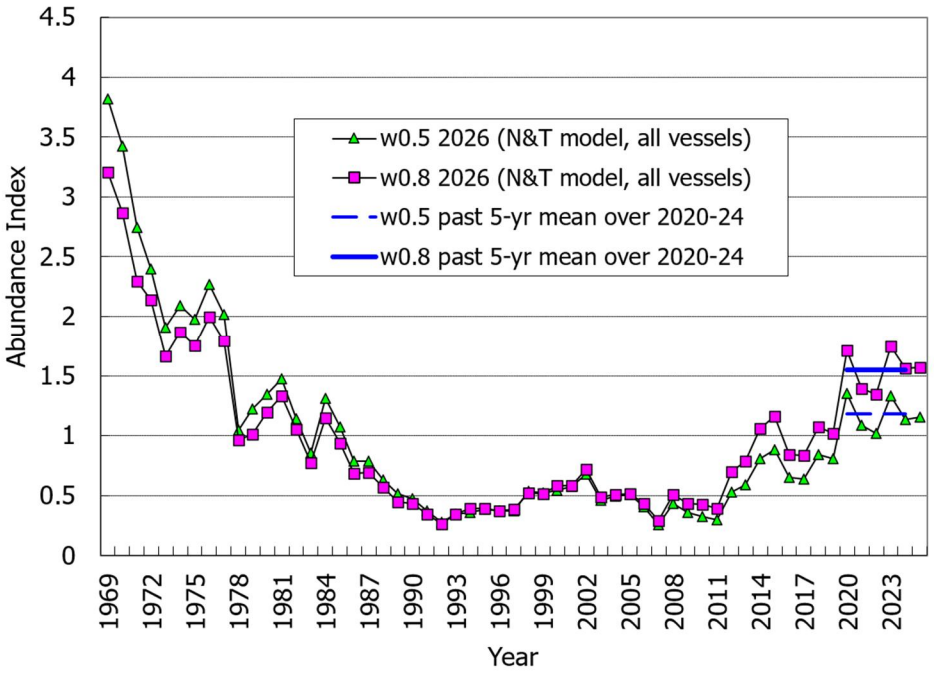


Fig. 1-5. Trends of normalized w0.5 (B-ratio proxy) and w0.8 (Geostat proxy) abundance indices. The standardization model used was the same as that of Nishida and Tsuji (1998). (cont'd)

(e) Age 8-11



(f) Age 12+

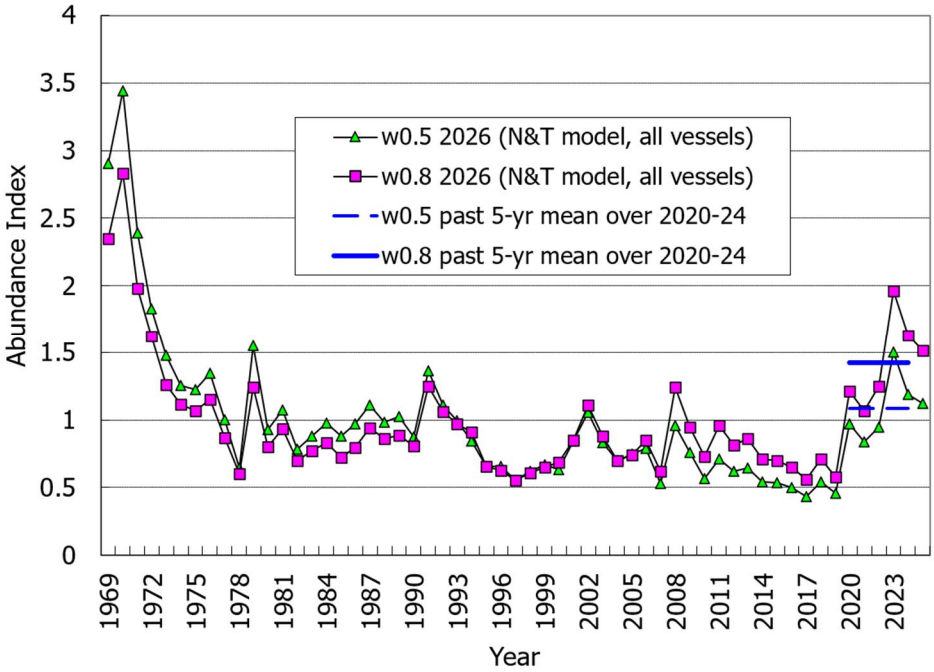


Fig. 1-5. Trends of normalized w0.5 (B-ratio proxy) and w0.8 (Geostat proxy) abundance indices. The standardization model used was the same as that of Nishida and Tsuji (1998). (cont'd)

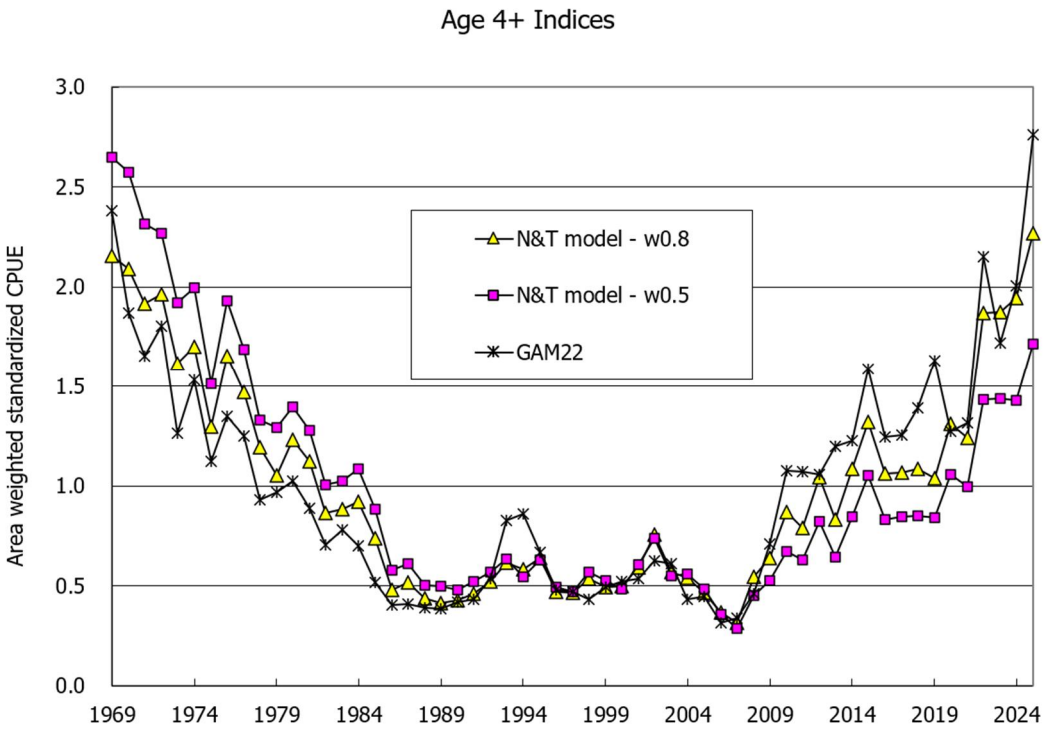


Fig. 1-6. Trends of various abundance indices for age 4+: Nishida & Tsuji model with all vessels data; GAM22 series with all vessels data.

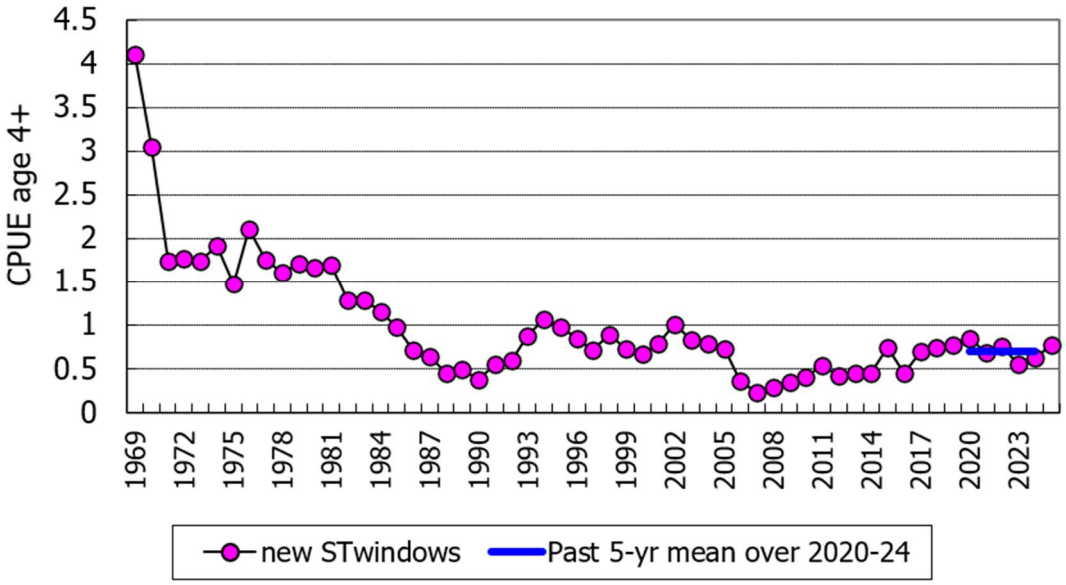


Fig. 1-7. Trend of normalized "ST Windows" index for age 4+ fish by the new calculation method.

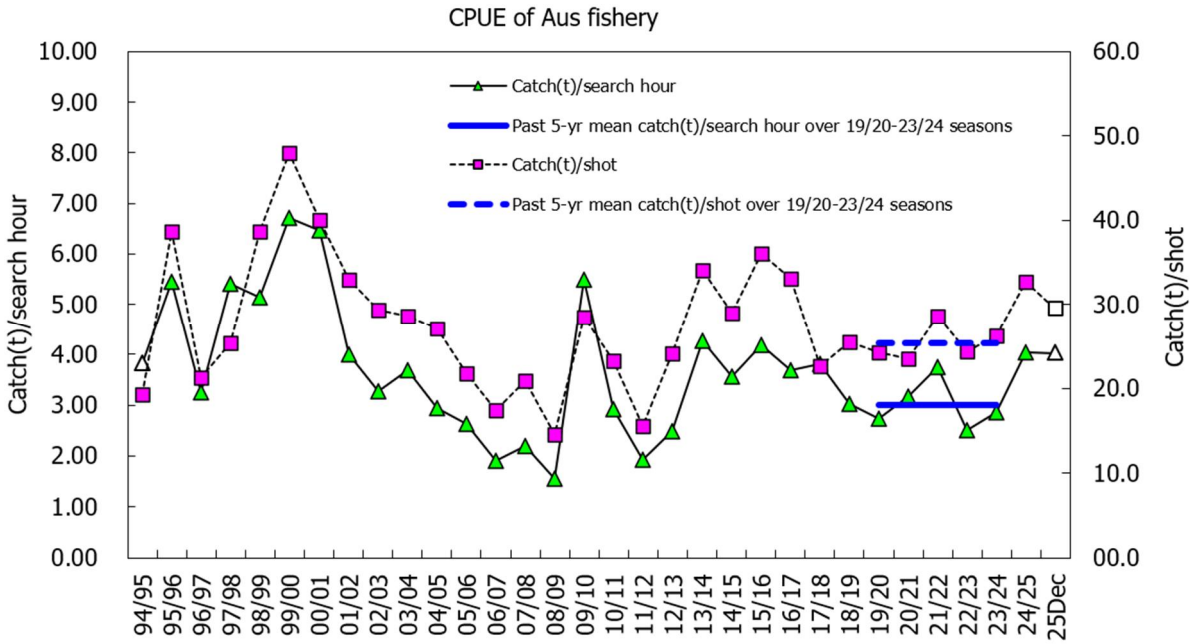


Fig. 2-1 Catch (in weight) per effort for Australia purse seine fishery.

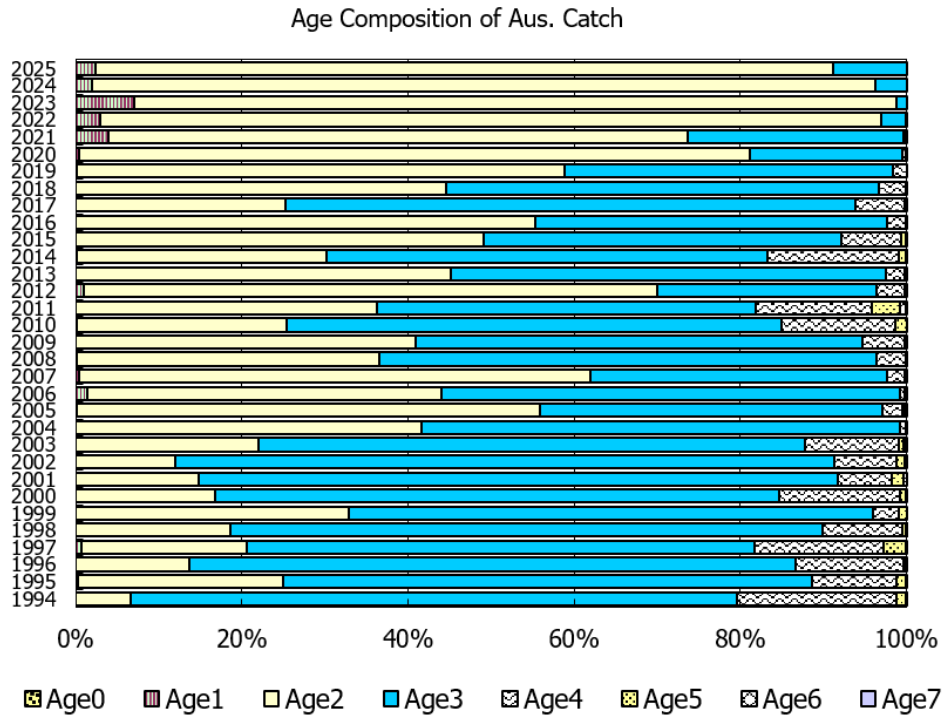


Fig. 2-2 Changes in the age composition of Australia purse seine catches.

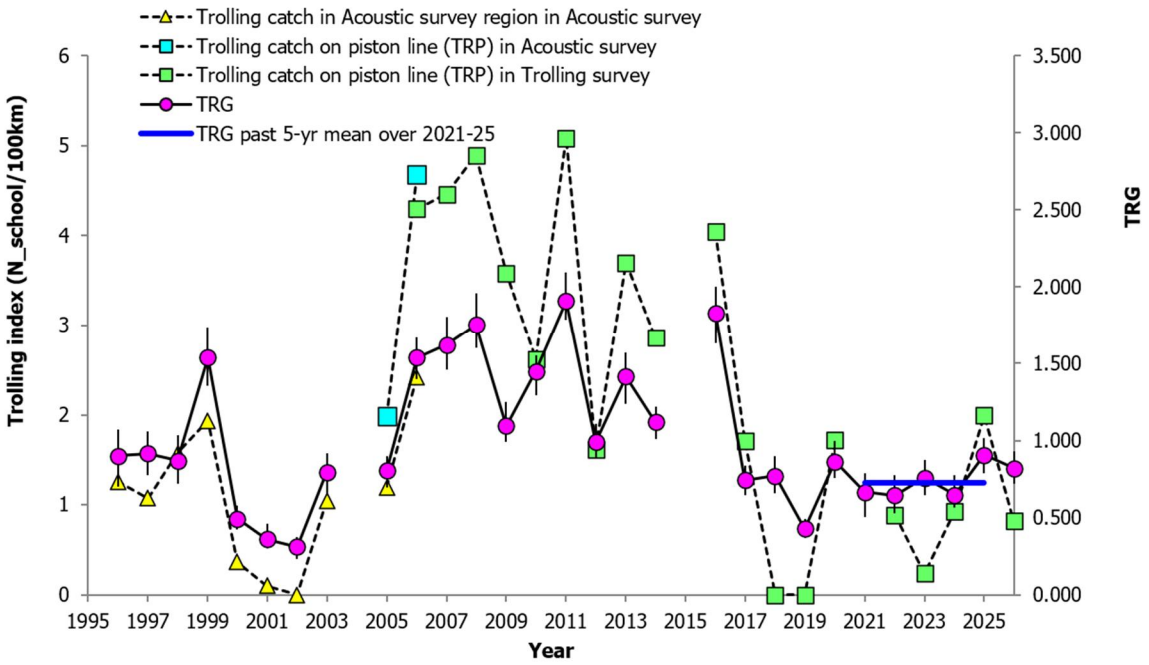


Fig. 3-1. Trends of various trolling catch index for age 1 SBT in the Western Australia. The previously reported trolling indices were indicated by dotted lines with symbols (Only the bootstrap estimates of median were plotted). "TRG" represents the standardized grid-type trolling index and vertical lines of each point indicate the bootstrap estimates of 90% confidence intervals.

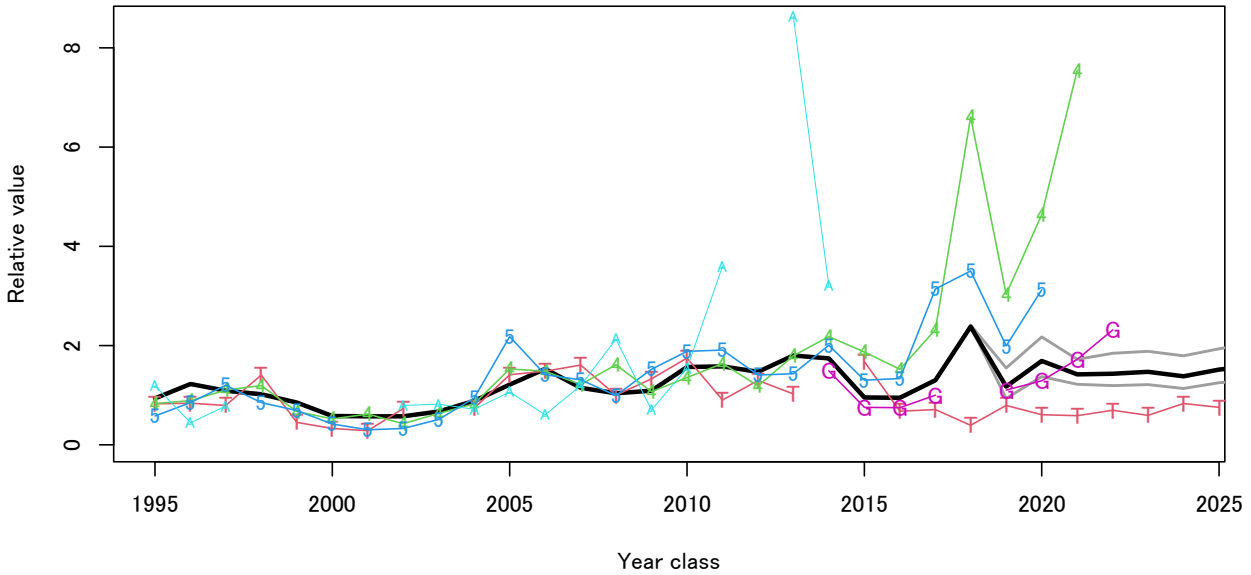


Fig. 3-2. Comparison of relative historical trends of various SBT recruitment indicators including recruitment estimates from the OM. A: aerial survey index, G: age 2 SBT abundance estimated from gene-tagging, T: grid-type trolling index, 4 and 5: standardized Japanese longline CPUE index for age 4 and 5 SBT, black and grey solid lines: median recruitment (with an 80% probability envelope) estimated from stock assessment using the OM.

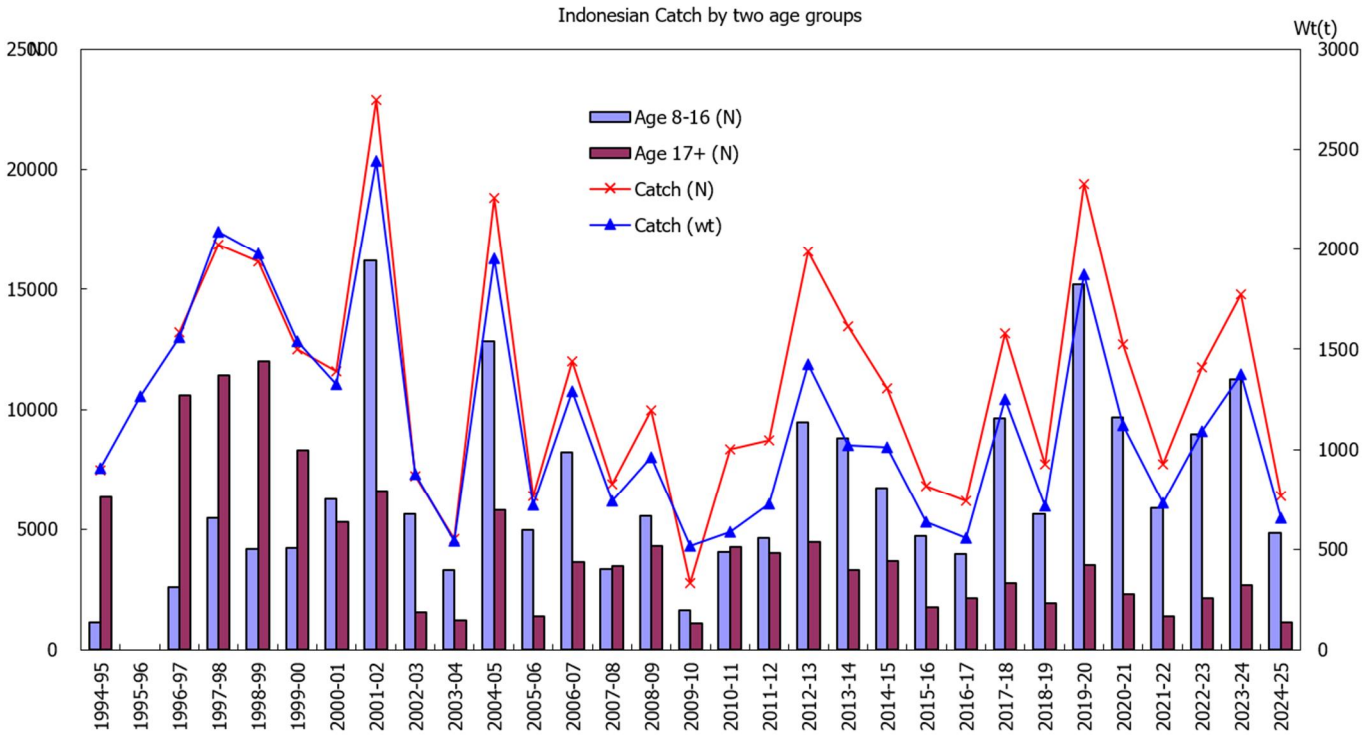


Fig. 4-1. Trends of Indonesian catches with proportion of two age groups occurrences.

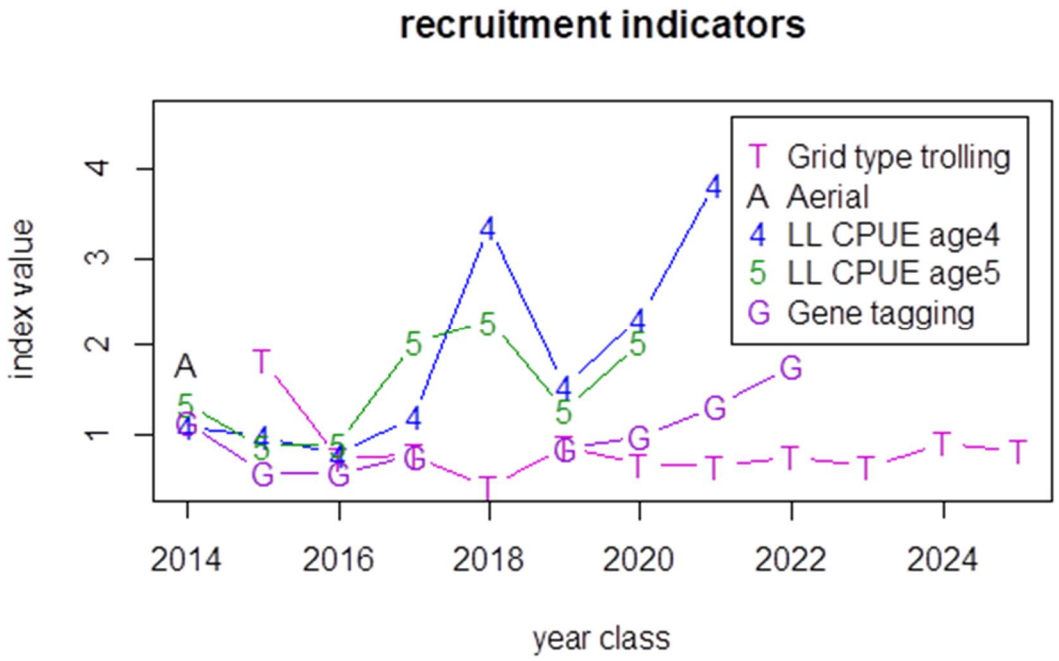


Fig. 5-1. Trends of recruitment in recent years. Note that the x-axis is year class, and the aerial survey (AS) index was plotted assuming that the AS index primarily represented the trend of age 3 SBT.

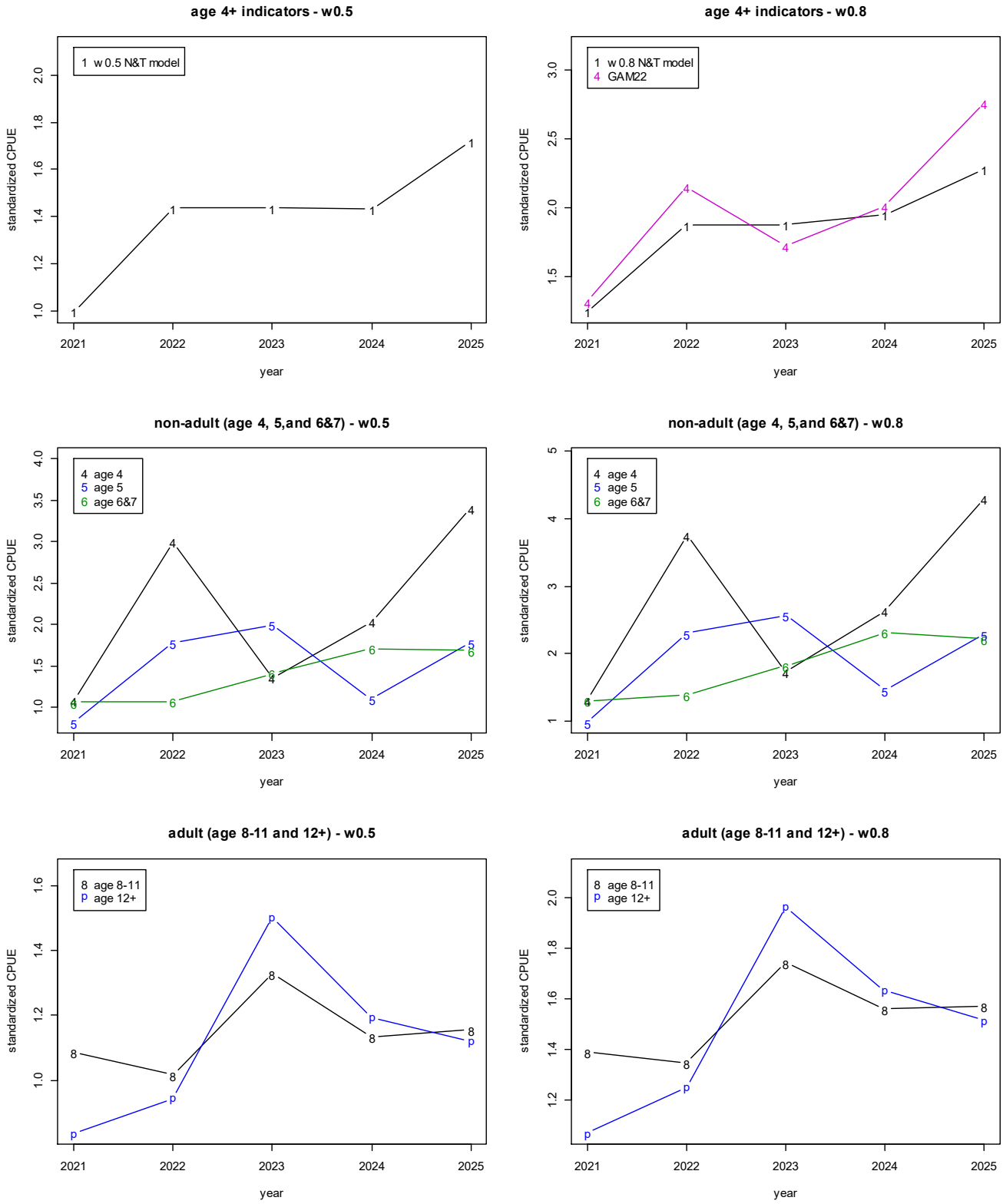


Fig. 5-2. Trends of CPUE-based indicators in recent years.