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Tini a Tangaroa

Catch-at-age of snapper in SNA 7 in the 2022–23 and 2023–24 fishing years

New Zealand Fisheries Assessment Report 2025/22

D.M. Parsons, R. Bian, C. Walsh, K. Johnson,
M. Smith, A. Hart, C. Sutton, P. Olmedo-Rojas,
J. Stead, L. Olsen, B. Madden, H. Armiger

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Fisheries Science Editor
Fisheries New Zealand
Ministry for Primary Industries
PO Box 2526
Wellington 6140
NEW ZEALAND

Email: Fisheries-Science.Editor@mpi.govt.nz
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PLAIN LANGUAGE SUMMARY:

Snapper is New Zealand’s most important commercial and recreational inshore finfish species.

This report describes a research study conducted in 2022–23 and 2023–24 to find out the size and age of snapper in the commercial bottom trawl catch in SNA 7, which covers Tasman and Golden Bays (TBGB) and the west coast of the South Island (WCSI). For TBGB this project contributes to a timeseries extending back to 1992–93. This is the first study to investigate snapper size and age on the WCSI.

While some difficulties were experienced obtaining samples in 2022–23, access to electronic reporting data from fishing vessels greatly improved sampling in 2023–24. In 2022–23, a total of 26 landings were sampled and 1496 otolith pairs aged; whereas in 2023–24, 43 landings were sampled and 1796 otolith pairs were aged.

Aging of otoliths has revealed that the bottom trawl catches in both TBGB and WCSI are dominated by young snapper, mostly five and six years of age and with average sizes of between 38 and 43 cm. Previous strong year-classes (notably 13 and 16 year old fish) are still present in the fishery, but are now of lesser importance (i.e., their abundance has decreased over the years since they were first present in the fishery). Overall, the SNA 7 fishery now includes multiple strong year-classes, which is generally a sign of an improving fishery.

The information generated by this study will be used for assessments and fisheries management advice for snapper stocks.

EXECUTIVE SUMMARY

Parsons, D.M.; Bian, R.; Walsh, C.; Johnson, K.; Smith, M.; Hart, A.; Sutton, C.; Olmedo-Rojas, P.; Stead, J.; Olsen, L.; Madden, B.; Armiger, H. (2025). Catch-at-age of snapper in SNA 7 in the 2022–23 and 2023–24 fishing years.

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A programme to estimate the age composition of snapper (SNA 7) caught by bottom trawl fisheries was conducted during the 2022–23 and 2023–24 fishing years. For the first time this programme included seasonal stratification (Spring = October to December and Summer = January to April) in Tasman Bay/Golden Bay (TBGB = Statistical Areas 037 and 038) and a new spatial stratum on the West Coast South Island (WCSI = Statistical Areas 033 to 036) (sampled between October and June). The target number of sampled landings was 15 for each spatio-temporal stratum (with 600 otolith pairs to be aged from samples collected), and landings qualified for inclusion if they were at least 300 kg for TBGB or 200 kg for WCSI. In TBGB, qualifying landings also had to target snapper (SNA), red gurnard (GUR), or flatfish (FLA).

In 2022–23 sample targets were not achieved, with many sampled landings rejected. This was largely due to difficulties in identifying landings containing catch with only the areas and target species specified in the sampling design. As a result, sampling from TBGB in 2022–23 had reduced representativeness relative to the entire TBGB bottom trawl fishery with respect to timing, target species (under sampling SNA target), spatial spread of sampling (under sampling Statistical Area 038) and depth (over sampling of greater depths). In 2023–24 access to electronic reporting provided near live information on fishing activities which greatly improved the acquisition of samples and sampling targets were almost achieved in full. Overall, 897 otoliths were successfully aged for the two TBGB strata in 2022–23 while 1197 otoliths were aged for TBGB in 2023–24. For the WCSI 599 otoliths were successfully aged in both 2022–23 and 2023–24.

Bottom trawl landings were dominated by younger age classes, in particular the 2019 and 2018 year-classes (5- and 6-year-olds). In 2023–24 these two year-classes alone accounted for 63% and 59% of the TBGB Spring and Summer landed catches by number, and 54% from the WCSI. Year-classes of moderate abundance in TBGB in 2023–24 included the 2011 and 2008 year-classes (13- and 16-year-olds) and the 2011, 2008 and 2006 year-classes (13-, 16- and 18-year-olds) for the WCSI. These results suggest a consistent broadening of the proportions of young to moderate age classes present in the SNA 7 fishery has occurred due to many strong year-classes since 2008.

The mean weighted coefficient of variation for the TBGB time series (i.e., the Spring and Summer strata combined) was 22 and 17% for 2022–23 and 2023–24, which was close to the target of 20%. For the WCSI, with relatively small otolith sample sizes, however, mean weighted coefficients of variation were 26 and 31%, which are higher than the target of 20%.

1. INTRODUCTION

The purpose of this project was to estimate the relative year-class strengths of snapper (*Chrysophrys auratus*, SNA) in the SNA 7 commercial catch by sampling landings at the major SNA 7 licensed fish receiver (LFR) during the 2022–23 and 2023–24 fishing years. Sampling involved the collection of length and age composition samples and data from commercial landings before fish were sorted or processed. This provides relative catch-at-age information that may be combined with estimates of selectivity-at-age within an age-structured population model to estimate stock age composition and to determine year-class strengths of cohorts recruited to the stock. Snapper stocks characteristically show large inter-annual variability in year-class strength (Francis 1993, Walsh et al. 2011), therefore catch-at-age information is an important input into models used for their assessment.

SNA 7 currently supports a modest but important shared fishery (mostly in Tasman Bay and Golden Bay (TBGB)), with a Total Allowable Commercial Catch (TACC) allowance of 450 t and a non-commercial allowance of 270 t. Reported annual commercial landings from SNA 7 declined from 2720 t in the 1977–78 fishing year to 142 t in 1997–98 fishing year (please note that fishing years straddle calendar years, and a fishing year is denoted by the most recent part of the fishing year, i.e., 2018 denotes the 2017–18 fishing year). The TACC was set at 330 t when it was introduced into the Quota Management System (QMS) in 1986–87, but the TACC was reduced to 160 t in 1989–90 and then increased to 200 t in 1997–98. The fishery was unable to catch the 200 t TACC from 1997–98 to 2002–03 but has generally exceeded 200 t since 2010–11 (Fisheries New Zealand 2024). In 2016–17 the TACC was increased to 250 t, which was again consistently exceeded, with a further increase to the TACC to 350 t in 2020–21, then to 450 t in 2022–23, and to its current level (720 t) in 2024–25.

A 2021 stock assessment of SNA 7, based on an age-structured population model, suggested biomass had increased rapidly since 2009, due to the recruitment of a number of strong year-classes (2015, 2011, and 2008) (Langley 2018, Langley 2020, Parsons et al. 2021, Fisheries New Zealand 2024). Overall biomass recovered from a historical low in the early 2000s, to being very likely to be above the target (40% B_0) at the time of assessment in 2021 (estimated biomass was 63% B_0). A subsequent assessment in 2024 suggested that biomass was very likely to be at or above the target (Langley 2024). Both the 2021 and 2024 assessments were highly influenced by strong year-classes in 2017 and 2018 observed from the West Coast South Island trawl survey (MacGibbon 2019, MacGibbon et al. 2022). These year-classes, however, had not recruited to the commercial fishery at the last time of sampling in 2019–20. The research proposed here characterised the recent age structure of the snapper catch in the SNA 7 TBGB fishery, thus providing more certainty about the relative strengths of these year-classes and the projection for the SNA 7 stock in general. The Inshore Fisheries Assessment Working Group (IFAWG) has recommended that commercial catches in SNA 7 be sampled for two consecutive years in every five, thus providing two estimates of the strength of these important recent year-classes. In addition, the IFAWG also recommended that sampling should describe seasonal (within TBGB) and spatial (comparison to West Coast South Island (WCSI)) differences in age structure to better understand connectivity. Analysis of otoliths collected during the sampling program and fishery data from Fisheries New Zealand catch and effort returns were used to describe the representativeness of the sampled catch compared to the total catch, and to scale the sampled age composition to the landed catch.

The specific objectives of this project SNA2022-02 were:

1. To determine the age composition of the commercial catch of snapper in SNA 7.
2. To conduct representative sampling to determine the length and age structure of the commercial catch of snapper in SNA 7 during the 2022–23 fishing year. The target coefficient of variation (CV) for the catch-at-age is 20% (mean weighted CV across all age classes).
3. To conduct representative sampling to determine the length and age structure of the commercial catch of snapper in SNA 7 during the 2023–24 fishing year. The target coefficient of variation (CV) for the catch-at-age is 20% (mean weighted CV across all age classes).
4. Broader outcomes.

2. METHODS

2.1 Fishery characterisation

The spatial, temporal, and operational details of the SNA 7 fishery were summarised for the period 2019–2024 (2018–19 to 2023–24 fishing years). The characterisation was based on an extract from the Fisheries New Zealand catch and effort database and analysed using the National Institute of Water and Atmospheric Research's (NIWA's) Catch-at-length and -age analysis (CALA) program. Operational aspects such as fishery timing, gear type, target species, statistical area, and fine scale spatial distribution were summarised.

2.2 Catch-at-age sample design

The purpose of estimating the age composition of the SNA 7 catch is to extend the series of annual age composition data that inform the stock assessment model. Therefore, it was important for the sampling design to be consistent with the previous sampling programmes and data generated for the purpose of age composition of the catch. However, sampling in 2022–23 and 2023–24 also needed to be stratified by season so that the age structure of catches in TBGB from the spawning (October–December) and post-spawning (January–April) periods could be estimated. Further, a separate WCSI stratum needed to be included. Therefore, the catch sampling design implemented for the 2022–23 and 2023–24 fishing years was based on operational details from the fishery as characterised for the previous catch sampling programme (Parsons et al. 2021), but incorporating these additional spatial and temporal strata considerations The operational details for each of these strata are defined in Table 1.

Table 1: Operational details and design for SNA 7 catch-at-age sampling conducted in 2022–23 and 2023–24. TBGB = Tasman Bay/Golden Bay; WCSI = West Coast South Island; SNA = snapper; FLA = flatfish species group; YBF = yellowbelly flounder; SFL = sand flounder; GUR = red gurnard.

			Stratum
	TBGB spring	TBGB summer	WCSI
Season	October–December	January–April	October–June
Fishing method	Bottom trawl	Bottom trawl	Bottom trawl
Statistical areas	037, 038	037, 038	033, 034, 035, 036
Target species	SNA, FLA (YBF, SFL), GUR	SNA, FLA (YBF, SFL), GUR	No target species
Minimum landing size	300 kg	300 kg	200 kg
Target number of landings/otoliths	15/600	15/600	15/600

Sampling was intended to be conducted only in Motueka or Nelson, but many WCSI strata landings were also sampled on the West Coast itself. Identification of the actual target species can be difficult to attain at the time of sampling. Therefore, it was our intention to ignore the reported target species at the time of landing (i.e., a sample was obtained regardless of the target species that was communicated to the catch samplers). However, as the reporting of fishing effort details during fishing trips improved during the second year of sampling, we were able to incorporate "target species" into our decision to sample a landing or not.

The target of a 20% Mean Weighted Coefficient of Variation (MWCV) was the same as the most recent SNA 7 catch sampling programme in the 2020–21 fishing year. In that last programme, a MWCV of 21% was achieved with a sample size of 30 qualifying landing samples and 999 otoliths aged (Parsons et al. 2021). Similar variation was anticipated for sampling conducted in the 2022–23 and 2023–24 fishing years. While each spatio-temporal stratum listed in Table 1 was only assigned a target of 15 sampled landings, it was anticipated that combination of the two seasonal TBGB strata should achieve a similar level of precision to previous SNA 7 sampling.

The random age frequency approach was used, where 60 fish were selected at random from the catch for sampling, and subsequently otoliths selected for ageing in proportion to the relative weight of the landings (Davies & Walsh 2003).

The agreed catch sampling programme design was implemented from October 2022 to June 2024, with the intention that catch sampling should match the seasonal pattern in landings. All sampling was designed, conducted, and analysed following recommended practices documented in "Guidelines to the design, implementation and reporting of catch sampling" (Ministry of Fisheries 2008).

Fish were sampled using the following procedure:

1. Details for each trip were obtained from each processor to complete the landing record; i.e., the vessel, estimated landing weight (all fish), estimated landed weight of SNA, landing date, and statistical area of the capture of fish in a landing.
2. The sample was assigned a Fisheries New Zealand *market* database landing number. This is typically based on the calendar year, the code for the sampling programme, and a two-digit sample sequence.
3. Approximately 15 bins of fish were chosen from a landing. A sampler would then count through 300 fish from these 15 bins and be blindly prompted to select a fish for otolith extraction by another sampler. This sampling process was conducted according to a random sampling form which had 60 of 300 lines randomly highlighted. A unique random sampling form was used for each sampling event. If the 15 bins selected did not contain 300 fish, the samplers returned to the first bin and began recounting fish until they reached 300 (and as a result had also selected 60 fish).
4. Fork length (FL) (rounded down to the nearest cm), sex, and gonad stage (5 stage method, see Beentjes et al. 2012) were recorded, and both otoliths were removed with forceps, cleaned of adhering tissue, dried, and placed in otolith envelopes.
5. The landing number, species, fish number, date, length, sex, and sampler initials were recorded on the otolith envelope.
6. A landing record form was completed at the end of the sampling.

2.3 Quality assurance of sampling processes

All sampling events were conducted by two samplers, one measuring fish length and extracting otoliths and the other recording the relevant information. Catch sampling was conducted by trained science staff and at least one of the samplers at each event was experienced. Furthermore, in both years a highly experienced lead sampler worked with SNA 7 sampling staff to ensure that sampling practice was consistent. In addition, comparisons of a full (300 fish) length frequency measurement distribution with the length frequency distribution of fish subsampled for otolith collection (60 fish) were conducted for all samplers that led SNA 7 sampling events.

2.4 Snapper age determination

A standardised procedure for reading otoliths was followed, outlined in the age determination protocol for snapper (Walsh et al. 2014). Two readers aged SNA 7 otolith samples in 2022–23 and 2023–24, with neither reader having any prior knowledge of the other's zone count, or of the fish length. For otoliths where both readers agreed on the zone count, the age was determined from this count. When readers disagreed, the otolith was re-examined to determine the likely source of disagreement, and a final count agreed upon. The forced margin method was implemented to anticipate the otolith margin type (wide, line, narrow) a priori based on the month in which the fish was sampled to provide guidance in determining age. To determine the 'fishing year age class' of fish using the forced margin, 'wide' readings are increased by 1 year (e.g., 3W is aged as a 4 year old) whereas 'line' and 'narrow' readings remain the same as the zone count (e.g., 4L or 4N are aged as a 4 year old), meaning that regardless of whether the fish was caught before or after the nominal birth date of 1 January, age remains the same throughout, unlike that which would be used for age groups/age classes or in growth rate estimation (see Walsh et al. 2014). Please note that due to the nominal birth date of 1 January as above, a specific year-class is referred to by the year that 1 January is associated with for the year-class in question.

Otolith reading precision was quantified by carrying out between-reader comparison tests after Campana et al. (1995), including those between each reader and the agreed age. The Index of Average Percentage Error, IAPE (Beamish & Fournier 1981), and MWCV (Chang 1982) were calculated for each test.

2.5 Snapper catch-at-age analysis

NIWA's catch-at-length and at-age analysis software tool CALA (catch-at-length and at-age, Francis & Bian (2011)) was used in the calculation of proportion-at-age and variance (bootstrap) estimates for the SNA 7 bottom trawl fishery from the random age frequency samples collected from each landing. Proportions-at-age across all landings within the sampling period were estimated from sample proportions, weighted by the estimated number of fish in each landing. Proportions-at-age were calculated for the range of fishing year age classes (herein referred to as "age classes") encompassing October 2022 to April 2023 in TBGB; November 2022 to June 2023 in WCSI; October 2023 to April 2024 in TBGB and October 2023 to June 2024 in WCSI) recruited, with the maximum age being an aggregate of all age classes over 29 years. Estimates of proportions of length-at-age were also calculated. All fish over 29 years were aggregated and assigned to a >29 age group (although plots and appendices presented in this report are summarised to a >19 group).

3. RESULTS

3.1 Fishery characterisation

Since 2018–19, the SNA 7 fishery has landed annual catches ranging from 257 t (2018–19) to 518 t (2022–23) (Fisheries New Zealand 2024). WCSI snapper catch increased during this period, making up 19% of the SNA 7 catch in 2018–19 but 36% of SNA 7 catch in 2022–23 (Figure 1). Catches in both areas were mainly from bottom trawl, with an average of 88% of TBGB and 76% of WCSI snapper catch taken by this method since 2018–19 (Figure 1). Bottom pair trawl landings comprised about 17% of the landings up to 2012 (Parker et al. 2015), but this method has not been used in recent years. Mid-water trawl accounted for 35% of snapper catch in WCSI in 2022–23.

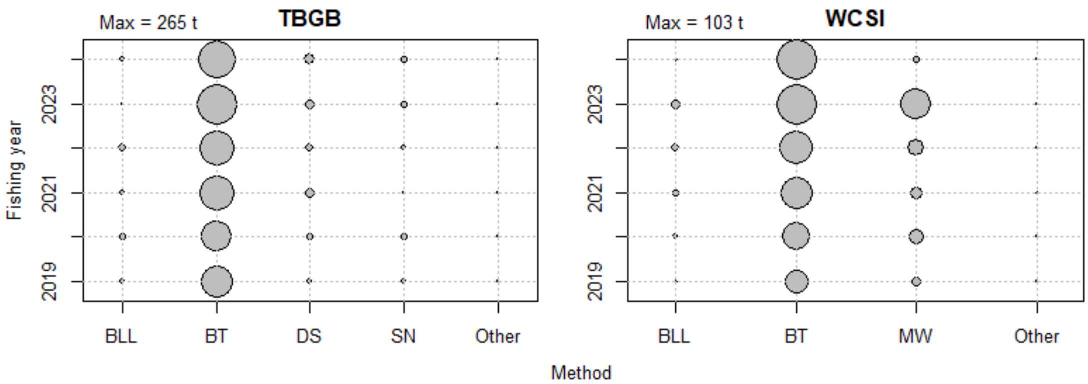

Figure 1: Snapper catch by gear type from the SNA 7 fishery between 2019 and 2024 (2024 includes data up to June only). BT = bottom trawl, DS = Danish seine, SN = set net, DS = Danish seine, MW = mid-water trawl, TBGB = Tasman Bay/Golden Bay, WCSI = West Coast South Island.

On average over the past six years about 54% of the bottom trawl snapper catch was taken from Statistical Area 038 (TBGB), with smaller landings percentages from Statistical Areas 017 (about 6%), 034–037 (about 36%) and 039 (about 3%) (Figure 2 and Figure 3). Many trips straddled Statistical Areas 037 and 038. During this period an increase in the snapper catch from Statistical Area 034 (2% of all SNA 7 catch in 2018–19 to 12% in 2022–23) was evident.

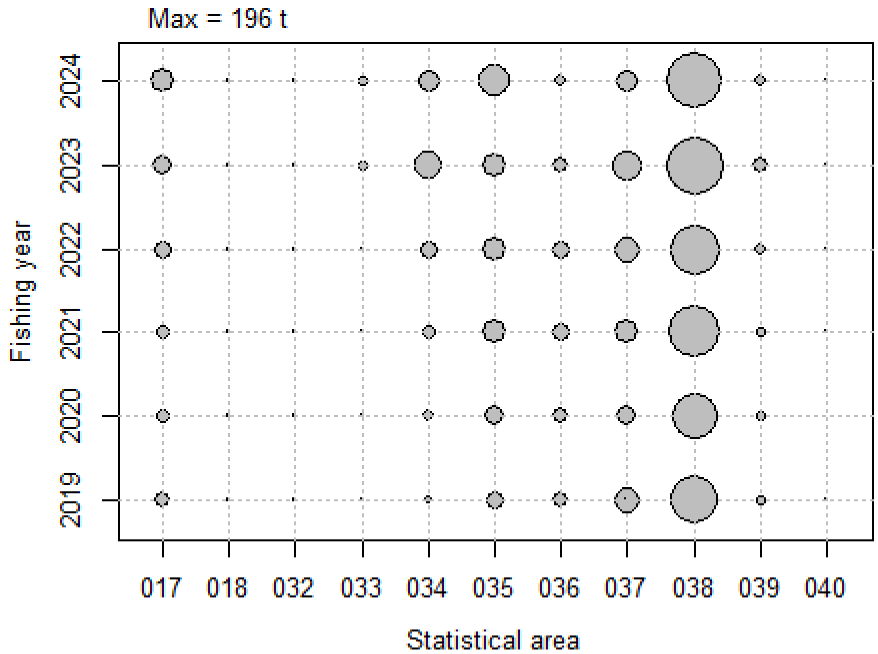

Figure 2: Snapper catch by statistical area from the SNA 7 bottom trawl fishery between 2019 and 2024 (2024 includes data up to June only).

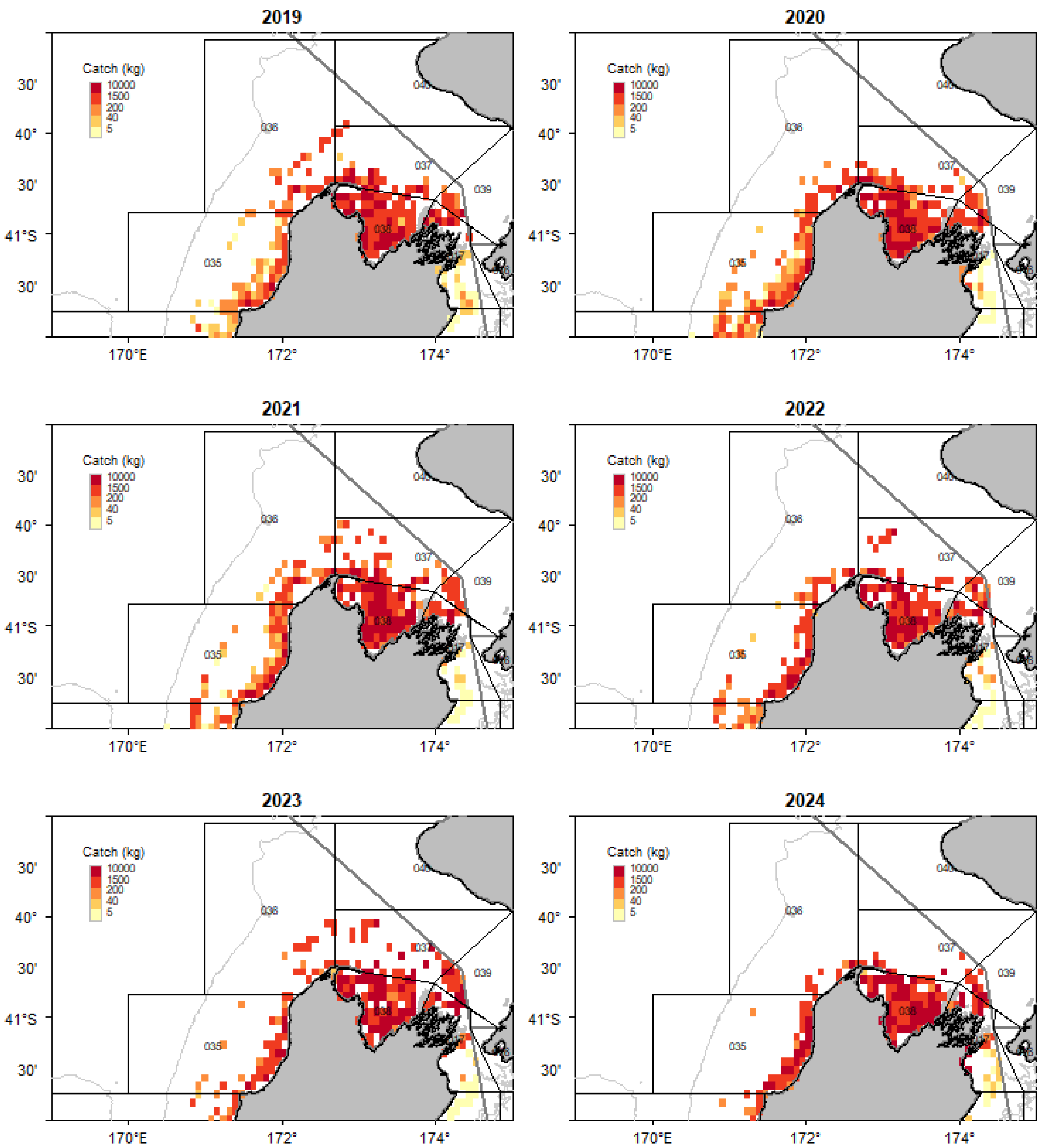

Figure 3: Spatial distribution of reported SNA 7 catch around the northern South Island, 2019–2024 (the 2024 plot includes data up to June only). Black lines delineate statistical areas and grey lines indicate boundaries of Quota Management Areas. Consistent with Fisheries New Zealand data confidentiality rules, each cell contains data from at least 3 permit holders

In TBGB the majority of bottom trawl catch since 2018–19 occurred in October to December, with significant catches continuing monthly through to April, and a diminishing trend for the remainder of the fishing year (Figure 4). For the WCSI bottom trawl catches generally occurred later in the year, being highest between January and May (Figure 4).

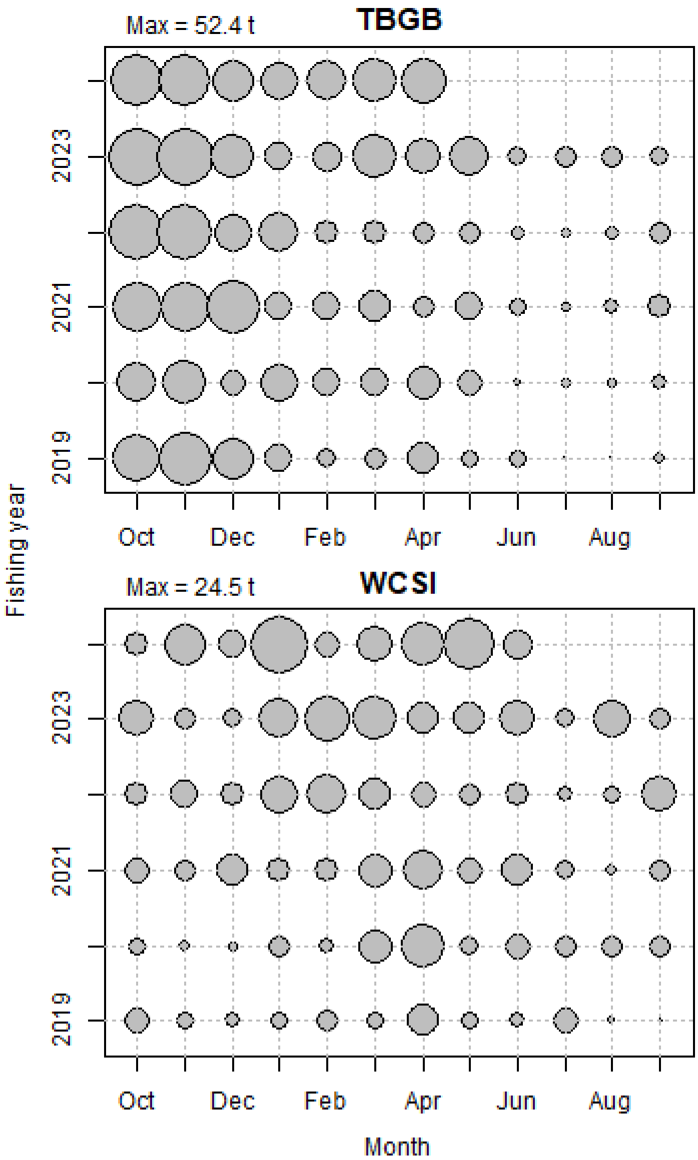

Figure 4: Monthly pattern of snapper catch from the SNA 7 bottom trawl fishery between 2019 and 2024 (2024 includes data up to June only). TBGB = Tasman Bay/Golden Bay, WCSI = West Coast South Island.

In TBGB the majority of snapper landed by bottom trawl was taken while targeting flatfish/sand flounder, snapper, red gurnard, and to some extent John dory (Figure 5). Flatfish, or FLA, (a code used for multiple species which was replaced by individual species codes such as sand flounder, SFL, from 2021–22) used to be an important target in the bottom trawl fisheries in both TBGB and WCSI. Since about 2018–19, however, red gurnard increased in importance as a target and was associated with 37% of TBGB snapper catch in 2018–19 compared to 78% in 2023–24. Red gurnard was also of increasing importance as a target in the WCSI (associated with 18% of TBGB snapper catch in 2018–19 compared to 68% in 2023–24). Other important targets in the WCSI were tarakihi and barracouta (Figure 5).

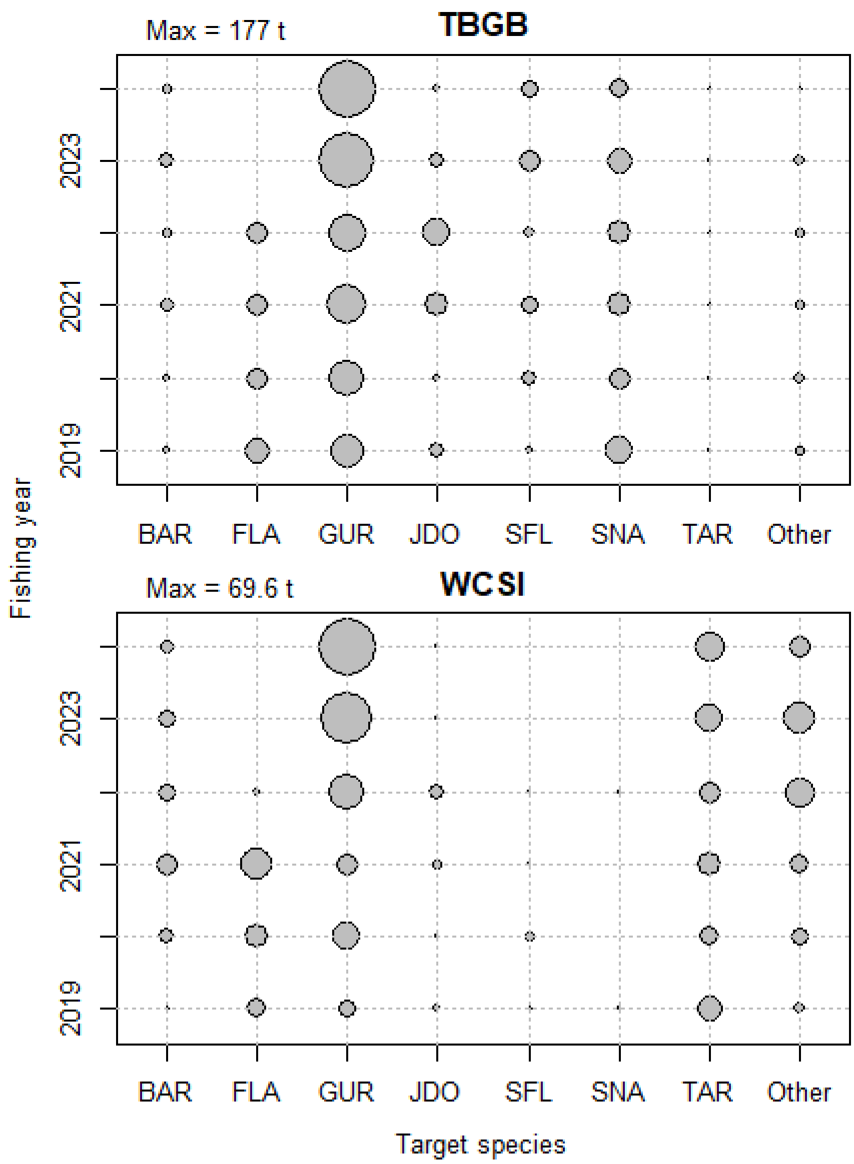

Figure 5: Target species associated with snapper catch from the SNA 7 bottom trawl fishery between 2019 and 2024 (2024 includes data up to June only). BAR = barracouta, FLA = flatfish species group (not used after 2022), GUR = gurnard, JDO = John dory, SFL = sand flounder, SNA = snapper, TAR = tarakihi, TBGB = Tasman Bay/Golden Bay, WCSI = West Coast South Island.

3.2 Sampling

In 2022–23 sampling targets (15 landings per spatio-temporal stratum) were not met for any of the three strata (Table 2). A number of landings that were sampled were inevitably rejected (largely due to fishing trips crossing area boundaries and/or including non-specified targets). In 2023–24 the daily provision of electronic reporting data vastly improved our ability to identify qualifying landings. This resulted in much fewer rejected landings and consequently nearly all sampling targets were achieved. Further, in 2023–24 we also started sampling WCSI landings on the West Coast itself, which greatly improved our access to landings enabling us to achieve this target. Further details associated with each successfully sampled landing can be found in Appendix 1.

Table 2: Sampled landings and otoliths by stratum and year. Numbers in table expressed as follows: number of landings sampled (landings accepted for aging)/ number of otoliths used for aging. TBGB = Tasman Bay/Golden Bay; WCSI = West Coast South Island.

Fishing year	TBGB spring	TBGB summer	WCSI
2022–23	16(10)/599	10(5)/298	11(11)/599
2023–24	15(15)/599	16(13)/598	15(15)/599

Sample representativeness in 2022–23

The temporal pattern of landings sampled was difficult to compare to that of the whole fishery due to sampling targets not being met, which resulted in many months of the fishing year where no sampling was conducted. So while the temporal pattern of landings sampled did not match that of the overall fishery, in broad terms the months with the highest number or weight of landings were generally those where sampling was also conducted, for both the TBGB and WCSI strata (Figure 6).

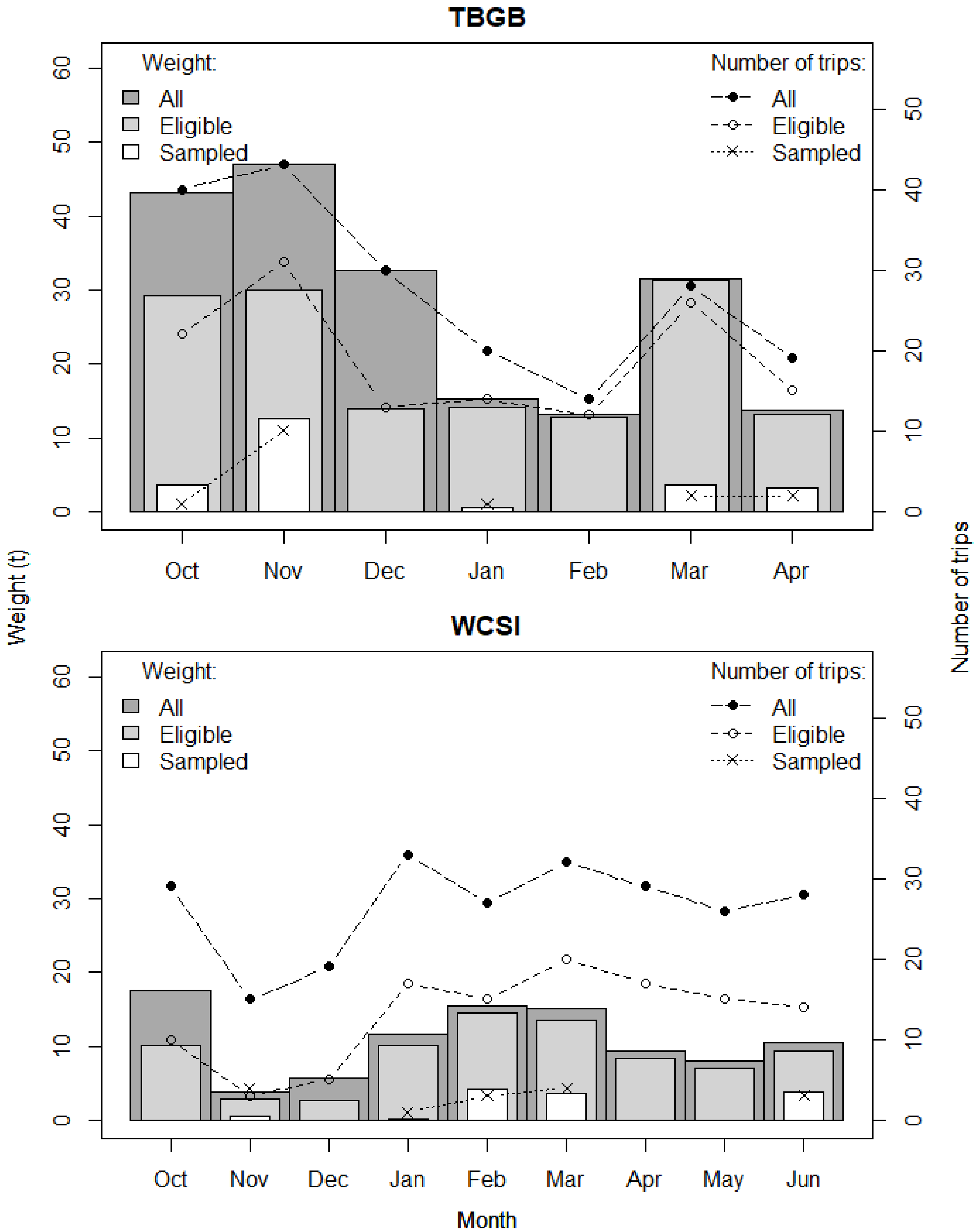

Figure 6: Comparison of the monthly distribution of landed weight (dark grey bars) and numbers of landings (dashed line with filled circles) of snapper in Tasman Bay/Golden Bay (TBGB) and the West Coast South Island (WCSI) bottom trawl fisheries between October and June 2022–23. Corresponding estimates for landings eligible to sample (light grey bars and dashed line with open circles) and sampled landings (white bars and dotted line) are also included to show representativeness of sample collections.

In terms of target species, for TBGB acceptable targets were SNA, GUR and FLA (YBF, SFL). Additional targets, however, can legitimately be present from a landing because we do accept up to 10% (by estimated snapper weight) where other targets are listed. Regardless, the difficulties in finding clean area and correct target landings resulted in non-representative sampling by target species in the Spring TBGB strata during 2022–23 (with oversampling of BAR and under sampling of SNA most notable) (Figure 7). Due to these difficulties, the target species requirement was removed for the Summer TBGB strata, where oversampling of GUR, SCH and to some extent TAR, and under sampling of snapper occurred. For the WCSI the landings that were sampled were a good match to the overall fishery in terms of target species proportions (Figure 7).

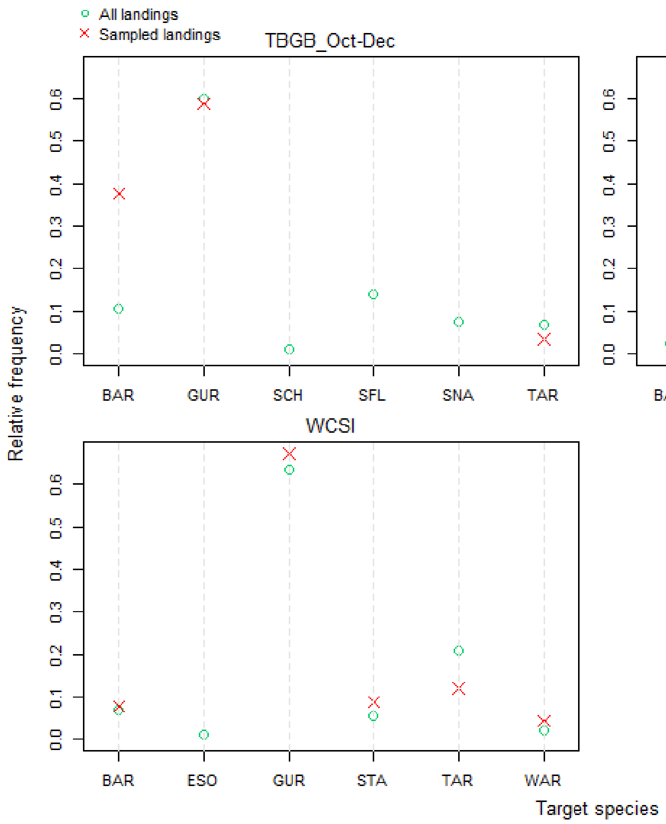

Figure 7: Comparison of the proportional distribution of the estimated bottom trawl catch and the sampled component by target species in Tasman Bay/Golden Bay (TBGB) and the West Coast South Island (WCSI) between October and June 2022–23. Top left panel is for TBGB during the October to December season, top right panel is for TBGB during the January to April season, bottom left panel is for WCSI during the October to June season. BAR = barracouta, GUR = gurnard, JDO = John dory, SFL = sand flounder, SNA = snapper, TAR = tarakihi, SCH = school shark, ESO = New Zealand sole, STA = giant stargazer, WAR = common warehou. Note that for Tasman Bay/Golden Bay some landings were listed as having a target of BAR, but additional information provided by skippers suggested that this was inaccurate and landings were accepted as a result. Other sampled landings from Tasman Bay/Golden Bay where alternate targets were listed (i.e., not the design criterion targets of SNA, GUR, or SFL) were sampled because the snapper catch from those landings was largely associated with the design criterion targets. In Tasman Bay/Golden Bay between January and April 2022–23 target was not used as a criterion to accept or reject a landing.

From a spatial perspective, the distribution of sampled landings compared well to that over the overall fishery (for TBGB and WCSI) (Figure 8). However, when assessed by statistical area, under sampling of Statistical Area 038 (and over sampling of Statistical Area 037) occurred in both Spring and Summer (Figure 9). Sampling on the WCSI was a good match for that of overall fishery when assessed by statistical area (Figure 9).

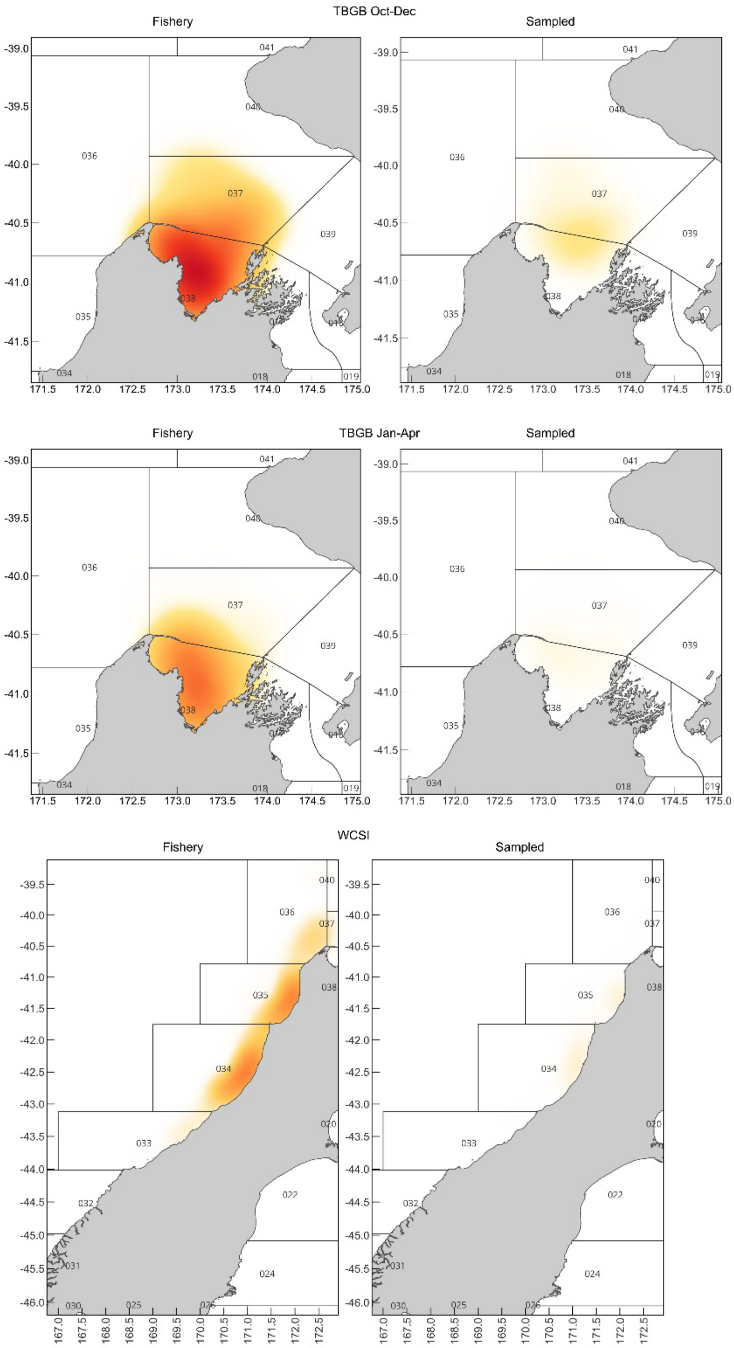

Figure 8: Spatial distribution of bottom trawl catch of snapper in 2022–23. Left panels = whole of fishery catch, right panels = just the sampled landings, top row = Tasman Bay/Golden Bay for the October to December season, middle row = Tasman Bay/Golden Bay for the January to April season, bottom row = West Coast South Island for the October to June season. Black lines delineate statistical areas. Heat maps are Kernel Density Estimates (quartic) with a radius of 50 km (TBGB) or 100 km (WCSI) and a cell size of 1 km. Colour ramps represent expected relative catch based on interpolation.

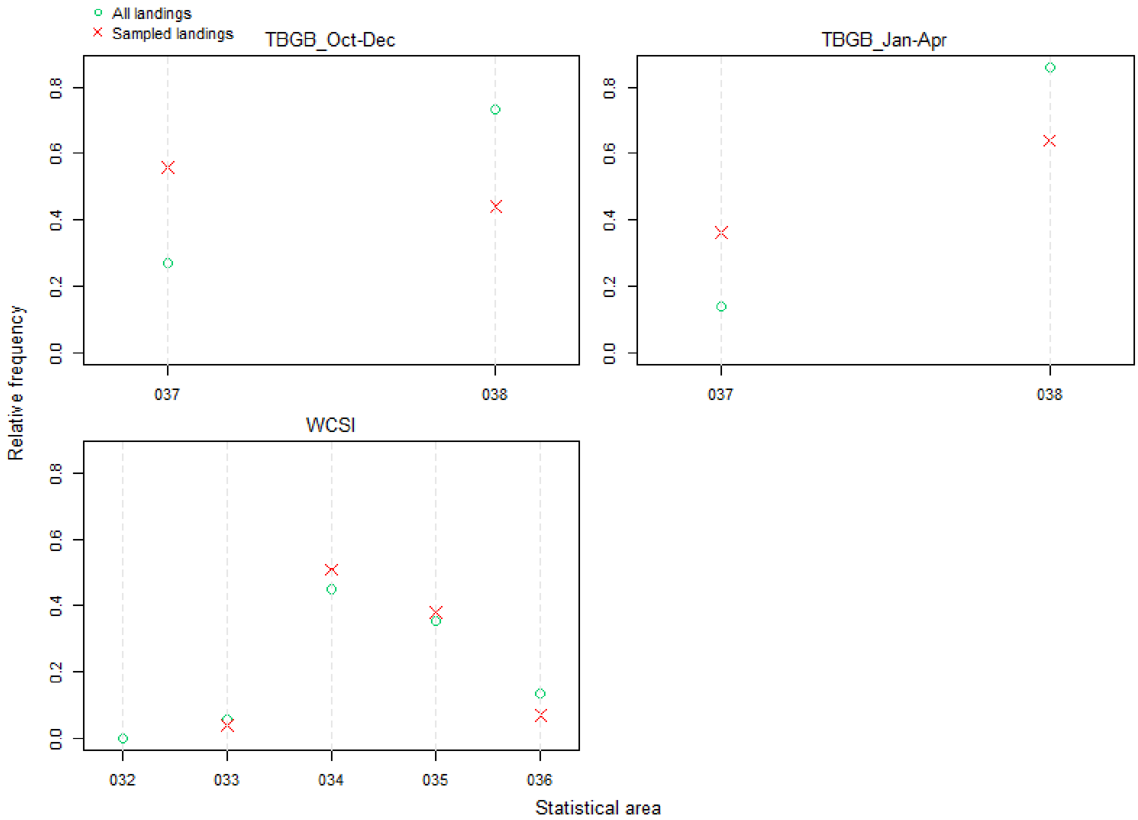

Figure 9: Comparison of the proportional distribution of the estimated bottom trawl catch and the sampled component by statistical area in Tasman Bay/Golden Bay (TBGB) and the West Coast South Island (WCSI) between October and June 2022–23. Top left panel is for TBGB during the October to December season, top right panel is for TBGB during the January to April season, bottom left panel is for WCSI during the October to June season.

Sampling representativeness when assessed by depth was consistent with the pattern observed by statistical area. In TBGB (both Spring and Summer) landings sampled had fished deeper than the overall fishery (sampled landings did not include much catch from < 50 m depth) (Figure 10). The depth distribution of sampled landings from the WCSI were a good match to that of the overall fishery (Figure 10).

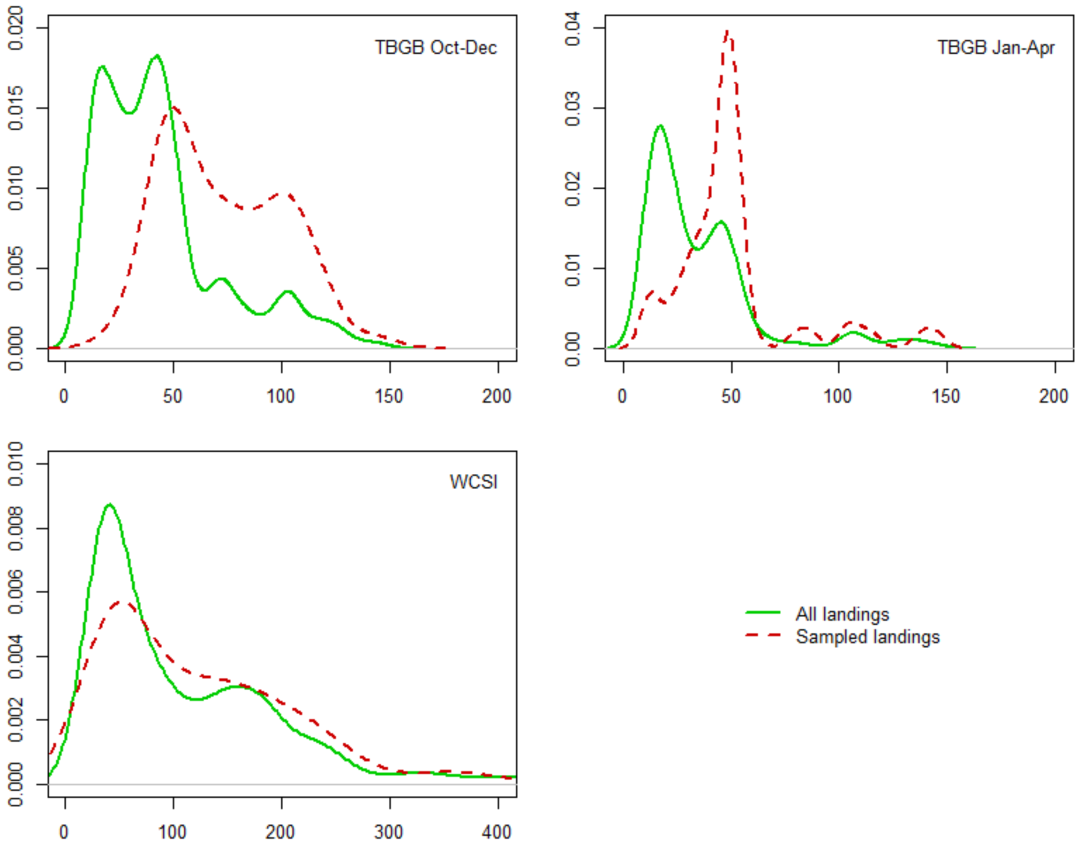

Figure 10: Comparison of the proportional distribution of the estimated bottom trawl catch and the sampled component by depth in Tasman Bay/Golden Bay (TBGB) and the West Coast South Island (WCSI) between October and June 2022–23. Top left panel is for TBGB during the October to December season, top right panel is for TBGB during the January to April season, bottom left panel is for WCSI during the October to June season.

Sample representativeness in 2023–24

The temporal pattern of landings sampled was more closely matched to that of overall fishery landings in 2023–24 compared to 2022–23. Most months had at least some landings sampled, although some under sampling was notable for TBGB in November, and between November and February in the WCSI (Figure 11).

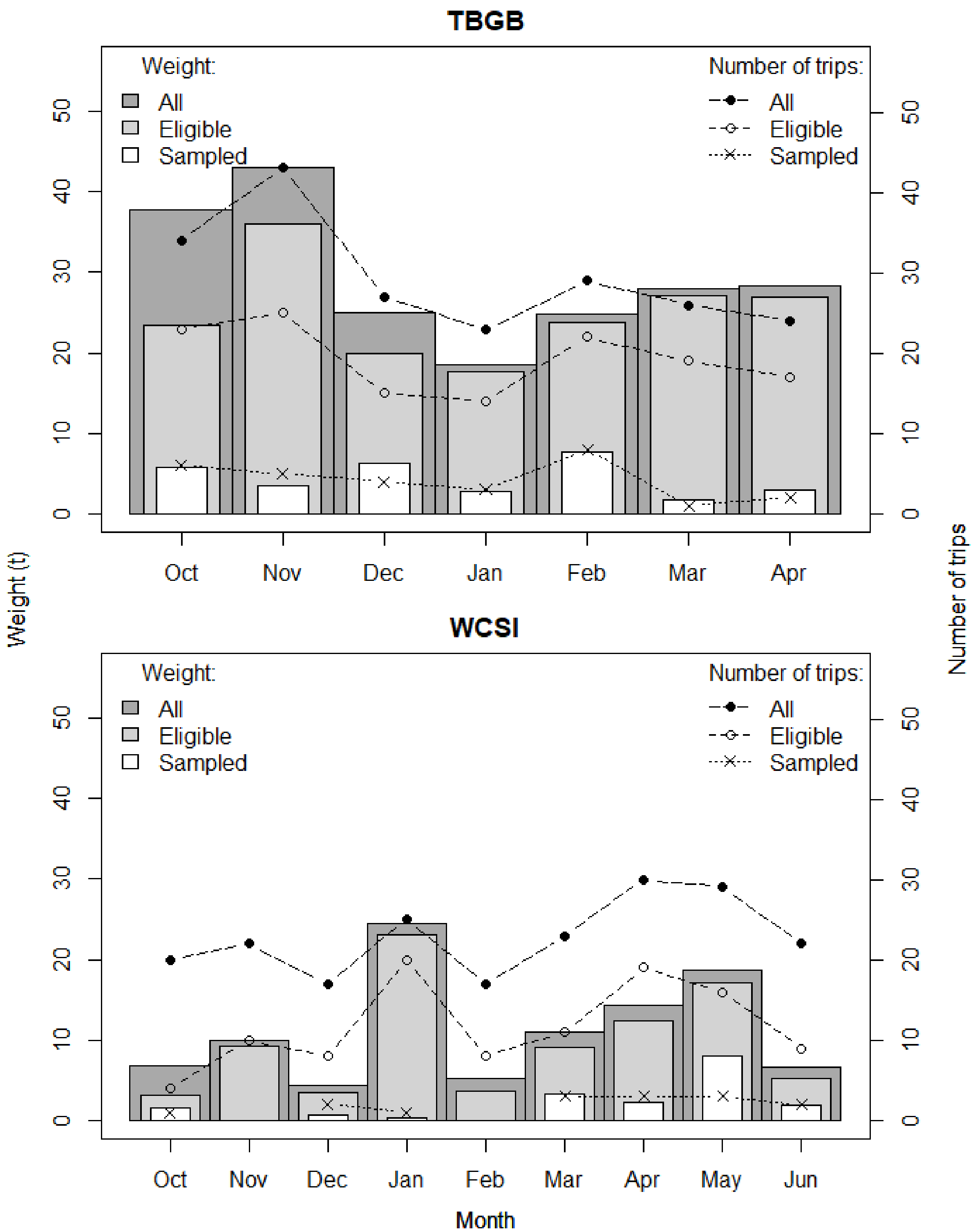

Figure 11: Comparison of the monthly distribution of landed weight (dark grey bars) and numbers of landings (dashed line with filled circles) of snapper in Tasman Bay/Golden Bay (TBGB) and the West Coast South Island (WCSI) bottom trawl fisheries between October and June 2023–24. Corresponding estimates for landings eligible to sample (light grey bars and dashed line with open circles) and sampled landings (white bars and dotted line) are also included to show representativeness of sample collections.

Target species sampling restrictions (SNA, GUR, FLA (YBF, SFL)) were reintroduced for TBGB 2023–24. Sampled landings were, however, a close match to overall fishery patterns for all strata sampled, with the exception of some minor over sampling of SNA in TBGB during Spring (Figure 12).

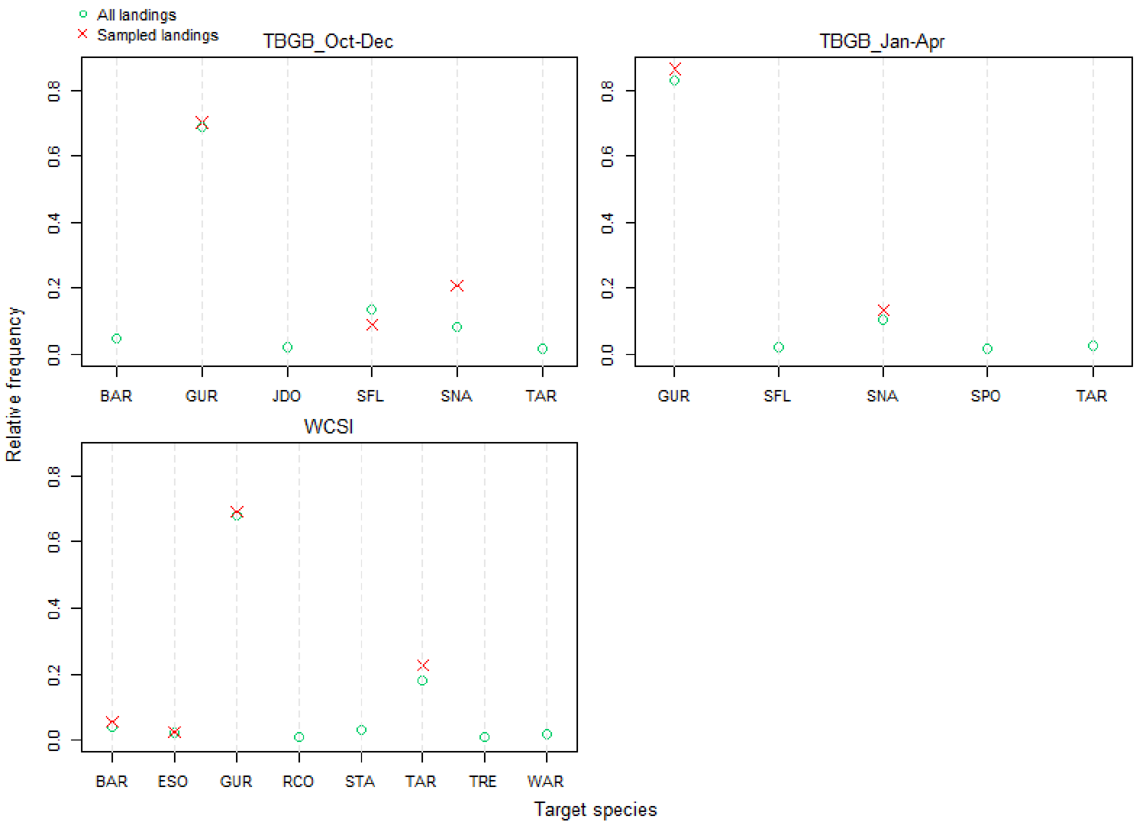

Figure 12: Comparison of the proportional distribution of the estimated bottom trawl catch and the sampled component by target species in Tasman Bay/Golden Bay (TBGB) and the West Coast South Island (WCSI) between October and June 2023–24. Top left panel is for TBGB during the October to December season, top right panel is for TBGB during the January to April season, bottom left panel is for WCSI during the October to June season. BAR = barracouta, GUR = gurnard, JDO = John dory, SFL = sand flounder, SNA = snapper, TAR = tarakihi, SCH = school shark, ESO = New Zealand sole, STA = giant stargazer, WAR = common warehou, TRE = trevally, RCO = red cod, SPO = rig.

The spatial pattern of sampled landings was a good match to that of the overall fishery in 2023–24 (Figure 13). When assessed by statistical area spatial representativeness was still good, especially in TBGB during Spring. There was, however, some minor oversampling of Statistical Area 038 in TBGB during Summer, and some over sampling of Statistical Area 035 for the WCSI (Figure 14).

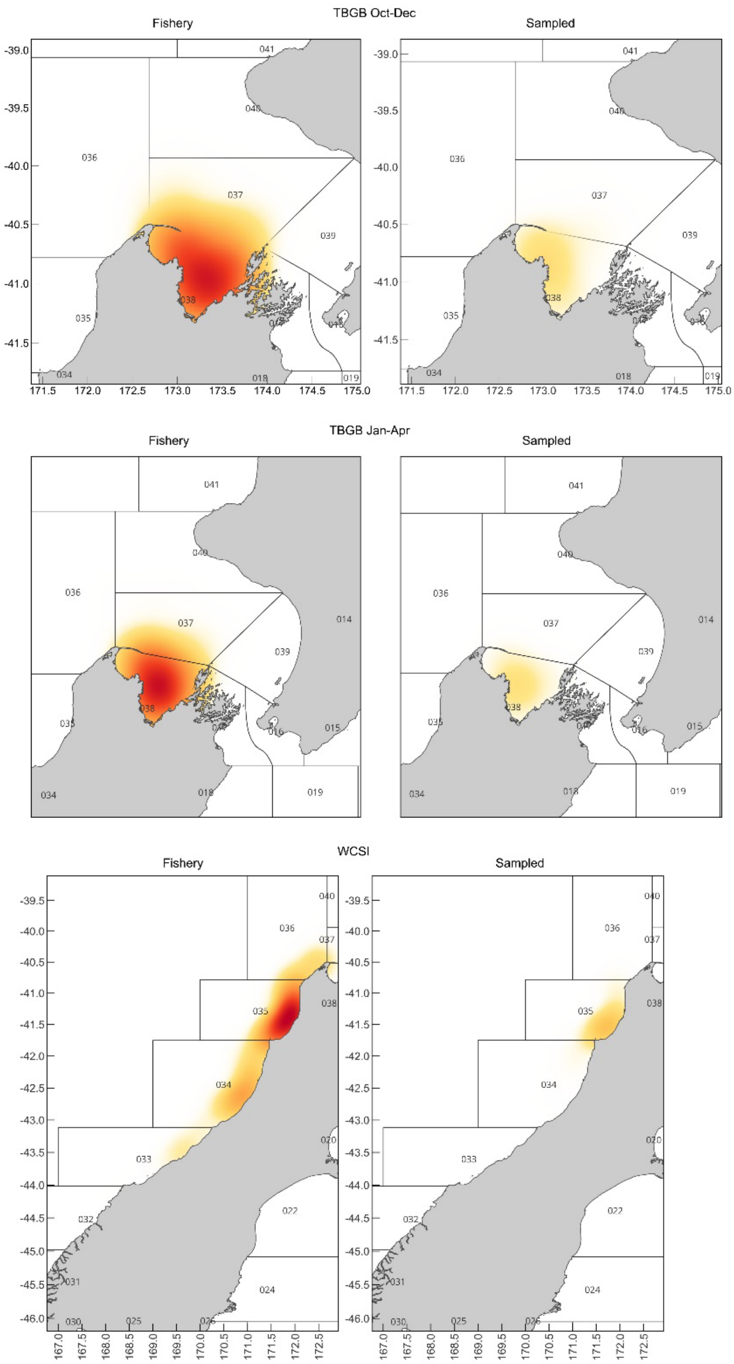

Figure 13: Spatial distribution of bottom trawl catch of snapper in 2023–24. Left panels = whole of fishery catch, right panels = just the sampled landings, top row = Tasman Bay/Golden Bay for the October to December season, middle row = Tasman Bay/Golden Bay for the January to April season, bottom row = West Coast South Island for the October to June season. Black lines delineate statistical areas and grey lines indicate boundaries of Quota Management Areas. Heat maps are Kernel Density Estimates (quartic) with a radius of 50 km (TBGB) or 100 km (WCSI) and a cell size of 1 km. Colour ramps represent expected relative catch based on interpolation.

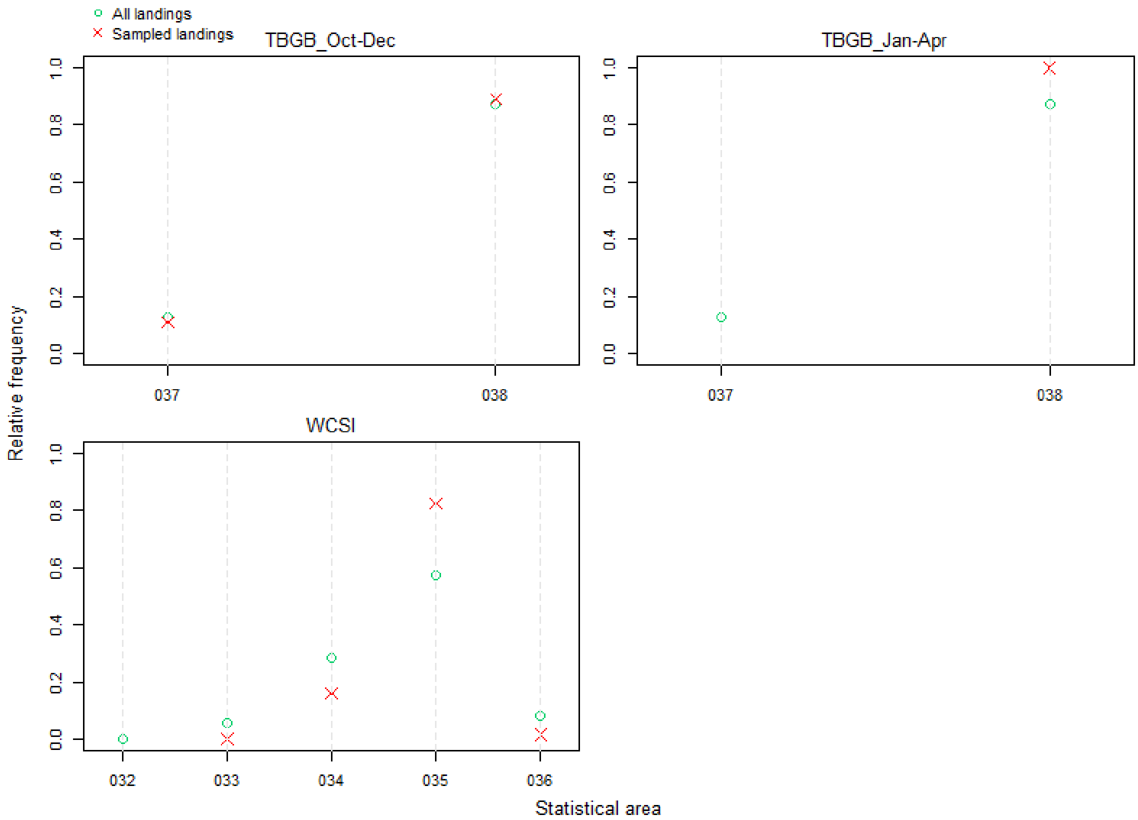

Figure 14: Comparison of the proportional distribution of the estimated bottom trawl catch and the sampled component by statistical area in Tasman Bay/Golden Bay (TBGB) and the West Coast South Island (WCSI) between October and June 2023–24. Top left panel is for TBGB during the October to December season, top right panel is for TBGB during the January to April season, bottom left panel is for WCSI during the October to June season.

The depth distribution of sampling was vastly improved in 2023–24 compared to 2022–23. Specifically, sampled landings contained a similar proportion of snapper catch from waters < 50 m depth compared to the overall fishery in TBGB in both Spring and Summer (Figure 15). The depth distribution of sampled landings also matched the overall fishery well for the WCSI (Figure 15).

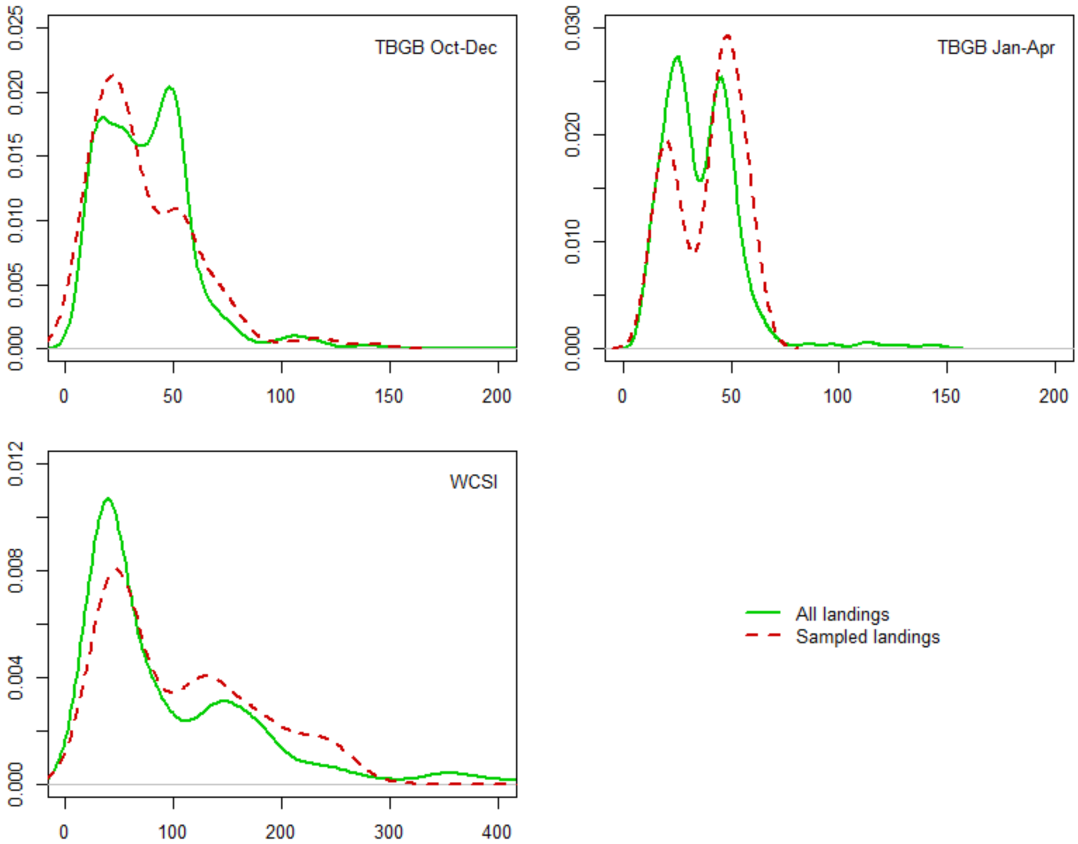

Figure 15: Comparison of the proportional distribution of the estimated bottom trawl catch and the sampled component by depth in Tasman Bay/Golden Bay (TBGB) and the West Coast South Island (WCSI) between October and June 2023–24. Top left panel is for TBGB during the October to December season, top right panel is for TBGB during the January to April season, bottom left panel is for WCSI during the October to June season.

3.3 SNA 7 otolith samples and length distributions in 2022–23

Because TBGB sampling targets were not achieved in 2022–23 nearly all otoliths collected were selected for aging. As a result, the length distribution of fish that were aged was identical (both TBGB strata) or near identical (WCSI) compared to the total sample of otoliths collected (Figures 16 and 17).

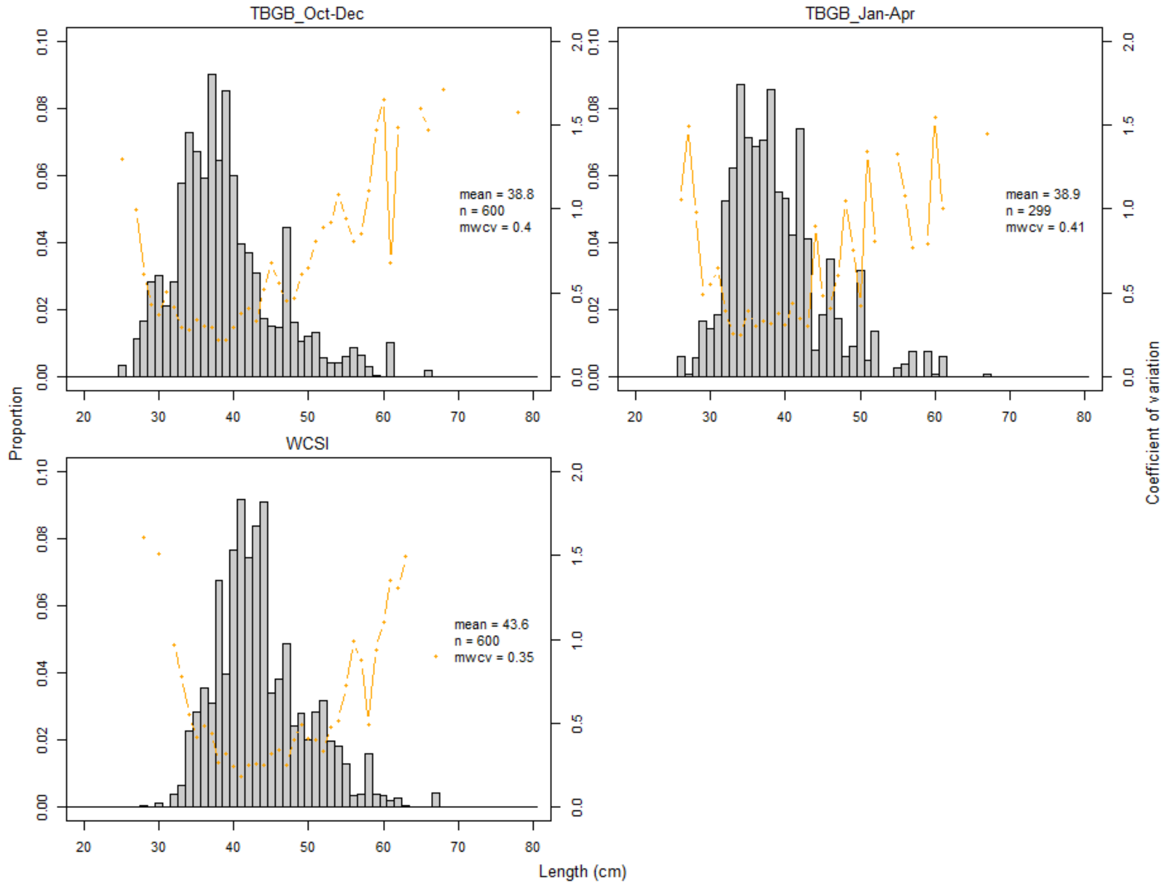

Figure 16: Proportion-at-length distributions (histograms) and CVs (lines) of the random age frequency sample determined from snapper landings sampled from the SNA 7 bottom trawl fishery in 2022–23 for Tasman Bay/Golden Bay in October–December (top left panel), Tasman Bay/Golden Bay in January–April (top right panel), and West Coast South Island in January–June (bottom left panel) (n, sample size; MWCV, mean weighted CV).

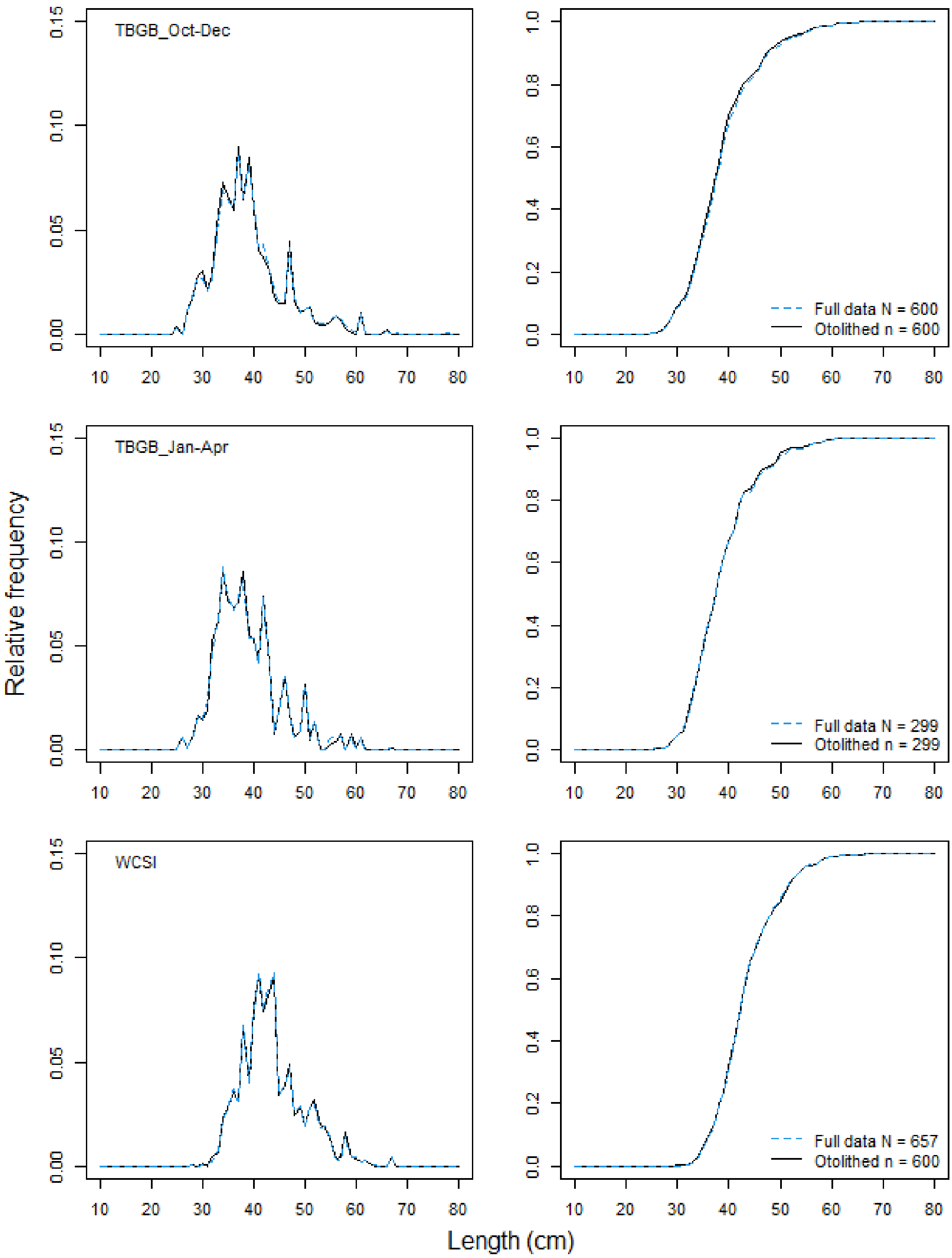

Figure 17: Comparison of the proportion- and cumulative proportion-at-length distributions of the random age frequency sample (blue dashed line), and subsample (solid line) determined from snapper landings sampled from the SNA 7 bottom trawl fishery in 2022–23 for Tasman Bay/Golden Bay in October–December (top row), Tasman Bay/Golden Bay in January–April (middle row), and West Coast South Island in January–June (bottom row).

3.4 SNA 7 otolith samples and length distributions in 2023–24

In 2023–24 sampling targets were achieved (or nearly achieved) so there were excess otoliths to select from for all strata. A subsample of 600 otoliths was randomly selected for each strata with the number of otoliths selected within each landing based on weight of the landing. The length distribution of the subsampled fish was representative of the larger random age frequency sample for all strata (Figures 18 and 19).

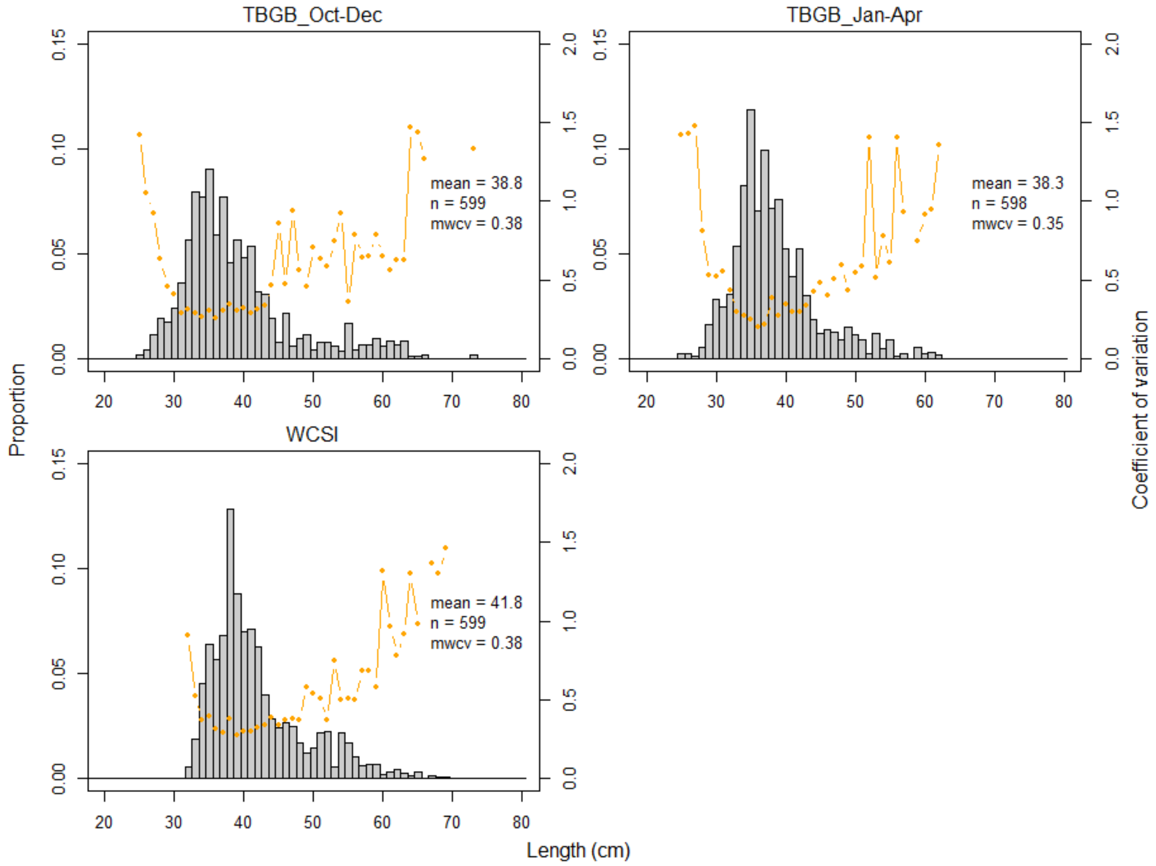

Figure 18: Proportion-at-length distributions (histograms) and CVs (lines) of the random age frequency sample determined from snapper landings sampled from the SNA 7 bottom trawl fishery in 2023–24 for Tasman Bay/Golden Bay in October–December (top left panel), Tasman Bay/Golden Bay in January–April (top right panel), and West Coast South Island in January–June (bottom left panel) (n, sample size; MWCV, mean weighted CV).

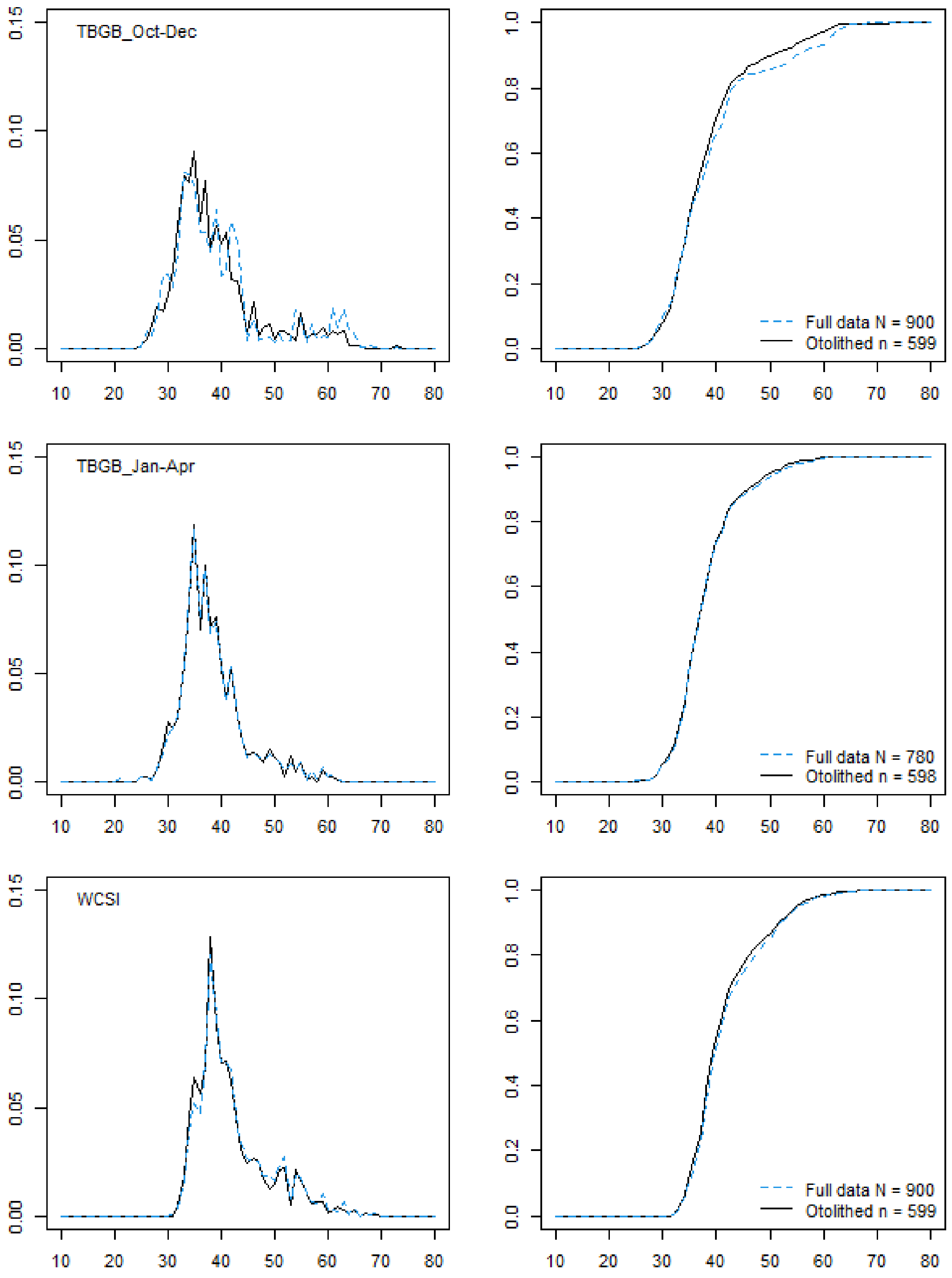

Figure 19: Comparison of the proportion- and cumulative proportion-at-length distributions of the random age frequency sample (blue dashed line), and subsample (solid line) determined from snapper landings sampled from the SNA 7 bottom trawl fishery in 2023–24 for Tasman Bay/Golden Bay in October–December (top row), Tasman Bay/Golden Bay in January–April (middle row), and West Coast South Island in January–June (bottom row).

3.5 Reader comparison tests for SNA 7 readings

Of the total subsample of 1499 otoliths selected for ageing from TBGB (899) and the WCSI (600) in 2022–23, 1496 were successfully aged. For 2023–24, 1800 otoliths were selected, 1200 from TBGB and 600 from the WCSI, resulting in 1796 successfully aged. Between reader tests from reading these 1496 (2022–23) and 1796 (2023–24) otoliths showed a high level of consistency between readers (Figures 20–23). Overall, for both year collections there was high level agreement (mean 86%) between the readers and relatively minor systematic differences (bias) in the first counts of snapper otoliths (Figures 20 to 23a–c). Between-reader CV and IAPE scores were less than 2% (Figures 20–23c) and the analyses show that precision was generally high, especially age classes to about 20 years (Figures 20–23d). Comparisons of age-bias plots for readers 1 and 2 with the agreed age show that overall, for both years, agreement was high (approximately 100% and 80–91%) and precision was generally high, with CV and IAPE marginally above 1% or less (Figures 20–23e and f).

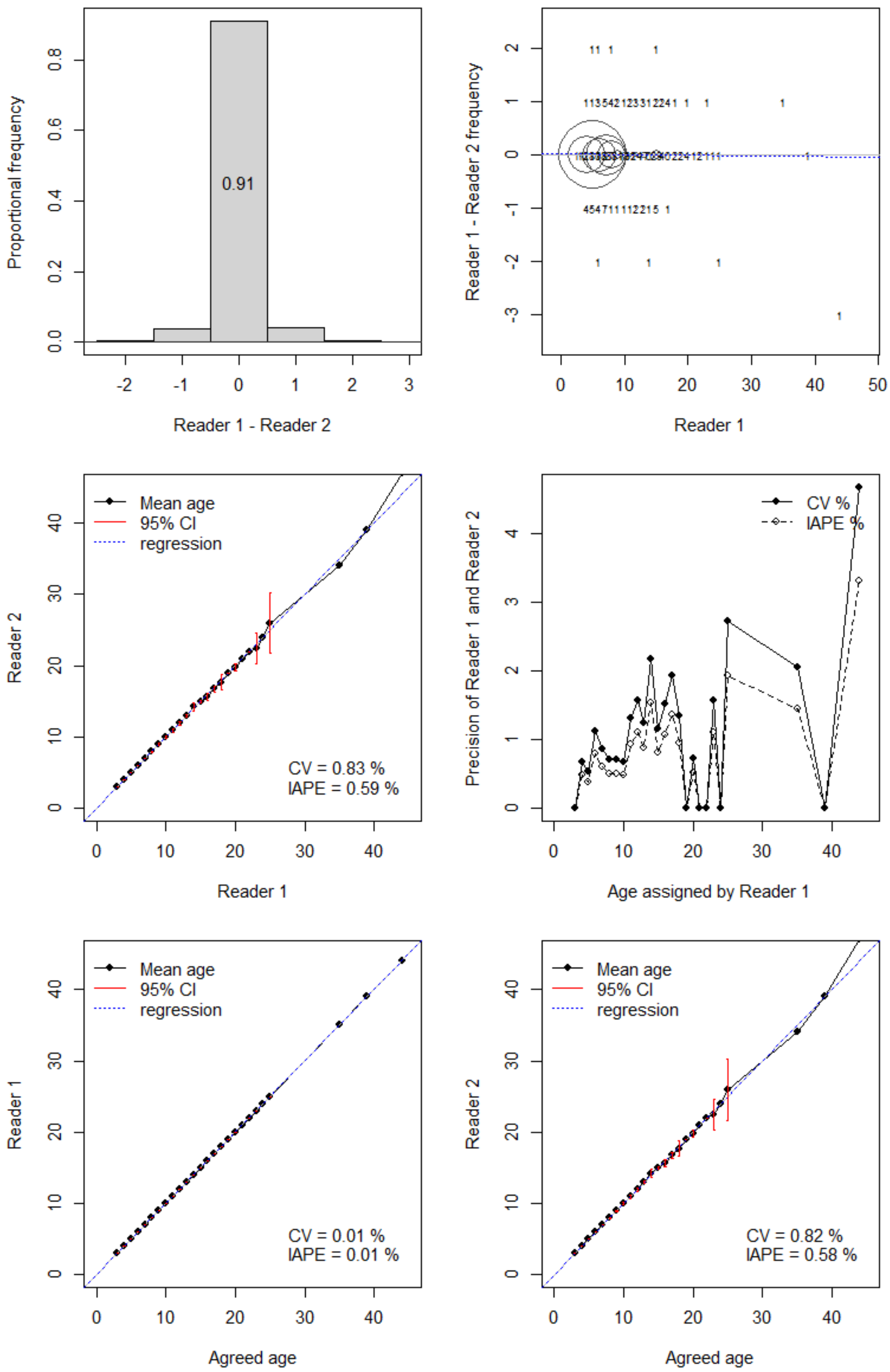

Figure 20: Results of between-reader comparison tests (Reader 1 and 2) for Tasman Bay/Golden Bay otoliths collected between October and April in 2022–23 (n = 897): (a) histogram of differences between readings for the same otolith; (b) differences between readers for a given age assigned by Reader 1; (c) bias plot between readers; (d) CV and IAPE profiles (precision) relative to the age assigned by Reader 1; (e, f) bias plot between Reader 1 and Reader 2 and agreed age. The expected perfect agreement (solid line) and actual relationship (dashed line) between readers are overlaid on (b) and (c), and between reader 1 and 2 and the agreed age on (e) and (f).

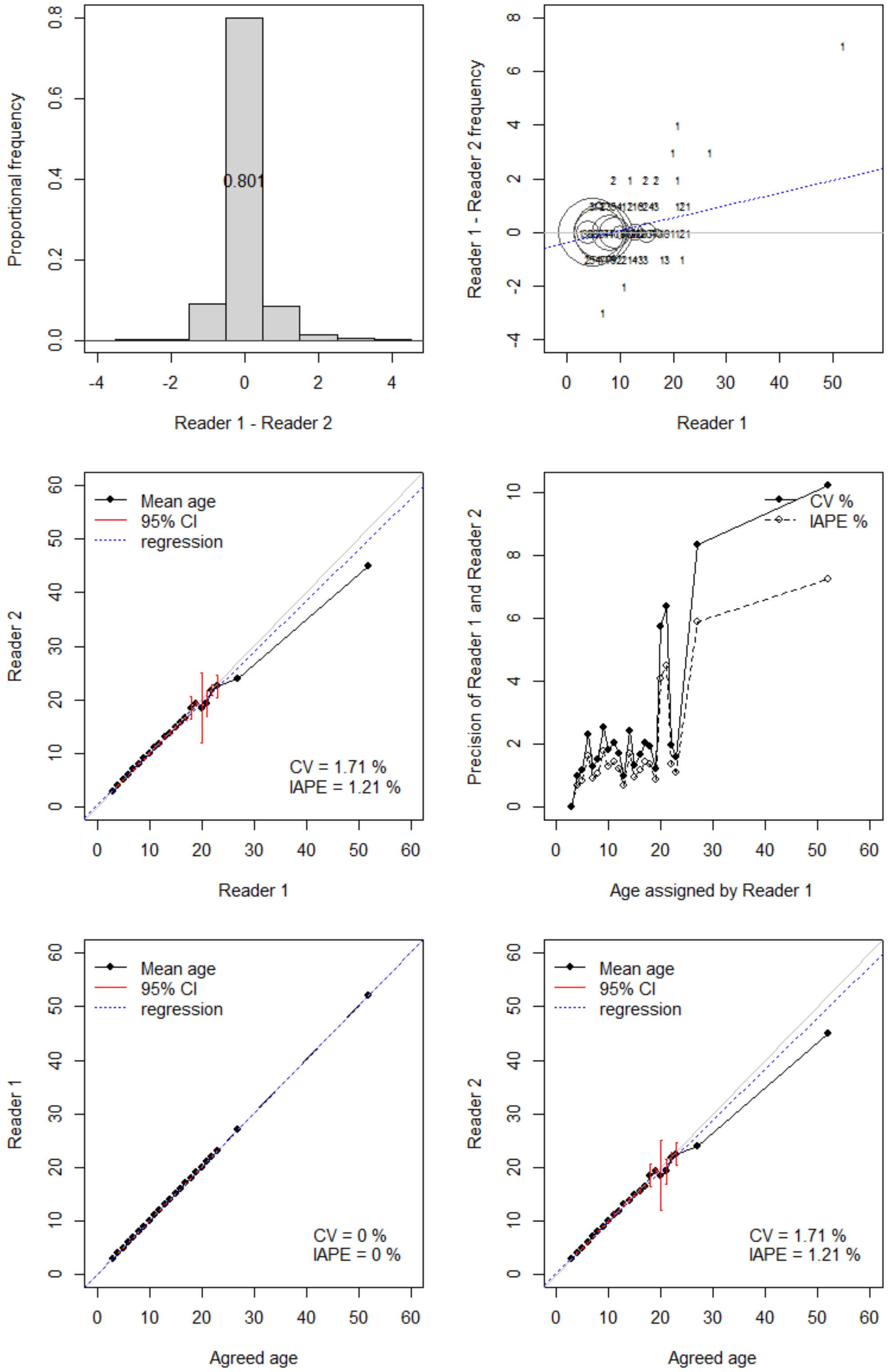

Figure 21: **Results of between-reader comparison tests (Reader 1 and 2) for West Coast South Island otoliths collected in 2022–23 (n = 599): (a) histogram of differences between readings for the same otolith; (b) differences between readers for a given age assigned by Reader 1; (c) bias plot between readers; (d) CV and IAPE profiles (precision) relative to the age assigned by Reader 1; (e, f) bias plot between Reader 1 and Reader 2 and agreed age. The expected perfect agreement (solid line) and actual relationship (dashed line) between readers are overlaid on (b) and (c), and between reader 1 and 2 and the agreed age on (e) and (f).**

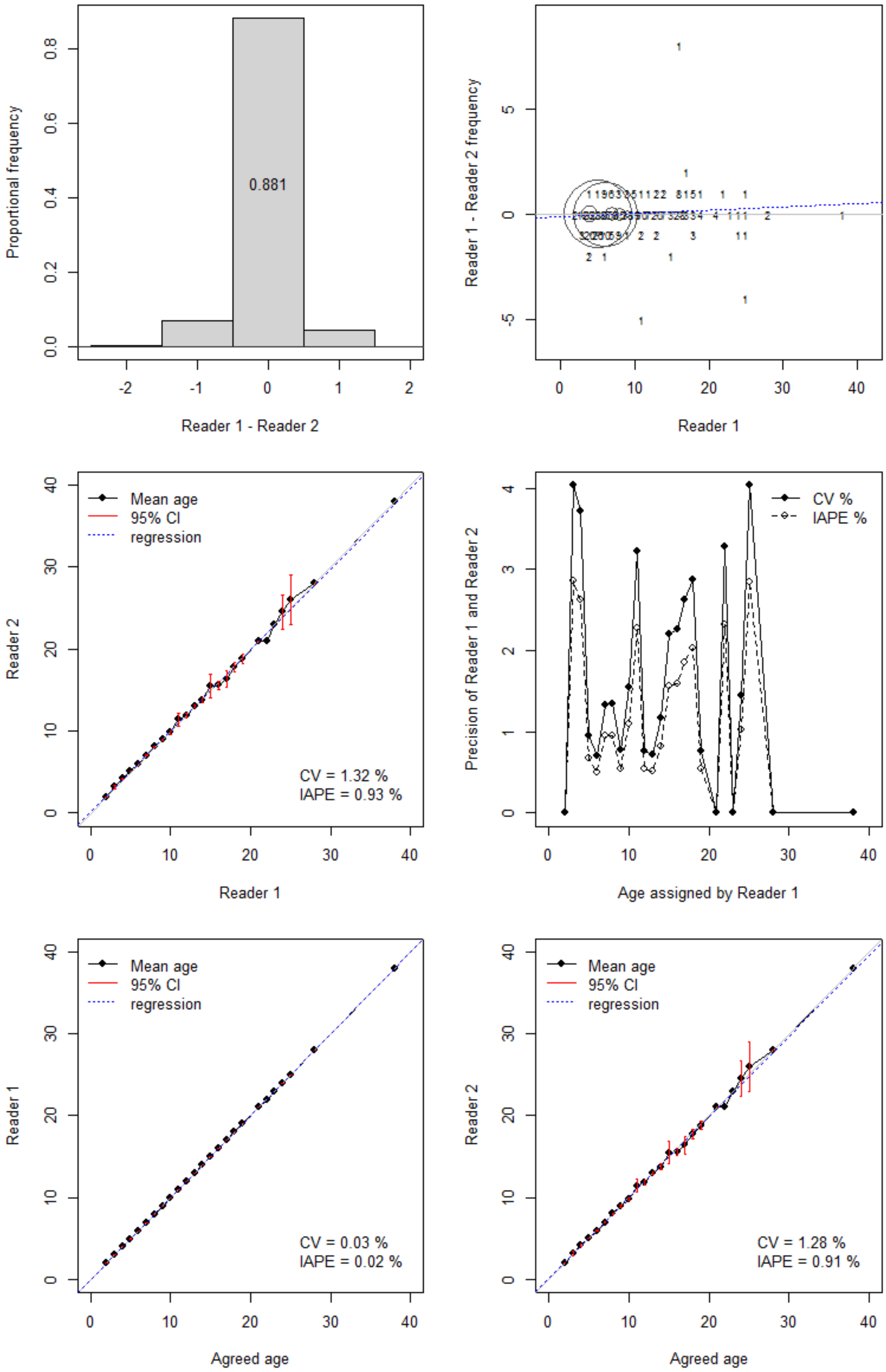

Figure 22: Results of between-reader comparison tests (Reader 1 and 2) for Tasman Bay/Golden Bay otoliths collected between October and April in 2023–24 (n = 1197): (a) histogram of differences between readings for the same otolith; (b) differences between readers for a given age assigned by Reader 1; (c) bias plot between readers; (d) CV and IAPE profiles (precision) relative to the age assigned by Reader 1; (e, f) bias plot between Reader 1 and Reader 2 and agreed age. The expected perfect agreement (solid line) and actual relationship (dashed line) between readers are overlaid on (b) and (c), and between reader 1 and 2 and the agreed age on (e) and (f).

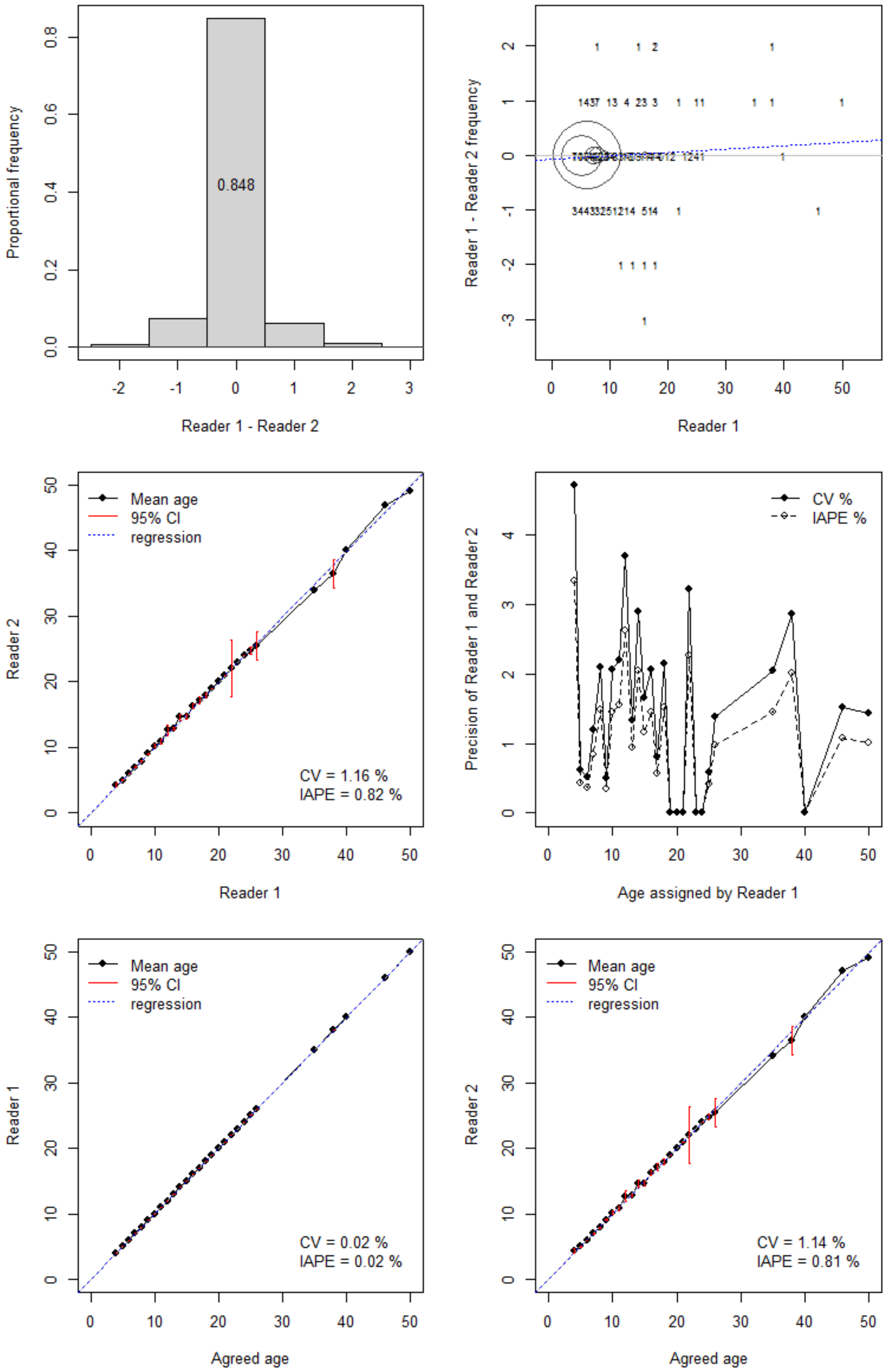

Figure 23: **Results of between-reader comparison tests (Reader 1 and 2) for West Coast South Island otoliths collected in 2023–24 (n = 599): (a) histogram of differences between readings for the same otolith; (b) differences between readers for a given age assigned by Reader 1; (c) bias plot between readers; (d) CV and IAPE profiles (precision) relative to the age assigned by Reader 1; (e, f) bias plot between Reader 1 and Reader 2 and agreed age. The expected perfect agreement (solid line) and actual relationship (dashed line) between readers are overlaid on (b) and (c), and between reader 1 and 2 and the agreed age on (e) and (f).**

3.6 SNA 7 bottom trawl catch-at-age estimates in 2022–23

Catch-at-age compositions for TBGB with bootstrapped variance estimates were derived for the October to December (Spring) and January to April (Summer) sampling periods in 2022–23, and for the WCSI, between October and June (Figure 24).

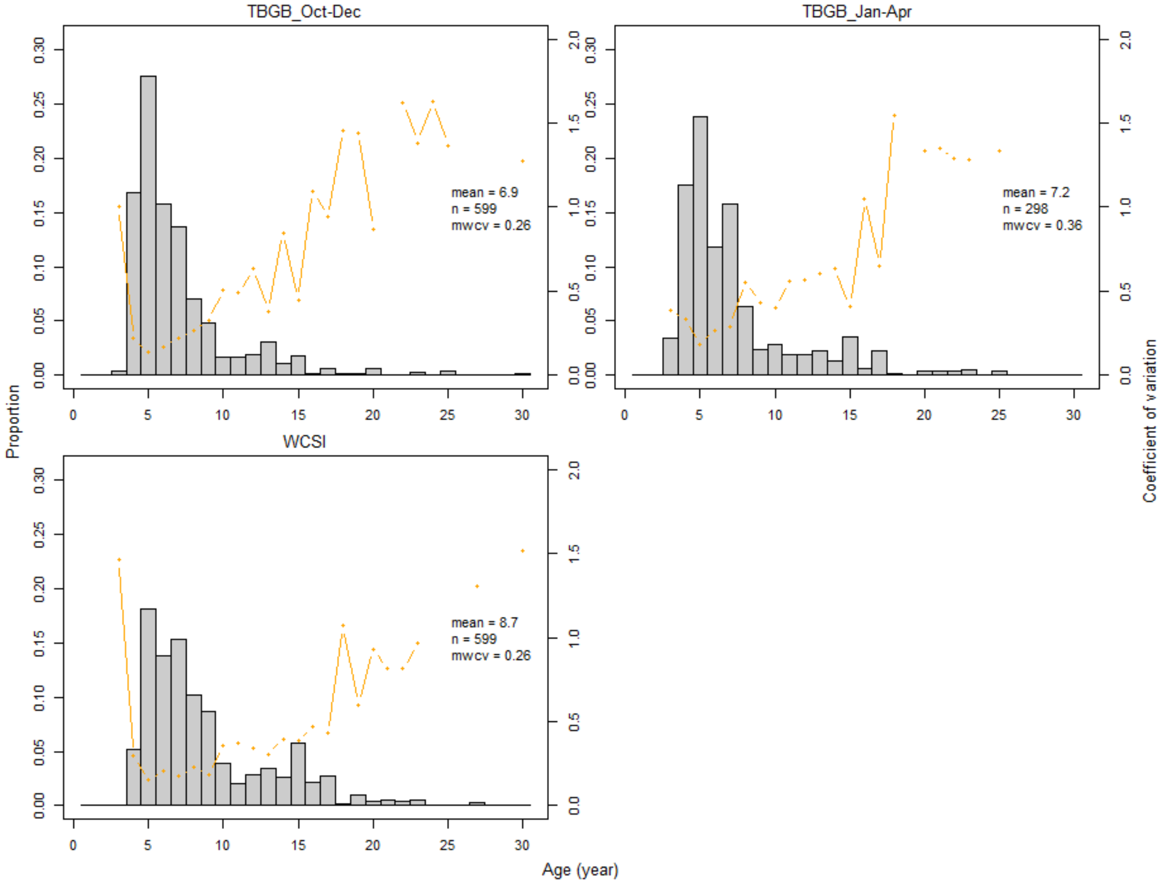

Figure 24: Proportion-at-age distributions (histogram) and CVs (line) determined from snapper landings sampled from the SNA 7 bottom trawl fishery in 2022–23 for Tasman Bay/Golden Bay in October–December (top left panel), Tasman Bay/Golden Bay in January–April (top right panel), and West Coast South Island in January–June (bottom left panel) (n, sample size; MWCV, mean weighted CV).

The SNA 7 bottom trawl catch in 2022–23 consisted mainly of young-aged fish. Those of 4 to 7 years of age overshadowed the rest of the age composition, collectively making up 74% and 69% of the TBGB Spring and Summer landed catches by number and those of 5 to 7 years of age made up 47% from the WCSI (Figure 24). The 2018 year-class (5-year-olds) was singularly the most dominant, accounting for approximately one-in-four snapper in TBGB landings, close to one-in-five snapper for the WCSI landings and is expected to be fully recruited to the fishery comprising individuals between 31 and 41 cm in length (Appendices 2 and 3). The most noticeable strong year-class that remained conspicuous in the 2022–23 distributions was 2008 (15-year-old) although it was less than expected in TBGB for Spring samples. Except for the strong 2019 to 2016 years classes (4- and 7-year-olds), most other year-classes were based on relatively low numbers of fish in comparison. The oldest fish sampled from the TBGB fishery in 2022–23 was 44 years old, with eleven fish over 20 years of age in the subsample of 897 fish that were aged. From the WCSI, the oldest fish was 52 years old, with thirteen fish over 20 years in a subsample total of 599 fish aged (Appendices 2 and 3). The mean ages of snapper in the TBGB during Spring and Summer were 6.9 and 7.2 years, respectively, and the MWCVs were 0.26 and 0.36. For the WCSI fishery, mean age was slightly higher at 8.7, due to fewer small/young snapper being available, and the MWCV was 0.31. Overall, the precision was indicative of relatively moderate between-landing variability. The age distribution of snapper by target species can be found in Appendix 4.

3.7 SNA 7 bottom trawl catch-at-age estimates in 2023–24

Catch-at-age compositions for TBGB, with bootstrapped variance estimates, were derived for both Spring and Summer 2023–24, and for the WCSI between October and June (Figure 25).

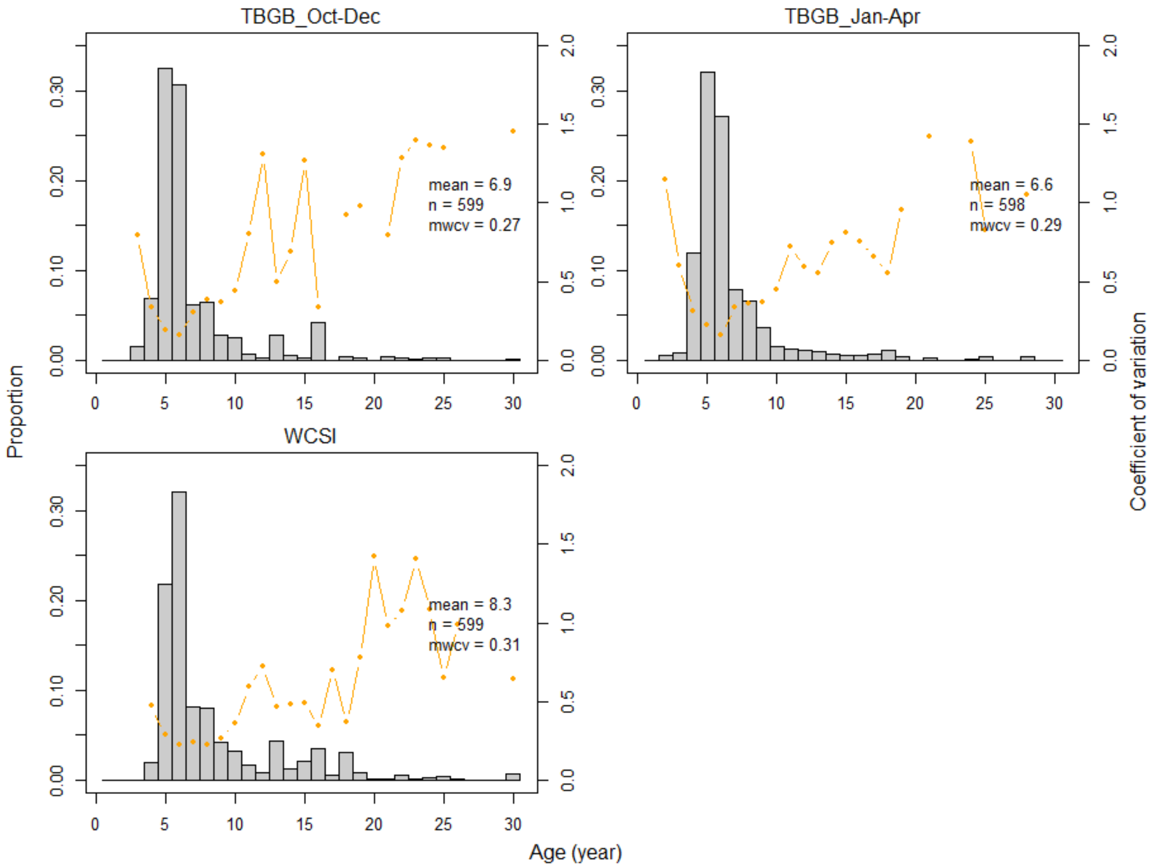

Figure 25: Proportion-at-age distributions (histogram) and CVs (line) determined from snapper landings sampled from the SNA 7 bottom trawl fishery in 2023–24 for Tasman Bay/Golden Bay in October–December (top left panel), Tasman Bay/Golden Bay in January–April (top right panel), and West Coast South Island in January–June (bottom left panel) (n, sample size; MWCV, mean weighted CV).

The SNA 7 bottom trawl catch in 2023–24 was dominated by the 2019 and 2018 year-classes (5- and 6-year-olds), these collectively making up, by number, 63% and 59% of the TBGB Spring and Summer landed catches and 54% from the WCSI landed catches (Appendices 2 and 3). In comparison, most other year-classes were largely based on relatively low numbers, those of moderate abundance present in the TBGB Spring distribution were the 2011 and 2008 year-classes (13- and 16-year-olds) and for the WCSI the 2011, 2008 and 2006 year-classes (13-, 16- and 18-year-olds). The oldest fish sampled from the TBGB fishery in 2022–23 was 38 years old, with only fifteen fish over 20 years of age in the subsample of 1162 fish that were aged. From the WCSI the oldest fish was 50 years old, with twenty fish over 20 years in a subsample total of 599 fish aged (Appendices 2 and 3). The mean ages of snapper in the TBGB during Spring and Summer were similar at 6.9 and 6.6 years, respectively, while the MWCVs were 0.27 and 0.29. For the WCSI fishery mean age was slightly higher at 8.3 and the MWCV was 0.31. Overall, the precision was indicative of relatively moderate between-landing variability. The age distribution of snapper by target species can be found in Appendix 4.

3.8 Time series of SNA 7 proportion-at-age distributions

Inspection of the TBGB time series of proportion-at-age distributions demonstrated a noticeable increase of young snapper dominating in 2022–23 and 2023–24 (Figure 26). Collectively, the 2019 and 2018 year-classes, 4 and 5 year-olds in 2022–23 alone made up 43% by number, and 5 and 6 year-olds in 2023–24 made up 61%, the most prominent within the landed catches. As a result, the proportion of moderate to old-age fish, although still apparent and broad, has reduced substantially in the TBGB commercial catch (Figure 26). Nevertheless, with the recent recruitment of these two age classes, assumed to be of above average strength in 2022–23 and 2023–24 age distributions, the SNA 7 bottom trawl fishery is likely to contain more year-classes than has been seen in two decades suggesting a continual rebuild of the fishery. This was reflected by the slightly reduced mean age estimates (in 2022–23 and 2023–24) of 7.0 and 6.7 years, respectively.

An important additional consideration revealed by the time series related to the pattern of relative year-class strengths for some of the older year-classes, specifically the historically dominant 2008 and 2011 year-classes. In 2022–23 the expected pattern of strong 2008 and 2011 year-classes interspersed by two weak year-classes was not observed. While patterns such as these may be expected to break down as year-classes become older and less numerically dominant, this pattern could also be due to the difficulty in achieving sampling targets in 2022–23, and the associated issues with the representativeness of the samples that were collected. More detail is provided in the Discussion below.

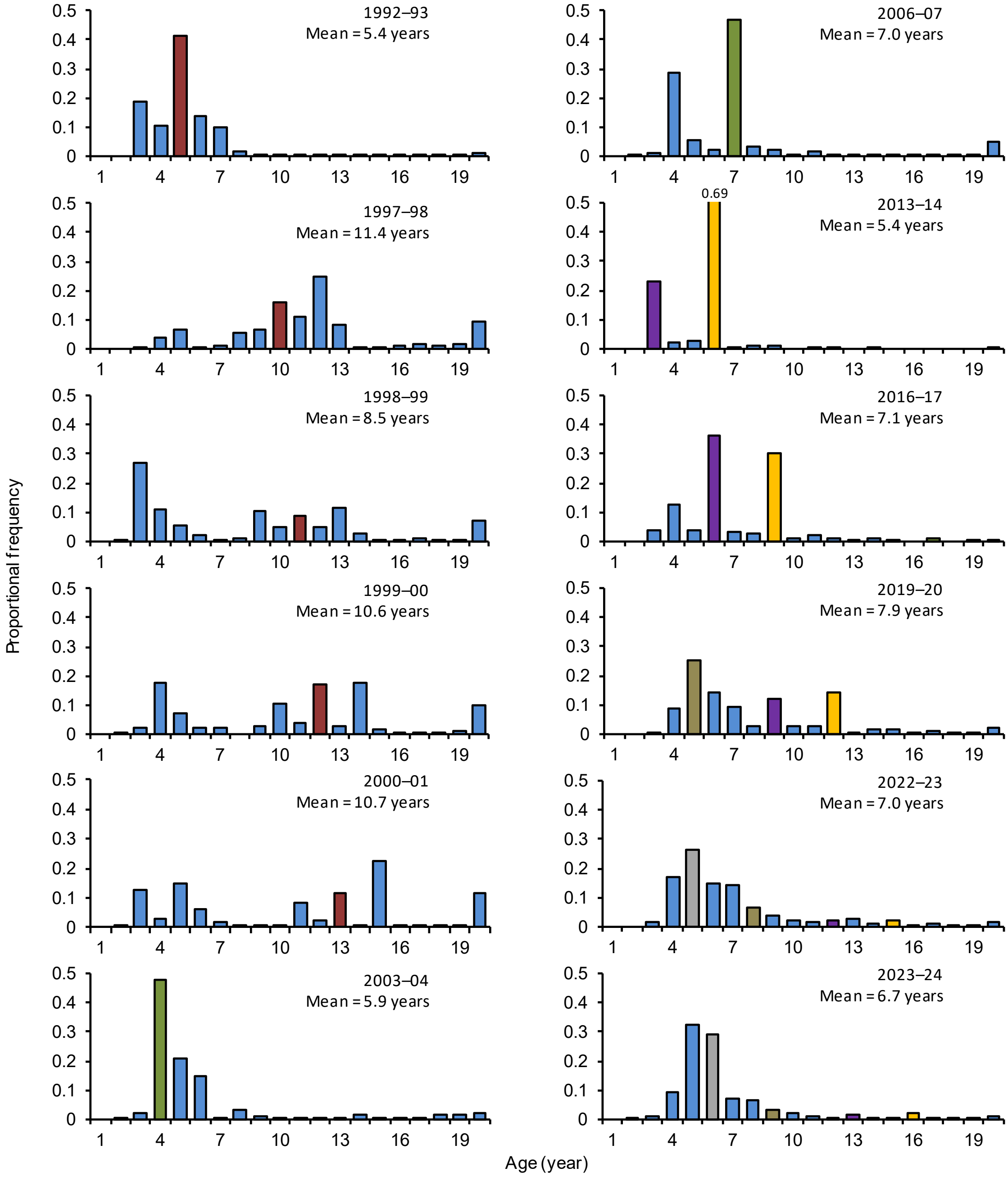

Figure 26: Intermittent time series of SNA 7 proportion-at-age distributions, 1992–93 (1993) to 2023–24 (2024). The 1988 year-class is coloured maroon, 2000 year-class green, 2008 year-class yellow, 2011 year-class purple, 2015 year-class brown, and the 2018 year-class grey. Age distributions for all years contain an over 19 group. Age distributions from 2013–14 (2014) comprise sample data from only Statistical Areas 037 and 038, whereas previous age distributions may have sampled vessels that fished across all statistical areas of SNA 7. For 2022–23 (2023) and 2023–24 (2024) October to December and January to April temporal strata were combined to be consistent with the rest of the time series (and the West Coast South Island stratum was excluded).

4. DISCUSSION

The SNA 7 bottom trawl fishery predominantly targeting GUR in Statistical Areas 037 and 038 TBGB and Statistical Areas 033 to 036 (WCSI) was sampled for length and age (otoliths) during the first halves of the 2022–23 and 2023–24 fishing years. Respectively, 26 and 31 landings were sampled, with 15 and 28 qualifying, over the two years from the core TBGB fishery, with 900 and 1680 pairs of otoliths collected from those landings. All of the sampled landings from the WCSI in both 2022–23 and 2023–24 were accepted (11 and 15 respectively), with 599 otoliths aged from each year. Reader comparison tests for otolith samples from both 2022–23 and 2023–24 demonstrated a high level of agreement, implying precise ageing.

Overall, the SNA 7 bottom trawl catch was dominated by the 2019 and 2018 year-classes (5- and 6-year-olds in 2023–24), which contributed more than 50% of the catch for both TBGB and the WCSI. Other year-classes contributed much lower numbers to the catch, but the once dominant 2011 and 2008 year-classes (13- and 16-year-olds in 2023–24) were still present in the fishery (as well as what would likely have been a strong 2006 year-class of 18-year-olds on the WCSI).

This report describes the first research sampling of the WCSI snapper trawl fishery. MWCV's of 26% and 31% in 2022–23 and 2023–24 suggest that 15 samples and 600 otoliths were insufficient to achieve a target of 20% MWCV. Future sampling of the WCSI snapper trawl fishery should provide greater understanding of snapper movement/separation between the WCSI and TBGB.

Age sampling of 1200 snapper otoliths from 30 TBGB trawl landings achieved adequate MWCVs of 22% and 17% (for the Spring and Summer seasonal strata combined for 2022–23 and 2023–24). However, it is important to note that in 2022–23 the spatio-temporal patterns in the TBGB trawl fishery were not adequately represented by the sampling particularly. These representativity issues in 2022–23 potentially influenced the pattern of relative abundance for the previously strong 2011 and 2008 year-classes (12 and 15 year-olds). In 2023–24 sampling was much more representative of the whole fishery (enabled by NIWA having access to near live electronic reporting to coordinate sampling efforts), and strong 2011 and 2008 year-classes were again observed. This outcome suggests that specifically targeting sampling towards shallow water in Statistical Area 038 where SNA and flatfish (SFL) are targeted early in the season might be crucial to picking up the year-class strength signals that describe the SNA 7 fishery. A potential explanation for why landings from certain spatial and temporal components of the fishery may be so disproportionately important to capturing year-class signals could be the potential for some landings to contain schools of snapper grouped by year-class (Parker et al. 2015).

Although previous sampling has shown that the strong 2011 and 2008 year-classes accounted for much of the recent rebuild of the fishery (Parker et al. 2015, Parsons et al. 2018, 2021), by 2022–23 and 2023–24 they had diminished to around 2% of the catch. Nevertheless, individual mean length and weight for both year-classes occupying TBGB in 2023–24, were approximately 56 and 58 cm and 3.4 and 3.8 kg respectively due to the fast growth rates in SNA 7. As these strong 2011 and 2008 year-classes have declined in importance, the overall age composition has broadened as evidenced by the proportions of young to moderate age classes now observed in the catch-at-age time series (Langley 2015, 2018, 2021, 2024, MacGibbon 2019).

It is important to consider how SNA 7 recruitment might alter in response to changing environmental conditions going forward. Recent RV *Kaharoa* trawl surveys of the TBGB in 2019 and 2021 were dominated by young recruiting snapper, the 2018 year-class as 1+ age group (KAH1902) and 2019 year-class as 2+ age group (KAH2103) (Walsh et al. 2019, MacGibbon et al. 2022), which were spawned during sustained periods of warmer sea temperatures (Langley 2024). By 2022–23 to 2023–24, both the 2018 and 2019 year-classes were 4 years or older, fully recruited and collectively accounted for approximately half (43% and 61% respectively) of the SNA 7 commercial catch. Furthermore, catch sampling of the SNA 8 fishery in 2022–23 at the same time as SNA 7 showed apparent spatial homogeneity across several moderate age classes, particularly in nearby SNA 8 south, indicating a degree of mixing of the snapper populations. The 2018 year-class (5 year-old) was the most notable, accounting for a high proportion (40%) of the commercial catch in SNA 8 as well (Walsh et al. 2024). Whether the SNA 7 fishery will continue to receive strong year-classes likely associated with the increasingly warmer waters expected under climate change will only be determined by continued frequent monitoring of the SNA 7 fishery age structure.

5. FULFILMENT OF BROADER OUTCOMES

Catch sampling projects help to fulfil the objectives associated with Broader outcomes in several ways. This includes: (1) Ongoing relationship development with the fishing industry through the coordination of sampling events with factory managers and vessel skippers; (2) utilisation of fishing industry staff to assist with the scientific sampling process which leads to upskilling and exposure to this process (e.g., skipper bin tagging at sea and bin selection in fish factories); (3) in remote areas we often utilise casual or contract staff to conduct sampling, thus increasing the exposure of the scientific process to the general public; (4) we reduce wastage by ensuring that fish which are cut for sampling go back to the production line for filleting; (5) catch sampling projects often support student projects by providing an opportunity to obtain samples; (6) we try to communicate our results as broadly as possible beyond scientific reports. For example, the catch sampling website and video that we prepared https://niwa.co.nz/news/catch-sampling.

6. ACKNOWLEDGEMENTS

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APPENDIX 1

Sampled landings that were used for SNA 7 age composition under project SNA20202202. For Target and Statistical area columns (for Tasman Bay/Golden Bay) we sometimes accepted landings that included some mixed target or mixed area fishing if the snapper catch estimated with the out of area or out of target component was small (see comments column). For Tasman Bay/Golden Bay sampling in January–April in 2022–23 we ignored target altogether. Where there was more than one species targeted during a trip, this landing was given the target label ‘mixed’ for Appendix 4. Also for Appendix 4, in some cases targets were relabelled ‘unknown’ where additional information was provided by skippers.

Sample number	Date sampled	Area	Year	Season	Landing weight (kg)	Sample weight (kg)	Target	Statistical area	Comment
20221303	18/10/2022	TBGB	2022–23	October–December	3 662	92	GUR	037, 038	
20221306	11/11/2022	TBGB	2022–23	October–December	539	139	Unknown	038	Mixed area landing but SNA 7 component tagged. Target listed as BAR, but confirmation from skipper that this was not reflective of actual fishing effort for this trip.
20221307	14/11/2022	TBGB	2022–23	October–December	2 205	75	Unknown	036, 037, 038, 040	Mixed area landing but majority from correct statistical areas. Targets listed as BAR and GUR, but confirmation from skipper that this was not reflective of actual fishing effort for this trip.
20221308	21/11/2022	TBGB	2022–23	October–December	2 706	93	Unknown	036, 037, 038, 039, 040	Mixed area landing but majority from correct statistical areas. Target listed as BAR, but confirmation from skipper that this was not reflective of actual fishing effort for this trip.
20221309	23/11/2022	TBGB	2022–23	October–December	1 325	105	GUR	017, 037, 038	Mixed area landing but majority from correct statistical areas.
20221311	27/11/2022	TBGB	2022–23	October–December	4 108	81	GUR, TAR (mixed)	037, 038	Majority GUR target.
20221310	28/11/2022	TBGB	2022–23	October–December	638	79	GUR, SFL, MOK (mixed)	017, 038	Mixed area landing but majority from correct statistical areas. Targets listed as GUR, SFL, and MOK, but majority was GUR and SFL.
20221312	29/11/2022	TBGB	2022–23	October–December	820	129	GUR	017, 038	
20221313	30/11/2022	TBGB	2022–23	October–December	1 238	88	Unknown	017, 018, 037, 038, 039	Mixed area landing but majority from correct statistical areas. Target listed as BAR, but

Sample number	Date sampled	Area	Year	Season	Landing weight (kg)	Sample weight (kg)	Target	Statistical area	Comment
									confirmation from skipper that this was not reflective of actual fishing effort for this trip.
20221314	30/11/2022	TBGB	2022–23	October–December	854	89	GUR, TAR (mixed)	017, 018, 036, 037, 038	Mixed area landing but majority from correct statistical areas. Targets listed as GUR and TAR, but majority was GUR.
20231303	26/01/2023	TBGB	2022–23	January–April	500	94	SNA	038	
20231305	6/03/2023	TBGB	2022–23	January–April	1 845	87	GUR, TAR (mixed)	036, 037, 038, 040	Mixed area landing but majority from correct statistical areas.
20231306	17/03/2023	TBGB	2022–23	January–April	1 962	108	SCH, TAR (mixed)	037	
20231308	4/04/2023	TBGB	2022–23	January–April	2 303	79	GUR, SCH (mixed)	038, 039	Mixed area landing but majority from correct statistical areas.
20231309	5/04/2023	TBGB	2022–23	January–April	1 236	87	GUR	037, 038	
20221351	4/11/2022	WCSI	2022–23	October–June	196	153	BAR	035, 036, 037	
20231351	23/01/2023	WCSI	2022–23	October–June	211	96	TAR, GUR	033, 034	
20231352	15/02/2023	WCSI	2022–23	October–June	408	133	BAR, STA, LIN, TAR	033, 034	
20231353	20/02/2023	WCSI	2022–23	October–June	2 493	136	GUR	034, 035	
20231354	23/02/2023	WCSI	2022–23	October–June	1 274	106	GUR, TAR	034, 035	
20231355	7/03/2023	WCSI	2022–23	October–June	392	132	TAR, WAR, GUR	033, 034	
20231356	10/03/2023	WCSI	2022–23	October–June	2 720	95	GUR	034, 035	
20231357	20/03/2023	WCSI	2022–23	October–June	439	109	GUR, BAR	033, 034	

Sample number	Date sampled	Area	Year	Season	Landing weight (kg)	Sample weight (kg)	Target	Statistical area	Comment
20231358	7/06/2023	WCSI	2022–23	October–June	1 584	107	GUR, STA, LDO, TAR	033, 034, 035	
20231359	13/06/2023	WCSI	2022–23	October–June	1 573	126	STA, GUR, WAR, SPO, TAR	033, 034, 036	
20231360	20/06/2023	WCSI	2022–23	October–June	581	111	WAR, TAR, SCH, GUR	034, 035, 036	
20231312	9/10/2023	TBGB	2023–24	October–December	938	112	GUR	038	
20231313	9/10/2023	TBGB	2023–24	October–December	973	99	GUR	038	
20231314	12/10/2023	TBGB	2023–24	October–December	973	99	GUR	038	
20231315	19/10/2023	TBGB	2023–24	October–December	798	69	GUR	038	
20231316	24/10/2023	TBGB	2023–24	October–December	658	114	SNA	038	
20231317	30/10/2023	TBGB	2023–24	October–December	1 302	176	SNA	038	
20231318	6/11/2023	TBGB	2023–24	October–December	419	138	GUR	038	
20231319	9/11/2023	TBGB	2023–24	October–December	574	116	GUR	038	
20231320	11/11/2023	TBGB	2023–24	October–December	263	103	GUR	038	
20231321	16/11/2023	TBGB	2023–24	October–December	1 717	67	GUR	038	
20231322	28/11/2023	TBGB	2023–24	October–December	478	88	GUR	037, 038	

Sample number	Date sampled	Area	Year	Season	Landing weight (kg)	Sample weight (kg)	Target	Statistical area	Comment
20231323	6/12/2023	TBGB	2023–24	October–December	1 738	74	GUR, SCH	037, 038	Majority GUR target.
20231324	7/12/2023	TBGB	2023–24	October–December	11 949	103	SNA	038	
20231325	7/12/2023	TBGB	2023–24	October–December	1 381	78	SFL	038	
20231326	13/12/2023	TBGB	2023–24	October–December	1 910	79	GUR	037, 038	
20241312	17/01/2024	TBGB	2023–24	January–April	566	87	GUR	038	
20241313	23/01/2024	TBGB	2023–24	January–April	940	77	GUR	038	
20241314	1/02/2024	TBGB	2023–24	January–April	1 029	62	GUR	038	
20241316	9/02/2024	TBGB	2023–24	January–April	642	84	SNA	038	
20241317	14/02/2024	TBGB	2023–24	January–April	1 028	68	SNA	038	
20241319	26/02/2024	TBGB	2023–24	January–April	873	83	GUR	038	
20241320	26/02/2024	TBGB	2023–24	January–April	587	74	GUR, SNA (mixed)	038	
20241321	1/03/2024	TBGB	2023–24	January–April	782	3	GUR	038	
20241322	4/03/2024	TBGB	2023–24	January–April	1 867	92	GUR	038	
20241323	20/03/2024	TBGB	2023–24	January–April	1 661	102	GUR	038	
20241325	3/04/2024	TBGB	2023–24	January–April	1 047	121	GUR	038	
20241327	22/04/2024	TBGB	2023–24	January–April	1 890	80	GUR	038	
20241315	2/02/2924	TBGB	2023–24	January–April	765	82	GUR	038	
20231361	24/10/2023	WCSI	2023–24	October–June	1 581	122	GUR	035, 036	
20231362	1/12/2023	WCSI	2023–24	October–June	270	133	TAR	035, 036	
20231363	12/12/2023	WCSI	2023–24	October–June	345	85	TAR, GUR	033, 034, 035	
20241361	10/01/2024	WCSI	2023–24	October–June	378	134	TAR	034, 035	

Sample number	Date sampled	Area	Year	Season	Landing weight (kg)	Sample weight (kg)	Target	Statistical area	Comment
20241362	5/03/2024	WCSI	2023–24	October–June	701	113	ALB, TAR, GUR	034, 035	
20241363	18/03/2024	WCSI	2023–24	October–June	1 173	138	TAR	034, 035	
20241364	25/03/2024	WCSI	2023–24	October–June	1 396	92	GUR	034, 035	
20241365	11/04/2024	WCSI	2023–24	October–June	666	111	GUR, TAR	033, 034, 035	
20241366	22/04/2024	WCSI	2023–24	October–June	561	112	TAR	034, 035	
20241367	29/04/2024	WCSI	2023–24	October–June	582	87	GUR, TAR	034, 035	
20241368	14/05/2024	WCSI	2023–24	October–June	4 428	91	GUR, SCH, JDO, TAR	034, 035	
20241369	20/05/2024	WCSI	2023–24	October–June	1 722	101	GUR, TAR	034, 035	
20241370	24/05/2024	WCSI	2023–24	October–June	1 890	117	GUR, TAR, ESO	034, 035	
20241371	19/06/2024	WCSI	2023–24	October–June	991	96	BAR	034, 035	
20241372	24/06/2024	WCSI	2023–24	October–June	1 890	136	TAR, GUR	034, 035	

APPENDIX 2

Estimated proportion-at-age and CVs for snapper sampled from the SNA 7 bottom trawl fishery. *P.j.* = proportion of fish in age class; CV, coefficient of variation; *n*, otolith sample size.

Tasman Bay/Golden Bay October–December 2022–23

Age (years)	October–December		
	P.j.	CV	*n*
1	0.0000	0.0000	–
2	0.0000	0.0000	–
3	0.0042	0.9828	2
4	0.1687	0.3291	69
5	0.2752	0.2675	145
6	0.1579	0.2084	81
7	0.1370	0.2315	96
8	0.0705	0.2994	75
9	0.0483	0.3212	27
10	0.0170	0.4664	11
11	0.0171	0.4457	9
12	0.0190	0.5949	13
13	0.0302	0.4693	16
14	0.0112	0.8324	6
15	0.0176	0.3735	24
16	0.0017	0.9922	4
17	0.0062	0.8933	6
18	0.0013	1.2222	2
19	0.0013	1.2969	2
20	0.0063	0.7565	4
21	0.0000	0.0000	–
22	0.0002	1.3919	1
23	0.0023	1.2513	1
24	0.0002	1.2482	1
25	0.0043	1.2831	1
26	0.0000	0.0000	–
27	0.0000	0.0000	–
28	0.0000	0.0000	–
29	0.0000	0.0000	–
>29	0.0021	1.0245	3

Tasman Bay/Golden Bay January–April 2022–23

Age (years)	January–April		
	P.j.	CV	*n*
1	0.0000	0.0000	–
2	0.0000	0.0000	–
3	0.0342	0.4621	9
4	0.1755	0.4542	54
5	0.2383	0.3185	72
6	0.1179	0.3170	37
7	0.1582	0.3820	43
8	0.0635	0.6407	19
9	0.0233	0.4432	7
10	0.0285	0.4641	10
11	0.0191	0.6239	6
12	0.0191	0.6280	6
13	0.0220	0.5832	6
14	0.0131	0.6896	3
15	0.0355	0.3944	13
16	0.0061	1.2275	2
17	0.0228	0.8264	5
18	0.0010	1.2185	1
19	0.0000	0.0000	–
20	0.0043	1.5771	1
21	0.0043	1.3215	1
22	0.0038	1.3299	1
23	0.0051	1.3710	1
24	0.0000	0.0000	–
25	0.0043	1.4597	1
26	0.0000	0.0000	–
27	0.0000	0.0000	–
28	0.0000	0.0000	–
29	0.0000	0.0000	–
>29	0.0000	0.0000	–

West Coast South Island October–June 2022–23

Age (years)	October–June		
	P.j.	CV	*n*
1	0.0000	0.0000	–
2	0.0000	0.0000	–
3	0.0007	1.5327	1
4	0.0522	0.3091	32
5	0.1818	0.2668	96
6	0.1378	0.2986	81
7	0.1535	0.2839	87
8	0.1016	0.3188	57
9	0.0870	0.2833	57
10	0.0387	0.4875	24
11	0.0201	0.4144	15
12	0.0284	0.3758	18
13	0.0339	0.3056	27
14	0.0258	0.4305	19
15	0.0572	0.4733	33
16	0.0217	0.4460	11
17	0.0270	0.5170	15
18	0.0012	0.9433	2
19	0.0093	0.5468	9
20	0.0045	0.9709	2
21	0.0050	0.9525	4
22	0.0042	0.7615	5
23	0.0048	0.9757	2
24	0.0000	0.0000	–
25	0.0000	0.0000	–
26	0.0000	0.0000	–
27	0.0029	1.2389	1
28	0.0000	0.0000	–
29	0.0000	0.0000	–
>29	0.0005	1.4542	1

Tasman Bay/Golden Bay October–December 2023–24

Age (years)	October–December		
	P.j.	CV	*n*
1	0.0000	0.0000	–
2	0.0000	0.0000	–
3	0.0145	0.7932	9
4	0.0684	0.3325	41
5	0.3254	0.1907	187
6	0.3070	0.1562	183
7	0.0622	0.3013	34
8	0.0644	0.3852	33
9	0.0276	0.3702	19
10	0.0249	0.4391	14
11	0.0070	0.8050	4
12	0.0022	1.3101	1
13	0.0271	0.4957	23
14	0.0057	0.6888	4
15	0.0022	1.2709	1
16	0.0414	0.3386	33
17	0.0000	0.0000	–
18	0.0043	0.9220	3
19	0.0026	0.9776	2
20	0.0000	0.0000	–
21	0.0039	0.7956	3
22	0.0022	1.2849	1
23	0.0011	1.3998	1
24	0.0022	1.3619	1
25	0.0022	1.3458	1
26	0.0000	0.0000	–
27	0.0000	0.0000	–
28	0.0000	0.0000	–
29	0.0000	0.0000	–
>29	0.0015	1.4517	1

Tasman Bay/Golden Bay January–April 2023–24

Age (years)	January–April		
	P.j.	CV	*n*
1	0.0000	0.0000	–
2	0.0050	1.1449	2
3	0.0079	0.6010	6
4	0.1189	0.3117	63
5	0.3204	0.2206	177
6	0.2707	0.1548	164
7	0.0790	0.3384	50
8	0.0651	0.3578	44
9	0.0361	0.3651	23
10	0.0153	0.4453	10
11	0.0126	0.7246	10
12	0.0105	0.5897	7
13	0.0093	0.5499	7
14	0.0066	0.7463	5
15	0.0048	0.8125	3
16	0.0054	0.7533	4
17	0.0071	0.6565	5
18	0.0106	0.5558	8
19	0.0042	0.9575	3
20	0.0000	0.0000	–
21	0.0021	1.4214	1
22	0.0000	0.0000	–
23	0.0000	0.0000	–
24	0.0016	1.3903	1
25	0.0038	0.8265	3
26	0.0000	0.0000	–
27	0.0000	0.0000	–
28	0.0031	1.0521	2
29	0.0000	0.0000	–
>29	0.0000	0.0000	–

West Coast South Island October–June 2023–24

Age (years)	October–June		
	P.j.	CV	*n*
1	0.0000	0.0000	–
2	0.0000	0.0000	–
3	0.0000	0.0000	–
4	0.0193	0.4710	10
5	0.2187	0.2875	109
6	0.3209	0.2280	183
7	0.0809	0.2370	51
8	0.0807	0.2281	53
9	0.0427	0.2661	30
10	0.0323	0.3602	20
11	0.0165	0.5914	12
12	0.0084	0.7237	6
13	0.0440	0.4692	21
14	0.0120	0.4843	10
15	0.0210	0.4937	12
16	0.0351	0.3410	27
17	0.0049	0.7010	5
18	0.0303	0.3656	24
19	0.0082	0.7773	5
20	0.0011	1.4217	1
21	0.0015	0.9784	2
22	0.0053	1.0809	2
23	0.0016	1.4058	1
24	0.0022	1.0873	2
25	0.0045	0.6508	5
26	0.0017	0.9881	2
27	0.0000	0.0000	–
28	0.0000	0.0000	–
29	0.0000	0.0000	–
>29	0.0062	0.6423	6

APPENDIX 3

Estimates of proportion of length-at-age for snapper sampled from the Tasman Bay/Golden Bay subarea of SNA 7, October–April 2022–23. (Note: Aged to 01/01/23).

Length																			Age (years)		No.
(cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	>19	aged
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
26	0	0	0.50	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
27	0	0	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
28	0	0	0.09	0.73	0.18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
29	0	0	0.15	0.80	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
30	0	0	0.13	0.75	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
31	0	0	0.06	0.50	0.44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
32	0	0	0.07	0.64	0.29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28
33	0	0	0.03	0.38	0.50	0.08	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	40
34	0	0	0	0.32	0.58	0.05	0.03	0.02	0	0	0	0	0	0	0	0	0	0	0	0	60
35	0	0	0	0.28	0.36	0.28	0.06	0.02	0	0	0	0	0	0	0	0	0	0	0	0	50
36	0	0	0	0.05	0.57	0.21	0.16	0.02	0	0	0	0	0	0	0	0	0	0	0	0	63
37	0	0	0	0.03	0.54	0.18	0.18	0.06	0	0	0	0	0	0	0	0	0	0	0	0	65
38	0	0	0	0	0.29	0.29	0.29	0.06	0.06	0	0	0	0	0	0	0	0	0	0	0	68
39	0	0	0	0	0.21	0.32	0.33	0.11	0.02	0	0	0	0.02	0	0	0	0	0	0	0	57
40	0	0	0	0	0.17	0.24	0.37	0.19	0.02	0.02	0	0	0	0	0	0	0	0	0	0	54
41	0	0	0	0	0.23	0.15	0.44	0.18	0	0	0	0	0	0	0	0	0	0	0	0	39
42	0	0	0	0	0.06	0.13	0.30	0.33	0.07	0.04	0.02	0.02	0.02	0	0.02	0	0	0	0	0	54
43	0	0	0	0	0	0.14	0.31	0.26	0.11	0.06	0.06	0.06	0	0	0	0	0	0	0	0	35
44	0	0	0	0	0	0.13	0.09	0.22	0.26	0.09	0.17	0.04	0	0	0	0	0	0	0	0	23
45	0	0	0	0	0	0	0.18	0.24	0.12	0.06	0.06	0.12	0.06	0.12	0	0	0.06	0	0	0	17
46	0	0	0	0	0	0	0	0.26	0.17	0.17	0.13	0	0.13	0	0	0.04	0.09	0	0	0	23
47	0	0	0	0	0	0.04	0.04	0.38	0.08	0.08	0.04	0	0.25	0	0.08	0	0	0	0	0	24
48	0	0	0	0	0	0	0.06	0.33	0.17	0.17	0	0.11	0.06	0.06	0	0	0	0	0.06	0	18
49	0	0	0	0	0	0	0.08	0	0	0.15	0.15	0	0.23	0.08	0.15	0.08	0	0	0	0.08	13
50	0	0	0	0	0	0	0	0.13	0.13	0.06	0	0.06	0.19	0.13	0.06	0	0.06	0.06	0	0.13	16
51	0	0	0	0	0	0	0	0.11	0.11	0.11	0.11	0.22	0	0.22	0	0	0.11	0	0	0	9
52	0	0	0	0	0	0	0	0	0	0	0	0.13	0.25	0	0.25	0	0.38	0	0	0	8
53	0	0	0	0	0	0	0	0	0	0	0	0.40	0	0	0.20	0.20	0	0	0	0.20	5
54	0	0	0	0	0	0	0	0	0	0	0	0.20	0	0	0.40	0	0.20	0	0	0.20	5
55	0	0	0	0	0	0	0	0	0	0	0	0	0.13	0	0.75	0	0	0	0	0.13	8
56	0	0	0	0	0	0	0	0	0	0	0	0.13	0	0	0.38	0.13	0.13	0.13	0	0.13	8
57	0	0	0	0	0	0	0	0	0	0	0	0.11	0	0	0.67	0	0	0	0	0.22	9
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0.20	0.60	0.20	0	0	0	0	5
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.60	0.20	0	0	0	0.20	5
60	0	0	0	0	0	0	0	0	0	0	0	0.50	0	0	0.50	0	0	0	0	0	2
61	0	0	0	0	0	0	0	0	0	0	0	0.14	0	0	0.43	0	0.14	0	0	0.29	7
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.50	0	0	0	0.50	0	2
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	1
68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total																					897

Estimates of proportion of length-at-age for snapper sampled from the West Coast South Island subarea of SNA 7, November–June 2022–23. (Note: Aged to 01/01/23).

Length																				Age (years)	No.
(cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	>19	aged
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0.25	0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
33	0	0	0	0.80	0.20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
34	0	0	0	0.25	0.44	0.19	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	16
35	0	0	0	0.33	0.44	0.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
36	0	0	0	0.28	0.61	0.11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
37	0	0	0	0.05	0.55	0.25	0.15	0	0	0	0	0	0	0	0	0	0	0	0	0	20
38	0	0	0	0.06	0.62	0.15	0.12	0.06	0	0	0	0	0	0	0	0	0	0	0	0	34
39	0	0	0	0.06	0.32	0.29	0.23	0.06	0.03	0	0	0	0	0	0	0	0	0	0	0	31
40	0	0	0	0.04	0.33	0.20	0.22	0.11	0.07	0.02	0	0	0	0	0	0	0	0	0	0	45
41	0	0	0	0.02	0.12	0.29	0.35	0.19	0.04	0	0	0	0	0	0	0	0	0	0	0	52
42	0	0	0	0	0.06	0.26	0.30	0.15	0.19	0	0	0.02	0	0	0.02	0	0	0	0	0	47
43	0	0	0	0	0.02	0.22	0.28	0.11	0.26	0.04	0	0.02	0	0.02	0.02	0	0	0	0	0	46
44	0	0	0	0	0.02	0.11	0.20	0.20	0.23	0.11	0.05	0.05	0	0	0.02	0	0	0	0	0	44
45	0	0	0	0	0	0	0.05	0.30	0.30	0.15	0	0.05	0.10	0	0	0.05	0	0	0	0	20
46	0	0	0	0	0.04	0.07	0.07	0.11	0.19	0.11	0.15	0	0.11	0.04	0.07	0.04	0	0	0	0	27
47	0	0	0	0	0	0	0	0.10	0.17	0.07	0.13	0.13	0.13	0.07	0.07	0.07	0	0	0.03	0.03	30
48	0	0	0	0	0	0	0.05	0.10	0.15	0.10	0	0.15	0.15	0.20	0.05	0	0.05	0	0	0	20
49	0	0	0	0	0	0	0.07	0.07	0	0	0.20	0.13	0.13	0.07	0.07	0.07	0.13	0	0.07	0	15
50	0	0	0	0	0	0	0.14	0.07	0	0.14	0	0.07	0.29	0.07	0	0.07	0.07	0.07	0	0	14
51	0	0	0	0	0	0	0	0.06	0.06	0.19	0.06	0.06	0.06	0.25	0.13	0	0.06	0	0.06	0	16
52	0	0	0	0	0	0	0	0	0	0	0	0.10	0.14	0.14	0.19	0.10	0.19	0	0.10	0.05	21
53	0	0	0	0	0	0	0	0	0	0.09	0.09	0	0.09	0	0.27	0.09	0.18	0	0	0.18	11
54	0	0	0	0	0	0	0	0	0	0	0	0	0.09	0.09	0.36	0	0	0.09	0.27	0.09	11
55	0	0	0	0	0	0	0	0	0	0	0	0	0.29	0	0.57	0.14	0	0	0	0	7
56	0	0	0	0	0	0	0	0	0	0	0	0	0.33	0	0	0	0.33	0	0.33	0	3
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.67	0.33	0	0	0	0	3
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0.13	0.38	0	0.25	0	0	0.25	8
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.33	0	0	0.67	3
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.50	0	0	0	0	0.50	2
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	0	0	0	1
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	3
68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total																					599

Estimates of proportion of length-at-age for snapper sampled from the Tasman Bay/Golden Bay subarea of SNA 7, October–April 2023–24. (Note: Aged to 01/01/24).

Length	Age (years)																				No.
(cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	>19	aged
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0.50	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
26	0	0.25	0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
27	0	0	0.50	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
28	0	0	0	0.93	0.07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
29	0	0	0.19	0.57	0.24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21
30	0	0	0.07	0.55	0.38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29
31	0	0	0	0.24	0.74	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34
32	0	0	0	0.20	0.78	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49
33	0	0	0.01	0.17	0.72	0.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76
34	0	0	0	0.13	0.71	0.16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90
35	0	0	0	0.10	0.63	0.24	0.03	0.01	0	0	0	0	0	0	0	0	0	0	0	0	114
36	0	0	0	0.01	0.41	0.47	0.07	0.04	0	0	0	0	0	0	0	0	0	0	0	0	74
37	0	0	0	0.04	0.39	0.48	0.07	0.02	0	0	0	0	0	0	0	0	0	0	0	0	98
38	0	0	0	0	0.14	0.58	0.20	0.09	0	0	0	0	0	0	0	0	0	0	0	0	66
39	0	0	0	0	0.11	0.60	0.14	0.14	0	0	0.01	0	0	0	0	0	0	0	0	0	81
40	0	0	0	0	0.07	0.67	0.13	0.08	0.05	0	0	0	0	0	0	0	0	0	0	0	61
41	0	0	0	0	0.04	0.54	0.16	0.16	0.07	0.04	0	0	0	0	0	0	0	0	0	0	56
42	0	0	0	0	0.02	0.47	0.17	0.23	0.08	0.04	0	0	0	0	0	0	0	0	0	0	53
43	0	0	0	0	0	0.42	0.21	0.18	0.03	0.05	0.05	0.05	0	0	0	0	0	0	0	0	38
44	0	0	0	0	0	0.29	0.21	0.33	0	0.13	0	0	0.04	0	0	0	0	0	0	0	24
45	0	0	0	0	0	0.27	0.18	0.18	0.18	0.09	0	0.09	0	0	0	0	0	0	0	0	11
46	0	0	0	0	0	0.14	0.05	0.23	0.18	0.05	0.09	0.05	0.05	0.09	0.09	0	0	0	0	0	22
47	0	0	0	0	0	0.08	0.08	0.08	0.25	0.08	0.08	0.17	0.08	0	0	0	0.08	0	0	0	12
48	0	0	0	0	0	0.08	0	0.08	0.25	0.08	0.17	0.08	0	0.17	0	0	0	0.08	0	0	12
49	0	0	0	0	0	0.05	0.05	0.11	0.21	0.21	0.05	0	0.05	0.05	0	0.05	0	0.16	0	0	19
50	0	0	0	0	0	0	0	0.09	0.36	0.09	0	0	0	0.18	0.09	0	0.09	0.09	0	0	11
51	0	0	0	0	0	0	0.10	0	0.20	0	0.20	0.10	0	0	0.10	0.20	0	0.10	0	0	10
52	0	0	0	0	0	0	0	0.13	0.38	0.13	0.13	0	0	0	0	0.13	0	0	0	0.13	8
53	0	0	0	0	0	0	0	0	0.23	0.15	0	0	0.23	0.08	0	0.08	0.08	0.15	0	0	13
54	0	0	0	0	0	0	0	0	0	0.17	0	0	0	0	0	0.67	0	0	0	0.17	6
55	0	0	0	0	0	0	0	0	0.06	0.06	0.11	0	0.39	0	0	0.11	0	0.06	0.06	0.17	18
56	0	0	0	0	0	0	0	0	0	0.25	0	0	0.75	0	0	0	0	0	0	0	4
57	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0.13	0	0.50	0	0	0	0.13	8
58	0	0	0	0	0	0	0	0	0.17	0	0	0	0.50	0	0	0.17	0	0	0	0.17	6
59	0	0	0	0	0	0	0	0	0	0	0	0	0.38	0	0	0.23	0.15	0	0.15	0.08	13
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.57	0	0.14	0	0.29	7
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.78	0	0	0	0.22	9
62	0	0	0	0	0	0	0	0	0	0	0	0	0.33	0	0	0.33	0	0.17	0.17	0	6
63	0	0	0	0	0	0	0	0	0	0	0	0	0.17	0	0	0.50	0	0	0.17	0.17	6
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	0	0	1
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	0	0	1
66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total																					1197

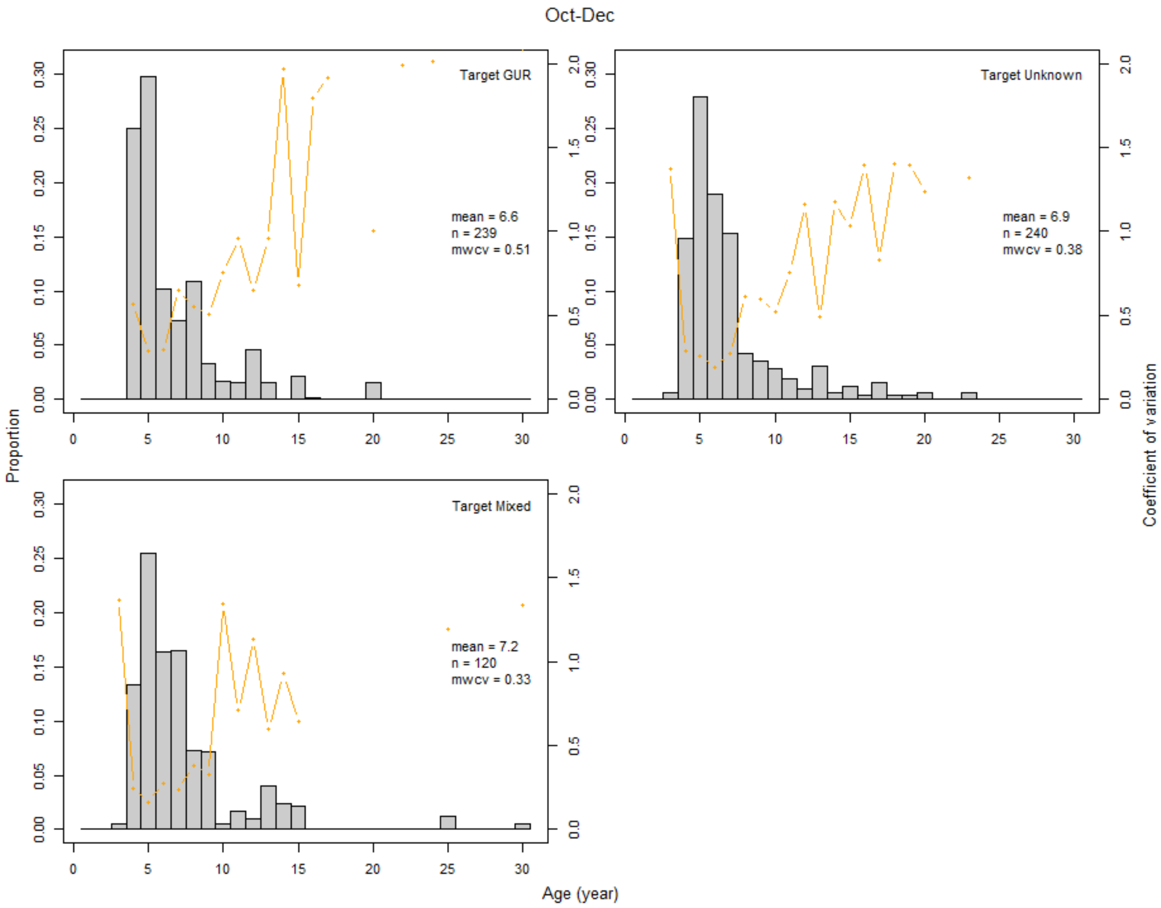
Estimates of proportion of length-at-age for snapper sampled from the West Coast South Island subarea of SNA 7, October–June 2023–24. (Note: Aged to 01/01/24).

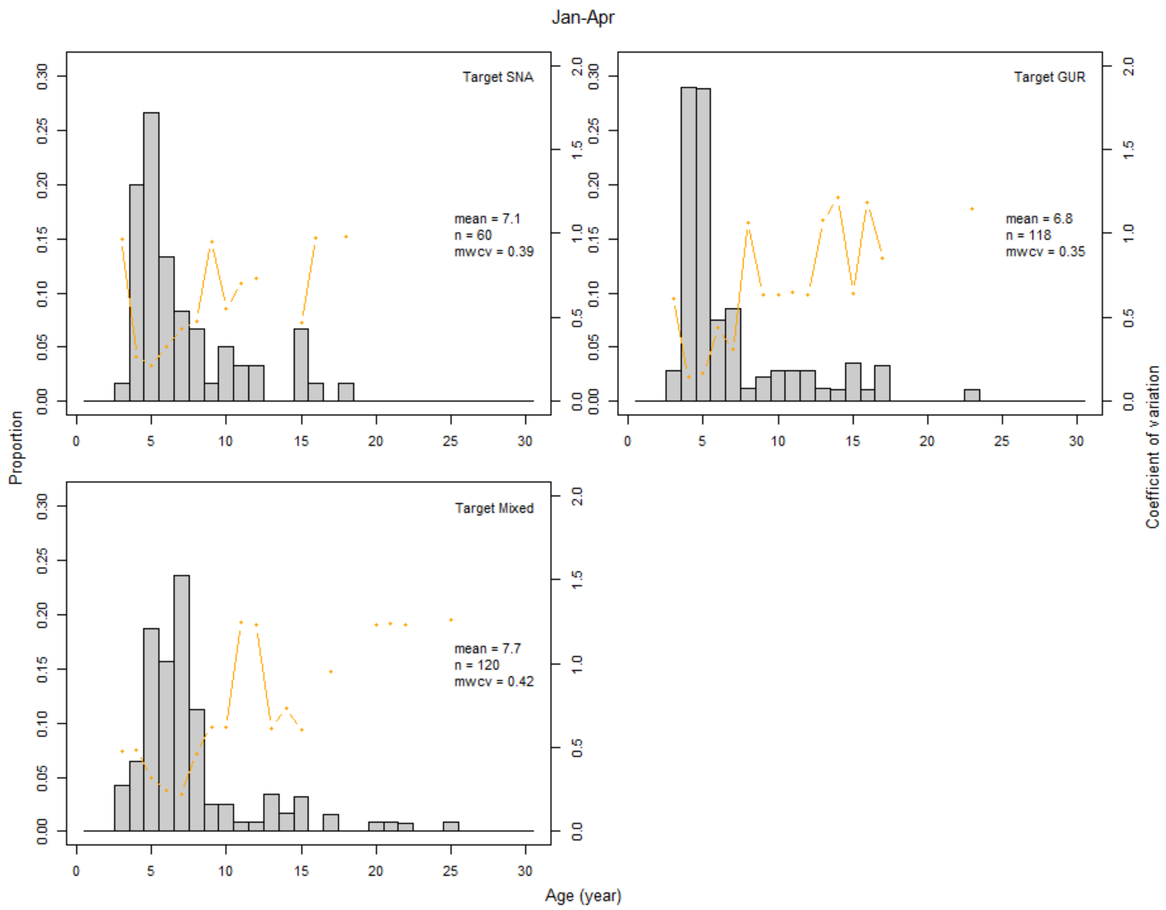
Length	Age (years)																				No.
(cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	>19	aged
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0.33	0.33	0.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
33	0	0	0	0.11	0.89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
34	0	0	0	0.05	0.86	0.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22
35	0	0	0	0.04	0.82	0.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28
36	0	0	0	0.07	0.62	0.24	0.07	0	0	0	0	0	0	0	0	0	0	0	0	0	29
37	0	0	0	0	0.43	0.50	0.08	0	0	0	0	0	0	0	0	0	0	0	0	0	40
38	0	0	0	0.03	0.22	0.62	0.05	0.07	0	0	0	0	0	0	0	0	0	0	0	0	58
39	0	0	0	0.04	0.13	0.70	0.06	0.07	0	0	0	0	0	0	0	0	0	0	0	0	54
40	0	0	0	0	0.05	0.53	0.23	0.14	0.05	0	0	0	0	0	0	0	0	0	0	0	43
41	0	0	0	0	0.02	0.55	0.16	0.20	0.02	0.05	0	0	0	0	0	0	0	0	0	0	44
42	0	0	0	0	0	0.40	0.18	0.23	0.10	0.05	0.03	0	0.03	0	0	0	0	0	0	0	40
43	0	0	0	0	0	0.19	0.26	0.33	0.11	0.07	0.04	0	0	0	0	0	0	0	0	0	27
44	0	0	0	0	0	0.22	0.17	0.17	0.33	0.06	0	0	0.06	0	0	0	0	0	0	0	18
45	0	0	0	0	0	0	0.19	0.06	0.19	0.25	0	0	0.13	0.13	0.06	0	0	0	0	0	16
46	0	0	0	0	0	0.10	0	0.15	0.25	0.20	0.10	0	0.10	0.05	0	0.05	0	0	0	0	20
47	0	0	0	0	0	0	0.06	0.18	0.12	0.06	0.18	0.12	0.18	0	0	0.12	0	0	0	0	17
48	0	0	0	0	0	0.07	0.14	0	0.07	0.07	0.14	0.07	0.14	0.07	0.07	0.07	0	0.07	0	0	14
49	0	0	0	0	0	0	0	0	0.20	0.20	0.10	0	0	0.20	0.10	0.10	0	0.10	0	0	10
50	0	0	0	0	0	0	0	0.11	0.11	0	0	0	0.11	0.11	0.22	0.22	0	0.11	0	0	9
51	0	0	0	0	0	0	0	0	0	0	0	0.08	0.17	0.08	0.17	0.17	0.17	0.08	0.08	0	12
52	0	0	0	0	0	0	0	0.06	0	0	0.12	0.12	0.12	0.06	0	0.18	0.06	0.12	0.18	0	17
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0.25	0	0.50	0	0	4
54	0	0	0	0	0	0	0	0	0	0.08	0	0	0	0	0.17	0.17	0	0.50	0.08	0	12
55	0	0	0	0	0	0	0	0	0	0	0	0	0.18	0.09	0.09	0.27	0	0.18	0	0.18	11
56	0	0	0	0	0	0	0	0	0	0	0	0	0.11	0	0	0.33	0.11	0.22	0	0.22	9
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.17	0	0.33	0	0.50	6
58	0	0	0	0	0	0	0	0	0	0	0	0	0.20	0	0	0	0	0.40	0	0.40	5
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.14	0.14	0.14	0.14	0	0.43	7
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	0	0	1
61	0	0	0	0	0	0	0	0	0	0	0	0	0.50	0	0	0	0	0	0	0.50	2
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.67	0	0.33	0	0	3
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.33	0	0	0	0.67	3
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	2
66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total																					599

APPENDIX 4

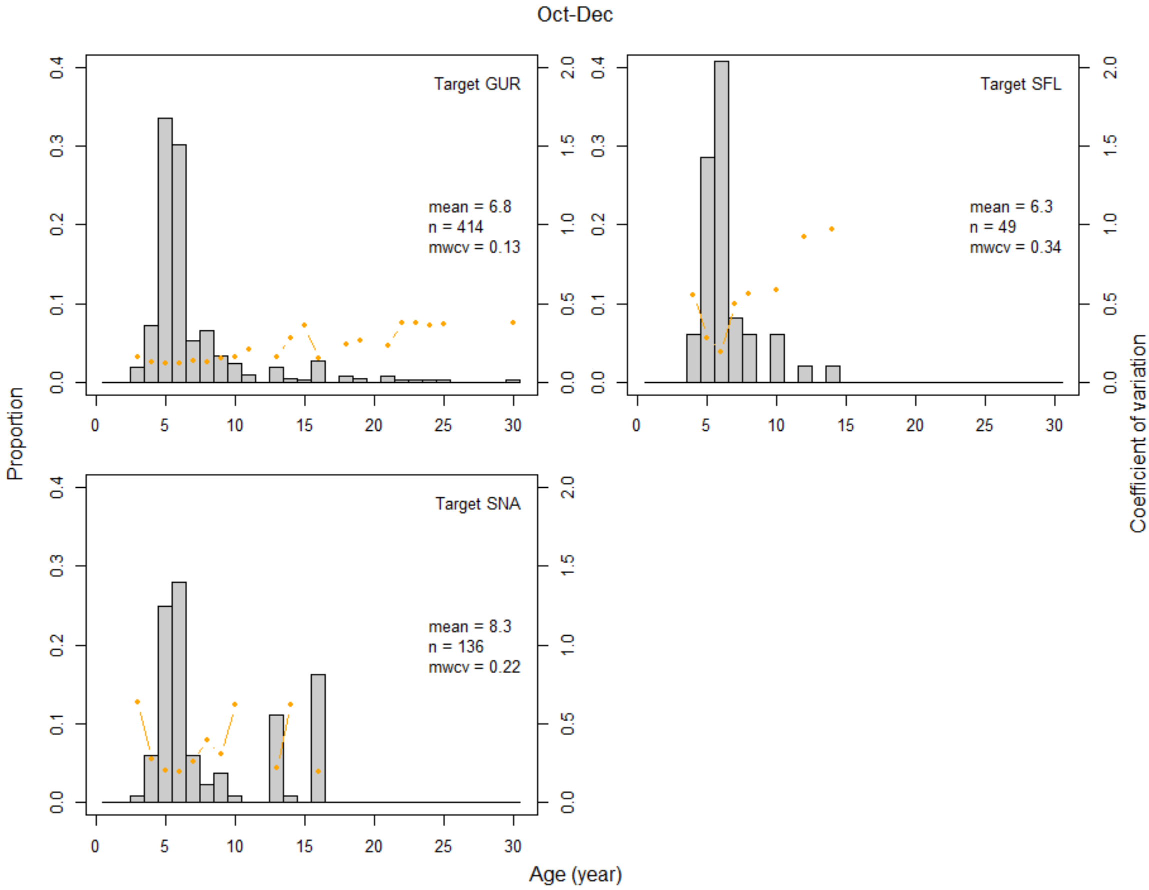
Proportion-at-age distributions (histograms) and CVs (lines) for Tasman Bay/Golden Bay sampling by season (October–December and January–April) separated by landings that targeted sand flounder (SFL), red gurnard (GUR), snapper (SNA), unknown targets (where information was provided by a skipper that disagreed with logbook records; see Appendix 1) and a mixture of species.

2022–23

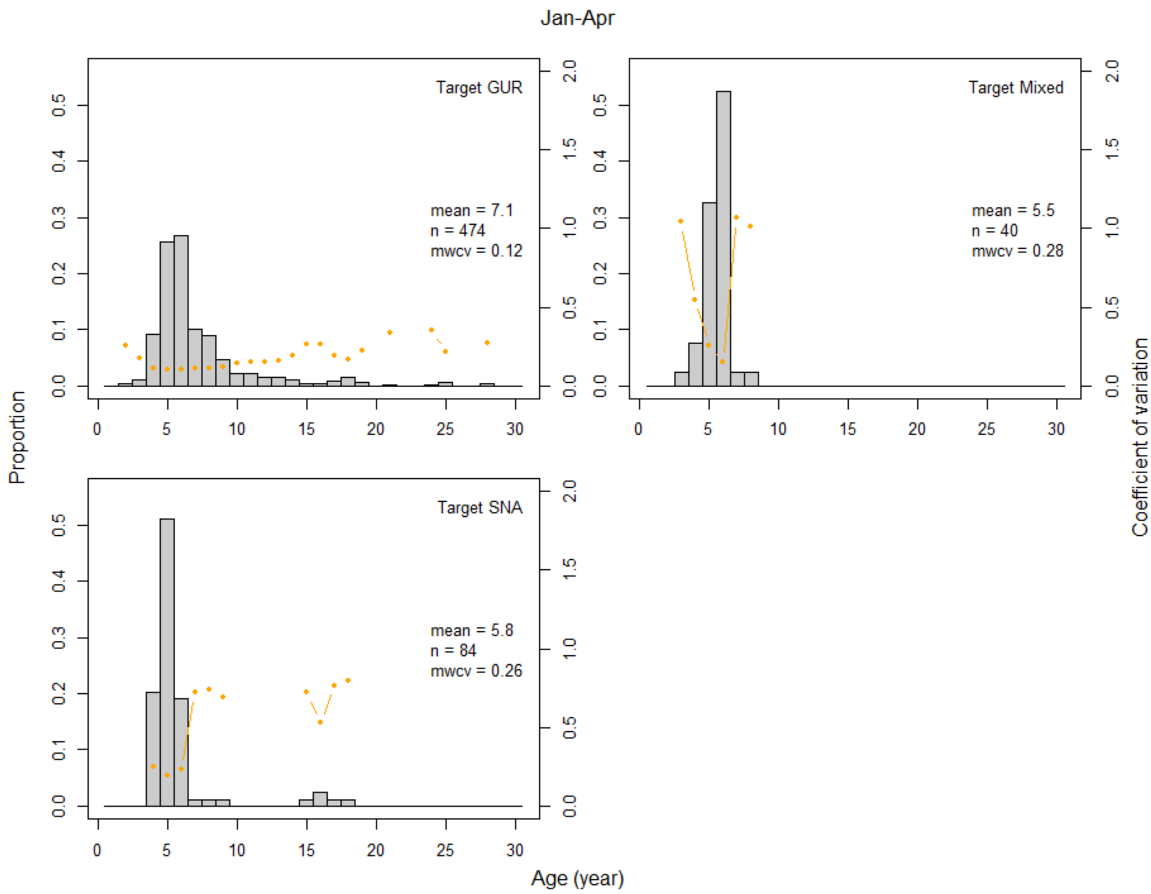



Jan-Apr
Target SNA
mean = 7.1
n = 60
mwcv = 0.39
Target GUR
mean = 6.8
n = 118
mwcv = 0.35
Target Mixed
mean = 7.7
n = 120
mwcv = 0.42
Proportion
Coefficient of variation
Age (year)

2023–24



Oct-Dec
Target GUR
mean = 6.8
n = 414
mwcv = 0.13
Target SFL
mean = 6.3
n = 49
mwcv = 0.34
Target SNA
mean = 8.3
n = 136
mwcv = 0.22
Proportion
Coefficient of variation
Age (year)


Jan-Apr
Target GUR
mean = 7.1
n = 474
mwcv = 0.12
Target Mixed
mean = 5.5
n = 40
mwcv = 0.28
Target SNA
mean = 5.8
n = 84
mwcv = 0.26
Proportion
Coefficient of variation
Age (year)