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Length and age composition of commercial trevally landings in TRE 7, 2022–23 and 2023–24

New Zealand Fisheries Assessment Report 2025/38

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PLAIN LANGUAGE SUMMARY

This project estimated the size and age of trevally caught in the commercial bottom trawl and modular harvest system bottom trawl fishery along the west coast of New Zealand (TRE 7 quota management area) during the 2022–23 and 2023–24 fishing years.

Samples were collected from four key areas: Ninety Mile Beach; Kaipara-Manukau; North Taranaki Bight; and South Taranaki Bight, to better understand the health of the fish population.

Over 5000 fish were measured, and more than 3200 were aged using their ear bones (otoliths), making this the most detailed study of the TRE 7 fishery to date.

The results showed clear differences between regions. Fish from Ninety Mile Beach were mostly small and young, while South Taranaki Bight had the largest and oldest fish, including some over 20 years old. Kaipara-Manukau and North Taranaki Bight had a mix of sizes and ages, with some fish also reaching over 20 years.

Overall, the average size and age of trevally slightly decreased during the 2022–23 and 2023–24 fishing years compared to previous sampling years due to more young fish being caught, but the presence of strong year classes and older fish is promising. These results are an important input for quantitative stock assessments for TRE 7.

EXECUTIVE SUMMARY

Armiger, H.[1]; Parsons, D.; Walsh, C.; Bian, R.; Buckthought, D.; Ó Maolagáin, C.; Evans, O; Madden, B.; Bodie, C.; Barry, F.; Taylor, R.; Stead. J.; Hamill, J.; Hart, A. (2025). Length and age composition of commercial trevally landings in TRE 7, 2022–23 and 2023–24.

New Zealand Fisheries Assessment Report 2025/38. **63 p.**

This report presents the results of a sampling programme to determine the length and age structure of commercial catch of trevally in TRE 7 (by land-based sampling), for use in stock assessment models.

A random age frequency sampling approach was employed during the 2022–23 and 2023–24 fishing years to estimate catch-at-age for trevally for the main fishing methods in the TRE 7 (west coast) Quota Management Area. Samples were collected from the TRE 7 bottom trawl and modular harvest system bottom trawl fishery (labelled 'precision bottom trawl') where it could be identified that catch had been taken from one of four spatial subarea strata: Ninety Mile Beach, Kaipara and Manukau coastline; North Taranaki Bight; and South Taranaki Bight.

Over the two-year period, 88 landings were sampled, with 39 bottom trawl landings sampled in 2022–23, and 49 (28 bottom trawl and 21 precision bottom trawl) in 2023–24. A total of 5280 fish were measured and the otoliths removed during the two years of sampling, with 3245 otolith samples aged (780 from Ninety Mile Beach, 1174 from Kaipara-Manukau; 512 from North Taranaki Bight; 779 from South Taranaki Bight) representing the most comprehensive catch sampling description of the TRE 7 fishery to date.

Across the 2022–23 and 2023–24 fishing years, the TRE 7 bottom trawl fishery exhibited consistent spatial variation in trevally length and age distributions. Ninety Mile Beach consistently showed the highest proportions of small and young fish, with mean fork lengths of 35.6 cm (2022–23) and 35.4 cm (2023–24), and mean ages of 6.4 and 6.1 years, respectively. The dominant year class shifted from 3-year-olds (2020 cohort) in 2022–23 to 4-year-olds in 2023–24. Kaipara-Manukau displayed broad distributions in both years, with mean lengths increasing from 36.1 cm to 36.5 cm and mean ages from 8.3 to 8.8 years, with several fish over 20 years old. North Taranaki Bight showed a shift from a narrower age distribution dominated by 5-year-olds in 2022–23 (mean age 6.7 years, mean length 34.6 cm) to a broader distribution in 2023–24 (mean age 8.0 years, mean length 35.8 cm), with fish ranging from 4 to 11 years. South Taranaki Bight consistently had the largest and oldest fish, with mean lengths of 40.5 cm and 40.6 cm respectively for the two fishing years, and mean ages increasing from 9.1 to 11.6 years. This subarea was uniquely marked by strong cohorts of 5-year-olds in 2022–23 and 6-year-olds in 2023–24. At the overall TRE 7 level, mean lengths increased from 36.2 cm to 37.6 cm, and mean ages from 7.5 to 9.2 years, with strong recruitment of 3-, 4-, 5-, and 6-year-olds and continued presence of fish over 20 years old. Sampling targets were met in both years, with MWCVs for length and age remaining at or below 0.23. A consistent latitudinal trend was observed, with decreasing proportions of small and young trevally from north to south.

Analyses of time-series explored differences in trevally length and age structure. Ninety Mile Beach consistently showed the youngest and smallest fish, with 75–90% of the catch aged 10 years or younger and mean lengths and ages declining to 35.5 cm and 6.4 years by 2023–24. Kaipara-Manukau and North Taranaki Bight exhibited broader distributions, with mean lengths up to 42.8 cm and mean ages up to 12.0 years. South Taranaki Bight had the oldest and largest fish, with mean ages reaching 14.1 years and a high proportion of fish over 20 years old. These patterns reaffirm persistent spatial heterogeneity in the TRE 7 stock, with a clear trend of decreasing proportions of small and young trevally from north to south.

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1. INTRODUCTION

Trevally (*Pseudocaranx dentex*) is a key commercial inshore species in New Zealand, with over half of the national Total Allowable Commercial Catch (TACC) of 3933 tonnes allocated to TRE 7 (2153 t). TRE 7 is the largest Quota Management Area (QMA), covering the west coast of the North Island and much of the north and west coasts of the South Island. Historically, most TRE 7 catch was taken by bottom trawl, particularly in the northern North Island. In recent years, modular harvest system or 'precision bottom trawl' (PRB) technology has become the dominant method in the northern areas of TRE 7. Trevally is primarily targeted in spring and summer, but is also caught as bycatch, especially when fishing for snapper (*Chrysophrys auratus*) and red gurnard (*Chelidonichthys kumu*). Over the past six fishing years (2018–19 to 2023–24), annual catch has averaged around 1300 t; about 60% of the TACC (Fisheries New Zealand, 2024).

Initial sampling of trevally length and age began with research trips between Tasman Bay and North Cape in 1971–72 (James 1984), followed by intermittent sampling until 1979. Commercial catch sampling resumed in 1997–98 (Walsh et al. 1999) under a Ministry of Fisheries monitoring programme. Annual sampling continued until 2000–01 (Walsh et al. 2000; Langley 2001, 2002) and was reviewed by Walsh & McKenzie (2009). The programme restarted in 2005–06 (Langley 2009) and ran through to 2009–10 (Walsh et al. 2010a, b, 2012a), with a focus on spatial heterogeneity. The most recent sampling occurred in 2012–13, targeting four subareas identified previously and included length frequency sampling and an age length key as did all the previous catch sampling programmes (Walsh et al. 2014d). These data supported a stock assessment for TRE 7 (Langley et al. 2015). A summary of sampling methods and subarea strata since 1997–98 is provided in Appendix 1.

The overall objective of Fisheries New Zealand research project TRE2021-01 was to determine the length and age structure of the commercial catch of trevally in TRE 7. The project was originally scheduled for 2021–22, with sampling to conclude by September 2023. Due to COVID-19 Delta outbreak restrictions, the start was delayed by one year. Sampling commenced in 2022–23 and concluded in September 2024, with initial characterisation based on the 2020–21 fishing year.

The specific objectives of this project for 2022–23 and 2023–24 were:

1. To characterise the TRE 7 fishery by analysing existing commercial catch and effort data to the end of 2020–21 fishing year.
2. To conduct representative sampling to determine the length, sex, and age composition of the commercial catch of trevally (*Pseudocaranx dentex*) in TRE 7 during the 2022–23 (original date 2021–22) fishing year. The target coefficient of variation (CV) for the catch-at-age is 20% (mean weighted CV across all age classes) combined across sexes.
3. To conduct representative sampling to determine the length, sex, and age composition of the commercial catch of trevally (*Pseudocaranx dentex*) in TRE 7 during the 2023–24 (original date - 2022–23) fishing year. The target coefficient of variation (CV) for the catch-at-age is 20% (mean weighted CV across all age classes) combined across sexes.
4. To explore the time series of catch sampling data, in particular, for any significant changes in the length and age composition of commercial catches.

This report presents the results of land-based sampling from the TRE 7 bottom and precision bottom trawl fishery for length and age data between October 2022 and September 2024.

2. METHODS

2.1 Characterisation of recent fishery profile for TRE 7, 2018–19 to 2023–24

Two fishery characterisations are generally conducted as part of catch-at-age projects. The first is conducted prior to the commencement of sampling and describes fishery patterns (e.g., TRE catch by fishing year, fishing method, statistical area, month, and target species), as well as assessing the proposed sampling design by considering an appropriate minimum landing weight for samples, and the availability of landings by sampling location (licenced fish receiver [LFR]). The second characterisation is conducted after sampling has been completed. It provides the most up to date description of fishery patterns and provides an opportunity to compare the patterns of the entire fishery with that of the samples collected (i.e., a description of sampling representativeness in terms of the number and weight of landings spatially and across the months of the sampling programme).

To achieve these characterisations, commercial catch and effort data were requested from the Fisheries New Zealand Enterprise Data Warehouse (1 October 2015 to 30 September 2021 for the sampling design characterisation and 1 October 2018 to 30 September 2024 for the final characterisation). The latter was supplied on 23 May 2025 under replog 15853. These extracts included all reported effort data and associated catch weights (for all species including trevally) from all trips landing trevally from TRE 7. Estimates of trevally catch per fishing event were linked to their associated effort variables by fishing event (such as fishing location, fishing method, target species). Individual fishing events were then linked to landed catch weights for each trip, to prorate the landed weight for each species across events, given event-based catch weight estimates. The link between the event-based estimated effort and trip-based landed catch weight tables was a common trip number field (trip_key). Thus, the catch weight from individual fishing events could be assigned to stocks and spatial strata within. This data set was then used to produce plots of trevally catch by fishing method, month, target species, and statistical area.

2.2 Design of TRE 7 sampling in 2022–23 and 2023–24

Stratification of the TRE7 fishery

Landings were stratified by subarea, with samples collected from the main commercial methods used in TRE 7: bottom trawl in 2022–23; and both bottom trawl and precision bottom trawl in 2023–24. Although no formal seasonal strata were defined, sampling was distributed throughout the year to reflect the temporal patterns of each area-method combination.

Subarea stratification followed the framework established by James (1984), dividing TRE 7 into four regions: Ninety Mile Beach; Kaipara-Manukau coastline; North Taranaki Bight; and South Taranaki Bight, which includes the west coast of the South Island (Figure 1). In 2022–23, subarea assignment was based on direct communication with fishing companies and skippers during or prior to each trip. In 2023–24, access to daily updates of at-sea estimated effort data from Fisheries New Zealand enabled more precise mapping of fishing effort using a custom RShiny application. This analytical tool displayed tow-by-tow catch estimates, improving spatial accuracy and allowed better alignment of landings with subareas. The estimated effort data also provided the trip key, which was later used to link fishing events to trip-level landed catch weights during data processing.

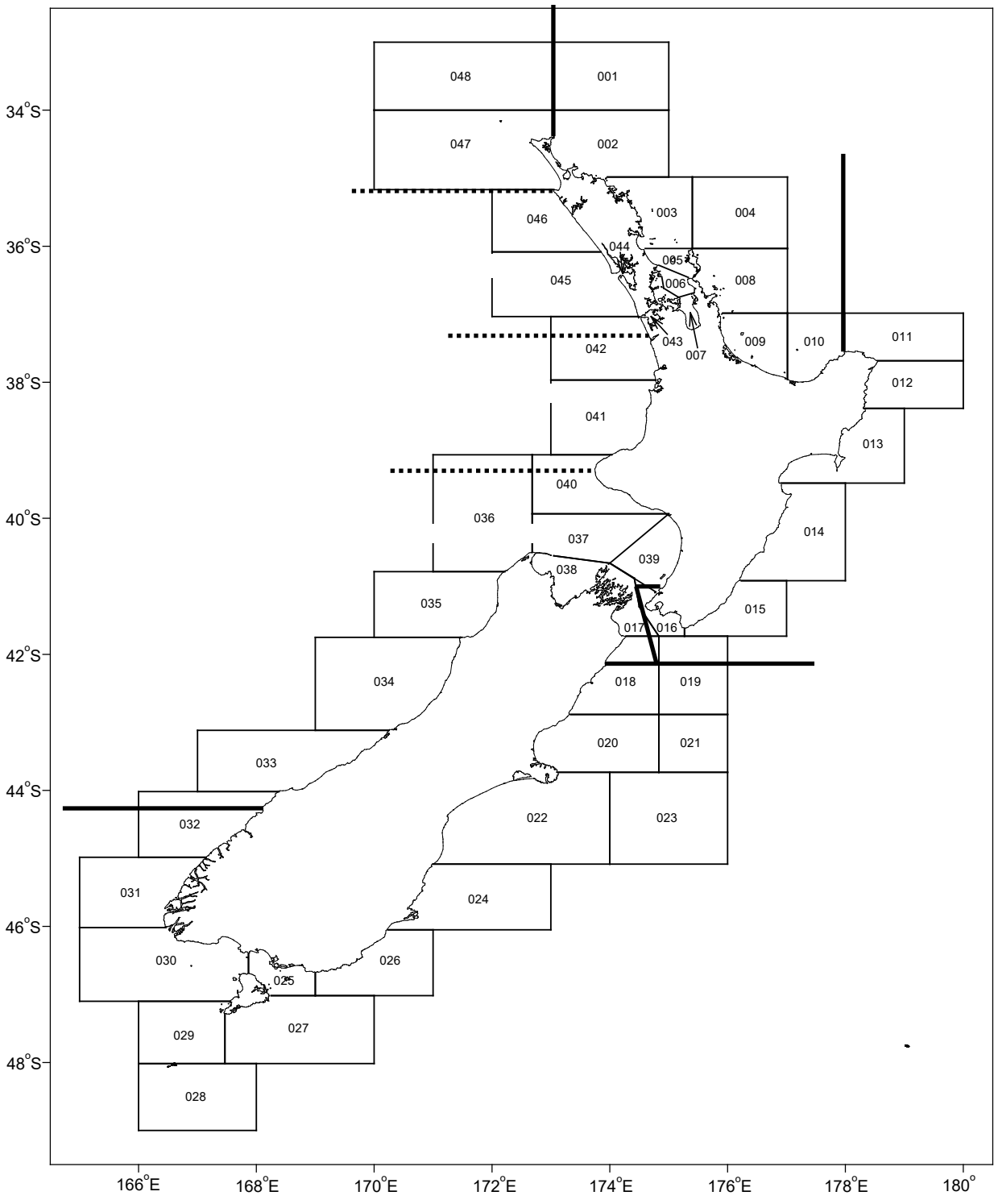

Figure 1: Trevally quota management areas, statistical areas, and locations referred to in the text. Dashed lines represent the boundaries separating the subareas that make up the TRE 7 stock.

Sampling TRE 7 bottom trawl and precision bottom trawl landings

The TRE 7 sampling design specified minimum trevally catch weights for landings to qualify for sampling. Initial thresholds were set at 2 t for Ninety Mile Beach and Kaipara-Manukau, 1 t for North Taranaki Bight, and 0.2 t for South Taranaki Bight. These were later reduced to 1 t and 0.5 t respectively in subareas where larger landings were difficult to obtain (Table 1).

Table 1: Level of sampling proposed to describe the TRE 7 subarea bottom trawl and precision bottom trawl fisheries in 2022–23 and 2023–24.

TRE 7 Subarea	Method	Minimum landing size	Number of landings*	Total number of otoliths collected	Total number of otoliths aged
Ninety Mile Beach	BT/PRB	2 t	10	600	400
Kaipara-Manukau	BT/PRB	2 t	15	900	600
North Taranaki Bight	BT/PRB	1 t	10	600	400
South Taranaki Bight	BT/PRB	0.2 t	15	900	400

*number of landings is the combined total of "landing" and "at-sea" subarea samples

To improve spatial resolution and include trips that fished across multiple subareas, comprehensive at-sea bin selection was conducted in both 2022–23 and 2023–24. This approach allowed subarea-specific samples to be collected directly during fishing operations, avoiding the exclusion of mixed-subarea landings that would otherwise be invalid for shore-based sampling.

At-sea bin selection required vessel skippers to label bins at the time each tow was stowed, as stratifying catch within the hold was not feasible. Skippers were instructed to set aside five bins per qualifying tow, each containing approximately 200 kg of trevally, and to avoid size selective grading. This process was repeated for the first four qualifying tows, aiming to collect 20 bins per subarea on each trip. All bins were tagged with colour-coded labels to ensure clear identification during unloading and factory processing. Initially, in 2022–23, there was a delay in the supply of bin tags and subsequent distribution to the main vessel for sampling in the three northern subareas. Consequently, sampling was limited during that time to where landings were limited to a single area.

The success of this method relied on strong coordination between vessel crews, unloading staff, and onshore samplers, and was only possible with full industry support. Final confirmation of subarea assignments for at-sea bin selections was based on Fisheries New Zealand catch and effort return data, which became available several months after sampling. Unlike previous years, mixed-subarea landings were excluded from analysis unless the spatial origin of the catch could be verified.

2.3 Random Age Frequency (RAF) sampling methods

Since 1997–98, the TRE 7 catch-at-age programme has primarily used a length frequency analysis based on an age-length-key (LF + ALK). However, the Inshore Working Group (INSWG) recommended adopting a random age frequency (RAF) approach for future sampling from the 2022–23 fishing year.

The RAF approach involves randomly selecting a small number of fish (typically 30–60) from each sampled landing for otolith extraction and ageing (Davies et al. 2003). Although RAF generally

requires more otoliths than the LF + ALK method to achieve the same precision, it is better suited for long-term sampling periods where fish growth during the year could introduce bias. Optimisation studies for TRE 1 and TRE 7 indicated that collecting 600 otoliths from 15 landings per stratum would achieve a coefficient of variation (CV) of 0.3 or less (Walsh & McKenzie 2009).

A key challenge in RAF is ensuring that the small sample of fish is representative of the entire landing, which may range from one to six tonnes. In New Zealand, trevally is typically packed into 35 kg bins during unloading. Samplers were instructed to select 12 bins randomly from across the landing and then use a specially designed random selection form to choose 60 fish from a sequence of 300. This process required two people: one to draw fish sequentially and another to track the form and indicate which fish to retain. This ensured that the sampler could not anticipate which fish would be selected. Each of the 60 selected fish were measured to the nearest centimetre (fork length), and both sagittal otoliths were removed, cleaned, dried, and stored in individual labelled envelopes.

Although sex and maturity stage were recorded, they are not reported here. Sex has not been routinely recorded in previous trevally catch-at-age studies due to the absence of growth differences between sexes (James 1984).

Sampling was conducted by six lead samplers, each trained and mentored according to their experience. Quality assurance was overseen by NIWA's head sampler, who has over 30 years of experience. To validate the randomness of fish selection, the length frequency of the 60 selected fish was compared to that of the full 300-fish pool using a Kernel Density Estimation (KDE) test (Anderson & Titterington 1994). If a sampler's selection failed the test, they received further training and repeated the process. All six lead samplers passed the quality assurance test.

2.4 Ageing methods

The RAF selection process resulted in the collection of more otoliths than required from each region (Table 1). An initial random sample of 15 otoliths was selected from each sampled landing. The remaining required number of otoliths (Table 1) were then randomly drawn from across all the landings in proportion to the weight of the landing.

All otoliths were prepared using the thin section technique (Stevens & Kalish 1998; Tracey & Horn 1999), following a standardised age determination protocol (Walsh et al. 2014a). Up to five otoliths were embedded in epoxy resin and sectioned through the core using a Struers Secotom-10 digital saw to a thickness of ~350 μm. Sections were mounted on slides, cured at 50 °C, and examined under transmitted light using a compound microscope to count opaque growth zones.

A review by Walsh & McKenzie (2009) identified ageing errors in pre-2006–07 data, mainly due to misinterpretation of growth zones and incorrect assessment of otolith margins. In response, a more rigorous protocol was adopted in 2006–07 to improve accuracy and consistency, and this was followed in the current study (Walsh et al. 2014a).

Key improvements included standardised interpretation of the first annulus, use of a "forced margin" method to guide age determination based on the sampling month and access to reference otolith images from previous collections.

Under the forced margin method, fish sampled with a "wide" margin were aged one year older than the zone count (e.g., 3W = 4 years), while "line" and "narrow" margins retained the zone count (e.g., 4L or 4N = 4 years). This approach ensures consistent age classification across the fishing year

(October–September), regardless of the nominal birth date (1 January), and differs from methods used for growth rate estimation (Walsh et al. 2014a). This protocol has significantly improved ageing precision in recent years (Walsh et al. 2010a, b, 2012a, b, 2014c, d).

A reference collection of approximately 500 otolith preparations was compiled from archived samples (Walsh et al. 2014a) to support consistent ageing across readers and years. Before ageing the TRE 7 samples, two readers read a subsample of 50 reference otoliths to meet competency thresholds: an Index of Average Percentage Error (IAPE) of ≤2.5% (Beamish & Fournier 1981) and a mean CV of ≤3.54% (Chang 1982), as outlined in Walsh et al. (2014b).

Once qualified, both readers independently aged all TRE 7 otoliths from 2022–23 and 2023–24. Agreed counts were accepted as final. Disagreements were resolved through joint review with a third experienced reader or discarded if unreadable. Discarding unreadable otoliths was expected to have minimal impact and improve overall precision.

Reading precision of the otoliths collected in 2022–23 and 2023–24 was assessed using between-reader comparison tests (Campana et al. 1995), including comparisons with the agreed age. The IAPE and CV metrics were calculated for each test to quantify consistency.

2.5 Catch-at-age analysis

Scaled numbers-at-age for each subarea and fishing method were calculated using NIWA's Catch-at-Length-and-Age (CALA) program (Francis & Bian 2011**).** Age data were scaled to estimate the total number of fish in each subarea by applying CALA methodology, which uses sample and landing weights from commercial catches to extrapolate from sampled vessels to the entire annual catch.

Proportions-at-age were calculated across fishing year age classes, with the oldest age group (29+) treated as a plus group, aggregating all fish aged 29 years and over.

To assess variability, mean-weighted coefficients of variation (MWCVs) were calculated using a bootstrapping routine with 500 iterations. Bootstrap variances were also estimated for proportions-at-length and proportions-at-age.

All trevally length and age data are stored in the Fisheries New Zealand *market* and *age* databases, managed by NIWA.

3. RESULTS

3.1 Characterisation of TRE 7 2018–19 to 2023–24

Fishery data collated from Fisheries New Zealand covers all TRE 7 catches from 2018–19 to 2023–24.

Annual TRE 7 catch by subarea

Between 2018–19 and 2023–24, reported commercial landings remained well below the total allowable commercial catch for the TRE 7 quota management area (Figure 2). Catches varied notably across subareas. The Kaipara-Manukau subarea consistently contributed the largest share of the annual catch. Ninety Mile Beach and South Taranaki Bight also recorded substantial catches in most years, while North Taranaki Bight had the lowest catch across the TRE 7 fishery.

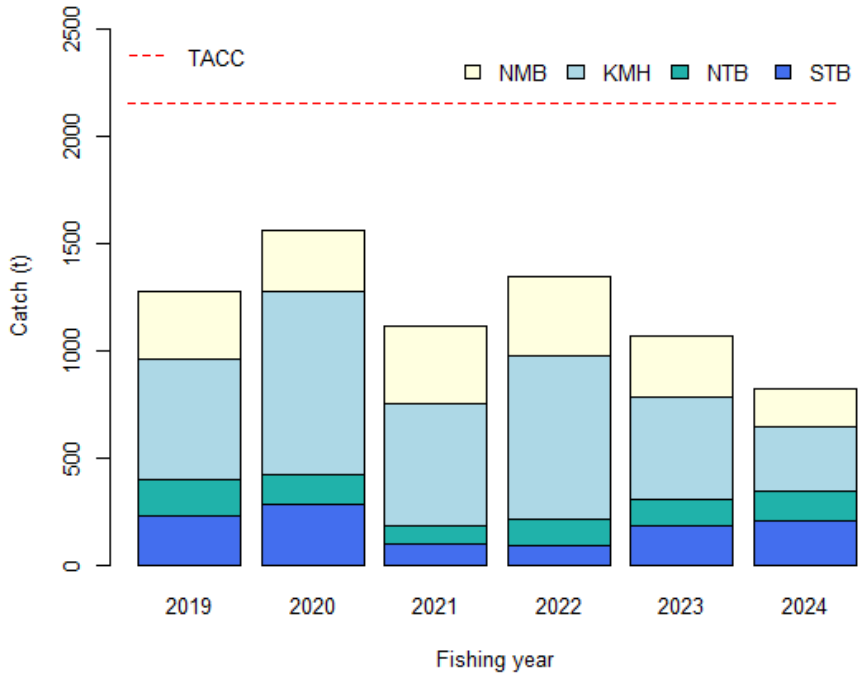

Figure 2: Annual commercial landings of trevally in the TRE 7 quota management area by subarea from 2018–19 to 2023–24. The red line indicates the Total Allowable Commercial Catch for TRE 7. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

Relative catch by method and subarea

Historically, bottom trawl was the primary method used across all TRE 7 subareas. In 2023–24, however, substantial trevally catches were recorded using precision bottom trawl gear, particularly in the Ninety Mile Beach, Kaipara-Manukau, and North Taranaki Bight subareas (Figure 3).

A reduction in bottom trawl effort in South Taranaki Bight during 2018–19 and 2019–20 coincided with increased midwater fishing, although bottom trawl usage rebounded in 2020–21. By 2022–23, bottom trawl accounted for most of the TRE 7 landings. In 2023–24, the contribution of bottom trawl to landings declined, largely due to increased adoption of the precision bottom trawl method, which dominated catches in the northern subareas. Overall commercial landings in 2023–24 were lower than in previous years (see Figure 2).

Given the prevalence of bottom trawl and precision bottom trawl landings in 2023–24, further characterisation from 2018–19 to 2023–24 was based on combined bottom trawl and precision bottom trawl data.

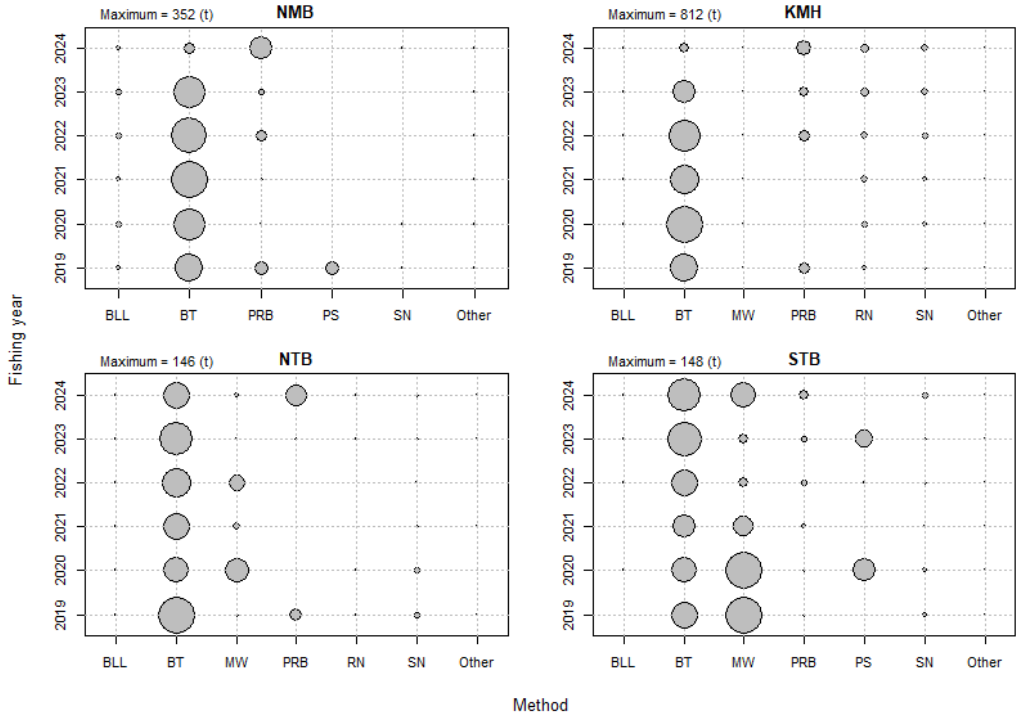

Figure 3: Annual catch of trevally by method for the TRE 7 subareas from 2018–19 to 2023–14 (BLL, bottom longline; BT, bottom trawl; MW, midwater trawl; PRB, Precision bottom trawl; PS, purse seine; RN, ring net; SN, set net). NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight. Data extracted from Fisheries New Zealand's Enterprise Data Warehouse under replog 15853.

Spatio-temporal distribution and target species of the bottom and precision bottom trawl commercial catch

From 2018–19 to 2023–24, the majority of TRE 7 bottom trawl and precision bottom trawl catches were taken from the northern half of the west coast of the North Island, particularly Statistical Areas 041, 042, and 045–047 (Figure 4). Catches in areas 045 (coastal Kaipara Harbour) and 046 (Northern Kaipara-Manukau) declined significantly in 2023–24. In contrast, catches in areas 041, 042, and 047 (North Taranaki Bight and Ninety Mile Beach) remained relatively stable, except for a slight dip in area 042 during 2019–20.

Catches from southern Statistical Areas (017–040), south of New Plymouth, remained consistently low throughout the period. Area 040 showed a minor decline in 2023–24 compared to previous years (Figure 4).

Seasonally, most TRE 7 bottom trawl and precision bottom trawl catch occurred during spring and summer (Figure 5). A temporal peak was evident in the northern subareas, with fishing activity greatest in late spring and summer for Kaipara-Manukau (November–January), and in North Taranaki Bight during summer (December–February). Trevally was caught year-round off Ninety Mile Beach and South Taranaki Bight, with peak catches typically occurring from March to May.

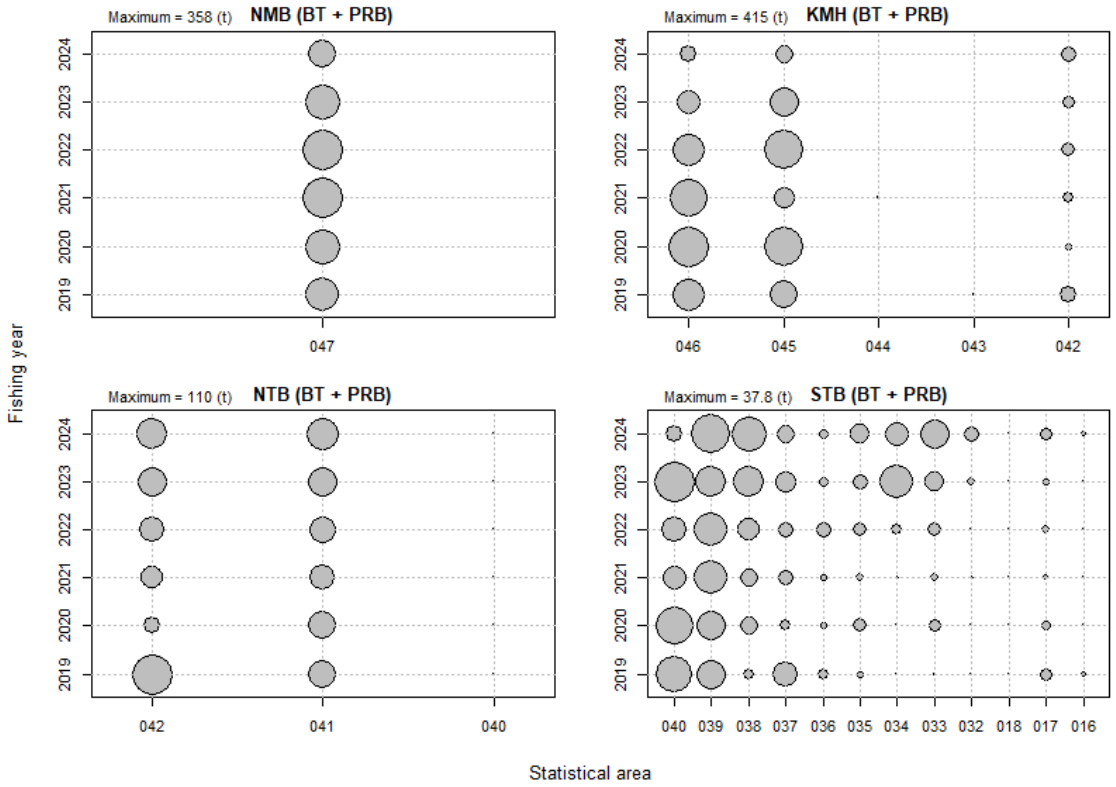

Figure 4: **Annual bottom trawl and precision bottom trawl catch of trevally by statistical reporting areas within the TRE 7 sub-areas from 2018–19 to 2023–24. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.**

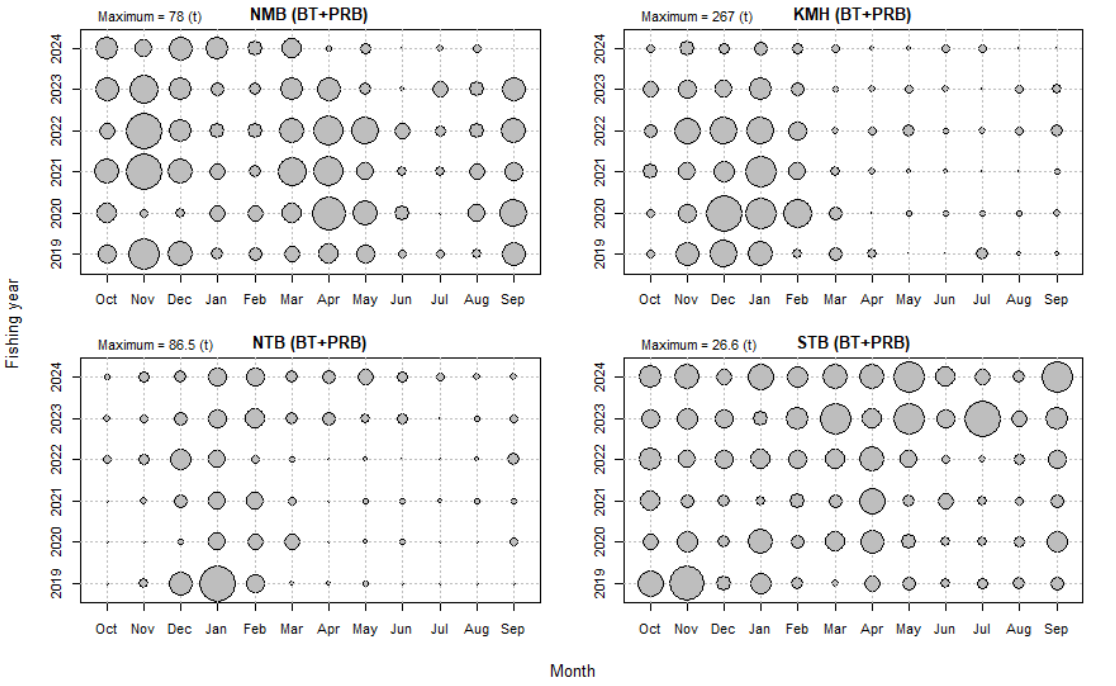

Figure 5: **Annual bottom trawl and precision bottom trawl catch of trevally by month for the subareas of TRE 7 from 2018–19 to 2023–24. Scales differ between subareas. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.**

In the two northern subareas (Ninety Mile Beach and Kaipara-Manukau) of TRE 7, bottom and precision bottom trawl fisheries primarily targeted trevally, with only minor trevally bycatch occurring when targeting snapper or red gurnard (Figure 6). In contrast, the North and South Taranaki Bight subareas showed a marked decline in trevally-targeted effort in recent years. In these areas, trevally was more frequently caught as bycatch in fisheries targeting red gurnard, snapper, and tarakihi (*Nemadactylus macropterus*) (Figure 6).

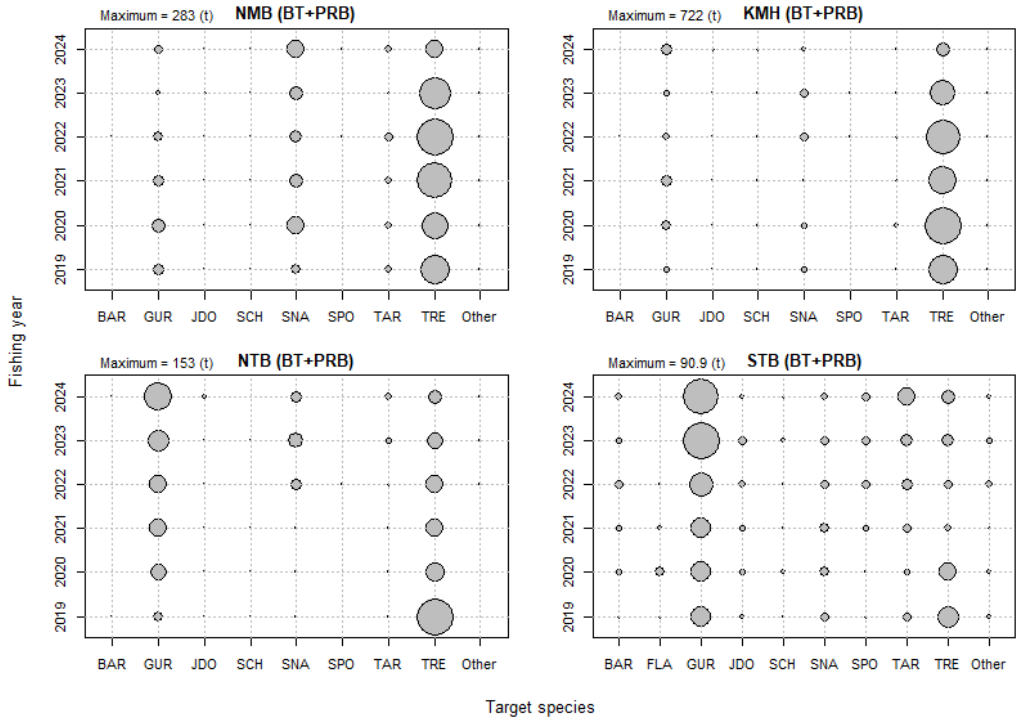

Figure 6: Annual bottom trawl and precision bottom trawl catch of trevally by target species for the subareas of TRE 7 from 2018–19 to 2023–24 (TRE, trevally; SNA, snapper; GUR, red gurnard; TAR, tarakihi; BAR, barracouta; JDO, John dory; SCH, school shark; SPO, rig; FLA, flatfish). Scales differ between subareas. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

3.2 Sample collections of TRE 7 bottom trawl in 2022–23 and 2023–24

Random age frequency samples from bottom trawl and precision bottom trawl landings across TRE 7 subareas in 2022–23 and 2023–24 are summarised in Table 2.

The sampling design for both years targeted 15 landings each from Kaipara-Manukau and South Taranaki Bight, and 10 each from Ninety Mile Beach and North Taranaki Bight, totalling 50 samples. In 2022–23, all samples were intended to represent bottom trawl landings, reflecting its dominance at the time. However, by 2023–24, precision bottom trawl had emerged as a significant method, prompting the INSWG to recommend inclusion of both methods in the sampling design for the northern subareas.

In 2022–23, 39 valid samples were collected: 10 from Ninety Mile Beach, 13 from Kaipara-Manukau, two from North Taranaki Bight, and 14 from South Taranaki Bight. One sample from South Taranaki Bight was excluded due to insufficient size. Limited sampling in North Taranaki Bight was attributed

to vessel activity being concentrated in northern subareas and restricted access to landings via a single licensed fish receiver (LFR) and vessel.

In 2023–24, 49 valid samples were obtained: 10 from Ninety Mile Beach (five bottom trawl, five precision bottom trawl); 14 from Kaipara-Manukau (five bottom trawl, nine precision bottom trawl), 10 from North Taranaki Bight (three bottom trawl, seven precision bottom trawl); and 15 from South Taranaki Bight (all bottom trawl). No samples were excluded, aided by access to electronic reporting data provided by Fisheries New Zealand, which enabled targeted sampling based on tow-level catch data and estimated weights.

Table 2: Details of samples, number of fish measured, otoliths collected, and otoliths aged in method–subarea strata for the TRE 7 bottom trawl fishery in 2022–23 and 2023–24. BT = bottom trawl, PRB = precision bottom trawl, RAF = random age frequency. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

Fishing Method	Subarea*	No. of landings sampled	Sampling Method	No. of fish measured	No. of otoliths collected	No. of otoliths aged
Sampling in 2022–23						
BT	NMB	10	RAF	600	600	385
BT	KMH	13	RAF	780	780	586
BT	NTB	2	RAF	120	120	118
BT	STB	14	RAF	840	840	394
Sampling in 2023–24						
BT + PRB	NMB	5 (BT) 5 (PRB)	RAF	600	600	395
BT + PRB	KMH	5 (BT) 9 (PRB)	RAF	840	840	588
BT + PRB	NTB	3 (BT) 7 (PRB)	RAF	600	600	394
BT	STB	15 (BT)	RAF	900	900	385

Sampling representativeness of the TRE 7 bottom trawl and precision bottom trawl fishery in 2022–23

A temporal comparison of monthly trevally catch and corresponding sample data (by weight and number of landings) in 2022–23 for the bottom trawl method, illustrating seasonal patterns and sampling representativeness across TRE 7 subareas is shown in Figure 7. While trevally is caught year-round, the majority of the 2022–23 bottom trawl catch occurred during spring and summer in the northernmost subareas (Ninety Mile Beach and Kaipara-Manukau). In contrast, catches in North and South Taranaki Bight were lower and more evenly distributed throughout the year. The Kaipara-Manukau subarea contributed the largest share of the total TRE 7 bottom trawl catch (Figure 7)

Sampling representativeness was highest in the Ninety Mile Beach subarea, with consistent coverage throughout the year relative to the fishery pattern. In contrast, Kaipara-Manukau lacked coverage during key months (November–December and March–May), while North and South Taranaki Bight had fewer candidate landings overall. Sampling in the three northern subareas was limited by the availability of whole, valid subarea landings, as opposed to at-sea samples, particularly during the December–January holiday period. This is evident in the absence of valid landings from Kaipara-

Manukau and North Taranaki Bight during that time (Figure 7). Additional constraints included difficulty accessing tags for binning at sea early in the project as many landings spanned multiple subareas, and limited supply from the primary licenced fish receiver (LFR) in North Taranaki Bight, as the main vessel used did not move into that area. In South Taranaki Bight, sampling was coordinated in line with a concurrent SNA 8 catch sampling project in the upper South Island, resulting in reduced temporal coverage during late autumn to winter.

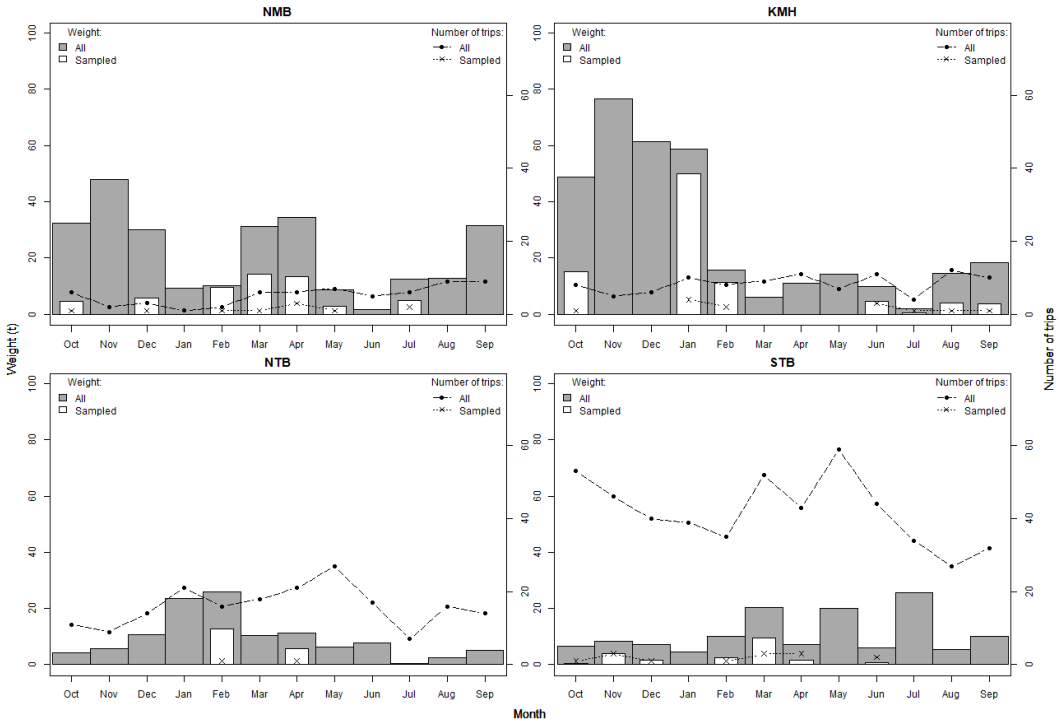

Figure 7: Comparison of the monthly distributions of landed weight and number of landings of trevally in the TRE 7 bottom trawl subarea fisheries for all landings where trevally was caught in 2022–23. Included are corresponding estimates for all sampled landings to show representativeness of collections. Note: bars and lines are overlaid. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

Sampling performance was also assessed against the cumulative proportion of total landings by number and weight, which again indicated that temporal coverage was initially limited relative to catch availability in the Kaipara-Manukau and North Taranaki Bight subareas (Figure 8). Contrastingly, in South Taranaki Bight, sampling was concentrated in the early part of the fishing year.

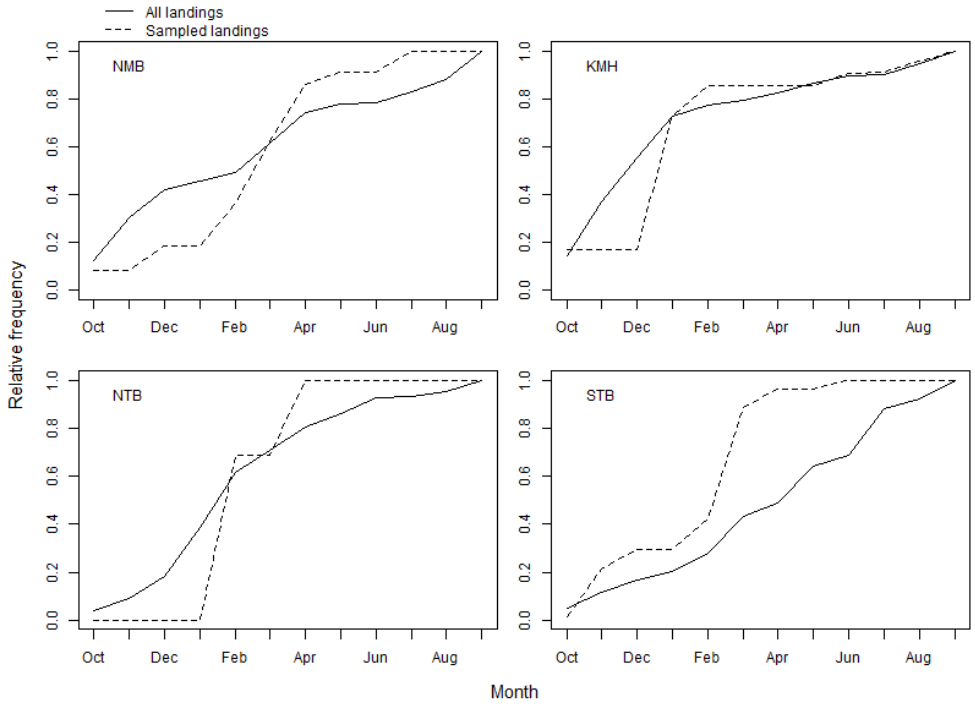

Figure 8: Comparison of the cumulative proportion of the number of landings with samples taken from the TRE 7 bottom trawl subarea fisheries in 2022–23. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

Spatial catch, statistical area, and target species comparisons 2022–23

Fine-scale spatial analysis (0.1° blocks) of the proportional distribution of estimated TRE 7 bottom trawl commercial catch and corresponding samples in 2022–23 indicated that, while a few large catches occurred just south of Taranaki, the majority of both catch and sampling effort was concentrated along the coast between Ninety Mile Beach and North Taranaki Bight (Figure 9). Catch and sampling effort in the southern part of the South Taranaki Bight subarea (west coast South Island) was relatively small compared to northern subareas.

With the exception of the northern North Taranaki Bight (primarily Statistical Areas 041 and lower 042), the spatial distribution of sampled landings generally aligned with the areas of commercial bottom trawl activity in 2022–23, suggesting that the sampling was broadly representative of the spatial extent of the TRE 7 fishery. In North Taranaki Bight, sampling was limited in Statistical Areas 041 and 042 due to limited fishing in those two areas by the main vessel used for sampling.

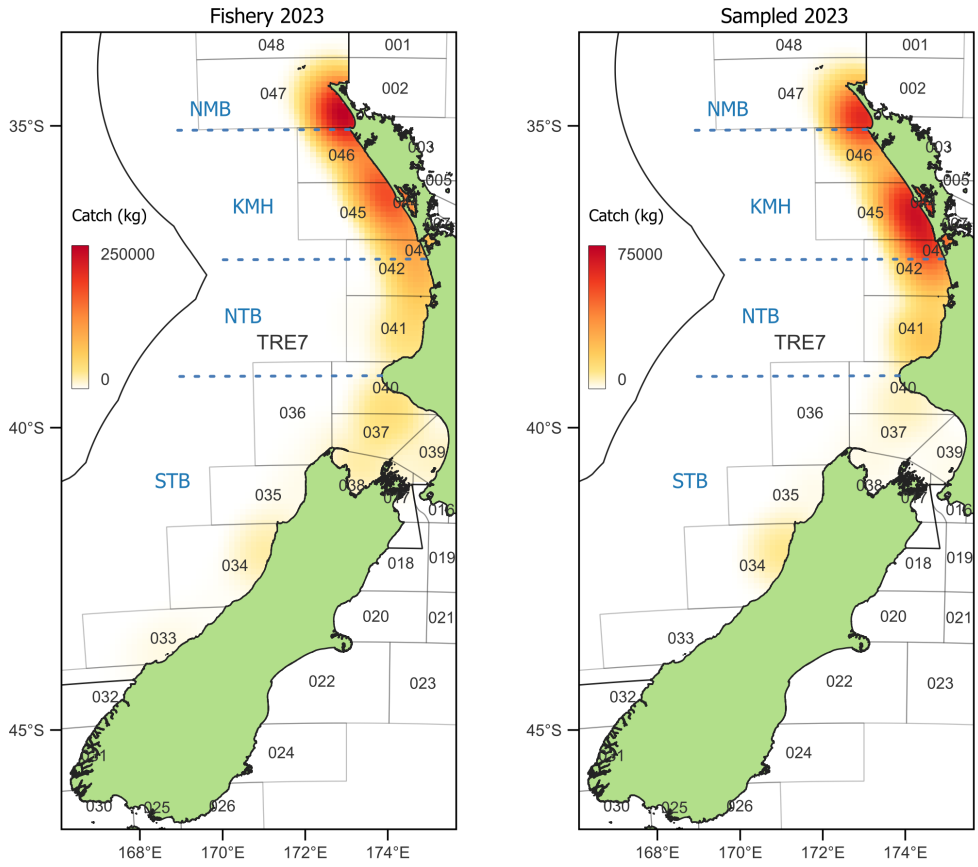

Figure 9: Spatial distribution of the bottom trawl catch (left) and the sampled component (right) for the TRE 7 stock in 2022–23. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight. Heat maps are Kernal Density Estimates (quartic) with a radius of 100 km and a cell size of 10x10 km. Colour represents expected relative catch based on interpolation. Note that the scales differ between left and right plots.

Figure 10 compares the proportional distribution of estimated bottom trawl trevally catch with the corresponding sample coverage across the statistical areas comprising TRE 7 in 2022–23. Sampling was well represented in Statistical Areas 041–047. In contrast, Statistical Area 034 was overrepresented due to the sampling of one large landing in the area.

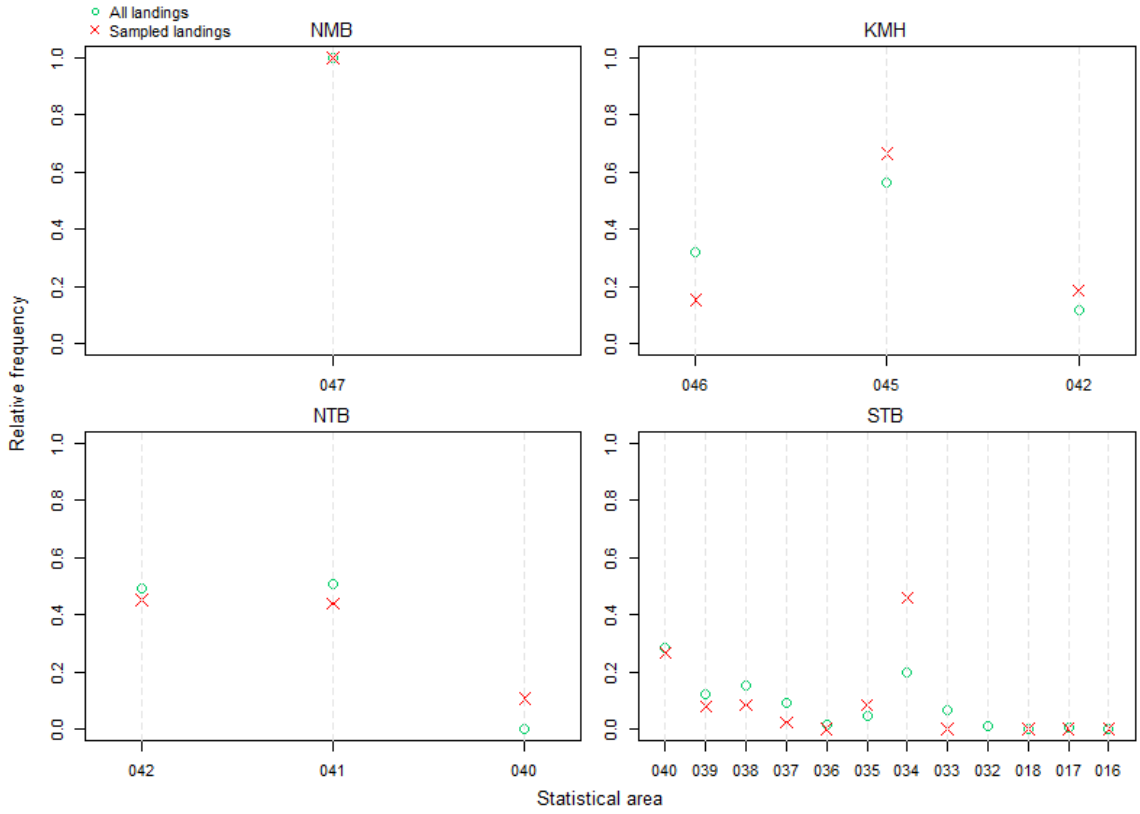

Figure 10: Comparison of the proportional distribution of the estimated bottom trawl catch and the sampled component by statistical area for TRE 7 in 2022–23. Red crosses = sampled landings, green circles = all landings. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

Figure 11 presents a comparison of bottom trawl catch by target species in 2022–23. In the three northern subareas of TRE 7, most trevally landings originated from tows specifically targeting trevally. Sampling was well matched for the Ninety Mile Beach and Kaipara-Manukau subareas for targeted trevally landings, but less so for North Taranaki Bight in the case of targeted trevally which was over sampled. Snapper and red gurnard were other notable target species targeted in the three northern sub areas (Ninety Mile Beach, Kaipara-Manukau and North Taranaki Bight), with targeted snapper samples represented in the Ninety Mile Beach and Kaipara-Manukau subareas but less so in North Taranaki Bight, where there was slight over sampling of snapper and under sampling of gurnard targeted landings. In contrast, trevally-targeted tows accounted for a minor portion of the catch in the South Taranaki Bight subarea, where red gurnard-targeted tows dominated, exceeding catches from the six other reported target species. In the South Taranaki Bight subarea, there was over sampling of gurnard targeted landings and no sampling of trevally targeted landings.

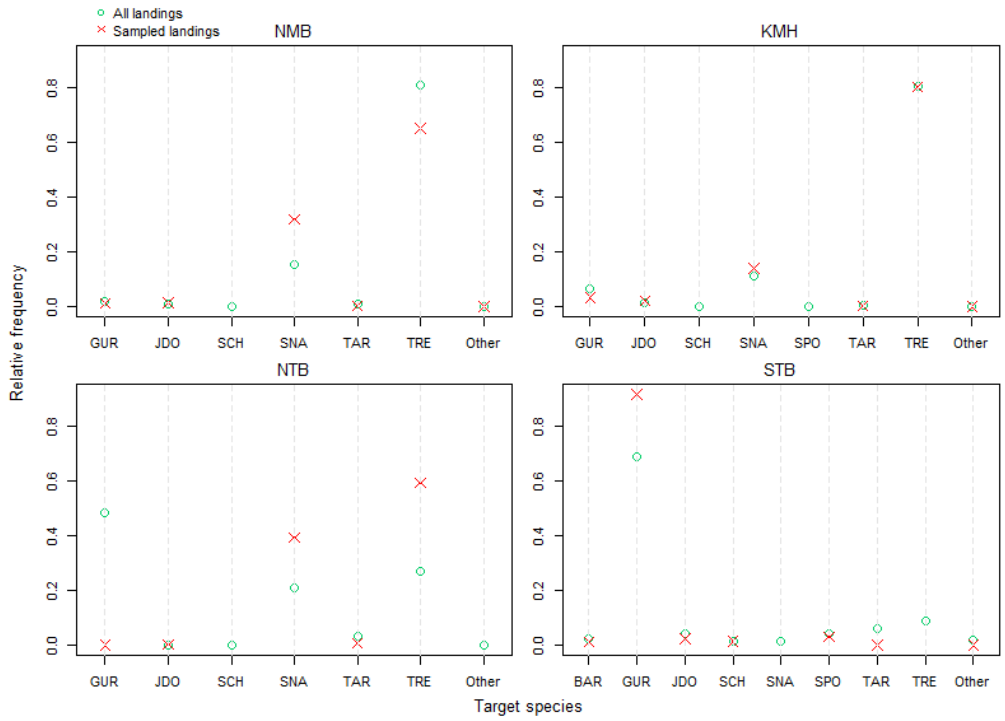

Figure 11: Comparison of the proportional distribution of the estimated bottom trawl catch and the sampled component by target species for TRE 7 in 2022–23. Red crosses = sampled landings, green circles = all landings. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

Sampling representativeness of the TRE 7 bottom trawl and precision bottom trawl fishery in 2023–24

Figure 12 presents a temporal comparison of monthly trevally catch and corresponding sample data (by weight and number of landings) for 2023–24, across both bottom trawl and precision bottom trawl methods. This comparison highlights seasonal patterns and the representativeness of sampling across TRE 7 subareas. As in 2022–23, trevally was caught year-round; however, the highest catches in 2023–24 occurred during spring and summer, particularly in the northern subareas of Ninety Mile Beach and Kaipara–Manukau.

A notable shift in 2023–24 was the change in LFRs and the increased use of precision bottom trawling in the northern subareas (Ninety Mile Beach, Kaipara-Manukau and North Taranaki Bight). These changes contributed to a rise in candidate landings in the North Taranaki Bight compared to the previous year. Despite this, Kaipara–Manukau remained the dominant subarea for trevally catch, followed by Ninety Mile Beach, with lower volumes from North and South Taranaki Bight (Figure 12).

Sampling coverage early in the year during spring and early summer was limited in the Ninety Mile Beach and North Taranaki Bight subareas due to a lack of valid non-mixed area landings. This was partly due to logistical challenges during the transition between major LFRs. The new vessels required training in the ‘at-sea bin selection’ protocol, which had to be conducted over the December–January holiday period as new vessels were integrated into the LFR. However, sampling coverage

was much improved across the rest of the fishing year once tags became available, and landings were generally representative.

In contrast, early spring landings from Kaipara–Manukau were predominantly valid, facilitating easier sampling, except for December. Once bin tags became available, good sampling representation was achieved across the year. Sampling in South Taranaki Bight followed a similar temporal pattern to the previous year, aligning with snapper landings for a concurrent project in the upper South Island in the spring and late summer/early autumn.

Figure 13 shows sampling performance relative to the cumulative proportion of total landings (by number and weight) throughout 2023–24. As in the previous year, sampling in Ninety Mile Beach and North Taranaki Bight was initially constrained by limited access to valid, subarea-specific landings. Sampling in South Taranaki Bight was again concentrated in the early part of the fishing year.

The introduction of daily electronic catch estimates from Fisheries New Zealand improved sampling coordination by enabling more responsive and informed targeting of landings. This enhancement is reflected in the successful sampling of all but one target landing and the absence of rejected landings (Table 2).

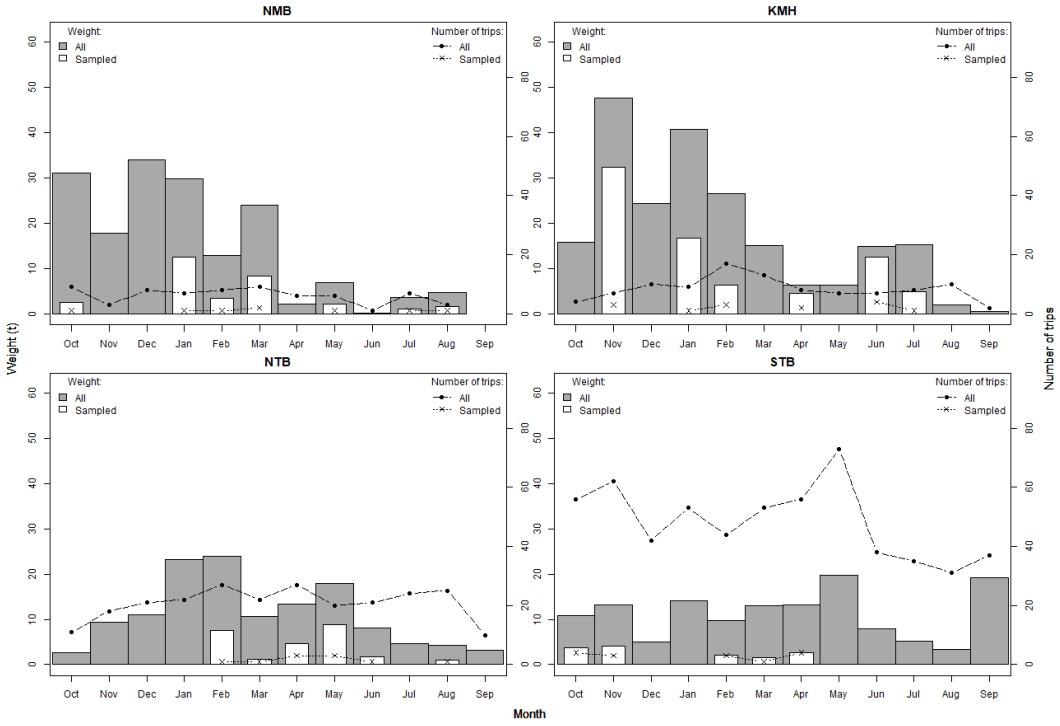

Figure 12: Comparison of the monthly distributions of landed weight and number of landings of trevally in the TRE 7 bottom trawl and precision bottom trawl subarea fisheries for all landings where trevally was caught in 2023–24. Included are corresponding estimates for all sampled landings to show representativeness of collections. Note: bars and lines are overlaid. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

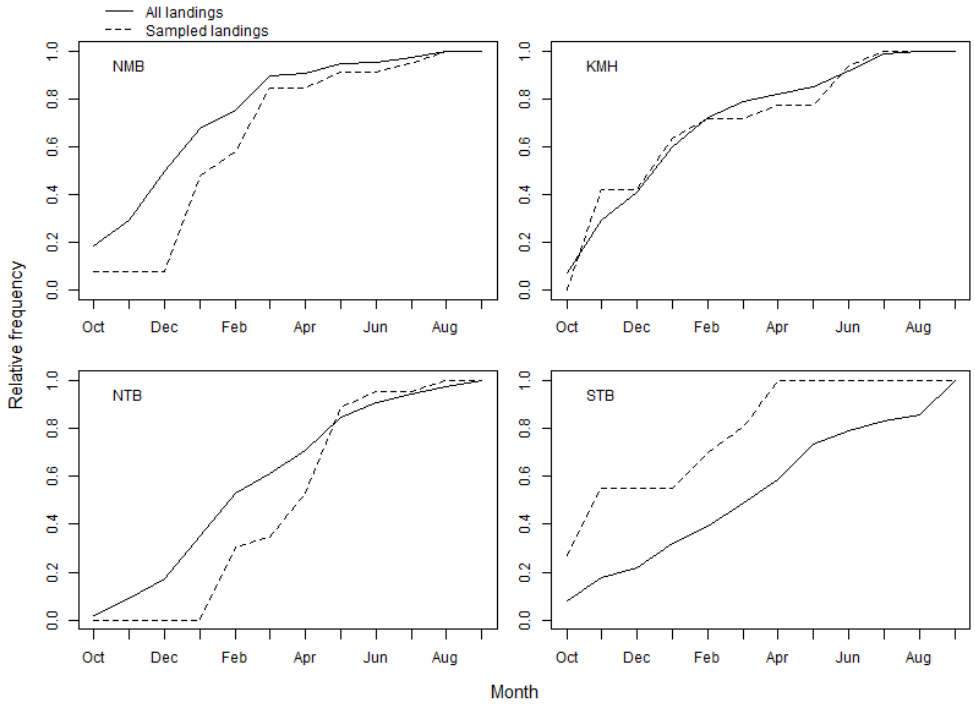

Figure 13: Comparison of the cumulative proportion of the number of landings with samples taken from the TRE 7 bottom trawl and precision bottom trawl subarea fisheries in 2023–24. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

Spatial catch, statistical area, and target species comparisons 2023–24

Fine-scale spatial analysis (0.1° blocks) of the proportional distribution of estimated commercial and sampled catch from bottom trawl and precision bottom trawl fishery in 2023–24 shows a further reduction in large catches south of Cape Egmont compared to the previous year. The majority of both catch and sampling effort was concentrated along the coast between Cape Maria van Diemen and New Plymouth (Figure 14).

Catch and sampling in the southern part of the South Taranaki Bight subarea (west coast South Island) remained negligible, with only a few small landings recorded. Trevally landings were generally below the minimum sample weight south of Statistical Area 036, except for a few larger landings near Greymouth and Westport (Figure 14). Overall, the spatial distribution of sampled landings closely aligned with the areas of commercial fishing activity, suggesting that the 2023–24 sampling was broadly representative of the TRE 7 bottom trawl and precision bottom trawl fishery.

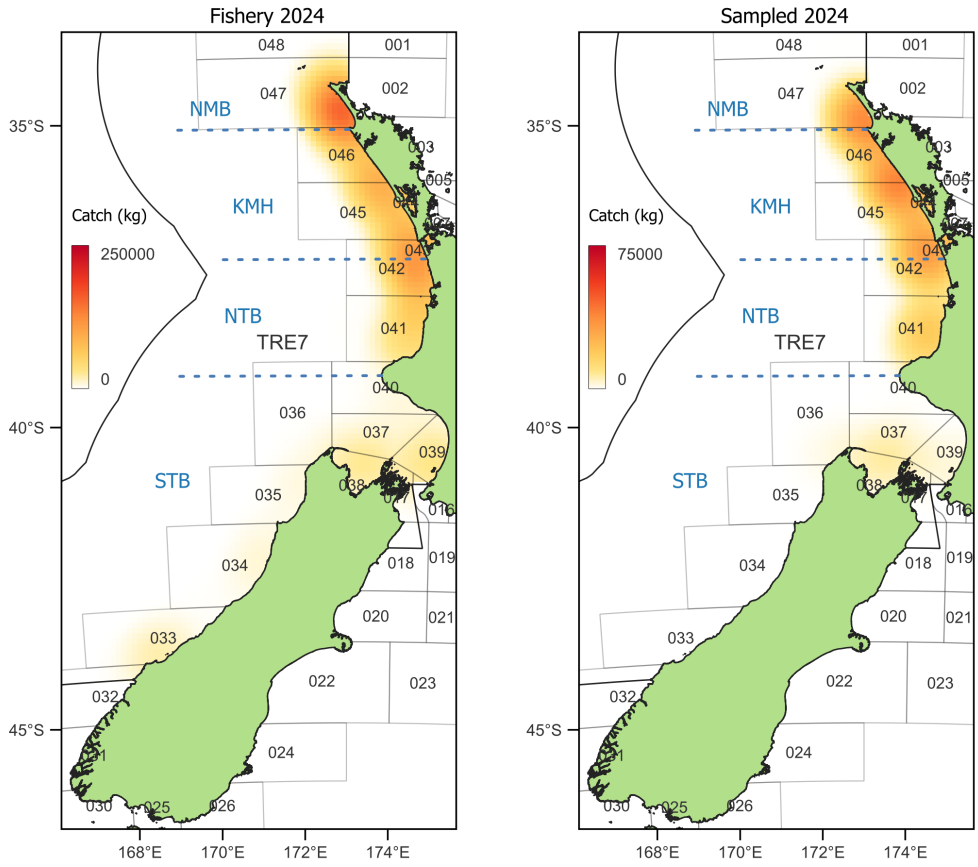

Figure 14: Spatial distribution of the bottom trawl catch and precision bottom trawl catch (left) and the sampled component (right) for the TRE 7 stock in 2023–24. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight. Heat maps are Kernal Density Estimates (quartic) with a radius of 100 km and a cell size of 10x10 km. Colour represents expected relative catch based on interpolation. Note that the scales differ between left and fight plots.

Figure 15 compares the proportional distribution of estimated trevally catch from bottom trawl and precision bottom trawl operations with the corresponding sample coverage across TRE 7 statistical areas in 2023–24. Sampling was well represented in Statistical Areas 041–047, largely due to access to real-time effort data from Fisheries New Zealand, which improved sample coordination and targeting.

Statistical Area 038 was over-represented, as landings from this area were selected to align with concurrent snapper and tarakihi sampling projects, to optimise resource use and reduce overall sampling costs.

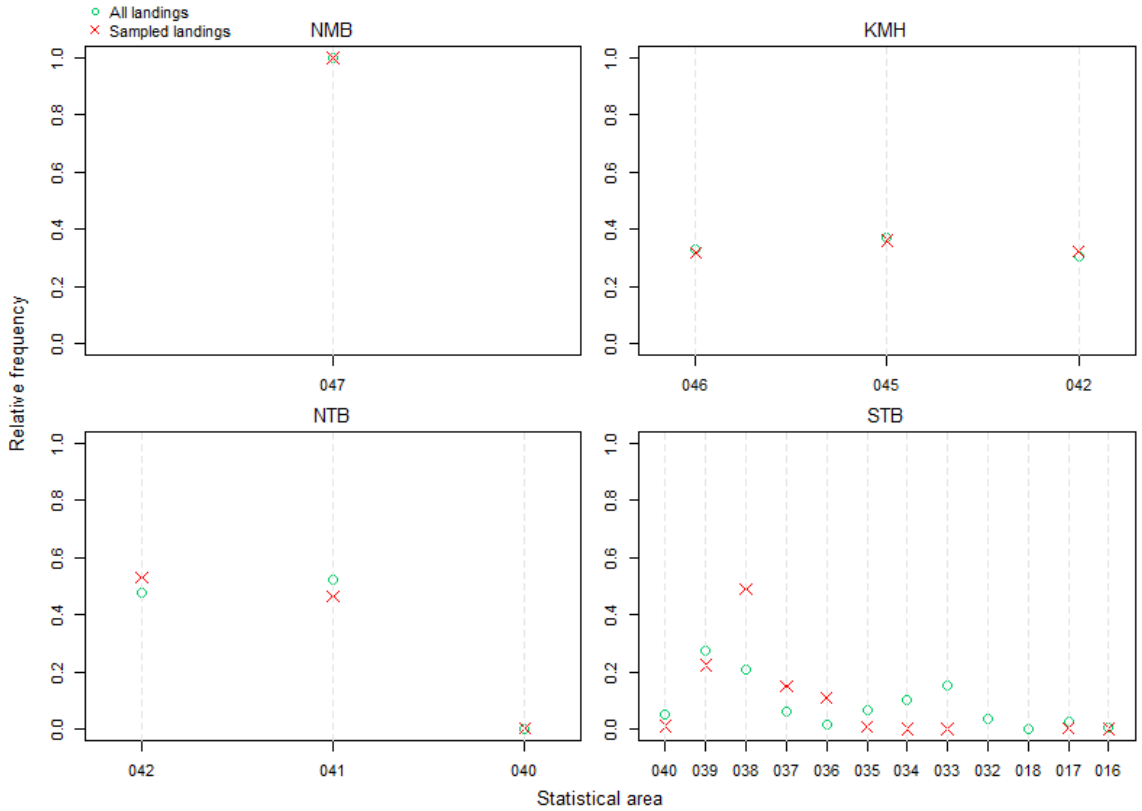

Figure 15: Comparison of the proportional distribution of the estimated bottom trawl and precision bottom trawl catch and the sampled component by statistical area over the sampling period for the TRE 7 stock in 2023–24. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

Figure 16 compares the proportional distribution of trevally catch by target species for bottom trawl and precision bottom trawl operations in 2023–24. In the Kaipara-Manukau subarea, most trevally landings were from trevally-targeted tows. In contrast, for Ninety Mile Beach, snapper was a significant target species, though trevally landings from snapper-targeted tows were under-sampled, while red gurnard-targeted landings were over-sampled. Trevally remained a key target species in this subarea.

In the North Taranaki Bight subarea, red gurnard-targeted landings were under-sampled relative to their contribution to trevally catch. In the South Taranaki Bight, trevally-targeted tows accounted for a small portion of the catch, with red gurnard-targeted tows dominating over the six other reported target species.

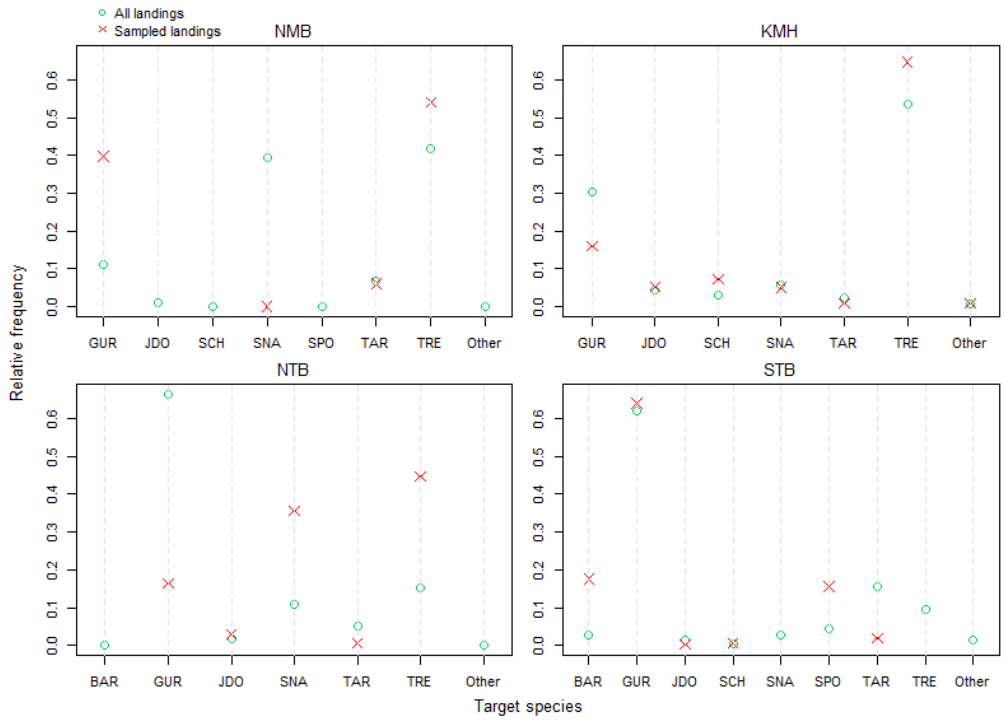

Figure 16: Comparison of the proportional distribution of the estimated bottom trawl and precision bottom trawl catch and the sampled component by target species over the sampling period for the TRE 7 bottom trawl subarea fisheries in 2023–24. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

Despite some spatial sampling limitations, particularly in the South Taranaki Bight, the proportionality between sampled and commercial catch data suggests that the 2023–24 sampling was broadly representative of the TRE 7 bottom trawl and precision bottom trawl fleet.

3.3 Otolith readings

Reader comparison tests for reference readings

For the 50 reference otoliths used to assess reader competency, both readers 1 and 2 achieved CV and IAPE pass mark scores better than the failure threshold set at 3.54% (CV) and 2.50% (IAPE) respectively, meaning both readers could go on with ageing the TRE 7 otolith collection from 2022–23 and 2023–24 (Table 3).

Table 3: Reader comparison scores determined from ageing 50 randomly selected trevally reference otolith samples ranging in age from three to 42 years. CV: coefficient of variation; IAPE: index of average percent error).

	CV	IAPE	Agreed age	Pass/Fail
Target	3.54%	2.50%	–	–
Reader 1	0.64%	0.46%	88%	Pass
Reader 2	1.88%	1.33%	82%	Pass

Reader comparison tests for TRE 7 2022–23 and 2023–24 readings

Between-reader comparisons for trevally otoliths aged from TRE 7 in 2022–23 (n = 1483) and 2023–24 (n = 1762) are shown in Figures 17 and 18, respectively. These figures demonstrate a reasonable level of consistency between readers across both years. Minor systematic differences were observed, with the first reader tending to slightly over-count zones compared to the second reader. This is evident from the slight negative skew in the histograms (panel a), the clustering of points around the zero line in the difference plots (panel b) and deviations from the one-to-one line in the age-bias plots, particularly for older age classes (panel c). Precision was lower for very young age classes but moderate across most other ages (panel d). Comparisons of age-bias plots against agreed ages show that Reader 2 had higher precision and consistency, with 96% agreement across both years and CV/IAPE values below 1.00% (panels e and f).

Reader agreement was 66% in 2022–23 and 56% in 2023–24. The CV and IAPE scores between readers in 2022–23 were CV = 4.35%, IAPE = 3.08%, and in 2023–24 were CV = 5.98%, IAPE = 4.23% (panel c).

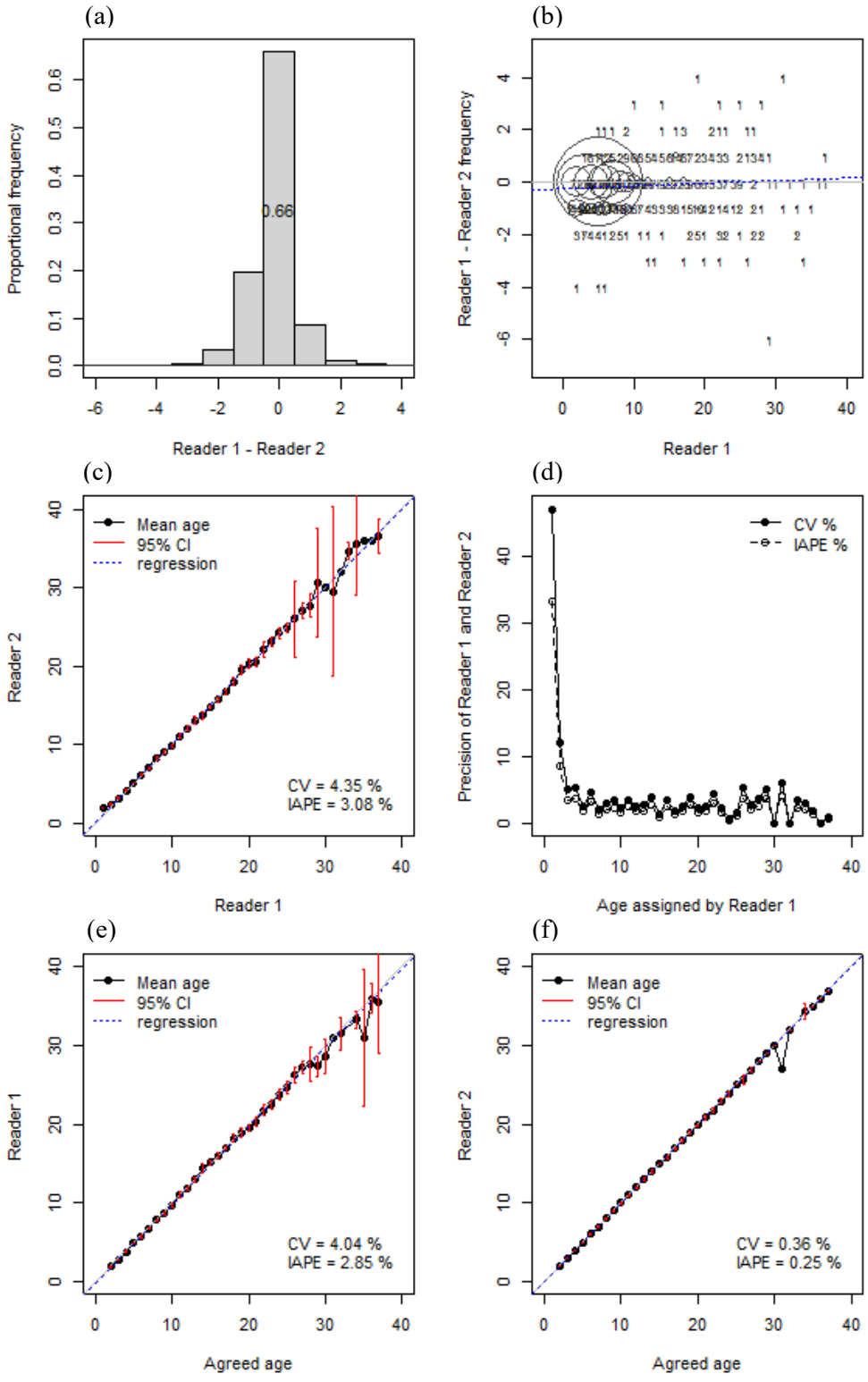

Figure 17: Results of between-reader comparison test) for TRE 7 otoliths collected in 2022–23 (*n* = 1483): (a) histogram of differences in age between readers for the same otolith; (b) differences between readers for a given age assigned by reader 1; (c) bias plot between readers; (d) CV and IAPE profiles (precision) relative to the age assigned by reader 1; (e) bias plot between reader 1 and agreed age; (f) bias plot between reader 2 and agreed age. The expected one-to-one (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).

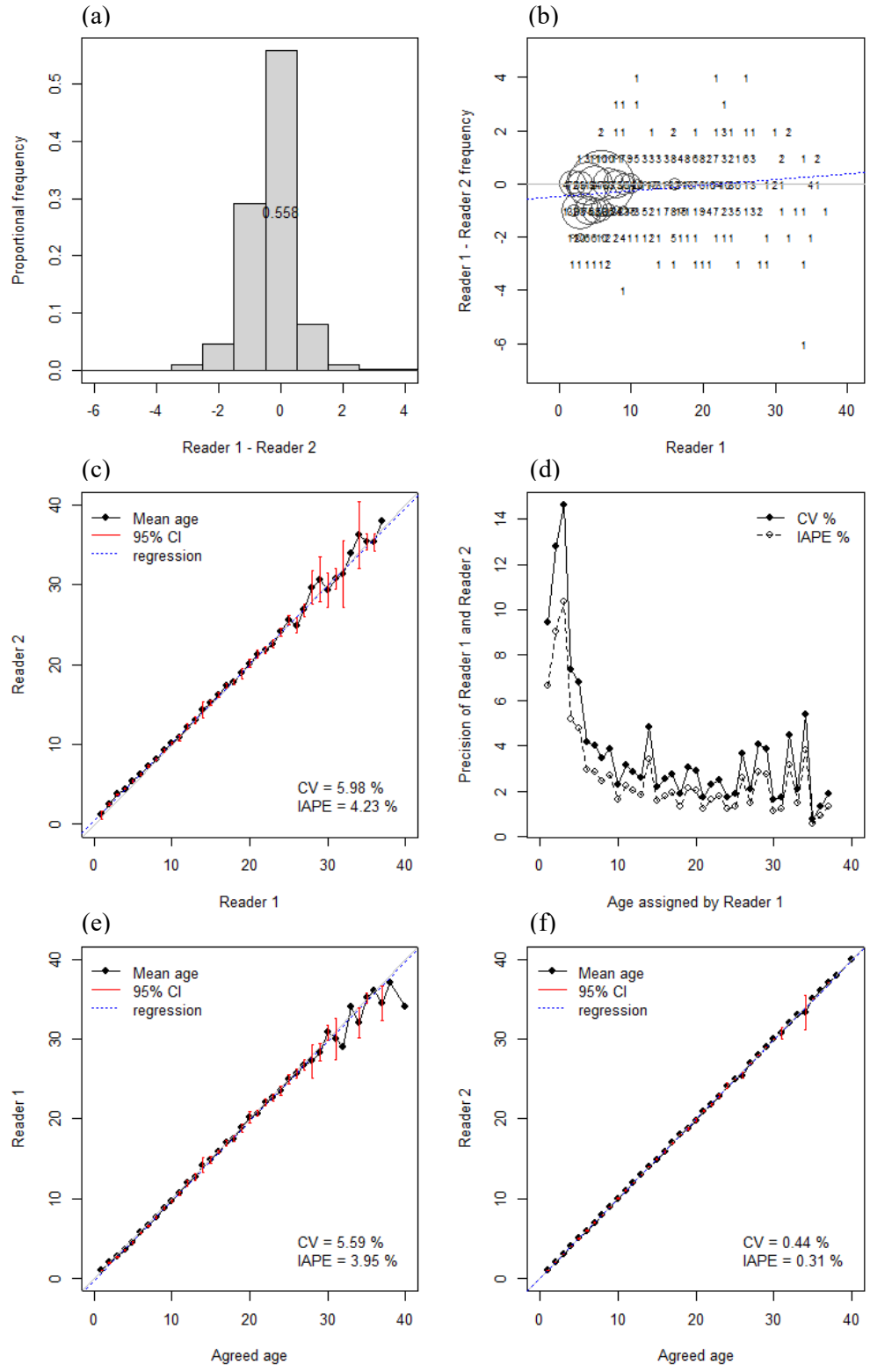

Figure 18: Results of between-reader comparison test (reader 1 and 2) for TRE 7 otoliths collected in 2023–24 (n = 1762): (a) histogram of differences between readings for the same otolith; (b) differences between readers for a given age assigned by reader 1; (c) bias plot between readers; (d) CV and IAPE profiles (precision) relative to the age assigned by reader 1; (e) bias plot between reader 1 ((f) reader 2) and agreed age. The expected one-to-one (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).

3.4 TRE 7 and subarea catch-at-length and catch-at-age estimates 2022–23

Length and age distributions, along with MWCV estimates, for the TRE 7 bottom trawl fishery and its subareas are shown in Figure 19. Substantial variation was observed among subareas.

Ninety Mile Beach

This subarea was dominated by small to moderate-sized trevally (34–42 cm), with a primary mode at 34 cm and a narrow tail beyond 50 cm (Figure 19). The mean length was 35.6 cm (second lowest among subareas), and the MWCV was 0.38. The age distribution was skewed toward younger fish (≤7 years), with the 2020 year-class (3-year-olds) comprising approximately one-fifth of the catch. The mean age was 6.4 years, the lowest among subareas with a MWCV of 0.36. Cumulative plots of length and age proportion indicate that the Ninety Mile Beach subarea comprised the highest proportions of small and young trevally caught from TRE 7 in 2022–23 (Figure 20).

Kaipara-Manukau

This subarea had a broad length distribution, with a strong presence of small, moderate, and large fish. Modes were centred around 33 and 36 cm (Figure 19). The mean length was 36.1 cm (second highest), and the MWCV was 0.35, indicating high variability between landings. The age distribution was also broad, with fish up to and over 20 years old. The mean age was 8.3 years, with a MWCV of 0.31.

North Taranaki Bight

Landings here were dominated by trevally between 30 and 40 cm, with a mode at 35 cm and a narrow tail up to 42 cm (Figure 19). The mean length was 34.6 cm, and the MWCV was 0.40, suggesting high variability between landings. The age distribution was narrow, dominated by 5-year-olds (2018 year-class), with a range from three to 11 years. The mean age was 6.7 years, with a MWCV of 0.40.

South Taranaki Bight

This subarea featured mostly moderate to large trevally (35–49 cm), with a tail extending beyond 50 cm (Figure 19). The mean length was the highest among subareas at 40.5 cm, and the MWCV was 0.39. The age distribution was broad, with fish up to and over 20 years old. A distinct spike in 5-year-olds was unique to this subarea. The mean age was also the highest at 9.1 years, with a MWCV of 0.46, reflecting both the broad age range and the dominance of the 5-year-old cohort. Cumulative plots of length and age proportion indicate that the South Taranaki Bight subarea comprised the highest proportions of large and older trevally caught from TRE 7 in 2022–23 (Figure 20).

TRE 7

The overall TRE 7 length distribution was broad (Figure 19). The mean length was 36.2 cm, with a MWCV of 0.21. The age distribution was similarly broad, with good representation across most recruited age classes, including fish over 20 years old. Strong recruitment was evident for 3- and 5-year-olds. Fish aged 3–7 years dominated the catch. The mean age was 7.5 years, with a MWCV of 0.20. A trend of decreasing proportions of small and young trevally down a latitudinal cline was evident in the respective subareas of TRE 7 in 2022–23 (Figure 20).

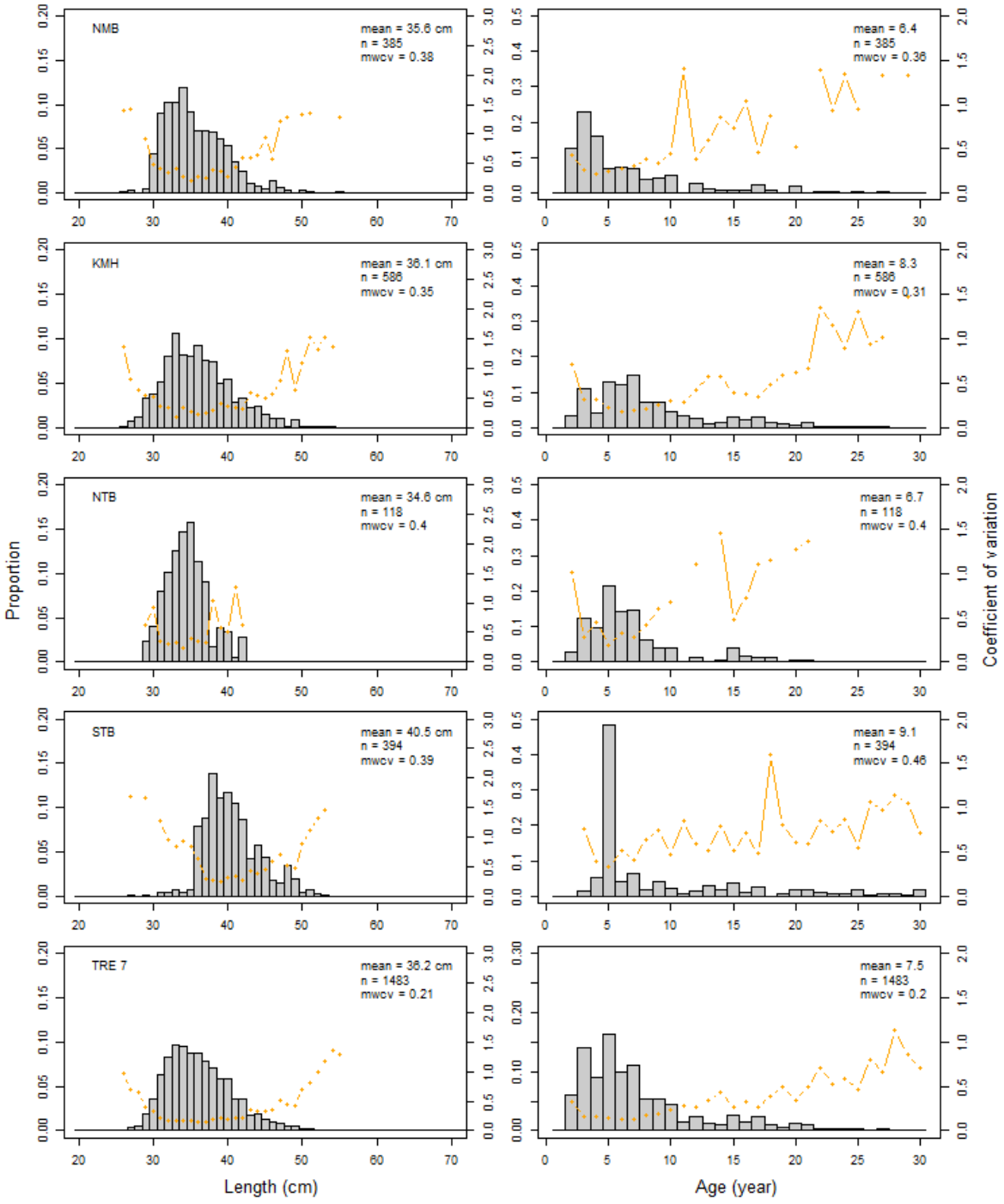

Figure 19: Proportion at length and age distributions (histograms) and bootstrap CVs (lines) determined from trevally landings sampled from the TRE 7 and subarea bottom trawl fisheries in 2022–23 using the length frequency and age-length key approach (n, sample size; MWCV, mean weighted CV). NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

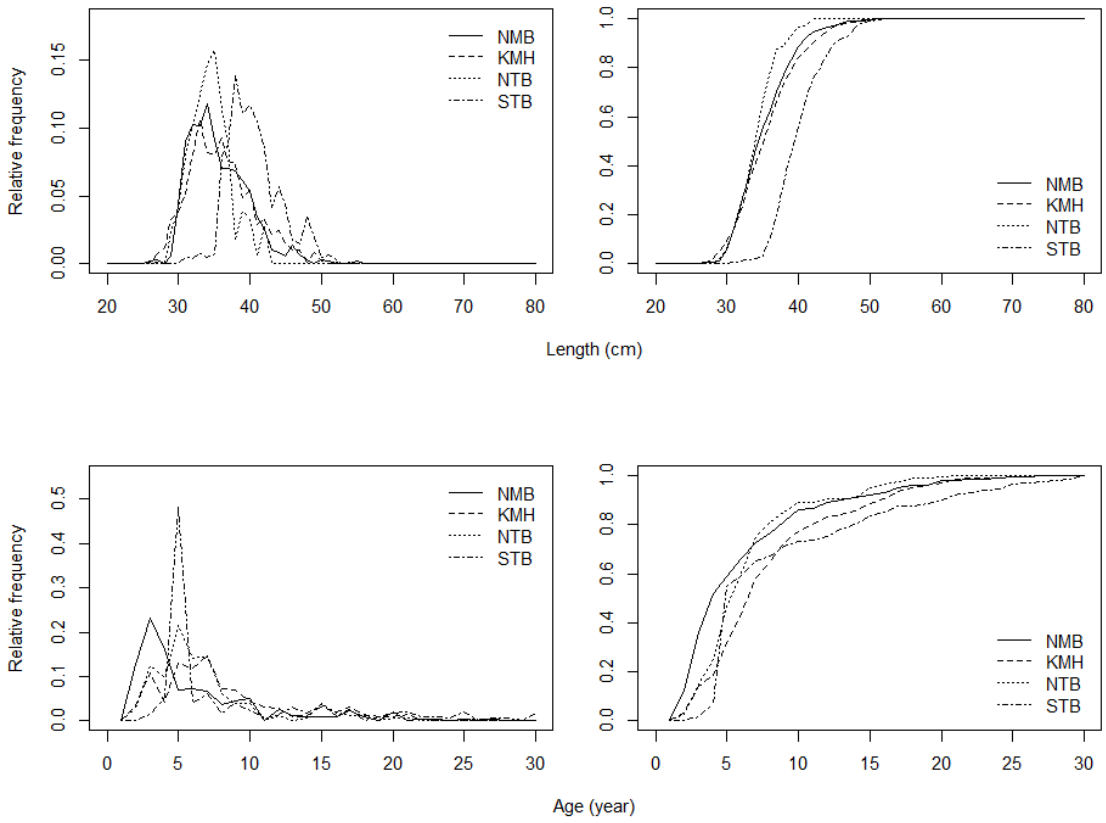

Figure 20: Comparison of the proportion and cumulative proportion at length (top) and age (bottom) distributions determined from trevally landings sampled from the TRE 7 subarea bottom trawl fisheries in 2022–23. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

3.5 Mean length-at-age and mean weight-at-age 2022–23

A general trend of increasing mean weight-at-age and mean length-at-age across successive age classes up to 20 years was observed in data collected from the four subareas of the TRE 7 bottom trawl fishery during 2022–23 (Figure 21), although some variability was evident between subareas. Among the common age classes, the lowest mean weight-at-age estimates were most frequently recorded in the North Taranaki Bight, while the highest were typically observed in the South Taranaki Bight (Figure 21). For some of the younger age classes (2- to 3-year-olds), mean weight-at-age estimates may be positively biased due to the minimum legal size (MLS) restriction of 25 cm in commercial catches, as well as the possibility that fish in this age range are not yet fully recruited to the fishery (Davies et al. 2003). Patterns in observed mean length-at-age estimates across the TRE 7 subarea bottom trawl fisheries closely mirrored those seen in the mean weight-at-age data (Figure 21).

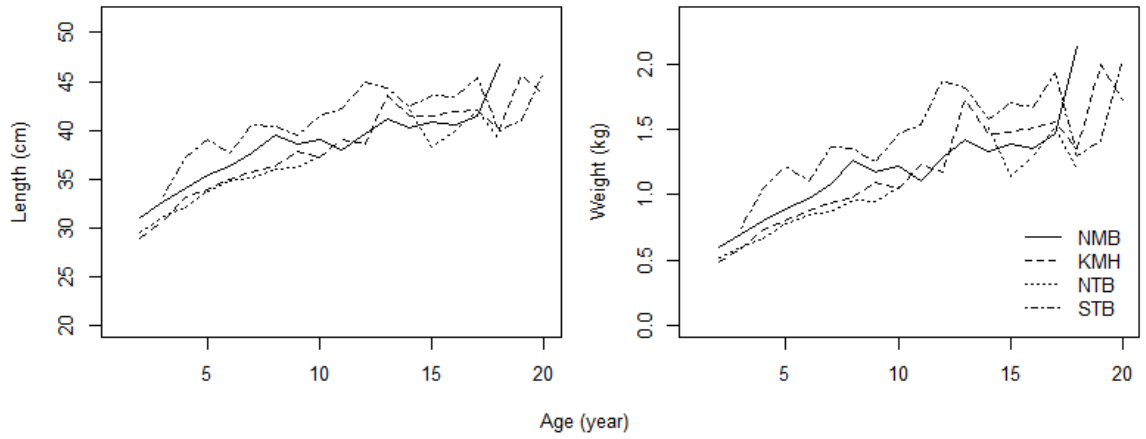

Figure 21: Observed mean length-at-age (left panel) and weight-at-age (right panel) estimates from trevally landings sampled from the TRE 7 subarea bottom trawl fisheries in 2022–23. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

3.6 TRE 7 and subarea catch-at-length and catch-at-age estimates 2023–24

Length and age distributions, along with MWCV) for the TRE 7 bottom trawl and precision bottom trawl fishery and its subareas in 2023–24 are shown in Figure 22. Substantial variation was observed among subareas.

Ninety Mile Beach

Landings from bottom trawl and precision bottom trawl fisheries in this subarea were dominated by small to moderate-sized trevally (31–39 cm), with a primary mode at 34 cm and a narrow tail just below 50 cm (Figure 22). The mean length was 35.4 cm, the lowest among subareas with a MWCV of 0.27. The age distribution was skewed toward younger fish (≤8 years), with the 2020 year-class (4-year-olds) comprising approximately one-fifth of the catch. The mean age was 6.1 years, also the lowest among subareas, with a MWCV of 0.27. Cumulative plots of length and age proportion indicate that the Ninety Mile Beach subarea had the highest proportions of small and young trevally caught from TRE 7 in 2023–24 (Figure 23).

Kaipara-Manukau

This subarea had the broadest length distribution across both bottom trawl and precision bottom trawl fisheries, with a strong presence of small, moderate, and large fish. Modes were centred around 31 and 32 cm (Figure 22). The mean length was 36.5 cm, and the MWCV was 0.40, indicating high variability between landings. The age distribution was also broad, with fish up to and over 20 years old. The mean age was 8.8 years, with a MWCV of 0.38.

North Taranaki Bight

Landings from bottom trawl and precision bottom trawl fisheries in this subarea were dominated by trevally between 31 and 40 cm, with a narrow tail up to 47 cm (Figure 22). The mean length was 35.8 cm, and the MWCV was 0.39. The age distribution was broad, similar to that from Kaipara-Manukau, but with a slightly narrower range of older fish. Most fish were between 4 and 11 years old. The mean age was 8.0 years, with a MWCV of 0.36.

South Taranaki Bight

This subarea featured mostly moderate to large trevally (36–50 cm), with a tail extending beyond 50 cm (Figure 22). The mean length was the highest among subareas at 40.6 cm, and the MWCV was 0.39. The age distribution was also broad, with fish up to and over 20 years old. A distinct spike in 6-year-olds was unique to this subarea. The mean age was the highest at 11.6 years, with a MWCV of 0.45, reflecting both the broad age range and the dominance of the 6-year-old cohort. Cumulative plots of length and age proportion indicate that the South Taranaki Bight subarea had the highest proportions of large and older trevally caught from TRE 7 in 2023–24 (Figure 23).

TRE 7

The overall TRE 7 length distribution was broad (Figure 23). The mean length was 37.6 cm, with a MWCV of 0.23. The age distribution was also broad, with good representation across most recruited age classes, including fish over 20 years old. Strong recruitment was evident for 4- and 6-year-olds. Fish aged 3–10 years dominated the catch. The mean age was 9.2 years, with a MWCV of 0.23. A trend of decreasing proportions of small and young trevally down a latitudinal cline was evident in the respective subareas of TRE 7 in 2023–24 (Figure 23).

Figure 22: Proportion at length and age distributions (histograms) and bootstrap CVs (lines) determined from trevally landings sampled from the TRE 7 and subarea bottom trawl and precision bottom trawl fisheries in 2023–24 using the length frequency and age-length key approach (n, sample size; MWCV, mean weighted CV). NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

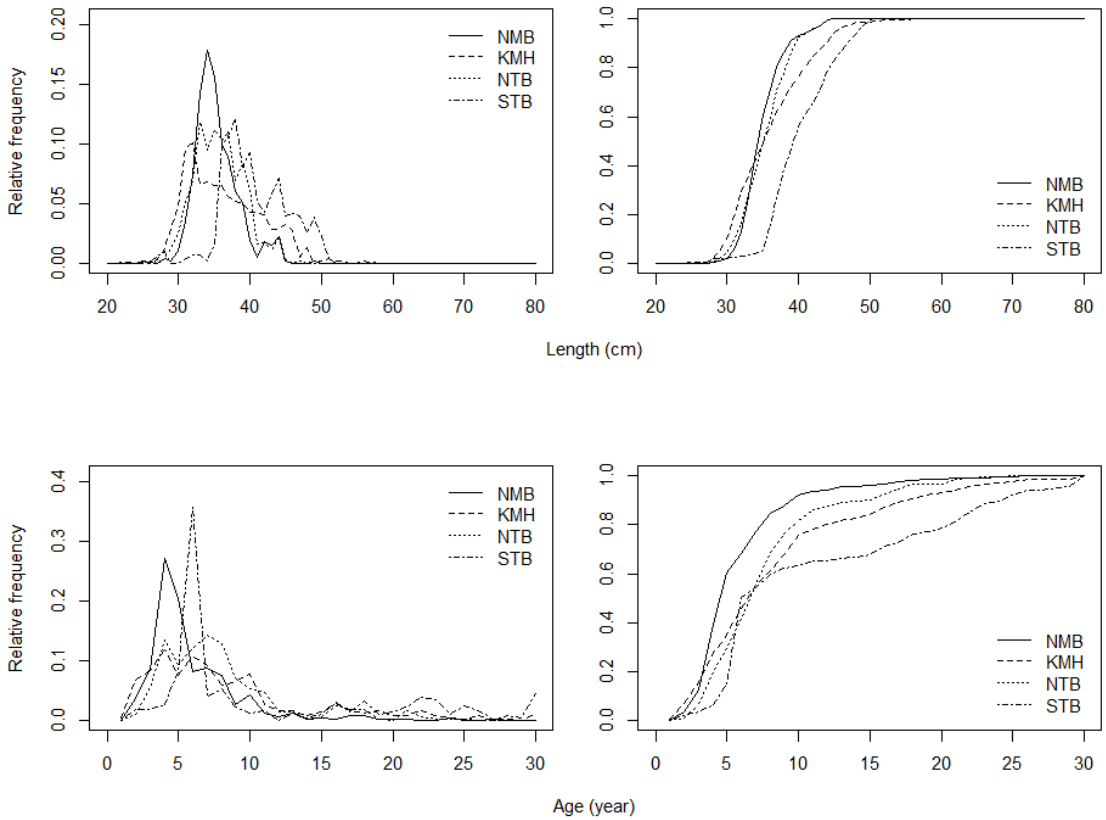

Figure 23: Comparison of the proportion and cumulative proportion at length (top) and age (bottom) distributions determined from trevally landings sampled from the TRE 7 subarea bottom trawl fisheries in 2023–24. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

3.7 Mean length-at-age and mean weight-at-age 2023–24

A general trend of increasing mean weight-at-age and mean length-at-age across successive age classes up to 30 years was observed in data collected from the four subareas of the TRE 7 bottom trawl and precision bottom trawl fishery during 2023–24 (Figure 24), although some variability was evident between subareas. Among the common age classes, the lowest mean weight-at-age estimates were most frequently recorded in the North Taranaki Bight, while the highest were typically observed in the South Taranaki Bight. For some of the younger age classes (2- to 3-year-olds), mean weight-at-age estimates may be positively biased due to the minimum legal size (MLS) restriction of 25 cm in commercial catches, as well as the possibility that fish in this age range are not yet fully recruited to the fishery (Davies et al. 2003). Patterns in observed mean length-at-age estimates across the TRE 7 subarea bottom trawl fisheries closely mirrored those seen in the mean weight-at-age data (Figure 24).

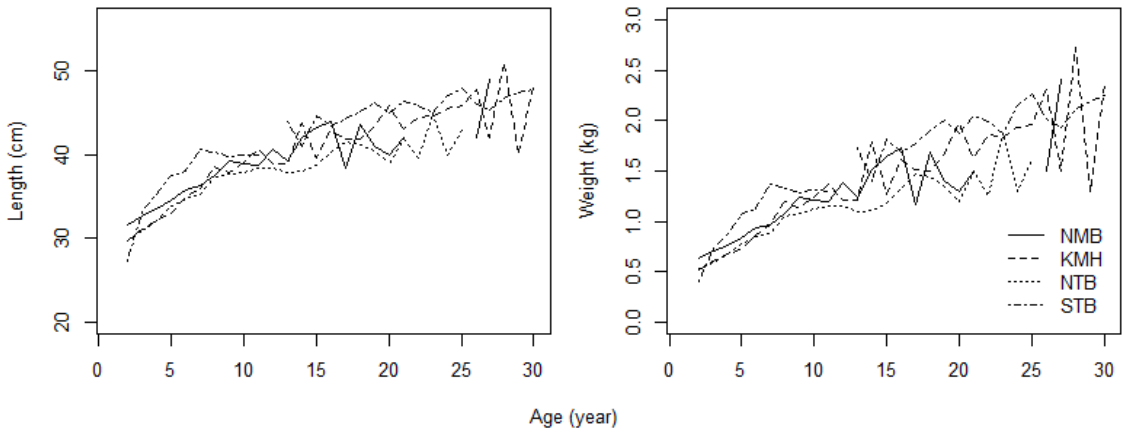

Figure 24: Observed mean weight-at-age (small symbols) and mean length-at-age (large symbols) estimates from trevally landings sampled from the TRE 7 subarea bottom trawl fisheries in 2023–24. NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

3.8 TRE 7 and subarea length and age distribution time series comparisons

Although the time series of length and age information from catch sampling the TRE 7 fishery spans the period 1997–98 to 2023–24 (see Appendix 1), investigation into patterns of spatial heterogeneity within the stock for three subareas (Ninety Mile Beach, Kaipara-Manukau and North Taranaki Bight combined, and South Taranaki Bight) only began in 2006–07, the same time that a rigorous approach to ageing trevally was adopted (see Section 2.4). A six-year non-sequential time series (2006–07, 2007–08, 2009–10, 2012–13, 2022–23 and 2023–24) of these distributions is presented below for TRE 7 (Figure 25), Ninety Mile Beach (Figure 26), Kaipara-Manukau/North Taranaki Bight (Figure 27) and South Taranaki Bight (Figure 28). Independent subarea collections made from the Kaipara-Manukau and North Taranaki Bight in 2012–13, 2022–23 and 2023–24 were combined here for the purpose of time series comparisons described above. As the years are non-sequential, specific age classes within each time series age distribution have been annotated white and black for easier interpretation of cohort progression between sampling years. These results are based on bottom trawl only for continuity (data collected from precision bottom trawl landings was not included in these time series).

Ninety Mile Beach

The length and age distributions sampled from bottom trawl landings from the Ninety Mile Beach subarea from 2006–07 to 2023–24 consistently had a high proportion of small and young trevally, with fish 10 years and younger accounting for 75–90% of the catch (Figure 25). Over the 17-year period, estimates of mean length indicate a considerable reduction from 40.6 to 35.5 cm and mean age from 8.2 to 6.4 years, consistently representing the lowest age estimates sampled from the TRE 7 subarea fisheries in each respective sampling year. Some continuity of year class progression over successive years was evident, most noticeably the strong 2003 year-class, 4-year-olds in 2006–07 and the recent 2019 and 2020 year-classes, 3- and 4-year-olds in the 2022–23. Sample sizes for both length and age collections in the 2006–07, 2007–08 and 2023–24 fishing years were well below targets and most likely explain some of the variability apparent in length and age structure between years.

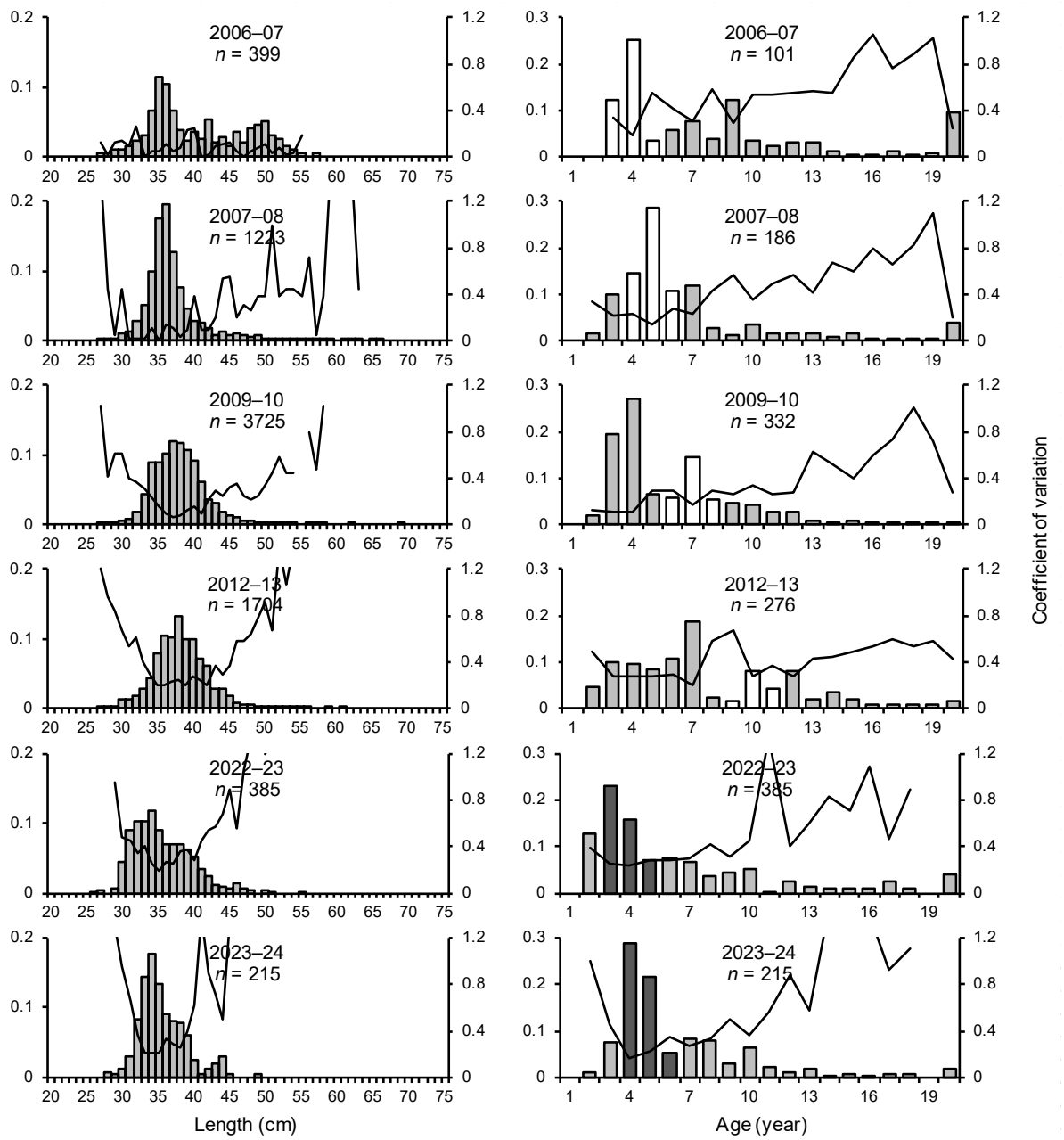

Figure 25: Recent time series of proportion at length and age distributions (histograms) and CVs (lines) determined from trevally landings sampled from the Ninety Mile Beach subarea bottom trawl fishery using the length frequency and age-length key approach in 2006–07, 2007–08, 2009–10, 2012–13 and the random age-frequency approach in 2022–23 and 2023–24 (*n*, sample size). White bars in the age distribution represent the 2002 to 2004 year-classes and dark black bars represent the 2018 to 2020 year-classes.

Kaipara-Manukau/North Taranaki Bight

In previous research, sampled bottom trawl age distributions from the Kaipara-Manukau and North Taranaki Bight subareas (2006–07, 2007–08, 2009–10 and 2012–13) were combined into one subarea due to too small sample size availability within each area (Figure 26). Further, continuity in year class strength progression in the Kaipara-Manukau and North Taranaki Bight time series age distributions is less evident than other subarea summaries. With the exception of samples from 2009–10, all other samples were based on comprehensive collections, although the proportion of samples associated with either the Kaipara-Manukau or North Taranaki Bight subarea is unknown. Estimates of mean length ranged from 35.7 to 42.8 cm and mean age from 7.9 to 12.0 years, most often second highest in TRE 7, behind those determined for South Taranaki Bight (Figure 26).

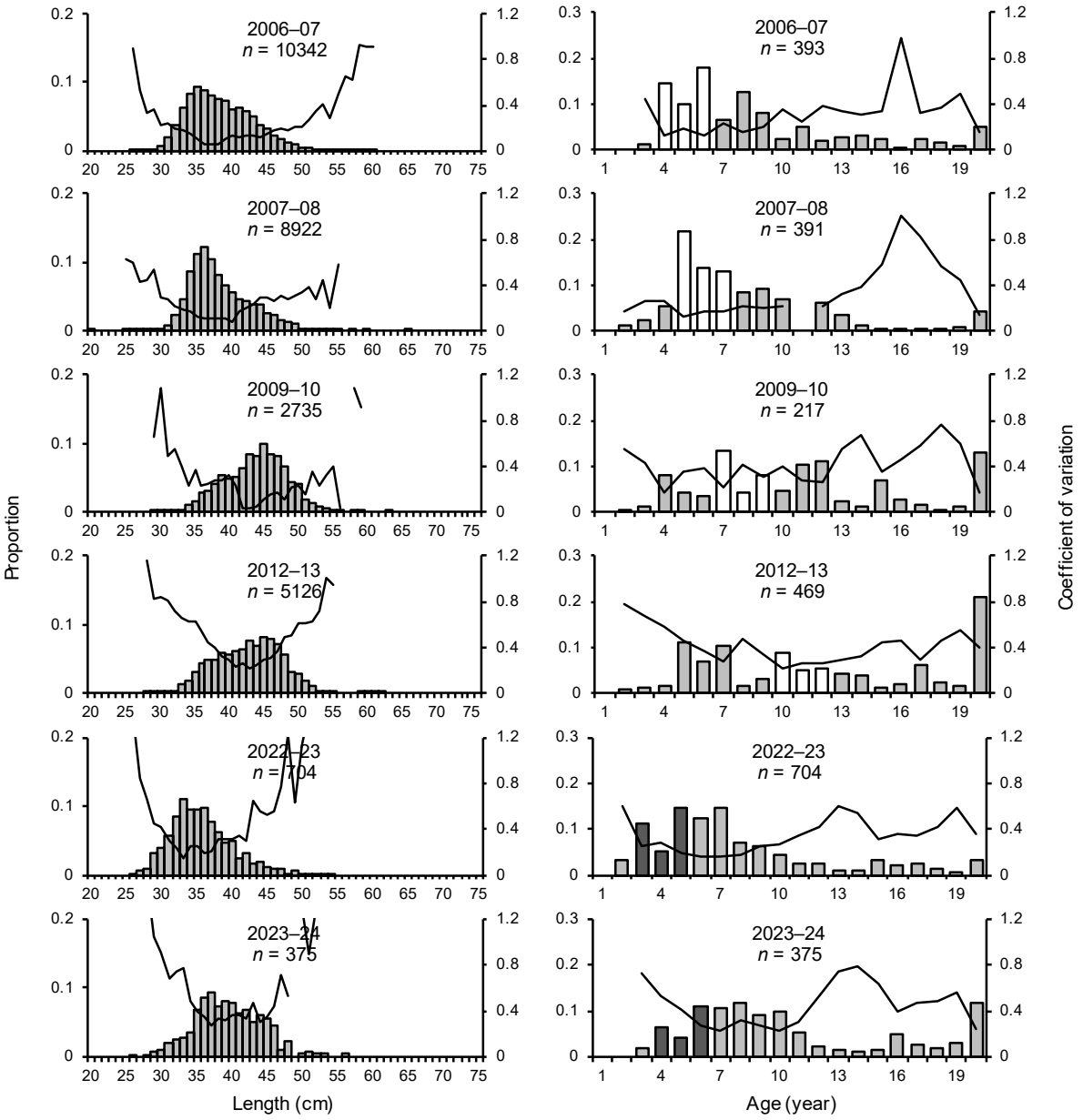

Figure 26: Recent time series of proportion at length and age distributions (histograms) and CVs (lines) determined from trevally landings sampled from the Kaipara-Manukau/North Taranaki Bight subarea bottom trawl fishery using the length frequency and age-length key approach in 2006–07, 2007–08, 2009–10, 2012–13 and the random age-frequency approach in 2022–23 and 2023–24 (*n*, sample size). White bars in the age distribution represent the 2001 to 2003 year-classes and dark black bars represent the 2018 to 2020 year-classes.

South Taranaki Bight

The length and age distributions sampled from South Taranaki Bight bottom trawl landings from 2006–07 to 2023–24 illustrates that substantial variability occurs in year-class strength within this subarea compared with northern subareas (Figure 27). The dominant 2018 year-class, which was 5- and 6-years old in 2022–23 and 2023–24 respectively, accounted for 48% and 36% of the year classes by number. The South Taranaki Bight fishery contained a high proportion of fish that was 20 years old or more, compared with the other TRE 7 subareas. (Figure 27). Estimates of mean length ranged from 40.5 to 44.6 cm and mean age from 8.6 to 14.1 years, often being the highest estimates sampled from the TRE 7 subarea fisheries in each respective year. Despite some variability in length and age

structure between years, continuity in year class strength progression over most sampled years was generally evident.

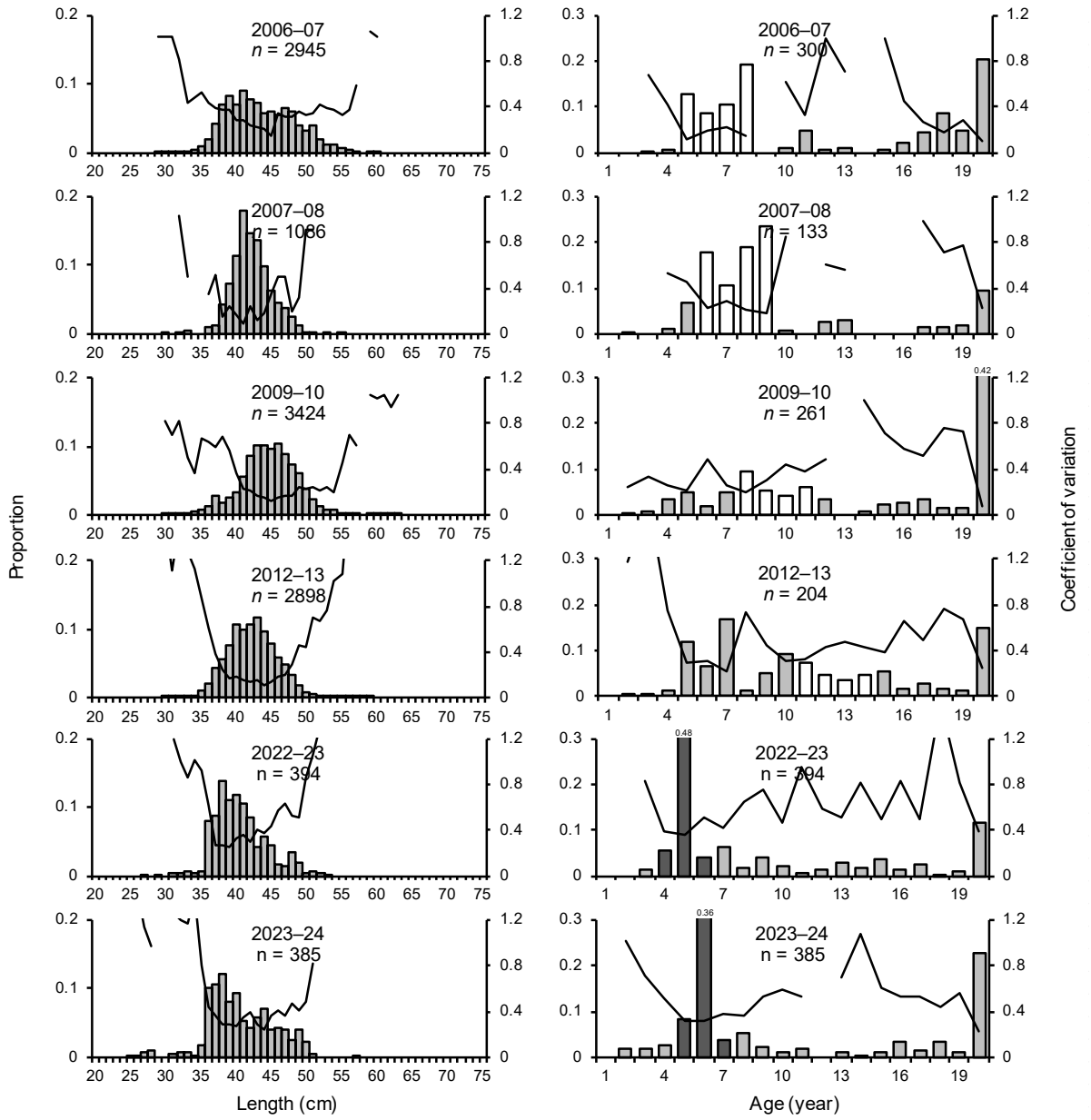

Figure 27: Recent time series of proportion at length and age distributions (histograms) and CVs (lines) determined from trevally landings sampled from the South Taranaki Bight subarea bottom trawl fishery using the length frequency and age-length key approach in 2006–07, 2007–08, 2009–10, 2012–13 and the random age-frequency approach in 2022–23 and 2023–24 (*n*, sample size). White bars in the age distribution represent the 1999 to 2002 year-classes and dark black bars represent the 2017 to 2019 year-classes.

TRE 7

Length and age distributions sampled from TRE 7 bottom trawl landings broadened considerably between 2006–07 and 2012–13 (Figure 28) with estimates of mean length and age increasing from 38.0 to 40.8 cm and 7.9 to 10.6 years respectively. By 2022–23 to 2023–24 mean length and age had reduced slightly due to increasing proportions of young trevally up to 10 years of age, with mean length and age estimated at 36.3 to 38.5 cm and 7.5 to 9.9 years respectively. Despite some variability in length and age structure between years, there was good continuity in year-class strength, which was evident in the progression of most year classes over successive years, particularly those occupying the common age classes.

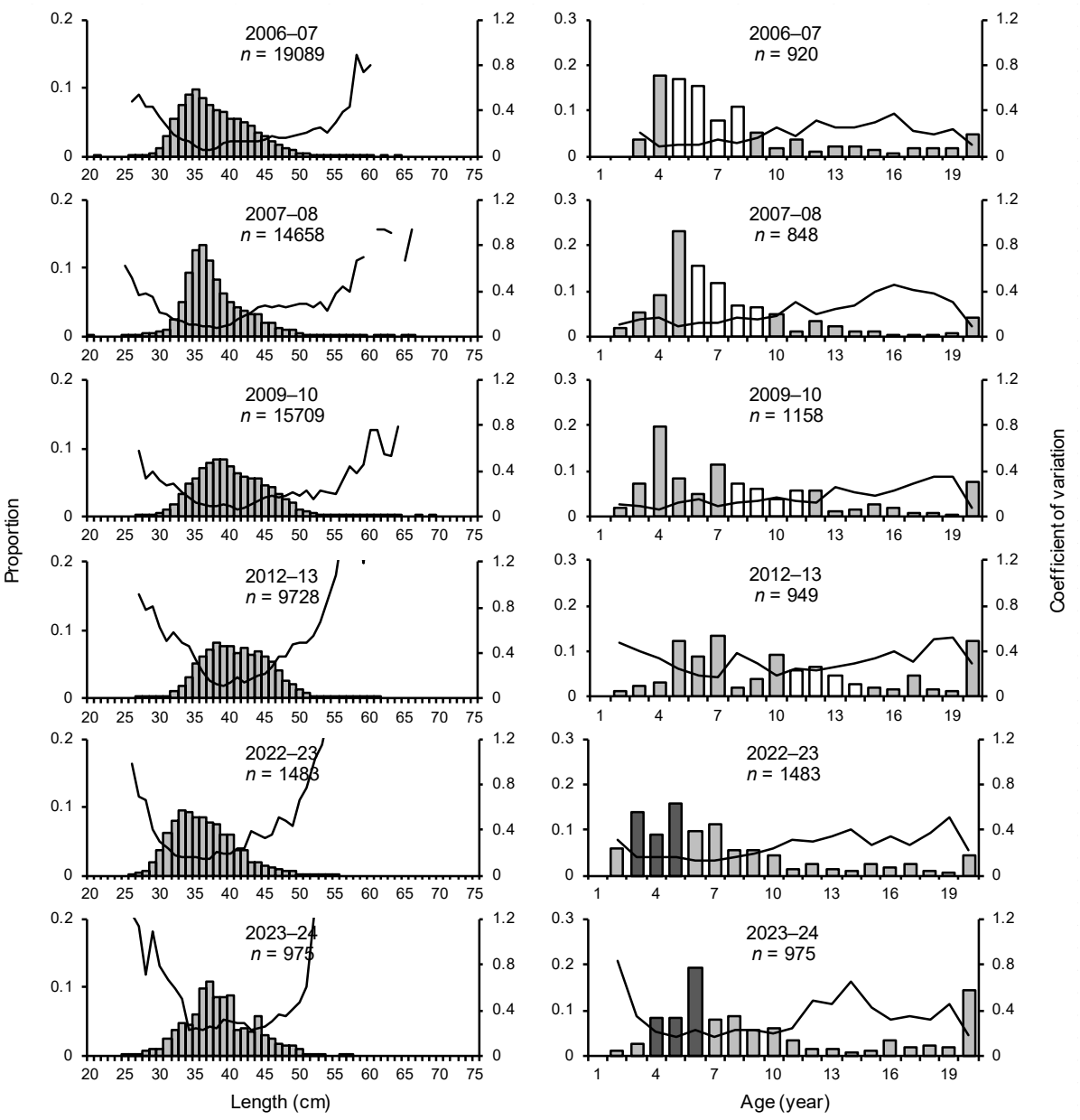

Figure 28: Recent time series of proportion at length and age distributions (histograms) and CVs (lines) determined from trevally landings sampled from the TRE 7 bottom trawl fishery using the length frequency and age-length key approach in 2006–07, 2007–08, 2009–10, 2012–13 and the random age-frequency approach in 2022–23 and 2023–24 (*n*, sample size). White bars in the age distribution represent the 1999 to 2002 year-classes and dark black bars represent the 2018 to 2020 year-classes.

4. DISCUSSION

This report represents the ninth summary of trevally length and age compositions in TRE 7 since 1997–98, and the fifth to investigate spatial variability within the stock. Since the adoption of a revised ageing protocol in 2014 (Walsh et al. 2014a), age estimates have become more reliable, enhancing confidence in interpreting year-class strengths. However, ageing older trevally remains inherently challenging, and some uncertainty persists.

Fishery Trends and Gear Transition

Between 2018–19 and 2022–23 the fishery was dominated by bottom trawl. In 2023–24 the TRE 7 fishery exhibited notable methodological shift, with the widespread adoption of precision bottom trawl gear in northern subareas, replacing traditional bottom trawling. Kaipara-Manukau consistently contributed the largest share of annual landings, followed by Ninety Mile Beach and South Taranaki Bight. North Taranaki Bight remained the least productive subarea. In the first year (2022–23) of sampling only one large vessel was sampled in the three northern sub areas. In the second year (2023–24) of sampling seven smaller vessels were sampled in these subareas. Each vessel will have selectivity differences, and it will be difficult to compare these over the two-year period due to the differences in gear used and size. This transition coincided with a decline in overall catch rates, suggesting changes in either gear efficiency, fish availability or due to skippers avoiding snapper in the area (Fisheries New Zealand, 2024; various skippers pers. comm.).

Sampling Design and Representativeness

Sampling in 2022–23 and 2023–24 was designed to capture spatial and temporal variability in trevally landings. The 2023–24 programme expanded to include precision bottom trawl samples, reflecting evolving fishing practices. Sampling coverage improved year-on-year, with 49 valid samples collected in 2023–24. The introduction of daily electronic catch estimates from Fisheries New Zealand significantly enhanced sample coordination and responsiveness to fleet activity.

Despite logistical constraints, such as changes in LFRs and limited access to valid subarea landings, sampling was broadly representative of commercial fishing activity, particularly in Statistical Areas 041–047. Some mismatches between catch and sampling by target species were observed, but overall proportionality between sampled and commercial data was maintained.

Length and Age Composition

Catch-at-length and catch-at-age analyses for 2022–23 and 2023–24 revealed consistent spatial patterns and interannual variability. The overall TRE 7 fishery exhibited a broad size and age structure, with fish exceeding 50 cm and over 30 years old present in the catch. Mean lengths increased from 36.2 cm to 37.6 cm, and mean ages rose from 7.5 to 9.2 years. Strong recruitment signals were evident for 3- to 6-year-olds, indicating stable cohort strength.

Subarea-specific patterns were distinct. Ninety Mile Beach consistently yielded younger, smaller fish, with the 2020 year-class dominating recent catches. Kaipara-Manukau displayed the broadest length and age distributions, reflecting a diverse and mature population. North Taranaki Bight showed moderate size and age distributions, with a dominant presence of 5-year-olds in 2022–23 and a broader age range in 2023–24. South Taranaki Bight featured the largest and oldest trevally, with mean ages reaching 11.6 years in 2023–24 and a substantial proportion of individuals over 20 years old. A strong 2018 year-class was prominent across both years, with 5- and 6-year-olds comprising nearly half of the catch in 2022–23 and over a third in 2023–24, highlighting the subarea's key role in supporting both recruitment and longevity within the TRE 7 stock. These findings are consistent with earlier observations from 2012–13, where Kaipara-Manukau and South Taranaki Bight also exhibited broader age structures, while Ninety Mile Beach was dominated by younger fish (Walsh et al. 2014d).

Time Series and Cohort Progression

Time series comparisons from 2006–07 to 2023–24 show that TRE 7-wide length and age distributions broadened through 2012–13, followed by a slight reduction in recent years due to increased proportions of younger fish. Despite interannual variability, cohort progression is evident, particularly for common age classes such as the 2018–2020 year-classes in recent years. However, observations of further year class progression have been hampered by a ten-year gap in the time series. Ninety Mile Beach consistently exhibited the youngest population structure, with mean length and age declining from 40.6 cm and 8.2 years in 2006–07 to 35.5 cm and 6.4 years in 2023–24. Kaipara-Manukau/North Taranaki Bight showed less consistent cohort progression but maintained relatively high mean lengths and ages, second only to South Taranaki Bight. South Taranaki Bight displayed the greatest variability in year class strength, with dominant cohorts such as the 2018 year-class accounting for a substantial portion of the catch in recent years.

Stock Structure and Connectivity

Spatial patterns in age and size distributions indicate a north–south cline, with older fish increasingly dominant in southern areas. The absence of recruits and the southward progression of strong year classes suggest a single stock exhibiting age-related movement. Northern subareas show more stable year-class strengths, while South Taranaki Bight is more variable, possibly due to environmental and fishing pressures. These findings highlight persistent spatial heterogeneity in the TRE 7 stock, with a clear decline in younger, smaller fish from north to south.

The Inshore Working Group recommended that future TRE 7 catch-at-age programmes include trevally found off the west coast of the South Island in order to better understand the stock structure of TRE 7.

Objectives and Recommendations

Sampling precision in 2022–23 and 2023–24 was close to target for the TRE 7 region, with CVs of 0.21 and 0.23 respectively for length and 0.20 and 0.23 respectively for age. The slightly higher CV was potentially because the age structure has broadened overall. This may require a higher sampling intensity in future years. Subarea variability was highest in South Taranaki Bight, reflecting its broad age structure and dominant cohort effects. While some sample targets were missed in earlier years, recent improvements in sampling design, coordination, and industry collaboration have enhanced data quality.

To support robust stock assessments and sustainable management, future sampling must ensure representative coverage across all subareas, maintain target sample sizes, and continue adapting to changes in fishing practices. The transition to RAF sampling has improved precision and reduced bias (Davies et al. 2003), but continued refinement is needed to address spatial heterogeneity and ensure long-term data continuity.

5. FULFILMENT OF BROADER OUTCOMES

As required under Government Procurement rules[2], Fisheries New Zealand considered broader outcomes (secondary benefits such as environmental, social, economic, or cultural benefits) that would be generated by this project. 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

[2] https://www.procurement.govt.nz/procurement/principles-charter-and-rules/government-procurement-rules/planning-your-procurement/broader-outcomes/

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 alongside a lead sampler, 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 (e.g., https://niwa.co.nz/news/catch-sampling).

6. ACKNOWLEDGEMENTS

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8. APPENDICES

APPENDIX 1: TRE 7 catch sampling summary from 1997–98 to 2012–13

Note: all collections made using the length frequency and age-length key sampling approach, and all ageing undertaken by NIWA).

TRE 7

Catch sampling Report	Research Provider	Fishing year	Fishing method	No. of landings sampled for LF	Season††	Comments*	Otolith sample size	Otolith prep[n†]	Season††
Walsh et al. (1999)	NIWA	1997–98	Bottom trawl	55	Spr–Aut, Win	9 NMB, 15 KMH, 10 NTB, 1 STB, 20 Mixed (47 Peak, 8 Off-peak)	375	B&E	Sum
			Bottom pair trawl	7	Spr–Sum	Unknown			
Walsh et al. (2000)	NIWA	1998–99	Bottom trawl	26	Spr–Aut	3 NMB, 10 KMH, 2 NTB, 11 Mixed	225	TS	Sum–Aut
			Bottom pair trawl	14	Sum–Aut	6 NMB, 2 KMH, 2 NTB, 4 Mixed	156	TS	Sum–Aut
Langley (2001)	Sanford Ltd	1999–2000	Bottom trawl	39	Sum–Aut	6 NMB, 7 KMH, 5 NTB, 2 STB, 19 Mixed	505	TS	Sum–Aut
Langley (2002)	Sanford Ltd	2000–01	Bottom trawl	49	Spr–Aut	5 NMB, 16 KMH, 3 NTB, 25 Mixed	496	TS	Spr–Sum
			Bottom pair trawl	13	Spr–Sum	2 NMB, 7 KMH, 4 Mixed			
Langley (2009)	GANZL	2005–06	Bottom trawl	11	Spr–Aut	3 KMH, 2 NTB, 3 STB, 3 Mixed	328	TS	Spr–Sum
Walsh et al. (2010a)	NIWA	2006–07	Bottom trawl	33	Spr–Win	2 NMB, 14 KMH/NTB, 11 STB, 6 Mixed	920	TS	Spr–Win
Walsh et al. (2010b)	NIWA	2007–08	Bottom trawl	21	Spr–Aut	2 NMB, 12 KMH/NTB, 3 STB, 4 Mixed	848	TS	Spr–Aut
Walsh et al. (2012a)	NIWA	2009–10	Bottom trawl	37	Spr–Win	6 NMB, 6 KMH/NTB, 17 STB, 8 Mixed	1158	TS	Spr–Win
Walsh et al. (2014d)	NIWA	2012–13	Bottom trawl	28	Spr–Win	7 NMB, 7 KMH, 4 NTB, 10 STB	949	TS	Spr–Win

* NMB = Ninety Mile Beach; KMH = Coastal Kaipara-Manukau; NTB = North Taranaki Bight; STB = South Taranaki Bight.
† B&E = Bake and embed; TS = Thin section.
†† Spr (Oct–Nov), Sum (Dec–Feb), Aut (Mar–May), Win (Jun–Sep).
NIWA, National Institute of Water and Atmospheric Research; GANZL, Golder Associates (NZ) Ltd

APPENDIX 2: Age-length key derived from otolith samples collected from trevally fisheries in TRE 7 in 2022–23

Table A2.1: Estimates of proportion of age at length for trevally sampled from all TRE 7 subareas combined, 2022–23. (Note: aged to 1 January 2023).

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	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
27	0	0.78	0.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
28	0	0.60	0.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
29	0	0.50	0.47	0	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32
30	0	0.34	0.50	0.05	0.11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44
31	0	0.20	0.49	0.10	0.11	0.07	0.04	0	0	0	0	0	0	0	0	0	0	0	0	0	84
32	0	0.13	0.34	0.16	0.18	0.11	0.06	0	0.01	0	0	0	0	0	0	0	0	0	0	0	97
33	0	0.02	0.29	0.24	0.15	0.09	0.15	0.03	0.03	0.01	0	0	0	0	0	0	0	0	0	0	117
34	0	0.03	0.17	0.21	0.22	0.15	0.11	0.09	0	0.02	0	0	0	0	0	0	0	0	0	0	109
35	0	0	0.06	0.19	0.20	0.21	0.09	0.09	0.05	0.04	0.02	0.01	0.01	0	0.01	0	0.01	0.01	0	0.01	101
36	0	0	0.06	0.11	0.26	0.14	0.15	0.07	0.06	0.06	0.03	0.02	0	0.01	0.01	0	0	0.01	0	0.01	125
37	0	0	0.01	0.06	0.27	0.10	0.14	0.12	0.10	0.07	0.01	0.05	0	0	0.04	0	0.02	0.01	0	0	108
38	0	0	0	0.04	0.30	0.10	0.15	0.09	0.13	0.08	0.03	0.03	0.01	0.01	0.02	0	0.02	0	0	0.02	120
39	0	0	0	0	0.20	0.04	0.20	0.06	0.15	0.11	0.02	0.01	0.03	0.02	0.02	0.02	0.05	0.01	0.01	0.04	95
40	0	0	0	0.03	0.17	0.03	0.09	0.06	0.09	0.11	0.04	0.06	0.01	0.04	0.08	0.06	0.04	0.03	0.01	0.04	90
41	0	0	0	0	0.17	0.09	0.11	0.09	0.12	0.06	0	0.09	0.03	0	0.03	0.05	0.03	0.02	0.05	0.06	65
42	0	0	0	0	0.13	0.06	0.06	0.02	0.02	0.08	0.05	0.05	0.06	0.06	0.06	0.06	0.08	0.03	0	0.17	63
43	0	0	0	0	0.09	0	0.06	0	0.03	0.03	0.03	0	0.03	0.06	0.09	0.03	0.13	0	0.03	0.38	32
44	0	0	0	0	0.04	0	0.09	0	0.02	0	0.04	0.02	0	0.02	0.15	0.09	0.07	0	0.07	0.39	46
45	0	0	0	0	0	0.03	0.03	0.03	0	0.03	0	0.06	0.09	0.03	0.09	0.03	0.12	0	0.06	0.41	34
46	0	0	0	0	0.04	0.04	0	0.07	0	0	0.07	0.07	0.11	0.04	0.04	0.07	0.04	0	0	0.41	27
47	0	0	0	0	0	0	0.05	0.05	0	0	0	0	0.05	0.05	0	0	0.05	0.05	0	0.68	19
48	0	0	0	0	0	0	0	0	0	0.06	0.06	0.06	0	0	0.06	0.06	0.12	0	0.06	0.53	17
49	0	0	0	0	0	0	0.06	0	0	0	0	0	0.11	0	0	0	0	0.06	0.06	0.72	18
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.13	0.13	0	0.75	8
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	4
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0.33	0	0	0.33	0	0	0.33	3
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	2
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	1
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	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	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	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
Total																					1483

Table A2.2: Estimates of proportion of age at length for trevally sampled from the Ninety Mile Beach subarea of TRE 7, 2022–23. (Note: aged to 1 January 2023).

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	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
27	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0.50	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
30	0	0.67	0.20	0.07	0.07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
31	0	0.47	0.47	0.06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32
32	0	0.30	0.57	0.11	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37
33	0	0.05	0.53	0.37	0	0.03	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	38
34	0	0.05	0.34	0.41	0.11	0.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44
35	0	0	0.17	0.31	0.29	0.17	0	0.03	0.03	0	0	0	0	0	0	0	0	0	0	0	35
36	0	0	0.11	0.15	0.11	0.22	0.22	0	0.04	0.07	0	0.07	0	0	0	0	0	0	0	0	27
37	0	0	0	0.14	0.14	0.14	0.24	0.10	0.10	0.10	0	0.03	0	0	0	0	0	0	0	0	29
38	0	0	0	0.07	0.11	0.14	0.25	0.07	0.14	0.14	0.04	0.04	0	0	0	0	0	0	0	0	28
39	0	0	0	0	0	0.11	0.19	0.04	0.22	0.19	0	0.04	0.07	0.04	0	0.04	0.07	0	0	0	27
40	0	0	0	0	0	0	0.05	0.14	0.05	0.18	0	0.09	0.05	0.09	0.14	0.05	0.14	0.05	0	0	22
41	0	0	0	0	0	0	0.07	0.21	0.14	0.07	0	0.14	0	0	0	0.07	0.14	0	0	0.14	14
42	0	0	0	0	0	0	0	0	0.08	0.08	0	0.08	0.17	0.08	0	0.08	0.17	0	0	0.25	12
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0	0.75	4
44	0	0	0	0	0	0	0.25	0	0	0	0	0	0	0	0.25	0	0	0	0	0.50	4
45	0	0	0	0	0	0	0	0	0	0.50	0	0	0	0	0	0	0	0	0	0.50	2
46	0	0	0	0	0	0	0	0.20	0	0	0	0.20	0.20	0	0	0	0.20	0	0	0.20	5
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.50	0	0.50	2
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	1
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	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	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	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
Total																					385

Table A2.3: Estimates of proportion of age at length for trevally sampled from the Kaipara-Manukau subarea of TRE 7, 2022–23. (Note: aged to 1 January 2023).

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	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
27	0	0.86	0.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
28	0	0.60	0.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
29	0	0.50	0.46	0	0.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26
30	0	0.09	0.73	0	0.18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22
31	0	0.05	0.46	0.10	0.22	0.12	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	41
32	0	0.04	0.18	0.13	0.24	0.24	0.13	0	0.02	0	0	0	0	0	0	0	0	0	0	0	45
33	0	0	0.17	0.14	0.19	0.14	0.24	0.05	0.05	0.02	0	0	0	0	0	0	0	0	0	0	58
34	0	0.02	0.07	0.05	0.18	0.20	0.23	0.20	0	0.05	0	0	0	0	0	0	0	0	0	0	44
35	0	0	0	0.07	0.16	0.18	0.14	0.16	0.05	0.07	0.05	0.02	0.02	0	0.02	0	0.02	0.02	0	0.02	44
36	0	0	0.02	0.06	0.10	0.13	0.15	0.17	0.15	0.06	0.08	0	0	0.02	0.02	0	0	0.02	0	0.02	48
37	0	0	0.03	0	0.08	0.05	0.11	0.22	0.16	0.11	0.03	0.11	0	0	0.03	0	0.05	0.03	0	0	37
38	0	0	0	0	0.08	0.13	0.13	0.13	0.18	0.11	0.05	0.05	0	0.03	0.03	0	0.05	0	0	0.03	38
39	0	0	0	0	0.04	0	0.22	0.07	0.15	0.11	0.07	0	0.04	0	0.04	0.04	0.07	0	0	0.15	27
40	0	0	0	0	0.04	0.04	0.11	0	0.18	0.14	0.11	0.07	0	0.04	0.07	0.07	0.04	0.04	0.04	0.04	28
41	0	0	0	0	0	0.16	0.21	0.05	0.11	0	0	0.11	0.05	0	0	0.11	0	0.05	0.05	0.11	19
42	0	0	0	0	0.05	0.14	0	0.05	0	0.05	0.05	0.05	0.05	0.05	0.14	0.05	0.09	0.09	0	0.18	22
43	0	0	0	0	0	0	0	0	0.09	0	0	0	0	0.18	0.27	0.09	0.18	0	0.09	0.09	11
44	0	0	0	0	0	0	0.13	0	0	0	0.13	0.07	0	0.07	0.07	0.13	0.07	0	0.07	0.27	15
45	0	0	0	0	0	0.09	0	0	0	0	0	0	0	0	0.09	0.09	0.18	0	0.18	0.36	11
46	0	0	0	0	0	0.10	0	0.10	0	0	0.20	0.10	0.10	0	0.10	0.10	0	0	0	0.20	10
47	0	0	0	0	0	0	0.20	0.20	0	0	0	0	0.20	0.20	0	0	0	0	0	0.20	5
48	0	0	0	0	0	0	0	0	0	0	0.33	0	0	0	0	0.33	0	0	0.33	0	3
49	0	0	0	0	0	0	0.13	0	0	0	0	0	0.13	0	0	0	0	0.13	0.13	0.50	8
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.50	0	0	0.50	2
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	0	1
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	1
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	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	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	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
Total																					586

Table A2.4: Estimates of proportion of age at length for trevally sampled from the North Taranaki Bight subarea of TRE 7, 2022–23. (Note: aged to 1 January 2023).

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	0.67	0.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
30	0	0.43	0.43	0.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
31	0	0	0.67	0.22	0	0	0.11	0	0	0	0	0	0	0	0	0	0	0	0	0	9
32	0	0	0.17	0.50	0.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
33	0	0	0.13	0.19	0.38	0.13	0.13	0.06	0	0	0	0	0	0	0	0	0	0	0	0	16
34	0	0	0	0.06	0.59	0.18	0.12	0.06	0	0	0	0	0	0	0	0	0	0	0	0	17
35	0	0	0	0	0.19	0.38	0.19	0.06	0.13	0.06	0	0	0	0	0	0	0	0	0	0	16
36	0	0	0	0	0.08	0.25	0.50	0.08	0	0.08	0	0	0	0	0	0	0	0	0	0	12
37	0	0	0	0	0.10	0.10	0.20	0.10	0.20	0.10	0	0	0	0	0.20	0	0	0	0	0	10
38	0	0	0	0	0	0	0	0.33	0	0.33	0	0	0	0	0.33	0	0	0	0	0	3
39	0	0	0	0	0	0	0	0.25	0	0.25	0	0	0	0	0.25	0	0	0.25	0	0	4
40	0	0	0	0	0	0	0	0	0	0.25	0	0.25	0	0	0	0.50	0	0	0	0	4
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	0	0	0	1
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0	0.25	0	0	0.50	4
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	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	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	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
Total																					118

Table A2.5: Estimates of proportion of age at length for trevally sampled from the South Taranaki Bight subarea of TRE 7, 2022–23. (Note: aged to 1 January 2023).

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	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
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	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
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	0.50	0	0	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
32	0	0	0.67	0	0.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
33	0	0	0.40	0.60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
34	0	0	0.25	0.50	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
35	0	0	0	0.83	0	0.17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
36	0	0	0.08	0.18	0.63	0.08	0	0	0	0.03	0	0	0	0	0	0	0	0	0	0	38
37	0	0	0	0.09	0.66	0.13	0.06	0.03	0	0	0	0	0	0	0.03	0	0	0	0	0	32
38	0	0	0	0.06	0.59	0.06	0.12	0.06	0.08	0	0	0	0.02	0	0	0	0	0	0	0.02	51
39	0	0	0	0	0.49	0.03	0.22	0.05	0.11	0.03	0	0	0	0.03	0	0	0.03	0	0.03	0	37
40	0	0	0	0.08	0.39	0.06	0.11	0.06	0.06	0.03	0.03	0	0	0.03	0.06	0	0	0.03	0	0.08	36
41	0	0	0	0	0.35	0.10	0.06	0.06	0.13	0.10	0	0.06	0.03	0	0.03	0	0	0	0.06	0	31
42	0	0	0	0	0.28	0.04	0.16	0	0	0.12	0.08	0.04	0.04	0.04	0.04	0.08	0	0	0	0.08	25
43	0	0	0	0	0.18	0	0.12	0	0	0.06	0.06	0.00	0.06	0	0	0	0.06	0	0	0.47	17
44	0	0	0	0	0.07	0	0.04	0	0.04	0	0	0	0	0	0.19	0.07	0.07	0	0.07	0.44	27
45	0	0	0	0	0	0	0.05	0.05	0	0	0	0.10	0.14	0.05	0.10	0	0.10	0	0	0.43	21
46	0	0	0	0	0.08	0	0	0	0	0	0	0	0.08	0.08	0	0.08	0	0	0	0.67	12
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.08	0	0	0.92	12
48	0	0	0	0	0	0	0	0	0	0.08	0	0.08	0	0	0.08	0	0.15	0	0	0.62	13
49	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0	0	0	0	0	0	0.90	10
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	5
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	2
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0.50	0	0	0	0	0	0.50	2
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	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	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	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
Total																					394

APPENDIX 3: Age-length key derived from otolith samples collected from trevally fisheries in TRE 7 in 2023–24

Table A3.1: Estimates of proportion of age at length for trevally sampled from all TRE 7 subareas combined, 2023–24. (Note: aged to 1 January 2024).

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	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
23	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0.33	0.33	0	0.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
26	0.33	0.33	0	0.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
27	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
28	0	0.82	0.12	0.06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17
29	0	0.46	0.42	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24
30	0	0.35	0.28	0.26	0.07	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43
31	0	0.17	0.34	0.37	0.08	0.02	0.01	0	0.01	0	0	0	0	0	0	0	0	0	0	0	90
32	0	0.08	0.18	0.38	0.17	0.11	0.08	0	0	0	0	0	0	0	0	0	0	0	0	0	120
33	0	0.01	0.11	0.38	0.21	0.16	0.07	0.03	0.03	0.01	0	0	0	0	0	0	0	0	0	0	153
34	0	0.01	0.07	0.28	0.25	0.15	0.13	0.04	0.03	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	149
35	0	0.01	0.01	0.14	0.21	0.17	0.24	0.08	0.07	0.07	0	0	0	0	0	0	0.01	0.01	0	0	153
36	0	0	0.01	0.08	0.20	0.24	0.20	0.09	0.08	0.05	0.01	0.02	0.01	0	0	0.01	0	0	0	0.01	152
37	0	0	0	0.07	0.12	0.23	0.12	0.16	0.10	0.07	0.06	0.01	0.03	0.01	0.01	0	0.01	0	0	0	139
38	0	0	0	0	0.06	0.30	0.11	0.16	0.10	0.13	0.04	0	0.04	0.01	0.03	0.01	0.01	0	0	0	117
39	0	0	0.01	0	0.04	0.25	0.08	0.14	0.08	0.11	0.08	0.03	0.03	0.02	0.00	0.04	0.02	0.02	0.01	0.06	106
40	0	0	0	0	0.02	0.19	0.05	0.13	0.14	0.11	0.09	0.02	0.02	0	0.03	0.03	0.04	0.04	0.01	0.06	97
41	0	0	0	0	0.03	0.10	0.08	0.10	0.07	0.07	0.17	0.03	0	0.03	0.03	0.10	0.02	0.07	0.02	0.08	60
42	0	0	0	0	0.02	0.05	0.05	0.08	0.05	0.09	0.06	0.05	0.02	0	0.03	0.14	0.08	0.09	0.03	0.18	65
43	0	0	0	0	0	0.06	0.02	0.06	0.06	0.06	0.04	0.02	0.08	0.04	0.02	0.16	0.02	0.06	0.06	0.22	49
44	0	0	0	0	0	0.02	0.04	0.04	0	0.07	0	0	0.02	0.02	0.04	0.16	0.09	0.09	0.05	0.39	57
45	0	0	0	0	0	0.03	0.05	0	0.03	0.03	0	0	0.03	0	0	0.10	0.08	0.08	0.08	0.51	39
46	0	0	0	0	0	0	0	0.06	0	0.03	0	0	0	0	0.03	0.09	0.06	0.03	0.11	0.60	35
47	0	0	0	0	0	0	0	0	0	0.04	0	0	0	0	0.08	0	0.04	0.13	0.13	0.58	24
48	0	0	0	0	0	0	0	0.06	0.06	0	0	0	0	0	0	0	0.06	0.06	0	0.76	17
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.06	0.06	0	0.89	18
50	0	0	0	0	0	0	0	0	0.07	0	0	0	0.07	0	0	0	0	0.07	0	0.79	14
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	5
52	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	0	0	0	0	1
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	2
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	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	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	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
Total																					1762

Table A3.2: Estimates of proportion of age at length for trevally sampled from the Ninety Mile Beach subarea of TRE 7, 2023–24. (Note: aged to 1 January 2024).

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	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
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	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
29	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
30	0	0.83	0	0.17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
31	0	0.33	0.27	0.33	0	0	0.07	0	0	0	0	0	0	0	0	0	0	0	0	0	15
32	0	0.21	0.28	0.48	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29
33	0	0.02	0.16	0.53	0.24	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55
34	0	0.02	0.09	0.36	0.39	0.08	0.03	0.03	0	0	0	0	0	0	0	0	0	0	0	0	66
35	0	0.02	0.03	0.21	0.34	0.13	0.13	0.07	0.03	0.02	0	0	0	0	0	0	0.02	0	0	0	61
36	0	0	0	0.18	0.36	0.16	0.20	0.09	0	0	0	0	0	0	0	0	0	0	0	0	44
37	0	0	0	0.16	0.08	0.22	0.22	0.19	0.03	0.03	0.05	0.03	0	0	0	0	0	0	0	0	37
38	0	0	0	0	0.05	0.09	0.23	0.23	0.05	0.18	0.05	0	0.14	0	0	0	0	0	0	0	22
39	0	0	0.05	0	0	0.11	0.11	0.16	0.21	0.26	0.05	0	0	0.05	0	0	0	0	0	0	19
40	0	0	0	0	0	0	0.18	0.09	0.27	0.09	0.09	0	0	0	0.09	0	0.09	0	0	0.09	11
41	0	0	0	0	0	0	0	0	0	0	0	0.50	0	0	0	0	0	0	0.50	0	2
42	0	0	0	0	0	0	0	0.10	0.10	0	0	0	0.10	0	0	0	0.10	0.20	0	0.40	10
43	0	0	0	0	0	0	0	0	0.20	0.20	0.20	0.20	0.20	0	0	0	0	0	0	0	5
44	0	0	0	0	0	0	0	0.14	0	0.14	0	0	0	0.14	0.14	0.14	0	0.14	0	0.14	7
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	1
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	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	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	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
Total																					395

Table A3.3: Estimates of proportion of age at length for trevally sampled from the Kaipara-Manukau subarea of TRE 7, 2023–24. (Note: aged to 1 January 2024).

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	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
23	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
28	0	0.86	0.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
29	0	0.59	0.35	0.06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17
30	0	0.32	0.28	0.20	0.12	0.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25
31	0	0.19	0.30	0.36	0.09	0.04	0	0	0.02	0	0	0	0	0	0	0	0	0	0	0	53
32	0	0.04	0.18	0.30	0.25	0.14	0.09	0	0	0	0	0	0	0	0	0	0	0	0	0	56
33	0	0	0.09	0.28	0.09	0.28	0.19	0.02	0.05	0	0	0	0	0	0	0	0	0	0	0	43
34	0	0	0.05	0.21	0.15	0.21	0.15	0.05	0.08	0.03	0	0.05	0.03	0	0	0	0	0	0	0	39
35	0	0	0	0.13	0.08	0.15	0.23	0.10	0.15	0.15	0	0	0	0	0	0	0	0	0	0	39
36	0	0	0	0.05	0.08	0.13	0.28	0.10	0.18	0.08	0.03	0	0.05	0	0	0	0	0	0	0.03	39
37	0	0	0	0.03	0.09	0.21	0.09	0.12	0.12	0.15	0.03	0	0.03	0.03	0.06	0	0.06	0	0	0	34
38	0	0	0	0	0.03	0.17	0.14	0.20	0.14	0.20	0.03	0	0.03	0	0.06	0	0	0	0	0	35
39	0	0	0	0	0	0.10	0.07	0.20	0.07	0.17	0.07	0.10	0.07	0.03	0	0.03	0.03	0	0	0.07	30
40	0	0	0	0	0	0	0.03	0.07	0.13	0.23	0.07	0.03	0.07	0	0.03	0.03	0.07	0.10	0.03	0.10	30
41	0	0	0	0	0	0.04	0.07	0.11	0.07	0.11	0.21	0.04	0	0	0.07	0.11	0.04	0.11	0	0.04	28
42	0	0	0	0	0	0.04	0	0.11	0	0.18	0.11	0.07	0	0	0	0.21	0.07	0.04	0.04	0.14	28
43	0	0	0	0	0	0	0	0	0.13	0.13	0.07	0	0.07	0.13	0	0.07	0	0.07	0.20	0.13	15
44	0	0	0	0	0	0.06	0.06	0	0	0	0	0	0.06	0	0.06	0.13	0.13	0.06	0.13	0.31	16
45	0	0	0	0	0	0.06	0.12	0	0.06	0.06	0	0	0	0	0	0.18	0	0	0.12	0.41	17
46	0	0	0	0	0	0	0	0.07	0	0.07	0	0	0	0	0	0.07	0.13	0	0.07	0.60	15
47	0	0	0	0	0	0	0	0	0	0.25	0	0	0	0	0	0	0.25	0.25	0	0.25	4
48	0	0	0	0	0	0	0	0.17	0.17	0	0	0	0	0	0	0	0	0	0	0.67	6
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	1.00	0	0	0	0	0	0	0	0	0	0	0	1
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	2
52	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	0	0	0	0	1
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	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	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	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
Total																					588

Table A3.4: Estimates of proportion of age at length for trevally sampled from the North Taranaki Bight subarea of TRE 7, 2023–24. (Note: aged to 1 January 2024).

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	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0.50	0	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
29	0	0	0.67	0.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
30	0	0.17	0.42	0.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
31	0	0	0.50	0.40	0.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
32	0	0.06	0.06	0.42	0.15	0.15	0.15	0	0	0	0	0	0	0	0	0	0	0	0	0	33
33	0	0	0.04	0.32	0.28	0.19	0.06	0.06	0.04	0.02	0	0	0	0	0	0	0	0	0	0	53
34	0	0	0.05	0.23	0.12	0.23	0.26	0.05	0.05	0	0.02	0	0	0	0	0	0	0	0	0	43
35	0	0	0	0.04	0.13	0.21	0.40	0.10	0.04	0.06	0	0	0	0	0	0	0	0.02	0	0	48
36	0	0	0	0	0.10	0.17	0.24	0.14	0.12	0.12	0.02	0.07	0	0	0	0.02	0	0	0	0	42
37	0	0	0	0	0.05	0.10	0.13	0.23	0.23	0.08	0.13	0	0.08	0	0	0	0	0	0	0	40
38	0	0	0	0	0	0.09	0.09	0.22	0.13	0.17	0.09	0	0.04	0.04	0.04	0.04	0.04	0	0	0	23
39	0	0	0	0	0	0.04	0.08	0.19	0.08	0.04	0.12	0	0.04	0	0	0.12	0.04	0.08	0.04	0.15	26
40	0	0	0	0	0	0	0	0.24	0.18	0.06	0.12	0.06	0	0	0.06	0.12	0.06	0	0	0.12	17
41	0	0	0	0	0	0	0	0.11	0	0	0.22	0	0	0	0	0.22	0	0.11	0	0.33	9
42	0	0	0	0	0	0	0	0	0.17	0	0	0.17	0	0	0	0	0	0.17	0.17	0.33	6
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.20	0	0.20	0	0.60	5
44	0	0	0	0	0	0	0	0	0	0.33	0	0	0	0	0	0.17	0.33	0	0	0.17	6
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	1
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	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	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	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
Total																					394

Table A3.5: Estimates of proportion of age at length for trevally sampled from the South Taranaki Bight subarea of TRE 7, 2023–24. (Note: aged to 1 January 2024).

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	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
26	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
27	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
28	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
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	0.50	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
32	0	0	0.50	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
33	0	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
34	0	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
35	0	0	0	0.20	0.40	0.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
36	0	0	0.04	0.07	0.26	0.63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27
37	0	0	0	0.11	0.32	0.46	0	0.07	0	0.04	0	0	0	0	0	0	0	0	0	0	28
38	0	0	0	0	0.14	0.68	0.03	0.05	0.08	0.00	0.03	0	0	0	0	0	0	0	0	0	37
39	0	0	0	0	0.13	0.68	0.06	0.03	0.00	0.03	0.06	0	0	0	0	0	0	0	0	0	31
40	0	0	0	0	0.05	0.46	0.05	0.15	0.10	0.05	0.10	0	0	0	0	0	0	0.03	0	0	39
41	0	0	0	0	0.10	0.24	0.14	0.10	0.10	0.05	0.10	0	0	0.10	0	0.05	0	0	0	0.05	21
42	0	0	0	0	0.05	0.10	0.14	0.05	0.05	0.05	0.05	0	0	0	0.10	0.14	0.10	0.10	0	0.10	21
43	0	0	0	0	0	0.13	0.04	0.13	0	0	0	0	0.08	0	0.04	0.25	0.04	0.04	0	0.25	24
44	0	0	0	0	0	0	0.04	0.04	0	0.04	0	0	0	0	0	0.18	0.04	0.11	0.04	0.54	28
45	0	0	0	0	0	0	0	0	0	0	0	0	0.05	0	0	0.05	0.15	0.05	0.05	0.65	20
46	0	0	0	0	0	0	0	0.05	0	0	0	0	0	0	0.05	0.10	0	0.05	0.15	0.60	20
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.11	0	0	0.11	0.16	0.63	19
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.09	0.09	0	0.82	11
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.06	0.06	0	0.88	17
50	0	0	0	0	0	0	0	0	0	0	0	0	0.08	0	0	0	0	0.08	0	0.85	13
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	3
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	1
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	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	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	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
Total																					385

APPENDIX 4: Estimates of the proportion at length of trevally from the TRE 7 bottom trawl fishery in 2022–23

Table A4.1: Estimates of the proportion at length of trevally from the TRE 7 bottom trawl fishery in 2022–23. The proportion at length for each subarea is also presented (Area codes: NMB, Ninety Mile Beach; KMH, Kaipara-Manukau; NTB, North Taranaki; STB, South Taranaki Bight).

P.i. = proportion of fish in length class. *mwcv* = mean weighted cv
CV = coefficient of variation. *n* = total number of fish sampled.

Length	TRE 7		NMB		KMH		NTB		STB	
(cm)	*P.i.*	CV	*P.i.*	CV	*P.i.*	CV	*P.i.*	CV	*P.i.*	CV
20	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
21	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
22	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
23	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
24	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
25	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
26	0.0011	0.96	0.0022	1.39	0.0010	1.36	0.0000	0.00	0.0000	0.00
27	0.0041	0.69	0.0034	1.42	0.0072	0.81	0.0000	0.00	0.0009	1.70
28	0.0050	0.64	0.0000	0.00	0.0124	0.64	0.0000	0.00	0.0000	0.00
29	0.0187	0.40	0.0055	0.92	0.0328	0.54	0.0227	0.61	0.0008	1.66
30	0.0359	0.32	0.0438	0.48	0.0378	0.52	0.0404	0.92	0.0000	0.00
31	0.0631	0.21	0.0901	0.43	0.0513	0.37	0.0790	0.34	0.0049	1.27
32	0.0823	0.18	0.1030	0.34	0.0799	0.33	0.1017	0.29	0.0037	0.96
33	0.0967	0.16	0.1016	0.41	0.1066	0.19	0.1248	0.32	0.0074	0.84
34	0.0957	0.16	0.1184	0.28	0.0823	0.33	0.1468	0.25	0.0050	0.93
35	0.0880	0.16	0.0910	0.21	0.0807	0.26	0.1573	0.40	0.0072	0.84
36	0.0874	0.15	0.0706	0.29	0.0932	0.22	0.1125	0.35	0.0794	0.63
37	0.0777	0.14	0.0706	0.26	0.0756	0.25	0.0902	0.34	0.0877	0.29
38	0.0709	0.19	0.0690	0.39	0.0746	0.28	0.0173	1.04	0.1391	0.27
39	0.0584	0.20	0.0611	0.37	0.0492	0.40	0.0393	0.58	0.1105	0.24
40	0.0579	0.19	0.0534	0.29	0.0546	0.37	0.0339	0.50	0.1168	0.32
41	0.0359	0.22	0.0349	0.43	0.0292	0.35	0.0058	1.27	0.1049	0.35
42	0.0359	0.21	0.0253	0.60	0.0335	0.32	0.0285	0.63	0.0862	0.28
43	0.0170	0.35	0.0107	0.60	0.0218	0.59	0.0000	0.00	0.0421	0.43
44	0.0191	0.32	0.0086	0.65	0.0246	0.54	0.0000	0.00	0.0573	0.38
45	0.0130	0.34	0.0055	0.94	0.0157	0.51	0.0000	0.00	0.0437	0.46
46	0.0104	0.36	0.0135	0.59	0.0100	0.56	0.0000	0.00	0.0176	0.60
47	0.0079	0.52	0.0066	1.22	0.0101	0.79	0.0000	0.00	0.0148	0.70
48	0.0056	0.45	0.0033	1.29	0.0013	1.29	0.0000	0.00	0.0352	0.51
49	0.0057	0.43	0.0000	0.00	0.0088	0.64	0.0000	0.00	0.0196	0.49
50	0.0024	0.71	0.0033	1.33	0.0019	1.10	0.0000	0.00	0.0048	0.88
51	0.0018	0.81	0.0026	1.35	0.0004	1.53	0.0000	0.00	0.0068	1.11
52	0.0009	0.99	0.0000	0.00	0.0014	1.32	0.0000	0.00	0.0029	1.33
53	0.0004	1.18	0.0000	0.00	0.0007	1.53	0.0000	0.00	0.0007	1.45
54	0.0006	1.36	0.0000	0.00	0.0014	1.36	0.0000	0.00	0.0000	0.00
55	0.0007	1.29	0.0022	1.29	0.0000	0.00	0.0000	0.00	0.0000	0.00
56	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
57	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
58	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
59	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
60	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
61	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
62	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
63	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
64	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
65	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
66	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
67	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
68	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
69	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
70	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
71	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
72	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
73	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
74	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
75	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
mwcv	0.2116		0.382		0.351		0.4		0.392	
n	1 483		385		586		118		394	

APPENDIX 5: Estimates of the proportion at length of trevally from the TRE 7 bottom trawl and precision bottom trawl fishery in 2023–24

Table A5.1: Estimates of the proportion at length of trevally from the TRE 7 bottom trawl and precision bottom trawl fishery in 2023–24. The proportion at length for each subarea is also presented (Area codes: NMB, Ninety Mile Beach; KMH, Kaipara-Manukau; NTB, North Taranaki; STB, South Taranaki Bight).

P.i. = proportion of fish in length class. *mwcv* = mean weighted cv
CV = coefficient of variation. *n* = total number of fish sampled.

Length	TRE 7		NMB		KMH		NTB		STB	
(cm)	*P.i.*	CV	*P.i.*	CV	*P.i.*	CV	*P.i.*	CV	*P.i.*	CV
20	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
21	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
22	0.0003	1.55	0.0000	0.00	0.0016	1.55	0.0000	0.00	0.0000	0.00
23	0.0003	1.51	0.0000	0.00	0.0016	1.51	0.0000	0.00	0.0000	0.00
24	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
25	0.0012	0.93	0.0021	1.51	0.0016	1.59	0.0000	0.00	0.0015	1.52
26	0.0014	0.97	0.0012	1.50	0.0000	0.00	0.0024	1.52	0.0015	1.52
27	0.0029	0.94	0.0000	0.00	0.0034	1.11	0.0000	0.00	0.0062	1.17
28	0.0088	0.53	0.0047	1.31	0.0128	0.58	0.0055	1.01	0.0108	1.01
29	0.0104	0.42	0.0026	1.51	0.0289	0.49	0.0131	0.88	0.0000	0.00
30	0.0189	0.33	0.0105	0.75	0.0468	0.52	0.0249	0.53	0.0000	0.00
31	0.0423	0.27	0.0359	0.36	0.0957	0.43	0.0511	0.46	0.0047	1.22
32	0.0555	0.23	0.0747	0.30	0.1011	0.43	0.0702	0.44	0.0072	1.21
33	0.0723	0.20	0.1433	0.16	0.0670	0.39	0.1188	0.39	0.0072	1.22
34	0.0692	0.15	0.1784	0.17	0.0685	0.34	0.0956	0.31	0.0023	1.39
35	0.0751	0.14	0.1562	0.19	0.0654	0.31	0.1124	0.24	0.0162	0.83
36	0.0937	0.18	0.1000	0.25	0.0659	0.29	0.1035	0.23	0.0999	0.44
37	0.0942	0.17	0.0903	0.21	0.0562	0.22	0.1100	0.31	0.1058	0.37
38	0.0830	0.18	0.0608	0.28	0.0523	0.29	0.0699	0.30	0.1221	0.29
39	0.0714	0.18	0.0515	0.34	0.0511	0.27	0.0842	0.34	0.0812	0.29
40	0.0628	0.23	0.0199	0.54	0.0430	0.30	0.0619	0.57	0.0934	0.27
41	0.0333	0.24	0.0060	0.94	0.0433	0.33	0.0172	0.57	0.0519	0.35
42	0.0315	0.25	0.0185	0.52	0.0408	0.37	0.0174	0.59	0.0431	0.38
43	0.0324	0.24	0.0159	0.60	0.0289	0.54	0.0120	0.88	0.0586	0.25
44	0.0412	0.22	0.0224	0.50	0.0294	0.45	0.0227	0.70	0.0717	0.24
45	0.0226	0.28	0.0026	1.43	0.0329	0.40	0.0046	1.29	0.0397	0.36
46	0.0207	0.34	0.0000	0.00	0.0280	0.45	0.0000	0.00	0.0421	0.42
47	0.0158	0.35	0.0000	0.00	0.0056	0.67	0.0024	1.33	0.0397	0.38
48	0.0120	0.41	0.0000	0.00	0.0132	0.55	0.0000	0.00	0.0263	0.48
49	0.0139	0.43	0.0026	1.42	0.0000	0.00	0.0000	0.00	0.0389	0.44
50	0.0084	0.43	0.0000	0.00	0.0022	1.44	0.0000	0.00	0.0227	0.44
51	0.0025	0.64	0.0000	0.00	0.0044	0.90	0.0000	0.00	0.0046	0.83
52	0.0005	1.36	0.0000	0.00	0.0022	1.36	0.0000	0.00	0.0000	0.00
53	0.0005	1.40	0.0000	0.00	0.0022	1.40	0.0000	0.00	0.0000	0.00
54	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
55	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
56	0.0005	1.29	0.0000	0.00	0.0022	1.29	0.0000	0.00	0.0000	0.00
57	0.0006	0.95	0.0000	0.00	0.0018	1.29	0.0000	0.00	0.0006	1.36
58	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
59	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
60	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
61	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
62	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
63	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
64	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
65	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
66	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
67	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
68	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
69	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
70	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
71	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
72	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
73	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
74	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
75	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
mwcv	0.2265		0.274		0.398		0.391		0.388	
n	1 762		395		588		394		385	

APPENDIX 6: Estimates of proportion at age of trevally from the TRE 7 bottom trawl fishery in 2022–23

Table A6.1: Estimates of proportion at age of trevally from the TRE 7 bottom trawl fishery in 2022–23. The proportion at age for each subarea is also presented (Area codes: NMB, Ninety Mile Beach; KMH, Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight).

P.j. = proportion of fish in age class; CV = coefficient of variation.

Age	TRE 7		NMB		KMH		NTB		STB	
(years)	*P.j.*	CV	*P.j.*	CV	*P.j.*	CV	*P.j.*	CV	*P.j.*	CV
1	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
2	0.0597	0.33	0.1264	0.44	0.0344	0.71	0.0288	1.01	0.0000	0.00
3	0.1405	0.16	0.2309	0.26	0.1087	0.31	0.1241	0.28	0.0152	0.76
4	0.0904	0.16	0.1593	0.22	0.0419	0.32	0.0966	0.44	0.0541	0.39
5	0.1635	0.14	0.0708	0.25	0.1294	0.22	0.2146	0.19	0.4812	0.33
6	0.0991	0.13	0.0731	0.27	0.1202	0.18	0.1407	0.32	0.0409	0.52
7	0.1117	0.13	0.0684	0.30	0.1470	0.19	0.1464	0.29	0.0629	0.41
8	0.0535	0.17	0.0375	0.38	0.0732	0.21	0.0620	0.41	0.0175	0.64
9	0.0533	0.19	0.0447	0.33	0.0697	0.26	0.0393	0.59	0.0396	0.74
10	0.0438	0.24	0.0502	0.44	0.0462	0.30	0.0400	0.67	0.0218	0.47
11	0.0141	0.28	0.0022	1.40	0.0319	0.29	0.0000	0.00	0.0054	0.85
12	0.0232	0.26	0.0265	0.39	0.0277	0.42	0.0112	1.10	0.0143	0.59
13	0.0117	0.34	0.0127	0.59	0.0102	0.57	0.0000	0.00	0.0307	0.51
14	0.0112	0.43	0.0088	0.86	0.0133	0.57	0.0058	1.45	0.0180	0.79
15	0.0252	0.27	0.0082	0.73	0.0302	0.39	0.0397	0.47	0.0366	0.51
16	0.0156	0.33	0.0087	1.03	0.0218	0.38	0.0169	0.72	0.0120	0.71
17	0.0247	0.26	0.0240	0.47	0.0305	0.35	0.0112	1.10	0.0248	0.49
18	0.0105	0.39	0.0082	0.88	0.0149	0.49	0.0112	1.15	0.0006	1.60
19	0.0049	0.50	0.0000	0.00	0.0099	0.58	0.0000	0.00	0.0082	0.81
>19	0.0434	0.21	0.0394	0.35	0.0388	0.33	0.0115	1.12	0.1162	0.37
n	1483		385		586		118		394	
mwcv	0.1894		0.3368		0.2881		0.4005		0.4213	

APPENDIX 7: Estimates of proportion at age of trevally from the TRE 7 bottom trawl and precision bottom trawl fishery in 2023–24

Table A7.1: Estimates of proportion at age of trevally from the TRE 7 bottom trawl and precision bottom trawl fishery in 2023–24. The proportion at age for each subarea is also presented (Area codes: NMB, Ninety Mile Beach; KMH, Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight).

P.j. = proportion of fish in age class; CV = coefficient of variation.

Age	TRE 7		NMB		KMH		NTB		STB	
(years)	*P.j.*	CV	*P.j.*	CV	*P.j.*	CV	*P.j.*	CV	*P.j.*	CV
1	0.0012	1.07	0.0012	1.42	0.0047	1.24	0.0000	0.00	0.0000	0.00
2	0.0302	0.38	0.0370	0.45	0.0679	0.53	0.0116	0.78	0.0200	1.05
3	0.0530	0.22	0.0869	0.30	0.0840	0.49	0.0551	0.38	0.0182	0.78
4	0.1135	0.14	0.2713	0.14	0.1182	0.35	0.1345	0.35	0.0279	0.54
5	0.1019	0.13	0.2042	0.16	0.0756	0.39	0.0940	0.34	0.0828	0.30
6	0.1942	0.21	0.0825	0.30	0.1078	0.24	0.1198	0.23	0.3560	0.35
7	0.0883	0.12	0.0877	0.20	0.0924	0.23	0.1437	0.18	0.0393	0.38
8	0.0804	0.21	0.0757	0.24	0.0605	0.23	0.1289	0.38	0.0537	0.40
9	0.0481	0.17	0.0283	0.36	0.0669	0.23	0.0730	0.28	0.0237	0.53
10	0.0433	0.18	0.0443	0.42	0.0775	0.23	0.0540	0.32	0.0126	0.60
11	0.0280	0.23	0.0140	0.52	0.0272	0.43	0.0477	0.32	0.0175	0.53
12	0.0089	0.36	0.0070	0.98	0.0168	0.53	0.0144	0.51	0.0000	0.00
13	0.0144	0.31	0.0133	0.57	0.0180	0.48	0.0144	0.62	0.0125	0.74
14	0.0047	0.55	0.0030	1.03	0.0088	0.66	0.0027	1.42	0.0044	1.13
15	0.0102	0.34	0.0059	0.97	0.0153	0.41	0.0077	0.91	0.0108	0.58
16	0.0255	0.32	0.0026	1.44	0.0301	0.40	0.0253	0.68	0.0323	0.49
17	0.0152	0.30	0.0082	0.74	0.0175	0.44	0.0183	0.55	0.0142	0.52
18	0.0215	0.30	0.0084	0.76	0.0140	0.47	0.0186	0.50	0.0340	0.46
19	0.0091	0.37	0.0034	1.35	0.0178	0.61	0.0028	1.05	0.0114	0.53
>19	0.1085	0.18	0.0150	0.49	0.0787	0.26	0.0335	0.35	0.2286	0.22
n	1762		395		588		394		385	
mwcv	0.2007		0.2620		0.3475		0.3413		0.3801	

APPENDIX 8: Estimates of mean weight and length at age of trevally from the TRE 7 bottom trawl fishery in 2022–23

Table A8.1: Estimates of mean weight-at-age (kg) of trevally from the TRE 7 bottom trawl fishery in 2022–23. The mean weight-at-age for each subarea is also presented (Area codes: NMB, Ninety Mile Beach; KMH, Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight).

Age	TRE 7		NMB		KMH		NTB		STB	
(years)	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.57	0.04	0.60	0.03	0.49	0.12	0.52	0.58	0.00	0.00
3	0.65	0.02	0.70	0.02	0.59	0.03	0.60	0.03	0.75	0.15
4	0.78	0.03	0.80	0.03	0.74	0.04	0.67	0.04	1.05	0.08
5	0.95	0.05	0.90	0.05	0.80	0.07	0.78	0.02	1.21	0.06
6	0.90	0.03	0.97	0.05	0.88	0.04	0.85	0.03	1.10	0.10
7	0.98	0.05	1.09	0.04	0.94	0.08	0.87	0.04	1.36	0.06
8	1.06	0.05	1.27	0.08	0.98	0.07	0.96	0.09	1.35	0.12
9	1.11	0.03	1.17	0.05	1.10	0.05	0.95	0.21	1.25	0.08
10	1.14	0.04	1.22	0.07	1.05	0.06	1.06	0.19	1.46	0.09
11	1.24	0.09	1.11	1.03	1.23	0.10	0.00	0.00	1.53	0.26
12	1.28	0.06	1.28	0.07	1.18	0.11	1.30	0.96	1.87	0.20
13	1.64	0.08	1.42	0.23	1.72	0.19	0.00	0.00	1.81	0.16
14	1.45	0.07	1.33	0.48	1.46	0.14	1.51	0.93	1.58	0.34
15	1.42	0.06	1.39	0.33	1.47	0.11	1.14	0.09	1.70	0.10
16	1.46	0.05	1.35	0.76	1.51	0.07	1.30	0.37	1.67	0.25
17	1.56	0.07	1.47	0.13	1.55	0.13	1.51	0.92	1.92	0.08
18	1.52	0.16	2.13	0.57	1.34	0.18	1.20	0.89	1.30	1.08
19	1.89	0.14	0.00	0.00	2.00	0.18	0.00	0.00	1.41	0.19
>19	1.86	0.04	1.91	0.12	1.73	0.08	1.51	0.67	2.02	0.06

Table A8.2: Estimates of mean length-at-age (cm) of trevally from the TRE 7 bottom trawl fishery in 2022–23. The mean length-at-age for each subarea is also presented (Area codes: NMB, Ninety Mile Beach; KMH, Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight).

Age	TRE 7		NMB		KMH		NTB		STB	
(years)	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	30.4	0.012	31.0	0.011	28.9	0.107	29.6	0.578	0.00	0.000
3	31.9	0.007	32.7	0.008	30.8	0.011	31.1	0.01	33.3	0.095
4	33.8	0.008	34.1	0.009	33.2	0.013	32.2	0.012	37.2	0.025
5	35.8	0.017	35.4	0.017	33.9	0.023	33.8	0.007	39.0	0.021
6	35.4	0.009	36.3	0.017	35.0	0.014	34.8	0.009	37.7	0.034
7	36.3	0.016	37.7	0.012	35.7	0.026	35.1	0.015	40.5	0.018
8	37.2	0.016	39.5	0.026	36.3	0.020	36.1	0.051	40.4	0.048
9	37.9	0.010	38.6	0.015	37.8	0.016	36.1	0.205	39.5	0.049
10	38.2	0.013	39.1	0.038	37.2	0.020	37.4	0.180	41.4	0.028
11	39.1	0.028	38.0	1.029	39.1	0.031	0.00	0.000	42.2	0.253
12	39.6	0.020	39.7	0.023	38.6	0.034	40.0	0.959	44.9	0.146
13	42.9	0.026	41.1	0.219	43.5	0.118	0.00	0.000	44.4	0.096
14	41.4	0.022	40.3	0.469	41.5	0.091	42.0	0.933	42.3	0.250
15	40.9	0.021	40.8	0.309	41.5	0.049	38.3	0.074	43.5	0.032
16	41.5	0.015	40.5	0.754	41.9	0.023	40.0	0.373	43.4	0.245
17	42.2	0.022	41.5	0.089	42.0	0.041	42.0	0.918	45.4	0.041
18	41.6	0.051	46.8	0.513	40.1	0.071	39.0	0.885	40.0	1.075
19	44.8	0.042	0.00	0.000	45.7	0.102	0.00	0.000	41.0	0.166
>19	44.7	0.014	45.1	0.036	43.6	0.026	42.0	0.672	46.0	0.020

APPENDIX 9: Estimates of mean weight and length at age of trevally from the TRE 7 bottom trawl and precision bottom trawl fishery in 2023–24

Table A9.1: Estimates of mean weight-at age (kg) of trevally from the TRE 7 bottom trawl and precision bottom trawl fishery in 2023–24. The mean weight-at-age for each subarea is also presented (Area codes: NMB, Ninety Mile Beach; KMH, Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight).

Age	TRE 7		NMB		KMH		NTB		STB	
(years)	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV
1	0.27	0.51	0.35	1.03	0.25	0.81	0.00	0.00	0.00	0.00
2	0.52	0.06	0.64	0.08	0.52	0.04	0.53	0.33	0.40	0.46
3	0.64	0.03	0.71	0.06	0.60	0.04	0.59	0.04	0.73	0.27
4	0.72	0.03	0.76	0.02	0.67	0.04	0.67	0.04	0.89	0.15
5	0.87	0.04	0.84	0.02	0.73	0.06	0.78	0.06	1.07	0.04
6	1.03	0.03	0.93	0.03	0.87	0.06	0.85	0.05	1.12	0.03
7	0.99	0.04	0.97	0.03	0.96	0.08	0.89	0.05	1.37	0.06
8	1.14	0.03	1.08	0.06	1.19	0.09	1.06	0.07	1.33	0.06
9	1.15	0.05	1.24	0.08	1.14	0.12	1.09	0.09	1.29	0.06
10	1.20	0.06	1.21	0.06	1.24	0.08	1.12	0.12	1.31	0.12
11	1.23	0.03	1.19	0.18	1.37	0.06	1.15	0.05	1.30	0.05
12	1.21	0.08	1.38	0.57	1.21	0.18	1.16	0.20	0.00	0.00
13	1.34	0.08	1.24	0.22	1.22	0.13	1.09	0.22	1.73	0.33
14	1.52	0.18	1.52	0.60	1.80	0.34	1.11	1.09	1.40	0.61
15	1.49	0.08	1.65	0.57	1.27	0.10	1.18	0.61	1.82	0.13
16	1.57	0.04	1.74	1.07	1.62	0.06	1.34	0.16	1.68	0.03
17	1.56	0.07	1.17	0.40	1.51	0.11	1.47	0.28	1.78	0.08
18	1.72	0.06	1.69	0.32	1.50	0.07	1.44	0.15	1.91	0.07
19	1.78	0.07	1.40	1.04	1.67	0.13	1.34	0.59	2.01	0.12
>19	1.99	0.03	1.71	0.14	1.99	0.09	1.47	0.07	2.07	0.03

Table A9.2: Estimates of mean length- at -age (cm) of trevally from the TRE 7 bottom trawl and precision bottom trawl fishery in 2023–24. The mean length-at-age for each subarea is also presented (Area codes: NMB, Ninety Mile Beach; KMH, Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight).

Age	TRE 7		NMB		KMH		NTB		STB	
(years)	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV
1	23.7	0.485	26.0	1.029	23.3	0.801	0.0	0.000	0.0	0.000
2	29.5	0.020	31.7	0.024	29.7	0.012	29.8	0.313	27.3	0.463
3	31.6	0.010	32.7	0.021	31.1	0.013	30.9	0.013	33.1	0.246
4	32.9	0.009	33.6	0.007	32.2	0.012	32.2	0.015	35.2	0.124
5	35.0	0.012	34.7	0.006	33.0	0.018	33.8	0.018	37.5	0.012
6	37.0	0.010	35.8	0.011	34.9	0.020	34.7	0.016	38.1	0.010
7	36.4	0.012	36.2	0.011	36.0	0.025	35.3	0.015	40.6	0.020
8	38.2	0.009	37.5	0.018	38.6	0.028	37.3	0.022	40.2	0.019
9	38.2	0.016	39.2	0.027	37.9	0.035	37.6	0.028	39.8	0.047
10	38.7	0.018	38.9	0.018	39.1	0.026	37.8	0.037	40.0	0.071
11	39.2	0.011	38.8	0.141	40.6	0.047	38.4	0.018	40.0	0.017
12	38.9	0.028	40.7	0.544	39.0	0.128	38.4	0.156	0.0	0.000
13	40.2	0.026	39.3	0.196	38.9	0.042	37.8	0.210	43.9	0.306
14	41.7	0.051	42.0	0.569	43.8	0.208	38.0	1.093	41.0	0.612
15	41.6	0.027	43.2	0.558	39.5	0.030	38.8	0.609	44.6	0.095
16	42.4	0.013	44.0	1.067	42.9	0.019	40.3	0.145	43.5	0.009
17	42.2	0.023	38.5	0.358	41.8	0.037	41.5	0.239	44.2	0.025
18	43.6	0.019	43.5	0.312	41.9	0.048	41.2	0.077	45.2	0.048
19	44.2	0.049	41.0	1.038	43.4	0.113	40.4	0.579	46.2	0.111
>19	45.8	0.009	43.6	0.060	45.6	0.029	41.6	0.023	46.4	0.010

APPENDIX 10: Time series of proportion at length and age distributions for trevally from the TRE 7 bottom trawl fishery from 1997–98 to 2023–24

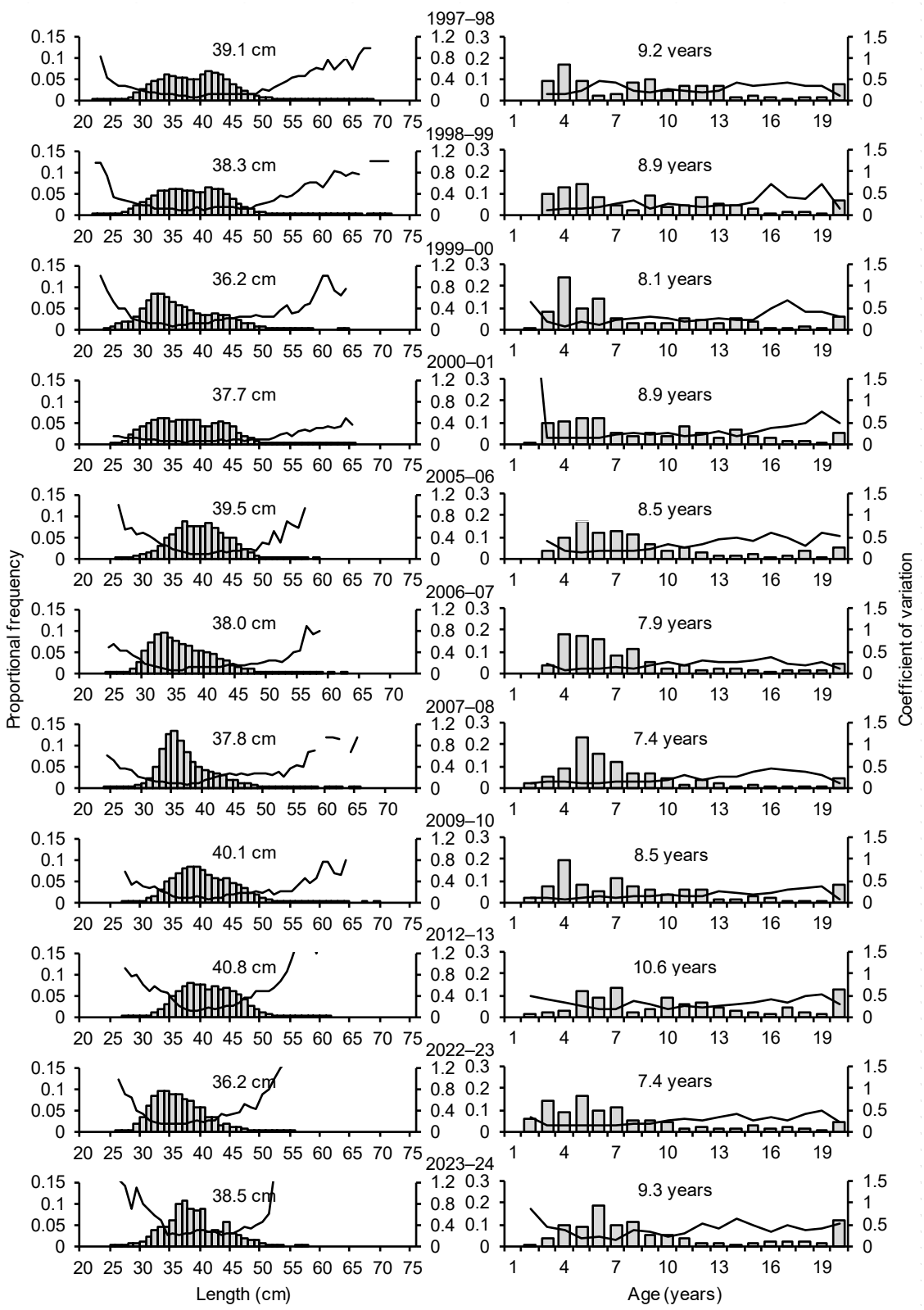

Figure A10.1: A discontinuous time series of proportion at length and age distributions and CVs for trevally from the TRE 7 bottom trawl fishery from 1997–98 to 2023–24. Plots are annotated with estimates of mean length or age.

APPENDIX 11: Proportion at length distributions from trevally landings sampled in 2023–24 by method

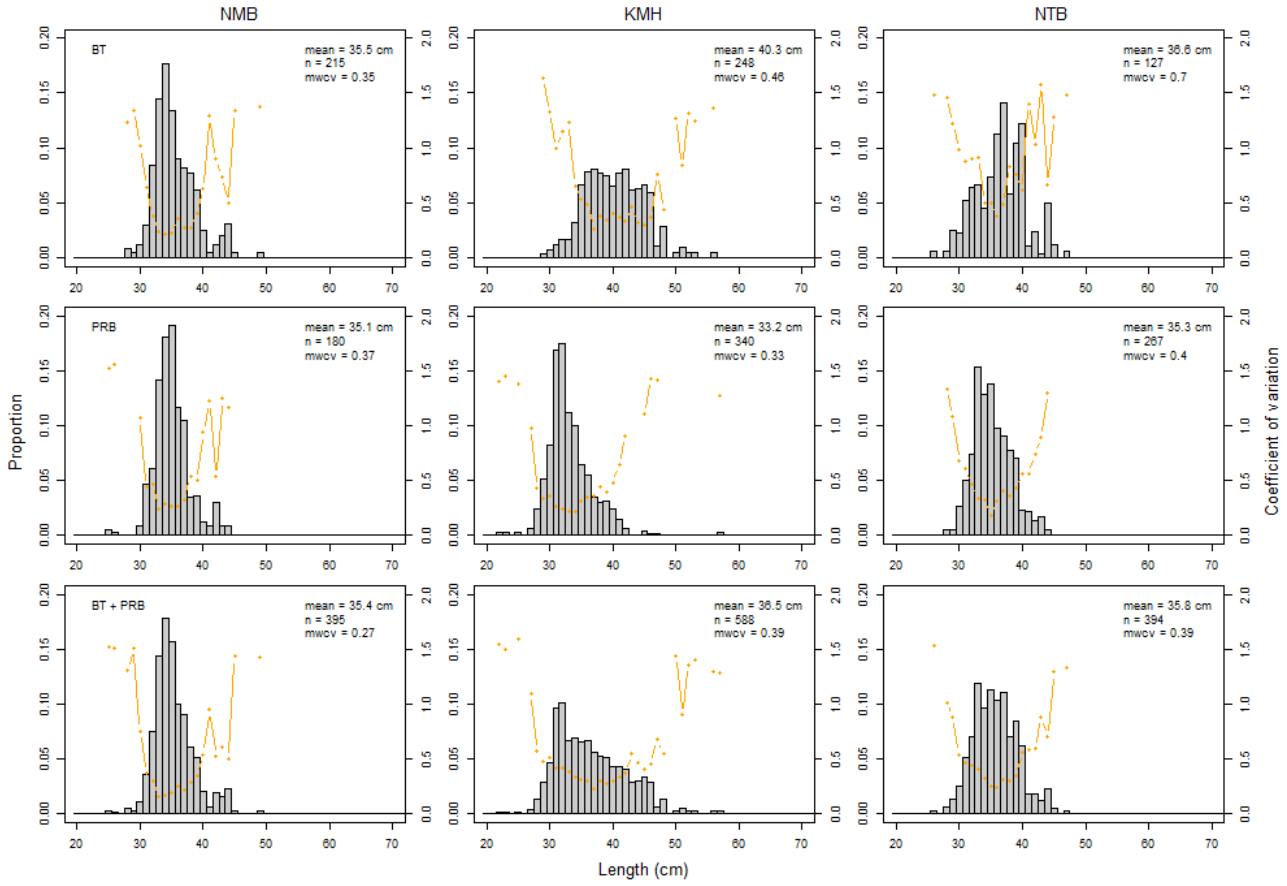

Figure A11: Proportion at length distributions (histograms) and bootstrap CVs (lines) determined from trevally landings sampled from the TRE 7 and subarea bottom trawl and precision bottom trawl fisheries in 2023–24 by method using the length frequency and age-length key approach (n, sample size; MWCV, mean weighted CV). NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.

APPENDIX 12: Proportion at age distributions from trevally landings sampled in 2023–24 by method

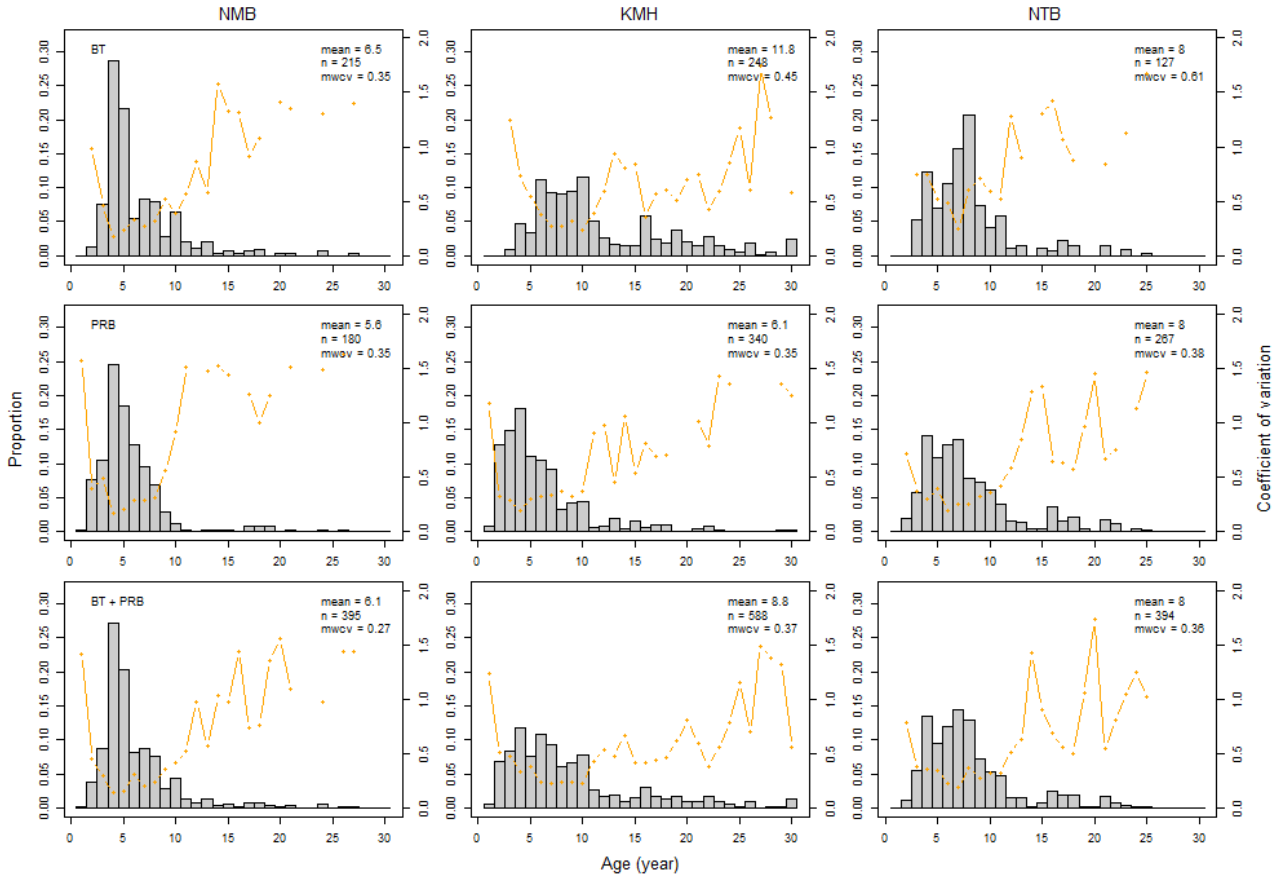

Figure A12: Proportion at age distributions (histograms) and bootstrap CVs (lines) determined from trevally landings sampled from the TRE 7 and subarea bottom trawl and precision bottom trawl fisheries in 2023–24 by method using the length frequency and age-length key approach (n, sample size; MWCV, mean weighted CV). NMB, Ninety Mile Beach; KMH, Coastal Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight.