# Length and age composition of commercial trevally landings in TRE 1 and TRE 7, 2006–07

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## EXECUTIVE SUMMARY

**Walsh, C.; McKenzie, J.M.; Ó Maolagáin, C.; Buckthought, D.; Blackwell, R.; James, G.D.; Rush, N. (2010). Length and age composition of commercial trevally landings in TRE 1 and TRE 7, 2006–07.**

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This report presents the results of Objective 1 and 2 of the Ministry of Fisheries project "Estimation of year class strength in TRE 1 and TRE 7" (TRE2006/01). The general objective was to determine the length frequency and age structure of commercial landings from TRE 1 and TRE 7 (by market sampling) for use in stock assessment models.

The length frequency and age-length key sampling approach was employed during the 2006–07 fishing year to estimate catch-at-age for trevally for the main fishing methods in TRE 1 and TRE 7. Length frequency samples were collected from the TRE 1 single trawl and purse-seine, and the TRE 7 single trawl fisheries, and age data were collected randomly in the form of fixed allocation age-length keys. For TRE 1, 5 and 2 landings were sampled for length frequency from the single trawl and purse-seine fisheries respectively, with an age-length key collection of 338 otoliths, almost exclusively sampled from the East Northland sub-area. For TRE 7, 33 landings were sampled for length frequency from the single trawl fishery with an age-length key collection of 920 otoliths.

A redesigned ageing protocol instigated in 2006–07 adopted a more rigorous approach than in past years with the aim of improving reader accuracy and increasing the level of between reader agreements. Initial reader agreement was relatively low at 44% for TRE 1 and 55% for TRE 7 otolith samples with estimates of Index of Average Percentage Error of 5.055% and 3.651% respectively. However, this result did not reflect the process of rereading otoliths where disagreement occurred which usually resolved most disagreements and was expected to increase the precision (implying accuracy) in final age estimates. Trevally otoliths are inherently difficult to age and, as such, some level of ageing error is always likely to be present in catch-at-age results.

The length and age distribution sampled from the TRE 1 purse-seine fishery in 2006–07 was generally consistent with trends observed in recent years, comprised mainly of moderate sized trevally of moderate to old age. Age composition of the single trawl fishery contained lower proportions of older fish than in the purse-seine fishery, or in the single trawl catches seven or more years ago. It is unknown whether the differences apparent in length and age structure of the TRE 1 single trawl fishery in 2006–07 compared to samples collected in the past may be related changes in the relative size and age structure of the trevally fishery or the effects of spatial heterogeneity as samples were almost exclusively based on collections from the East Northland sub-area only. The reinstatement of a trawl based sampling programme with some regularity may help to determine the reason for inter-annual variations in length and age compositions, and is likely to provide better information on the mortality and recruitment variation of the TRE 1 stock.

Length and age distributions from the TRE 7 fishery in 2006–07 were sampled from a wider range of the stock than ever before but combined estimates appeared generally consistent with collections from past years, although a four year hiatus in catch sampling makes comparisons, especially between catch-at-age summaries in the time series, more difficult, similar to that for the TRE 1 single trawl fishery.

For the first time, spatial differences in length and age in TRE 7 were investigated. For this purpose collections were made from three discrete sub-areas comprising the entire stock range: Ninety Mile Beach; Kaipara and Manukau coastline and North Taranaki Bight combined; South Taranaki Bight. The length and age distributions for the TRE 7 sub-area fisheries in 2006–07 showed heterogeneity

exists within the stock on a moderate spatial scale with noticeable differences between sub-area strata, with apparent increasing size and age in trevally down a latitudinal cline, particularly for the southernmost strata. The most obvious differences in the sub-areas of TRE 7 were the predominance of large and old fish in the South Taranaki Bight (the highest in TRE 7); almost complete absence of young trevally below 36 cm and 5 years of age, possibly reflecting delayed migration or recruitment; and the apparent intermittent recruitment in consecutive older age classes, perhaps reflective of periodic recruitment in the southern bounds of the stock. Similar to collections made in previous years, those from the Kaipara-Manukau and North Taranaki Bight sub-areas were largely made up of fish of moderate size and age. Although based on a broad range of sizes and ages, the low sample sizes in collections from the Ninety Mile Beach sub-area were considered insufficient to make any firm assumptions. Proportional catch-at-age data are not a direct index of absolute abundance, and inferences from these in respect to changes in stock size or state are not totally reliable and should be treated with some care. Nevertheless, based on the data presented here it is more than likely the current TRE 7 fishery is in a relatively healthy state and that exploitation rates in recent years have not impacted to any great extent on the stock.

Unlike previous years, no length frequency samples were obtained from the pair trawl fishery in 2006–07, largely due to a rationalisation of the Auckland based inshore trawl fleet, which resulted in fewer trawlers operating, and the virtual cessation of pair trawling in TRE 7. Similarly, few landings containing trevally were available from the purse-seine fishery in TRE 1 compared to that seen in previous years.

Trevally year class strength estimates often varied between methods in TRE 1 and sub-areas in TRE 7. In 2006–07, the 2003 year class dominated TRE 1 and East Northland single trawl landings making up 22% and 29% of the numbers of trevally landed respectively. The TRE 1 purse-seine landings were largely made up of few dominant age classes reflecting relatively low year class strength variation in this fishery. Although some spatial differences within TRE 7 exist, the 2003 year class was dominant in the northern two sub-areas of TRE 7 comprising 25% of the Ninety Mile Beach and 15% of the Kaipara-Manukau and North Taranaki Bight single trawl catch. Similarly, the 1999 year class appeared strong in the two southern most sub-areas, as did a higher proportion of trevally below 10 years of age and a low proportion in the mid-age range. A few speculative correlations could be made between relative year class strengths for young aged fish in catch-at-age estimates for the TRE 1 and TRE 7 stocks for 2006–07, and possibly between the relative year class strength estimates for snapper from SNA 1 and SNA 8, but these may just be coincidental.

Precision on sample estimates varied considerably between methods in TRE 1 and sub-areas in TRE 7, ranging from 0.13 to 0.35 for catch-at-age estimates. Low MWCV estimates for length compositions often related to the large size of the sampled landings compared to that landed in the fishery, the high number of samples obtained, and the low level of heterogeneity present. Low MWCV estimates in catch-at-age estimates were generally related to higher precision determined in the length composition and the size of and variability in age-at-length within the age–length key.

Mean weight-at-age estimates for most of the recruited age classes in the trawl and purse-seine collections from the TRE 1 East Northland fishery were generally well below the predicted values based on published parameters. Mean weight-at-age estimates (especially for age classes 5–15 years of age) derived from the Ninety Mile Beach and South Taranaki Bight sub-areas were generally the highest in TRE 7, largely similar to each other and the predicted values. Mean weight-at-age estimates for the combined Kaipara-Manukau and North Taranaki Bight sub-area were almost exclusively below the predicted values for almost all age classes.

# 1. INTRODUCTION

Trevally (*Pseudocaranx dentex*) is one of New Zealand's most important commercial inshore fish species with over 90% of the national Total Allowable Commercial Catch (TACC) of 3932 t apportioned to the TRE 1 (1506 t) and TRE 7 (2153 t) fish stocks (Figure 1). The TRE 1 stock encompasses the northeast coast of the North Island, and the TRE 7 stock the entire west coast of the North Island and most of the north and west coasts of the South Island, with both stocks thought to be biologically distinct. In most recent years the greatest proportion of the TRE 1 catch has been taken by both single trawl and purse-seine, mainly from the Bay of Plenty and East Northland areas, while the catch in TRE 7 has been predominantly caught by single trawl and pair trawl largely off the northern half of the North Island's west coast. Most trevally is caught as the target species, but can also be a bycatch when targeting other species, usually snapper (*Pagrus auratus*), especially in the trawl fisheries.

Catch sampling of the TRE 1 and TRE 7 commercial landings for length and age compositions took place intermittently from 1972 to 1978 (James 1984, unpublished data) and was resumed in the 1997–98 fishing year (Walsh et al. 1999) as part of a new stock monitoring programme instigated by the Ministry of Fisheries. Annual sampling from the main fishing methods continued in the TRE 1 fisheries until 2003–04 and in TRE 7 until 2000–01 and the data are summarised in a series of subsequent reports (Walsh et al. 2000, Langley 2001, 2002, 2003, 2004) and in two reviews by Langley (2000) and Walsh & McKenzie (2009). The programme was reinstated in 2005–06 with sampling conducted on the TRE 1 purse-seine fishery and the TRE 7 single trawl fishery (Langley 2009). A summary of the various stock-method strata that have been sampled from TRE 1 and TRE 7 since 1997–98 is presented in Tables 1 and 2.

This report presents the results of market sampling from the TRE 1 and TRE 7 stocks between October 2006 and September 2007 and thus continues the time series. Funding for this project, TRE2006/01, was provided by the Ministry of Fisheries.

The specific objective of this project for 2006–07 was:

1. To conduct representative sampling and determine the length and age composition of commercial catches in TRE 1 (and TRE 7 (Obj. 2.)) during the 2006/2007 fishing year. The target coefficient of variation (c.v.) for the catch at age will be 20% (mean weighted c.v. across all age classes), including demonstrating that sampling was representative of the fishery.

# 2. METHODS

## 2.1 Sample collection

Landings from the trevally fisheries were stratified by stock, sub-area, and fishing method and sample collections made from the main commercial methods that operate in the respective stocks: purse-seine and single trawl in TRE 1 and single trawl in TRE 7. There was no seasonal stratification imposed on the sampling other than it be conducted over the main "peak" period when trevally is landed by the respective methods. A rationalisation of the west coast trawl fleet in recent years has resulted in the pair trawl method in TRE 7 being excluded from the sampling programme because the relative pair trawl effort was deemed to be insignificant. The stratification of the single trawl landings by sub-area was most often done by communication with the skipper during the fishing event and before sampling, whereby cooperative skippers would mark the bins (or ponds within the hold) indicating a catch relating to a particular sub-area stratum. Other sub-area sample collections were confirmed some months after sampling based on data received from the Ministry of Fisheries catch and effort returns, some of these comprising samples from mixed sub-area strata.

As part of the trevally catch sampling review, Walsh & McKenzie (2009) undertook an optimisation analysis for various catch sampling designs. The optimisation results for the length frequency and age-length key approach indicated that a mean weighted coefficient of variation (MWCV) of 0.20 for TRE 1 and TRE 7 single trawl catch at-age estimates could be achieved by sampling about 20 landings through the application of a 900 otolith age length-key. A MWCV of 0.20 could be achieved for TRE 1 purse-seine if a similar size age length-key was applied to length data from 10 sampled landings (note: as 10 purse-seine landings have never been sampled in any fishing year, it is likely the MWCV target would be unachievable).

For reasons of cost, it was not proposed to target a MWCV of 0.20 in each sub-area–method–stratum. Instead the goal of the programme in 2006–07 would be to achieve a MWCV of at least 0.20 (for each method) in the TRE 1 and TRE 7 stocks after stratum amalgamation using the target sample sizes (length frequency samples and age-length key) outlined above.

Length frequency samples were collected sporadically from the TRE 1 fishery and are considered representative of the period April–September 2007. The purse-seine fishery is typically concentrated around periods when more valuable species such as skipjack tuna are absent, with catches usually made around spring–summer and winter. However, in 2006–07, there were few landings of trevally from the purse-seine fleet, with the one purse-seine vessel (*Lindberg*) almost solely responsible for most of the trevally purse-seine catches in the past 10 years of sampling, not operational. Single trawl landings in TRE 1 are often a bycatch of other targeted species, although some targeting does occur during summer. It was proposed that spatial differences in the length composition over the TRE 1 stock be investigated for the purse-seine and single trawl fisheries with sub-area stratification based on the stock boundaries used for snapper: East Northland and the Bay of Plenty (Davies & Walsh 1995). The sampling regime for TRE 1 specified that all purse-seine landings that targeted trevally were to be selected for sampling, and that single trawl landings were to be of a minimum catch weight of at least 1 t for the East Northland sub-area and 2 t for the Bay of Plenty sub-area.

All TRE 7 length frequency samples were collected during the "peak" season (October–May), which incorporates the period when schools of spawning trevally become more vulnerable to trawling. The peak of the season usually occurs during January–February, which is about one month after the peak of the snapper fishery. Although not consistent between years, Walsh et al. (1999) found significant spatial differences in the length composition of TRE 7 single trawl landings in 1997–98, as did Langley (2001) for samples collected from South Taranaki Bight in 1999–2000. Spatial differences in length composition were further investigated for samples collected from the single trawl fisheries in 2006–07. Where possible, landings were identified as coming from one of three sub-areas: Ninety Mile Beach; Kaipara and Manukau coastline and North Taranaki Bight combined (as few differences were apparent in past years between these sub-areas); South Taranaki Bight (see Figure 1). Sub-area stratification of the TRE 7 fishery was based on findings by James (1984). The sampling regime for TRE 7 specified that all single trawl landings were to have a minimum catch weight of trevally of at least 2 t for northern two sub-areas and 1 t for the South Taranaki Bight sub-area.

A two-stage sampling procedure was used to obtain length frequencies (West 1978). A random selection of landings and a random sample of bins within landings represent the first and second stages respectively. All fish in sampled bins were measured to the nearest centimetre below the fork length. As trevally show no differential growth between sexes (James 1984), sex was not determined. The sampling design used for snapper (Davies & Walsh 1995) was adopted for trevally. Sampling of purse-seine catches as described by Walsh et al. (1999) was slightly modified in that each hold (from a total of four) was treated as a separate stratum. A random sample of two bins of trevally was collected from the top, middle, and bottom of each hold as the fish were unloaded. A breakdown of the proposed sampling for trevally in 2006–07 is given in Table 3.

## 2.2 Otolith collections and ageing

Otoliths were generally collected as a subsample of all landings sampled for length frequency to create age-length keys (refer Davies & Walsh 1995). However, otoliths were only collected from single trawl landings from TRE 1 (April–September) and not from purse-seine, and from single trawl landings from TRE 7 (October–June). The purpose of the keys was to convert catch length frequency information to age frequency for the respective stocks. It was assumed that age was distributed randomly within each sampled centimetre length class (Southward 1976). A fixed allocation sample for each length class was determined from the proportion of fish in each length class in single trawl length frequency samples in TRE 1 from 1999–2000 and in TRE 7 from 2000–01, with about 450 and 300 otolith samples collected from each sub-area within the respective stocks. The overall target otolith allocation for TRE 1 (comprising 2 sub-area strata) and TRE 7 (comprising 3 sub-area strata) would therefore sum to about 900 otolith samples respectively, the optimised target sample outlined above. To ensure spatial and temporal representivity in the sample collections, a target of about 30 otoliths was collected from all landings sampled for length frequency within a sub-area until the target sample sizes for each length class within the age-length key were achieved. Those size classes that were uncommon in landings (i.e., very small or large fish) were often targeted for otoliths when available to samplers in order to fulfil the age-length key requirements as best as possible.

All otoliths were prepared using the thin section technique as described by Stevens & Kalish (1998) and Tracey & Horn (1999) and a standardised procedure for reading otoliths was followed (Walsh et al. 1999). However, Walsh & McKenzie (2009) determined that inconsistencies seen in the relative year class strengths of trevally catch-at-age data from previous collections were most likely a result of ageing error caused by two main factors: the misinterpretation of growth zones in difficult otolith sections, and the inaccurate determination of the margin relative to the sample collection and birth dates. Therefore, the trevally ageing protocol instigated in 2006–07 adopted a more rigorous approach than in past years to improve reader accuracy and increase the level of between-reader agreements. In summary, this modified protocol focused mainly on a few main facets: the interpretation and location of the first annulus; forcing an expected margin on the reader relative to the otolith collection date; and allowing the readers access to a variety of otolith images from previous collections in the hope of improving reader accuracy and precision, especially in preparations that are not easily interpretable. Two readers read the entire sets independently to determine an unbiased reading estimate. Where agreement was reached, it was deemed to be the final agreed reading. A third independent reader was assigned the task of re-ageing discrepant otoliths to determine a final agreed reading. If no agreement was attained, then the otolith was reviewed again by all three readers together (via remote log-ons and teleconference technology) to reach agreement, or discarded from the set as unreadable, only if it was of an age less than 20 years, as samples over 19 years were combined into an aggregate age group for the analysis. It was envisaged that discarding a random uninterpretable otolith from the age-length key should have minimal effect on the sample collections and is likely to improve the precision in estimates of catch-at-age. Age was defined as rounded whole years from a nominal birth date of 1 January (James 1984) e.g., in 2006–07, the 1998 year class was 9 years old, whether sampled in December 2006 or February 2007.

Otolith reader precision was quantified by carrying out between-reader comparison tests on initial readings and calculating the Index of Average Percentage Error, IAPE (Campana et al. 1995). Age bias plots were used to detect bias in readings (Campana et al. 1995) by plotting initial reading estimates against final agreed estimates. Initial reading estimates for each of the two readers were plotted as a mean with a 95% confidence interval for each age class. Bias in initial readings occurs when the mean of the initial reading estimates is clearly higher or lower than the final agreed reading estimate for that age class, relative to the 95% confidence interval.

## 2.3 Data analysis

Trevally length and age data were stored on the Ministry of Fisheries *market* and *age* databases respectively, held by NIWA.

The calculation of proportions at length and age, and variances from length frequency samples and age-length keys, followed that of Davies & Walsh (1995).

The calculation of mean weight-at-age and variances followed Quinn II et al. (1983), with a length-weight relationship: w (g) = $0.016 l^{3.064}$ (cm) (James 1984). Proportions at age, mean weight-at-age, and mean length-at-age (with analytical estimates of coefficient of variation, c.v.) were calculated for the range of age classes recruited, with the maximum age being an aggregate of all age classes over 19 years. Weight-at-age estimates are compared with reference curves from the published length-weight relationship (James 1984) and von Bertalanffy growth parameters for TRE 1 and TRE 7 (Walsh et al. 1999) as follows:

$$w_j = 0.016(L_\infty(1 - e^{-K(j-j_0)}))^{3.064}$$

where $w_j$ is the predicted weight (g) at age *j*.

# 3. RESULTS

## 3.1 Sample collections

Summaries of the length frequency sample sizes for each method sub-area stratum taken within TRE 1 and TRE 7 in 2006–07 are given in Tables 4 and 5 respectively, summaries of the otolith sample collections in Tables 6 and 7, and proportions of reader agreement and IAPE estimates in Table 8.

The weight of the annual trevally catch and percentage catch by method for TRE 1 and TRE 7 stocks by sub-area strata for 2006–07 is given in Figures 2 and 3 to display the spatial patterns in the fisheries. Most of the 2006–07 TRE 1 catch (750 t) was taken from the East Northland (55%) and Bay of Plenty (40%) sub-areas, while the Hauraki Gulf sub-area accounted for only 5% (Figure 2). Over half the 2006–07 TRE 7 catch came from the Kaipara-Manukau sub-area (53%) while that from the other three sub-areas ranged between 9 and 22% (Figure 3). Single trawl was the dominant method for catching trevally in 2006–07, accounting for about 65% and 90% of the total landed weight respectively in the TRE 1 and TRE 7 stocks. In 2006–07 there was noticeable reduction in effort from the purse-seine and pair trawl methods in the TRE 1 and TRE 7 fisheries respectively compared to that seen in previous years. As a result of the limited purse-seine effort, a high proportion (about 50%) of the TRE 1 stock TACC was uncaught in 2006–07 (Ministry of Fisheries 2008).

The average single trawl landing size and the numbers of landings in each stock sub-area stratum, for all landings and for those greater than 1 t, is illustrated in Figures 4 and 5 to depict landing size and availability of single trawl landings (the main method catching trevally) for sampling in TRE 1 and TRE 7 respectively. The monthly catch of trevally and of that sampled (weight and number of landings) for the single trawl method (for all landings and for those greater than 1 t) is presented for TRE 1 (Figures 6 and 7) and TRE 7 (Figures 8 and 9) to display the seasonal patterns in the fisheries and the representivity of the sample collections.

Five landings of a total target of 20 (see Tables 3 & 4) were sampled from the TRE 1 single trawl fishery in 2006–07; four landings being collected from the East Northland sub-area, and one landing comprising a mixed catch from the Hauraki Gulf and Bay of Plenty sub-areas. The average weight of a sampled landing from TRE 1 single trawl fishery was 1.9 t, with trevally the target species in all but one of the landings. As trevally was the target species in four of the sampled landings, the average sampled landing size was quite large compared to that of the fishery, which summarises information for all single trawl landings containing trevally (target and bycatch) caught from TRE 1 (see Table 4). As no Bay of Plenty single trawl samples were collected, no spatial comparisons in length and age composition could be made between the sub-areas of TRE 1 in 2006–07. Two purse-seine landings were sampled for length frequency, with an average landing weight of 43.4 t, from a total of four landings in the fishery in 2006–07. Both purse-seine landings were from the East Northland sub-area and comprised 75% of the total TRE 1 purse-seine catch in 2006–07. No otolith collections were made from the purse-seine landings.

Sampling targets for the Kaipara-Manukau and North Taranaki Bight, and South Taranaki Bight sub-areas of TRE 7, were achieved (see Tables 3 & 5). Only two sampled landings of a target of 10 were achieved for the Ninety Mile Beach sub-area. The average weight of the 33 sampled landings from TRE 7 single trawl fishery was 10.9 t, while that for that for the sub-areas was as follows: Ninety Mile Beach, 1.9 t; Kaipara-Manukau and North Taranaki Bight, 19.6 t; South Taranaki Bight, 1.5 t. For sampled landings from the northern three sub-areas of TRE 7 (Ninety Mile Beach, Kaipara and Manukau coastline, and North Taranaki Bight), the primary target species on most occasions was trevally (87%), with only three landings targeting snapper. However, for sampled landings from the South Taranaki Bight sub-area, the target species was more varied (flatfish, snapper, red cod (*Pseudophycis bachus*), barracouta (*Thyrsites atun*)), although trevally was the target on just over one-quarter of trips. Considerable differences are apparent between the percentage of number of landings sampled and the percentage of weight of landings sampled in the TRE 7 single trawl fishery (see Table 5), because trevally was the target species on 67% of the fishing trips, and the average trevally catch was large. The summarised information in Table 5 is for all single trawl landings containing trevally (target and bycatch) caught from TRE 7.

## 3.2 TRE 1 and TRE 7 length and age distributions

For the TRE 1 and TRE 7 fisheries in 2006–07, catch-at-age compositions (using the length frequency and age-length key approach) were derived from the combined length distributions of sub-area or stock strata, and used to identify year class strengths. Otolith collections may not have been consistent across the entire sampling period, especially from landings sampled toward the end of the season when the age-length key collection was nearly complete or when specific sub-area collections (e.g., Ninety Mile Beach) were difficult to obtain. This is unlikely to bias the age characterisations because the growth of recruited trevally (i.e., those over 25 cm long) would have been relatively low over the period when length frequency collections were made. This assumption has been accepted for other species with growth rates comparable to those of trevally (Westrheim & Ricker 1978, Davies & Walsh 1995).

Sample length and age distributions for the TRE 1 purse-seine and single trawl and TRE 7 single trawl fisheries in 2006–07 are presented as histograms and line graphs (Figures 10–29). Scatterplots of age-length data collected from TRE 1 and TRE 7 fisheries for 2006–07, and the sub-areas of TRE 7, are given in Figures 30–32. Mean weight-at-age estimates for the East Northland sub-area method strata of TRE 1 and single trawl sub-area strata of TRE 7 are presented in Figures 33 and 34 respectively, and comparable estimates for mean length-at-age in Figures 35 and 36. The estimated proportions at length, age, mean weight-at-age, and mean length-at-age, are tabulated in Appendices 1–4. The age-length keys for TRE 1 and TRE 7 stocks and sub-area strata are presented in Appendices 5 and 6 respectively. Length distributions of otolith sample collections as a comparison

to that targeted for TRE 1 and TRE 7 sub-area strata are presented in Appendix 7. A discontinuous time series of length and age compositions from the main trevally fisheries in TRE 1 and TRE 7 from 1997–98 to 2006–07 is given in Appendix 8.

The estimated total number of fish caught in each stock and sub-area method stratum was calculated from the reported total weight landed and the mean fish weight derived from stratum length compositions (see Appendix 1).

## 3.3 TRE 1

### 3.3.1 TRE 1 single trawl catch-at-length and catch-at-age

The length distribution of the TRE 1 single trawl catch in 2006–07 was narrow and characterised by one main mode at 38 cm and a tail of the distribution, although small, extending to over 50 cm (Figure 10). Noticeable in the collection were a few large trevally between 60 and 70 cm long. The mean length of trevally sampled from the fishery was 36.8 cm, and the proportion-at-length MWCV was 0.42, probably a reflection of the low number of landings sampled from the fishery (5) and the level of heterogeneity between them.

The age distribution for the TRE 1 single trawl fishery in 2006–07 was dominated by the 2003 year class (4-year-olds) making up over one-fifth (22%) of the number of trevally landed, while the second most dominant, 2001 year class (6-year-olds), made up about 15% (Figure 11). Most of the single trawl catch was based on trevally 10 years of age and younger, with relatively few fish present in the old age classes. A small number of fish, about 3% respectively, still exist in the 1995 year class (12 year olds) and in the aggregate (over 19) age group. In the age-length key collection for TRE 1, 8% of samples made up the aggregate (over 19) age group, with relatively low representation in age classes older than this, and few over 30 years old (see Appendix 5, Figure 30). Only those age classes over 3 years of age are likely to be fully recruited to the fishery as they no longer contain a noticeable proportion of fish in the 27–30 cm length intervals (see age-length key, Appendix 5). The mean age of trevally sampled from the fishery was 6.9 years and the proportion-at-age MWCV was 0.21

### 3.3.2 TRE 1 sub-area catch-at-length and catch-at-age

The length distributions for the East Northland sub-area method collections from the TRE 1 stock were relatively similar for the single trawl and pair trawl fisheries, and contained proportionally smaller fish to that sampled from the purse-seine fishery (Figures 12–14, 18). All distributions were generally unimodal and made up of fish of a narrow size range. The single trawl distribution largely comprised fish between 32 and 40 cm with a peak at 38 cm, the pair trawl slightly broader with a size range between 30 and 41 cm and a peak at 36 cm (Figures 12 & 14). The purse-seine estimates largely comprised fish between 36 and 46 cm, with few fish in the left and right hand tails of the distribution, and a peak at 41 cm (Figure 13). The mean length of trevally sampled from the East Northland single trawl fishery was 36.7 cm and the proportion-at-length MWCV was 0.45. The mean length of the pair trawl was 35.5 cm, and as derived from only one sampled landing the distribution had no variance estimate. The mean length of trevally sampled from the purse-seine fishery was 40.9 cm, and the proportion-at-length MWCV was low at 0.01 because the combined sampled landings weight was substantial, making up over 80% of the total East Northland purse-seine landed catch (see Table 4).

The age distributions for the East Northland sub-area method strata were similar for the single trawl and pair trawl estimates, largely made up of young fish below 10 years of age, and differed considerably from that of the purse-seine estimates which were broader and contained a reasonable

proportion of middle-aged fish (Figures 15–17, 19). The 2003 year class (4 year olds) was dominant in the single trawl and pair trawl fisheries, making up around 30% of the landed catch of trevally by number in East Northland. Both the single trawl and pair trawl fisheries had a high proportion of fish between 3 and 6 years of age (67% and 61% respectively), with low proportions of fish in the older age classes including the aggregate (over 19) age group. As a result, estimates of mean age, 6.1 and 5.5 years respectively, were fairly low for these fisheries. The purse-seine catch-at-age estimate had reasonable numbers of fish in most age classes between 4 and 17 years, with the most dominant being related to the 2001, 1998, and 1997 year classes (6, 9, and 10-year-olds). The aggregate (over 19) age group made up over 5% of the total numbers of fish landed by purse-seine. The mean age of trevally from the purse-seine fishery was high at 9.7 years and the proportion-at-age MWCV was 0.33.

## 3.4 TRE 7

### 3.4.1 TRE 7 single trawl catch-at-length and catch-at-age

The length distribution of the TRE 7 single trawl catch in 2006–07 was relatively broad and characterised by one main mode at 35 cm with the tail of the distribution extending to over 55 cm (Figure 20). The mean length of trevally sampled from the fishery was 38.0 cm, and the proportion-at-length MWCV was 0.13.

The age distribution for the single trawl fishery in 2006–07, although relatively broad, was dominated by young trevally from the 2003 to 2001 year classes (4 to 6-year-olds) making up half of landed catch by number (Figure 21). Other noticeably dominant year classes were those from 1999 (8-year-olds) and the combination of those making up the aggregate (over 19) age group. The aggregate (over 19) age group made up around 5% of the landed single trawl catch by number in TRE 7, reflecting a relatively high number of fish of this age range being available in the fishery. In the age-length key collection for TRE 7, over 20% of samples made up the aggregate (over 19) age group, with good representation up to the mid-30 age classes (see Appendix 6, Figures 31 & 32). Although age classes between 9 and 19 years appear of moderate to low relative abundance, combined with the aggregate (over 19) age group they made up over one-quarter (27%) of the landed catch of trevally in 2006–07. Only those age classes over four years of age are likely to be fully recruited to the fishery as they no longer contain a noticeable proportion of fish in the 25–30 cm length intervals (see age-length key, Appendix 6). The mean age of trevally sampled from the fishery was 7.9 years and the proportion-at-age MWCV was 0.13.

### 3.4.2 TRE 7 sub-area catch-at-length and catch-at-age

The length and age distributions determined from each of the three TRE 7 sub-area sample collections in 2006–07 were considerably different (Figures 22–29).

The Ninety Mile Beach sub-area had a high proportion of small fish and a moderate number of large fish, characterised by two main modes with peaks at 35 and 50 cm, and a tail extending to 55 cm (Figure 22). The mean length of trevally sampled from the fishery was 40.6 cm, and the proportion-at-length MWCV was 0.08. The age distribution of the Ninety Mile Beach sub-area catches comprised a high proportion of very young fish, dominated by the 2003 year class which made up over one-third of the trevally landed within the sub-area. The 1998 year class (9 year olds) was the strongest in the mid-age range, and there was a relatively high percentage (10%) of fish in the aggregate (over 19) age group (Figure 25). The mean age of trevally sampled from the fishery was 8.2 years, and the proportion-at-age MWCV was 0.35.

The sample length distribution from the combined Kaipara-Manukau and North Taranaki Bight sub-areas was relatively broad with a predominance of small–moderate sized fish, characterised by one mode centred at 35 cm, and a tail extending to over 50 cm (Figure 23). The mean length of trevally sampled from the fishery was the lowest of the TRE 7 sub-areas at 38.4 cm, and the proportion-at-length MWCV was 0.12. The age distribution from the Kaipara-Manukau and North Taranaki Bight sub-area was relatively broad comprising appreciable numbers of fish in most age classes between 4 and over 19 years, although the greatest proportion of fish were young, between 4 and 9 years of age, making up over two-thirds (70%) of the landed catch by number (Figure 26). A moderate number (5%) of fish occupy the aggregate (over 19) age group. The mean age of trevally sampled from the Kaipara-Manukau and North Taranaki Bight sub-area fishery was relatively high at 8.6 years, and the proportion-at-age MWCV was 0.21.

The South Taranaki Bight sub-area contained the highest proportions of large fish for sampling undertaken in TRE 7 in 2006–07 and was characterised by at least two modes centred at about 41 and 47 cm, and a tail extending to over 55 cm (Figure 24). The mean length of trevally sampled from the fishery was the highest of the TRE 7 sub-areas at 43.5 cm, and the proportion-at-length MWCV was 0.31. The South Taranaki Bight sub-area age distribution, although relatively broad with representation of fish in most age classes, was dominated by young fish from the 2002 to 1999 year classes (5–8 year olds), half the landed catch by number (Figure 27). Fish aged 17 years and older were also dominant in the South Taranaki Bight trawl catches making up 38% by number, the aggregate (over 19) age group, made up of many age classes, accounted for over half (20%) (see Figure 27). The mean age of trevally sampled from the South Taranaki Bight fishery was the highest of the three sub-areas at 12.0 years, and the proportion-at-age MWCV was 0.20.

### 3.4.3 TRE 1 and TRE 7 mean weight-at-age and mean length-at-age estimates

Observed and predicted mean weight-at-age estimates are given for the main methods in the TRE 1 and TRE 7 sub-area fisheries, with predicted values based on published parameters (Figures 33 & 34). The mean weight-at-age estimates for some of the young age classes (2–5 year olds) lie on or above the predicted weight-at-age curve because of the minimum legal size (MLS) restriction of 25 cm in commercial catches, and also because fish of this age range may not yet be fully recruited to the fishery. The absence of smaller fish of a partially recruited age class would positively bias the observed mean for that age class (Davies et al. 2003).

The differences between the observed and predicted mean weight-at-age estimates appear to vary for the trawl and purse-seine methods in the TRE 1 East Northland sub-area (Figure 33) and in the sub-areas of TRE 7 (Figure 34). Estimates derived from the East Northland sub-area purse-seine fishery were generally highest for the most common age classes in the fishery, but were below the predicted values. Estimates from the East Northland single trawl and pair trawl fisheries were generally more similar to each other but well below the predicted values. Estimates derived from the Ninety Mile Beach sub-area were most often the highest and usually above the predicted estimates for TRE 7, while those from the South Taranaki Bight sub-area more closely resembled the predicted values. Those estimates for age classes 16 years and older from these two sub-areas did not fit well with the predicted values, sitting well above the line. Those estimates derived for the combined Kaipara-Manukau and North Taranaki Bight sub-area were almost exclusively below the predicted values for almost all age classes.

Observed mean length-at-age estimates for the main methods in the TRE 1 and TRE 7 sub-area fisheries closely resemble those patterns seen in mean weight-at-age estimates (Figures 35 & 36).

### 3.4.4 Reader error in estimating ages of trevally

Levels of between-reader agreement for initial readings appeared relatively low at 44% for TRE 1 and 55% for TRE 7 otolith samples (Appendices 9a–9b) with estimates of IAPE of 5.055% and 3.651% respectively (Table 8). Comparisons made between each reader and the final agreed reading estimates were higher and ranged from 64 to 79% (Appendices 9a–9b). There were some minor differences in symmetry and clustering of points about the zero-line between the readers, and the final agreed reading estimates suggested reader 2 was slightly more consistent in ageing trevally otoliths than reader 1 (see Appendices 9a–9b).

Individual reader bias is shown in age-bias plots (Appendix 10). Reader 1 had slightly higher levels of bias and imprecision in reading estimates than reader 2 for both TRE 1 and TRE 7 otolith samples, and both readers generally displayed more bias and imprecision for the older age classes. For the TRE 1 samples, reader 1 mainly displayed positive bias, overestimating age, and reader 2 mainly negative bias, underestimating age, whereas for TRE 7 samples, reader 1 displayed mainly negative bias and reader 2 more closely approximated the one-to-one line for mean values (see Appendix 10).

## 4. DISCUSSION

This is the eighth report to summarise the length and age compositions of trevally landings from the main fishing methods operating in TRE 1 and/or TRE 7 since 1997–98. In a review of the trevally catch sampling data collected between 1997–98 and 2003–04 from both stocks, Walsh & McKenzie (2009) found that due to inconsistencies in year class strengths, trends in the progression of weak and strong year classes in TRE 1 and TRE 7 catches were difficult to determine. This conclusion is borne out by recent TRE 1 and TRE 7 stock assessments, in which the models also found it difficult to fit to the time series of catch-at-age observations (McKenzie 2007, 2008). Walsh & McKenzie (2009) determined that the 'smoothing' in trevally catch-at-age estimates was a direct result of ageing error, where the misinterpretation of growth zones in difficult otolith sections, and the inaccurate determination of the margin relative to the sample collection and birth dates, were the main contributing factors. The redesigned ageing protocol instigated in 2006–07 adopted a more rigorous approach with the aim of improving reader accuracy and increasing the level of between reader agreements. Initial reader agreement for the TRE 1 ($n$ = 338) and TRE 7 ($n$ = 920) otolith collections in 2006–07 was relatively low at 44% and 55% respectively. However, these estimates increased to about 90% and 88% respectively with second readings, although these estimates only reflect the third reader agreeing with one of the other two. James (1984) found that determining the otolith margin in preparations to be a subjective decision and estimated the errors associated with ageing trevally increase progressively with age. As both otolith collections comprised relatively high proportions of fish over 19 years, (8% in TRE 1 and 18% in TRE 7), the potential for a moderate level of reader disagreement is likely. However, for the analysis, fish over 19 years were combined into a single aggregate age class and are unlikely to have biased catch-at-age results. It was therefore not as crucial to determine an accurate final agreed reading for these old fish as it was for younger fish in the collection. We believe the advancements in ageing trevally achieved in the current study (notably in first annulus and margin recognition) have made ageing error as low as it practically can be, with moderate between-reader IAPE estimates of 5.055% and 3.651% (for TRE 1 and TRE 7) compared to APE estimates from other studies (4.4% to 11.6% from Beamish & Fournier (1981); 4.9% to 9.7% from Hill et al. (1989); and 4.2% to 15.7% from Campana et al. 1995)), although direct comparisons between published estimates is not straightforward. It has been suggested that an APE or CV (the same estimates as IAPE for between-reader comparisons given here for trevally) of 5% or less may serve as a threshold (or reference point) for precision levels for ageing laboratories for many fishes of moderate longevity and reading complexity (Morison et al. 1998, Campana 2001) similar to trevally. The initial reader disagreements for trevally were largely the result of misinterpreting ambiguous otolith structures, and the process of independent identification and rereading of otoliths where

disagreement occurred usually resolved most disagreements. This was expected to increase precision (implying accuracy) in final age estimates as far as practical. However, trevally otoliths can be inherently difficult to age, and as such, some level of ageing error is always likely to be present in catch-at-age results. As complexities in determining age estimates for previous trevally sample collections were encountered for reader ring counts and margin interpretations (Walsh & McKenzie 2009), no comparisons in estimates of reader error could be made with estimates presented here.

The results determined for length and age collections in TRE 1 in 2006–07 show variability in trevally catch-at-length and catch-at-age estimates exists between fishing methods, similar to findings in previous years (Walsh et al. 1999, 2000, Langley 2001, Walsh & McKenzie 2009).

The level of spatial coverage of the TRE 1 fisheries achieved in the 2006–07 trevally catch sampling programme was inadequate to determine whether spatial heterogeneity is present within the TRE 1 fishery. All length and age collections were based on samples almost entirely from the East Northland sub-area, and therefore no spatial comparisons could be made with trevally caught from the Bay of Plenty, the other main fishing area in TRE 1. Difficulties in obtaining samples from the Bay of Plenty trawl fishery came about because catch sampling coincided with the year the major TRE 1 processor changed its trevally landing distribution and processing practices. Although the company concerned had been specifically contracted to sample its own Bay of Plenty catches, confusion on the part of the sampling staff and resistance at factory management levels resulted in the main Bay of Plenty landing period being missed. It should be noted that these communication and access issues have now been rectified and an acceptable spatial coverage of TRE 1 was achieved in the 2007–08 fishing year by the fishing company concerned. In order to successfully monitor catch-at-age estimates through time it is essential to instigate a comprehensive and rigorous sampling strategy in the main sub-areas of the TRE 1 (and TRE 7) fishery, as has been accomplished in the SNA 1 and SNA 8 fisheries.

Similarly, samples were difficult to obtain from other TRE 1 fishers as they regularly operated between the TRE 1 and TRE 7 stocks on the same fishing trip, thereby rendering the catch useless for sample selection. Walsh et al. (2008) documented a downsizing and rationalisation of the inshore trawl fleet in northern New Zealand in recent years, largely for financial and economic reasons, resulting in fewer trawl vessels available to obtain samples from. Liaison with cooperative fishers enabled samples to be collected from within a stock (when the vessel fished in both TRE 1 and TRE 7) only when the fisher agreed to mark the sample bins directly after capture. Relying on the fisher to remember where the TRE 1 and TRE 7 catches were in the hold proved unworkable as later inspection of the catch length distributions revealed the two samples comprised trevally of the same length structure, obviously reflecting no separation by the fisher as requested.

The length composition of the single trawl (and pair trawl) catch from the East Northland sub-area was relatively narrow and dominated by small trevally having a different size range from that of the purse-seine catch, reflective of method–specific differences in selectivity, but relatively dissimilar to findings in previous years (Walsh et al. 1999, 2000, Langley 2001). The purse-seine catch was characterised by a strong unimodal distribution based on moderate sized individuals, reflective of this method catching surface schools of similar sized fish with little variation, analogous to findings by James (1984), and similar to that seen in past years. Walsh & McKenzie (2009) found the length compositions of purse-seine landings generally varied little between years. Minor spatial heterogeneous patterns in length structure were evident in certain years for the Bay of Plenty and East Northland, but generally the spatial catch length compositions were relatively homogeneous (Walsh et al. 1999, 2000).

Differences in TRE 1 length compositions between purse-seine and single trawl and pair trawl methods seen in the 2006–07 samples were also apparent in the catch-at-age compositions, with single trawl and pair trawl based largely on young trevally below 10 years of age and few fish present in the right hand limbs of the distributions, especially in the aggregate (over 19) age group when

compared to collections from past years. Purse-seine catch-at-age estimates were much broader than the trawl summaries, comprising a moderate number of fish in the mid-age classes and a significant proportion in the aggregate (over 19) age group. It is unknown whether the differences apparent in length and age structure of the single trawl fishery in 2006–07 compared to that of the time series may be related to effects of spatial heterogeneity as samples were almost exclusively based on collections from the East Northland sub-area. Alternatively, the high proportion of small young fish currently present in the trawl fishery may reflect recent strong recruitment that is not yet fully evident in the purse-seine fishery, or perhaps there has been general decline in the numbers of older fish present in the East Northland sub-area. As the purse-seine method is highly selective, sampling from the single trawl fishery is likely to be more representative, capturing a wider range of sizes and ages, and therefore having better stock monitoring utility (Walsh & McKenzie 2009). As there has been a six year hiatus since length and age data were last collected from the TRE 1 single trawl fishery, the differences seen in the 2006–07 collection compared to those seven years ago may actually reflect a change in the trevally population length and age structure within the stock. The reinstatement of a regular trawl based sampling programme may help to resolve this problem and is likely to provide better information on the mortality and recruitment variation of the TRE 1 stock.

The level of precision in the TRE 1 East Northland single trawl catch-at-length estimate was low (MWCV = 0.45) indicative of a high level of heterogeneity in length sample collections and the low number of landings sampled from this fishery in 2006–07. The purse-seine trevally fishery did not operate to the same level as it had done in past years, with samples taken from only two large landings of a total of five made in 2006–07, four of these in East Northland, and only three targeting trevally. The associated MWCV estimate for the purse-seine length distribution was very low (0.01) and is largely attributed to a high sampled landing weight relative to that of the whole purse-seine fishery, and to a lesser degree a low between-landing variance. It is therefore likely that the length composition summary is a reasonable representation of the East Northland trevally purse-seine fishery in the 2006–07 fishing year. As only one pair trawl landing was sampled from this sub-area fishery, no level of precision could be attributed to the length collection, and the sample size is more than likely inadequate. This pair trawl sample, although not a targeted sampling method under the project objective, was collected because the two vessels that were regularly sampled from the East Northland sub-area often changed from single trawling to pair trawling throughout the season, and target sample sizes from the single trawl fishery were unlikely to be met. Catch-at-age MWCV estimates for the single trawl and pair trawl fisheries in East Northland in 2006–07 were relatively low (0.23 and 0.22 respectively), especially given the high MWCV estimates from the length compositions, and are most likely related to the high proportion of young fish selected by the trawl methods, including the dominant 2003 year class (4 year olds). The MWCV for the purse-seine fishery was high (0.33) and probably reflects the broad age composition with few dominant age classes present in catches from this fishery, mainly of similar relative strength to adjacent cohorts. Precision may be further reduced by the paucity of defined strong and weak year classes in the distributions, reflective of ageing error (N. Davies, pers. comm.). Although a slightly higher proportion of larger and older fish were present, precision on estimates of proportion at length and age for the combined TRE 1 single trawl fishery in 2006–07 were not considerably different from those of the East Northland single trawl estimates as only one other landing, collected outside the East Northland sub-area, was included in the TRE 1 analysis.

A few large trevally were collected for the age-length key from the aforementioned landing that fished in the Hauraki Gulf and Bay of Plenty sub-areas of TRE 1. Three specimens measuring 70, 71, and 73 cm are the largest trevally encountered in 9 years of catch sampling in TRE 1 and TRE 7 where the total number of fish measured is over 150 000 individuals. About 20 000 length and age samples collected from research trawls and market samples (purse-seine and pair trawl) undertaken in similar areas (TRE 1 and TRE 7) during the 1970s (James 1984) had maximum length estimates considerably smaller at 55 and 58 cm for the two stocks respectively. Generally the largest trevally to be caught in New Zealand, about 8–9 kg or more (estimated to be about 72–75 cm), are targeted by

recreational fishers in the Far North's east and west coastlines, often in harbours, or close to the shore or rocky reefs (author's observations). Recent findings have surmised that snapper from stocks with low levels of biomass (e.g., SNA 8) currently grow much faster and may attain a larger maximum size than was possible when the stock was close to virgin, and this may also apply to trevally in some areas of TRE 1.

The length and age distributions for the TRE 7 sub-area fisheries in 2006–07 showed heterogeneity exists within the stock on a moderate spatial scale along a latitudinal cline from north to south. Unlike sampling conducted in previous years, length and age samples were independent collections within each sub-area, and it can therefore be hypothesised that the summaries presented here are spatially discrete, and that real differences in age and length structure exist within the TRE 7 stock.

The length frequency of the two Ninety Mile Beach sub-area sampled landings contained small and large trevally, the small, of a similar size range to the combined Kaipara-Manukau and North Taranaki Bight sub-area left hand limb, and the large, of similar size range to the South Taranaki Bight right hand limb. However, most noticeable in the Ninety Mile Beach age distribution was the prominence of the 2004, 2003, and 1998 year classes (3, 4, and 8 year olds), not as evident in similar proportions in the other TRE 7 sub-area age distributions. The Ninety Mile Beach sub-area catch was also dominated a high proportion of fish in the aggregate (over 19) age group. Length and age collections were made late in the season (May–June) in this sub-area, described by Walsh et al. (1999) as being 'off peak', a time when a high abundance of small, possibly 'resident' fish, are more common in catches, as they can be for other species such as snapper (Walsh et al. 2006b). If these are not spatially inherent differences in length and age structure or recruitment strength, then other factors that may influence the disproportionate number of 3 and 4 year olds present in Ninety Mile Beach landings may be related to growth where fish of this age have grown to a size (i.e., greater than 30 cm) by this time of the year and become vulnerable to trawl gear. These hypotheses are based on only two sampled landings, and to fully determine if spatial variability in length and age exists within the Ninety Mile Beach sub-area, a more comprehensive sampling strategy is required in the future. In past collections, Walsh et al. (1999, 2000) reported that trevally sampled from the Ninety Mile Beach (and the Far North) sub-area attained a larger size than in other sub-areas of TRE 7, and noticeably, many fish sampled from this area appeared to have a faster growth rate, on average, than those from elsewhere, although these differences were not always apparent between years (Langley 2001, 2002). Accordingly, the MWCV estimate for the Ninety Mile Beach sub-area age distribution was high, indicating low precision in sample estimates and probably reflective of a high level of heterogeneity between landings and the low sample size of the overall collection.

Walsh & McKenzie (2009) described previous length frequency collections from the Kaipara-Manukau and North Taranaki Bight sub-areas as generally similar and mainly made up of small–moderate sized fish, with few large fish over 50 cm, and this again was reflected in sample collections made in 2006–07. The length distribution from the combined Kaipara-Manukau and North Taranaki Bight sub-areas was unimodal and smooth, with a low MWCV estimate (0.12), reflecting a low level of heterogeneity in landings within this part of TRE 7, and also the large numbers of samples obtained. Over two-thirds of the Kaipara-Manukau and North Taranaki Bight sub-areas age composition comprised young fish between 4 and 9 years old, with the 2003, 2001, and 1999 year classes (4, 6, and 8 year olds) particularly dominant. Although a moderate number of trevally exist within most age classes, the aggregate (over 19) age group was the lowest in all TRE 7 sub-area collections in 2006–07, making up only 5% of the single trawl catch. The Kaipara-Manukau and North Taranaki Bight sub-areas receive by far the greatest fishing pressure with an estimated 75% of the TRE 7 catch taken within this area alone. The catch-at-age MWCV estimate was relatively high at 0.21 and probably reflects the broadness of the age distribution.

Past catch sampling in the South Taranaki Bight sub-area (one and two landings in 1997–98 and 1999–2000 respectively) brought to light differences in length structure from other TRE 7 spatial

areas (Walsh et al. 1999, Langley 2001). Notably a single dominant mode centred around 40–45 cm evident in the South Taranaki Bight catches was not seen in the other area samples. Spatial differences in catch length composition were also evident in the 2006–07 South Taranaki Bight samples where two distinct length modes (centred about 41 and 47 cm) were not strongly evident in the other TRE 7 samples. Similarly, the age composition of the South Taranaki Bight 2006–07 samples showed clear differences from the other spatial areas. Although area specific age collections were not made in previous years when sampling was undertaken in the South Taranaki Bight, it is reasonable to assume that the spatial differences in length composition seen at the time also reflected differences in age. There was a very low proportion of trevally in the mid age range (i.e., 9–16 year olds) in the 2006–07 South Taranaki Bight catch-at-age distribution. This paucity of data is better reflected by the age-at-length scatterplot and in the age-length key (see Figure 32 and Appendix 6) where few individuals were present for particular age classes (i.e., 9–10, 12–16, and 23–30 year olds), often for consecutive years, and generally followed by a greater number of fish in older age classes. As the age-length key collection was well represented by samples in all of the common length classes (see Appendices 6 & 7) it is unlikely that insufficiencies in the sample collections lead to this anomaly. The observed age structure may reflect periodic recruitment in the South Taranaki Bight sub-area, possibly related to its location at the southernmost geographic range of the trevally distribution, similar to that for snapper in SNA 7. The overwhelming dominance of old fish (i.e., those over 16 years of age) gave rise to a very high estimate of mean age (•12.0 years; see Figure 32). The length distribution MWCV estimate for the South Taranaki Bight sub-area was relatively high (0.31) reflective of high heterogeneity in sampled landings and possibly indicative of further internal spatial patterns within the South Taranaki Bight sub-area (i.e., South Taranaki Bight, Tasman and Golden Bays). The catch-at-age MWCV estimate was relatively low at 0.20 given the broadness of the age distribution, the high MWCV of the length distribution, and the moderate sample size of the age-length key ($n$ = 300). It is likely the aggregate (over 19) age group would have increased the precision in the catch-at-age estimate considerably as the most dominant age 'group' currently present in the fishery.

The TRE 7 combined single trawl length and age distributions for 2006–07 were broad and based on collections of over 19 000 length measurements and 900 otolith samples. However, as comprehensive length and age samples from the South Taranaki Bight sub-area were included in TRE 7 sample collections for the first time in 2006–07, the overall combined length and age distribution representing the TRE 7 stock may not be as analogous with collections in past years because of the level of spatial heterogeneity that appears to be present within the stock. Similar to the TRE 1 single trawl fishery, there has been a four year hiatus since length and age data were last collected from TRE 7 also making comparisons in year class strength estimates from previous collections difficult. The potential for differences in the length composition between sub-areas highlights the importance of ensuring the sampling coverage is representative of the areal distribution of the entire fishery to ensure the collection of an unbiased sample of the length composition of the (overall stock) catch (Langley 2002). As differences in the underlying age compositions of the sub-areas also appear to be present in TRE 7, it would seem fundamental that future sampling should also ensure that age data are also representative of the areal distribution of the entire fishery. James (1984) found trevally length and age compositions collected by trawl survey in the 1970s along the west coast stock to vary considerably, where larger and older fish were more common in the south, similar to this study. Although spatial differences in length and age composition may be explained by the presence of different substocks, this hypothesis was not supported by electrophoretic studies (Gauldie & Johnston 1980) which indicated west coast North Island trevally probably belong to one stock. However, enzyme markers used at the time were notoriously poor indicators for marine fish stocks and this study did not incorporate trevally from the southernmost range of the stock (South Taranaki Bight, Tasman and Golden Bays). Although inconsistencies in year class strengths appear to exist between the sub-areas of TRE 7, there are also a number of similarities, with a reasonably high proportion of

• Note this estimate is biased low because of the aggregate age class.

young fish present in all catch-at-age summaries, although the overall age range of these young fish decreases from north to south, and there is a consistently low proportion of fish between 10 and 16 years of age. The 2003 and 1998 year classes are well represented in both the Ninety Mile Beach and the Kaipara-Manukau and North Taranaki Bight sub-areas, as were the 1999 and 1996 year classes in the Kaipara-Manukau and North Taranaki Bight, and South Taranaki Bight sub-areas. There was also a considerable proportion of fish in the aggregate (over 19) age group in all TRE 7 sub-areas in 2006–07. Any variability in relative year class proportions between the TRE 7 sub-areas may also be due to the variable recruitment specific to a stock (a reflection of unique environmental conditions), growth differences, and fishing mortality differences, seen in other fisheries, such as SNA 1 (Walsh et al. 2003). Snapper on New Zealand's west coast are currently managed as two separate stocks: SNA 7, encompassing the northern South Island, and SNA 8, encompassing almost the entire west coast of the North Island. Although some spatial heterogeneity in length and age for snapper exists within the SNA 8 stock (Walsh et al. 2006), the differences seen in year class strengths between the two stocks are more apparent. It is therefore plausible that, for trevally, the current TRE 7 stock boundary may actually comprise more than one stock or substock.

Few small and young trevally were present in the South Taranaki Bight sub-area length and age distributions of the single trawl fishery compared to other sub-area collections in 2006–07, and as described above, may reflect periodic recruitment. The age-length key collection (see Appendix 6) and the length distribution of the otolith collection compared to the sub-area target (see Appendix 7) contained few individuals below 36 cm and 5 years of age. Although juvenile trevally may not be as adequately sampled, a summary of results from four trawl surveys (using a 40 mm codend) conducted between 1986 and 1991 determined recruitment on the west coast to vary between years and that the distribution and relative abundance of pre-recruits (under 25 cm – almost entirely 1 and 2 year old fish), was found to decrease south of New Plymouth (Langley 1994). Five west coast South Island trawl surveys (using a 60 mm codend) undertaken between 1992 and 2000 captured only 30 adult and no pre-recruit trevally. Similarly, comprehensive harbour surveys for juvenile fish assemblages using a fine mesh beach seine net found pre-recruit trevally (13–16 cm) in the Pauatahanui and Porirua Harbours just north of Wellington, but were rarely encountered in the northern South Island harbours (M. Morrison, NIWA, pers. comm.) An otolith microchemistry study conducted on the SNA 8 stock, (Morrison et al. unpublished results) found 98% of a sample collection of recruited 4-year-old snapper from the entire stock range (principally the west coast of New Zealand's North Island) to be natal to the largest harbour (Kaipara Harbour) situated in the north of the stock. Estuaries are important habitats for juvenile trevally, and are often associated with seagrass beds (Morrison et al. unpublished results), as are coastal areas directly adjacent to them (Langley 1994) and should similar recruitment patterns and ontogenetic shifts occur for juveniles in parts of TRE 7 as it does for SNA 8, then delays in recruitment to the adult stock for the furthermost areas such as South Taranaki Bight, and Tasman and Golden Bays, are not implausible. The current stock separation for SNA 7 and SNA 8 stocks, largely the division between the North and South Islands, also makes up the northern and southern bounds of the South Taranaki Bight sub-area stratum referred to in this report. As collections made from single trawl landings were from vessels that fished in either or both sub-area strata (South Taranaki Bight, Tasman and Golden Bays) on a single fishing trip, it is difficult to determine whether any differences in the length and age structure of trevally within the South Taranaki Bight strata exists as they do for snapper from SNA 7 and SNA 8.

Overall the TRE 7 stock generally comprises fish of a broad range of sizes and ages, a high proportion of these are from age classes 4–9 years old, moderate numbers across the mid length and age range, and an appreciable tail in the aggregate (over 19) age group. Although the aggregate (over 19) age group made up only 5% by number of the total TRE 7 catch in 2006–07, its combined biomass is likely to contribute significantly to the overall take, and will be important in the future sustainability of the TRE 7 stock. Precision on the sample collections for the TRE 7 fishery was relatively high, with a MWCV estimate of 0.13 determined for both the length and age distributions. The TRE 7 TACC (2153 t) is comparatively large and the catch regularly attainable given the

complexities of juggling the important commercial species mix that exists within the west coast fishery. However, as proportional catch-at-age data are not a direct index of absolute abundance, inferences from these changes in stock size or state are not totally reliable and should be treated with some care. Nevertheless, based on the data presented here and of that in the time series, and with comparisons made with the other main fishery on this coast, SNA 8, it is more than likely the current TRE 7 fishery is in a relatively healthy state and that exploitation rates in recent years have not impacted on the stock to any great extent.

The oldest trevally sampled from the TRE 1 and TRE 7 fisheries in 2006–07 were 32 and 47 years old respectively, and samples aged by James (1984) from collections undertaken in the 1970s determined maximum age estimates of 46 and 47 years. As relatively low numbers of older fish were present in collections from the TRE 1 fishery in 2006–07, it is unknown whether this reflected spatial heterogeneity of sample collections, largely made from the East Northland sub-area, or a reduction in the proportions of older trevally in the population.

Some minor similarities in relative year class strengths in single trawl catches from the TRE 1 and TRE 7 stocks have been noted previously when sampling was conducted concurrently in both fisheries in the late 1990s (Walsh et al. 1999, 2000). In 2006–07, the shape of the single trawl age distributions in TRE 1 and TRE 7 may be seen as generally similar, comprising proportionally more young fish up to 9 years of age, and few fish in the mid age range of the right hand limb, but is probably a reflection of the selectivity of the single trawl method catching a low proportion of large fish. Apart from the 2003 and 2001 year classes, it is generally difficult to determine any correlations between the stocks in respect to the presence of strong and weak year classes. Even using the same age-length key, it is difficult to depict any similarities in year class strengths between the East Northland sub-area single trawl and purse-seine catch-at-age compositions. Some minor similarities may be drawn for year class strengths between East Northland and Ninety Mile Beach summaries, especially for the dominant 2004, 2003, and 1998 year classes, but these may just be coincidental. If the apparent spatial heterogeneity in year class strengths exists within the TRE 7 sub-area collections from 2006–07, then similarities between the TRE 1 and TRE 7 stocks seem improbable. Also, as sampling undertaken in TRE 1 in 2006–07 did not incorporate collections from the Bay of Plenty sub-area, further work is required to validate assumptions of homogeneity in length and age in TRE 1. Inconsistencies apparent in catch-at-age estimates and variability in the relative year class strengths in stocks, especially between years, are likely to have been related to ageing error (Walsh & McKenzie 2009). However, as mentioned above, it is also unknown to what extent spatial collections influence the determination of heterogeneity in previous catch-at-age results. Speculative correlations could be made between the relative year class strength estimates for snapper and trevally from catch-at-age results for 2006–07 for the respective stock summaries, especially for some year classes below 12 years of age, but again these may just be coincidental.

Mean weight-at-age estimates for most of the recruited age classes in the trawl and purse-seine collections from the TRE 1 East Northland fishery were generally well below the predicted values based on published parameters. As no samples were collected from the Bay of Plenty sub-area, it is unknown whether spatial variation in the growth rates of trevally from the East Northland sub-area affected the variability seen in mean weight-at-age estimates in TRE 1 for 2006–07. Mean weight-at-age estimates (especially for age classes 5–15 years of age) derived from the Ninety Mile Beach and South Taranaki Bight sub-areas were generally the highest in TRE 7, and largely similar to each other and the predicted values. Mean weight-at-age estimates for the combined Kaipara-Manukau and North Taranaki Bight sub-area were almost exclusively below the predicted values for almost all fully recruited age classes. The predicted values are based on the published length-weight relationship (James 1984) and von Bertalanffy growth parameters (Walsh et al. 1999) for TRE 1 and TRE 7. Langley (1994) found the mean length of 1 and 2 year old trevally to be negatively correlated with latitude, suggesting a different growth rate and/or timing of the spawning period occurs along the west coast of the North Island. However, for adult fish from TRE 7 collected in 2006–07 this pattern

is not as apparent, with higher estimates of mean length-at-age from the northern (Ninety Mile Beach) and southernmost (South Taranaki Bight) sub-areas of TRE 7 being similar to the patterns seen in mean weight-at-age summaries. Spatial and temporal variability between observed and predicted mean weight-at-age estimates have also been found in snapper and are thought to be due to differences in regional exploitation levels, recruitment rates, and annual variation in water temperature (Davies et al. 2003, Walsh et al. 2006a, 2006b, 2006c). Should spatial and/or temporal variation in growth exist within the TRE 1 and TRE 7 stocks or sub-area strata, it is probable that the predicted estimates presented here are unlikely to be suitable descriptions of the respective stocks.

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**Table 1: TRE 1 catch sampling summary from 1997–98 to 2006–07 (Note: all collections made using the length frequency and age-length key sampling approach, and all ageing undertaken by NIWA).**

**TRE 1**

| Catch sampling report | Research Provider | Fishing year | Fishing method | No. of landings sampled for LF | Season†† | Comments* | Otolith sample size | Otolith prep† | Season†† |
|---|---|---|---|---|---|---|---|---|---|
| Walsh et al. (1999) | NIWA | 1997–98 | Purse-seine | 7 | Spr–Sum, Win | 5 BPLE, 2 ENLD | | | |
| | | | Single trawl | 12 | Sum–Aut | 3 BPLE, 4 HAGU, 4 ENLD, 1 Mixed | 357 | B&E | Sum–Aut |
| Walsh et al. (2000) | NIWA | 1998–99 | Purse-seine | 9 | Spr–Sum, Win | 5 BPLE, 4 ENLD | 30 | TS | Win |
| | | | Single trawl | 12 | Sum–Win | 8 BPLE, 3 ENLD, 1 Mixed | 280 | TS | Sum–Win |
| Langley (2001) | Sanford Ltd | 1999–2000 | Purse-seine | 7 | Spr–Sum | 4 BPLE, 3 ENLD | | | |
| | | | Single trawl | 22 | Spr–Win | 18 BPLE, 4 Mixed | 572 | TS | Aut–Win |
| Langley (2002) | Sanford Ltd | 2000–01 | Purse-seine | 7 | Spr–Sum, Win | 5 BPLE, 2 ENLD | 745 | TS | Spr–Sum, Win |
| Langley (2003) | Sanford Ltd | 2001–02 | Purse-seine | 8 | Spr–Sum, Win | 7 BPLE, 1 ENLD | 360 | TS | Sum,Win |
| Langley (2004) | Sanford Ltd | 2002–03 | Purse-seine | 8 | Spr–Sum | 2 BPLE, 6 ENLD | 554 | TS | Spr–Sum |
| Langley (2009) | GANZL | 2005–06 | Purse-seine | 5 | Spr, Aut, Win | 2 BPLE, 3 ENLD | 257 | TS | Spr, Aut, Win |
| Walsh et al. (2010) | NIWA | 2006–07 | Purse-seine | 2 | Spr–Sum | 2 ENLD | | | |
| | | | Single trawl | 5 | Aut, Win | 4 ENLD, 1 Mixed | 338 | TS | Aut, Win |

* BPLE = Bay of Plenty; ENLD = East Northland; HAGU = Hauraki Gulf.
† 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.

**Table 2: TRE 7 catch sampling summary from 1997–98 to 2006–07 (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† | Season†† |
|---|---|---|---|---|---|---|---|---|---|
| Walsh et al. (1999) | NIWA | 1997–98 | Single trawl | 55 | Spr–Aut, Win | 9 NMB, 15 K-M, 10 NTB, 1 STB, 20 Mixed (47 Peak, 8 Off-peak) | 375 | B&E | Sum |
| | | | Pair trawl | 7 | Spr–Sum | Unknown | | | |
| Walsh et al. (2000) | NIWA | 1998–99 | Single trawl | 26 | Spr–Aut | 3 NMB, 10 K-M, 2 NTB, 11 Mixed | 225 | TS | Sum–Aut |
| | | | Pair trawl | 14 | Sum–Aut | 6 NMB, 2 K-M, 2 NTB, 4 Mixed | 156 | TS | Sum–Aut |
| Langley (2001) | Sanford Ltd | 1999–2000 | Single trawl | 39 | Sum–Aut | 6 NMB, 7 K-M, 5 NTB, 2 STB, 19 Mixed | 505 | TS | Sum–Aut |
| Langley (2002) | Sanford Ltd | 2000–01 | Single trawl | 49 | Spr–Aut | 5 NMB, 16 K-M, 3 NTB, 25 Mixed | 496 | TS | Spr–Sum |
| | | | Pair trawl | 13 | Spr–Sum | 2 NMB, 7 K-M, 4 Mixed | | | |
| Langley (2009) | GANZL | 2005–06 | Single trawl | 11 | Spr–Aut | 3 K-M, 2 NTB, 3 STB, 3 Mixed | 328 | TS | Spr–Sum |
| Walsh et al. (2010) | NIWA | 2006–07 | Single trawl | 33 | Spr–Win | 2 NMB, 14 K-M/NTB, 11 STB, 6 Mixed | 920 | TS | Spr–Win |

* NMB = Ninety Mile Beach; K-M = 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.

**Table 3: Level of sampling proposed to describe the TRE 1 and TRE 7 sub-area method fisheries in 2006–07.**

| | Sub-area | Method | Number of landings sampled | Number of otoliths in age-length-key |
|---|---|---|---|---|
| TRE 1 | East Northland | Single trawl | 10 | 450 |
| | | Purse-seine | *1-10 | |
| | Bay of Plenty | Single trawl | 10 | 450 |
| | | Purse-seine | *1-10 | |
| TRE 7 | Ninety Mile Beach | Single trawl | 10 | 300 |
| | Kaipara-Manukau and North Taranaki Bight | Single trawl | 10 | 300 |
| | South Taranaki Bight | Single trawl | 10 | 300 |

* Allthough the total number of TRE 1 purse-seine landings is 10, however, the number to be sampled in each stratum cannot not be specified *a priori.*

**Table 4: Summary of the catch (total number and weight of landings) and samples (number of landings and weight sampled, and number of fish measured) in method–sub-area strata for the TRE 1 purse seine and single trawl fisheries for the 2006–07 fishing year.**[*]

| | | Number of landings | | | No. of fish | Weight of landings (t) | | |
|---|---|---|---|---|---|---|---|---|
| Method* | Area** | Total | Sampled | % of total | measured | Total | Sampled | % of total |
| PS | ENLD | 4 | 2 | 50.0 | 472 | 108 | 87 | 80.6 |
| | HAGU | 0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 |
| | BPLE | 1 | 0 | 0.0 | 0 | 8 | 0 | 0.0 |
| | TRE 1 | 5 | 2 | 40.0 | 472 | 116 | 87 | 75.0 |
| BT | ENLD | 192 | 4 | 2.1 | 1 781 | 219 | 9 | 4.1 |
| | HAGU | 181 | 0 | 0.0 | 0 | 28 | 0 | 0.0 |
| | BPLE | 299 | 0 | 0.0 | 0 | 240 | 0 | 0.0 |
| | TRE 1[†] | 672 | 5 | 0.7 | 2 126 | 487 | 9 | 1.8 |

[*] PS, purse seine; BT, single trawl.

[†] The TRE 1 single trawl total number of landings does not equal combined sub-areas total as a vessel may fish over more than one sub-area per trip.

[**] ENLD, East Northland; HAGU, Hauraki Gulf; BPLE, Bay of Plenty.

**Table 5: Summary of the catch (total number and weight of landings) and samples (number of landings and weight sampled, and number of fish measured) in method–sub-area strata for the TRE 7 single trawl fishery for the 2006–07 fishing year.**[*]

| | | Number of landings | | | No. of fish | Weight of landings (t) | | |
|---|---|---|---|---|---|---|---|---|
| Method* | Area** | Total | Sampled | % of total | measured | Total | Sampled | % of total |
| BT | NMB | 95 | 2 | 2.1 | 399 | 184 | 4 | 2.2 |
| | K-M/NTB | 240 | 14 | 5.8 | 10 342 | 1 181 | 275 | 23.3 |
| | STB | 152 | 11 | 7.2 | 2 945 | 145 | 17 | 11.7 |
| | TRE 7[†] | 406 | 33 | 8.1 | 19 089 | 1 510 | 360 | 23.8 |

[*] BT, single trawl.

[†] The TRE 7 total number of landings does not equal combined sub-areas total as a vessel may fish over more than one sub-area per trip.

[**] NMB, Ninety Mile Beach; K-M/NTB, Kaipara-Manukau & North Taranaki Bight; STB, South Taranaki Bight.

**Table 6: Details of trevally otolith samples collected in 2006–07 from TRE 1 sub-areas for age-length key collections.**

| Method* | Area** | Sampling period | Sample method [†] | Length range (cm) | No. aged[††] |
|---|---|---|---|---|---|
| BT/BPT | ENLD | 12 Apr 07–13 Sep 07 | SR | 27–62 | 258 |
| | TRE 1 | 12 Apr 07–13 Sep 07 | SR | 27–73 | 338 |

[*] BT, single trawl; BPT, pair trawl.

[**] ENLD, East Northland.

[†] Stratified random sample.

[††] The TRE 1 total number of otoliths do not equal the combined sub-area total as one sample collection was from a vessel that fished over more than one sub-area per trip.

**Table 7: Details of trevally otolith samples collected in 2006–07 from TRE 7 sub-areas for age-length key collections.**

| Method* | Area** | Sampling period | Sample method † | Length range (cm) | No. aged†† |
|---|---|---|---|---|---|
| BT | NMB | 10 May 07–22 Jun 07 | SR | 29–57 | 101 |
| | K-M/NTB | 20 Nov 06–9 Mar 07 | SR | 26–59 | 393 |
| | STB | 16 Oct 06–26 Apr 07 | SR | 29–60 | 300 |
| | TRE 7 | 16 Oct 06–22 Jun 07 | SR | 26–64 | 920 |

* BT, single trawl.

** NMB, Ninety Mile Beach; K-M/NTB, Kaipara-Manukau & North Taranaki Bight; STB, South Taranaki Bight.

† Stratified random sample.

†† The TRE 7 total number of otoliths do not equal the combined sub-areas total as some sample collections were from vessels that fished over more than one sub-area per trip.

**Table 8: Proportions of reader agreement (initial readings) and Index of Average Percentage Error (IAPE) for the TRE 1 and TRE 7 otolith sample collections in 2006–07.**

| | | No. of readers agreeing | | | |
|---|---|---|---|---|---|
| Area | Age group (years) | 2 | 0 | IAPE | No. aged |
| TRE 1 | 2–19 | 0.47 | 0.53 | 5.063 | 310 |
| | 19+ | 0.11 | 0.89 | 4.976 | 28 |
| | 2–19+ | 0.44 | 0.56 | 5.055 | 338 |
| TRE 7 | 2–19 | 0.61 | 0.39 | 3.864 | 751 |
| | 19+ | 0.31 | 0.69 | 2.706 | 169 |
| | 2–19+ | 0.55 | 0.45 | 3.651 | 920 |

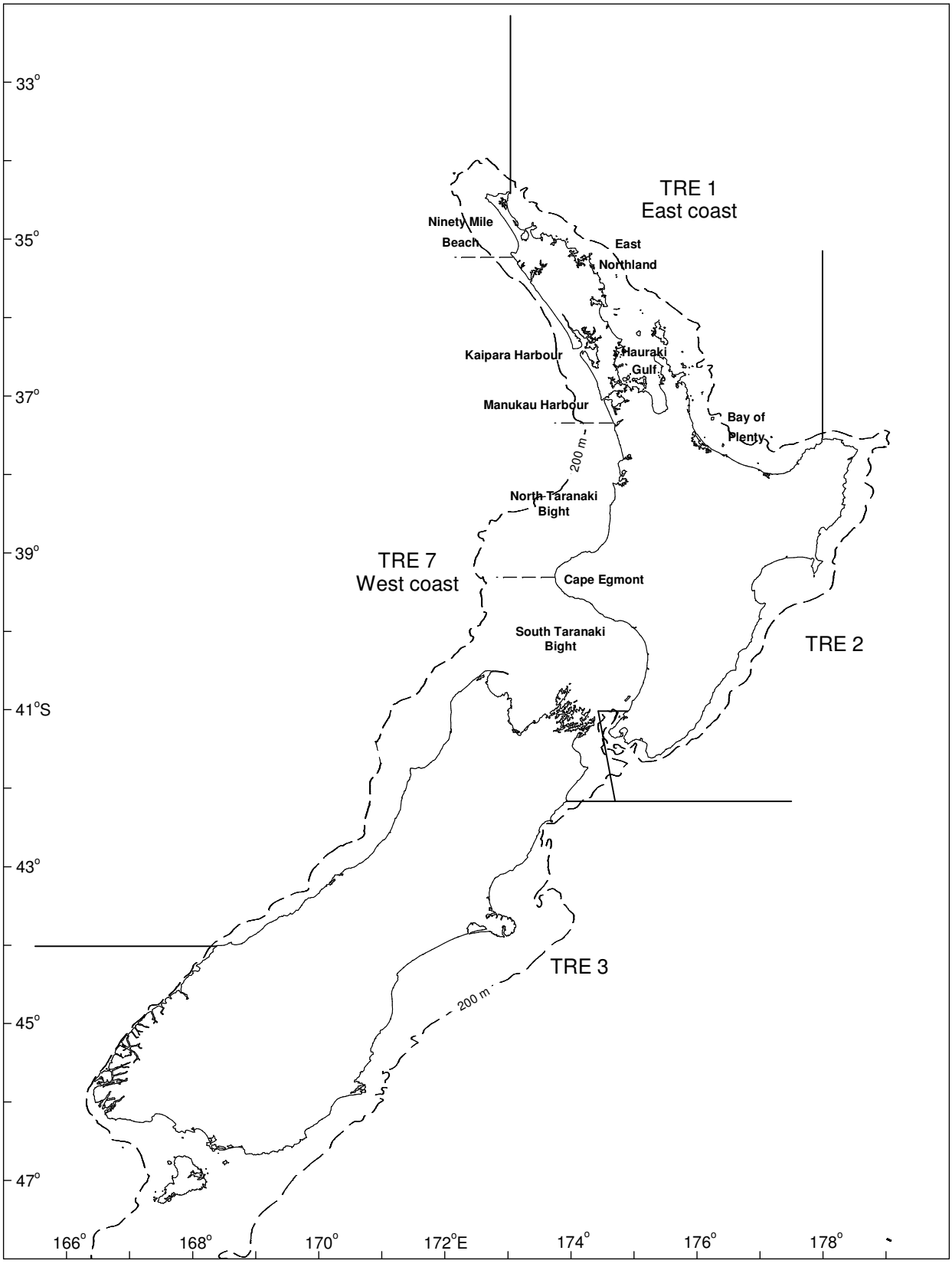



**Figure 1: Trevally quota management areas and locations referred to in the text.**

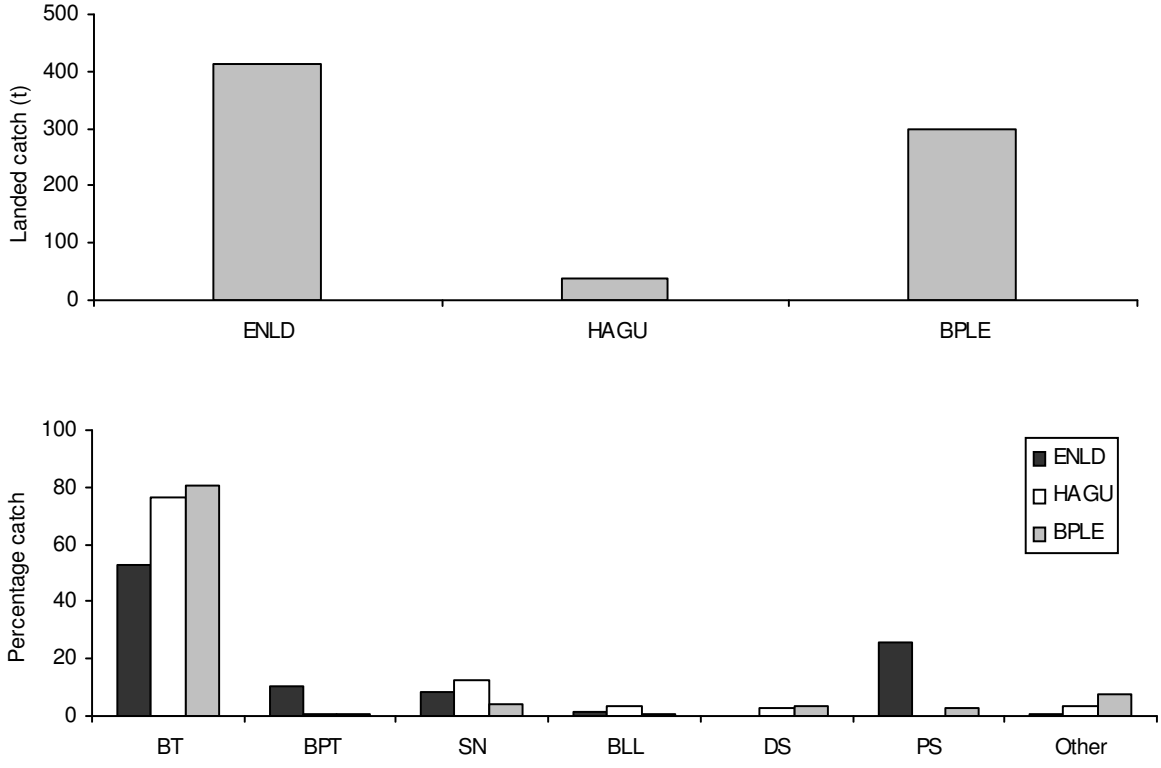



**Figure 2: The landed catch (t) and percentage catch by method of trevally for the sub-areas of TRE 1 in 2006–07 (ENLD, East Northland; HAGU, Hauraki Gulf; BPLE, Bay of Plenty; BT, single trawl; BPT, pair trawl; SN, set net; BLL, bottom longline; DS, Danish seine; PS, Purse seine).**

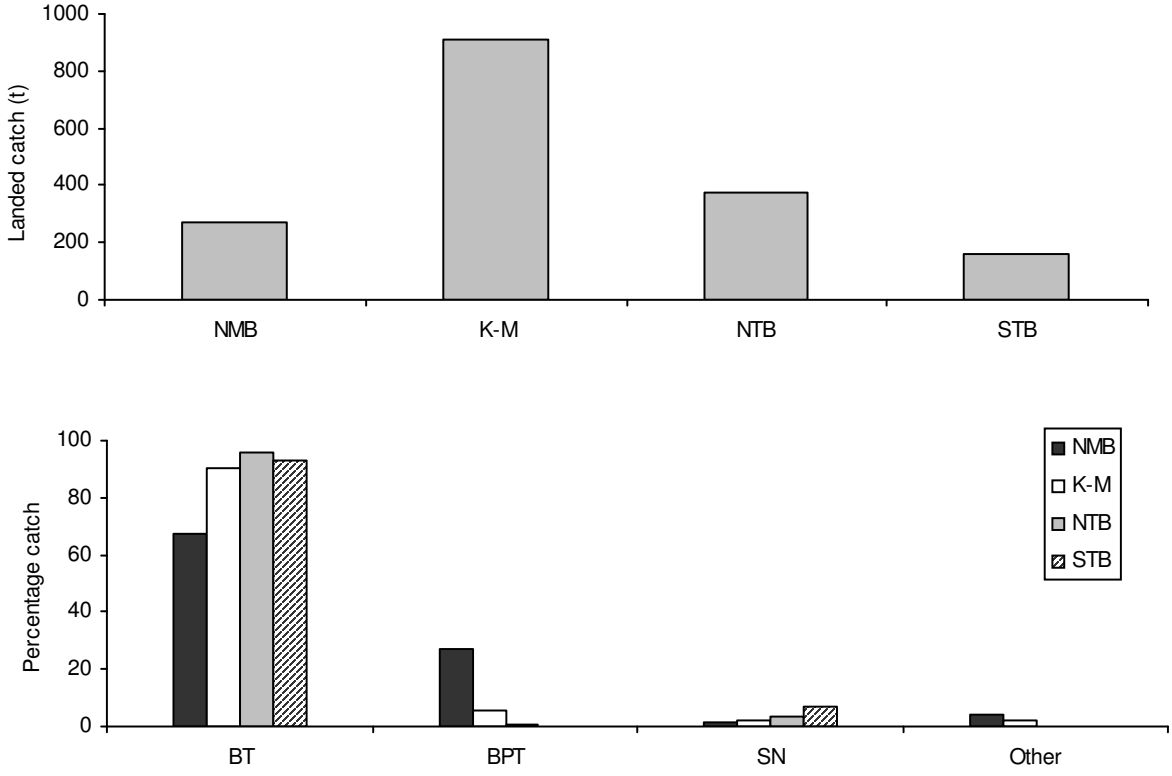



**Figure 3: The landed catch (t) and percentage catch by method of trevally for the sub-areas of TRE 7 in 2006–07 (NMB, Ninety Mile Beach; K-M, Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight; BT, single trawl; BPT, pair trawl; SN, set net).**

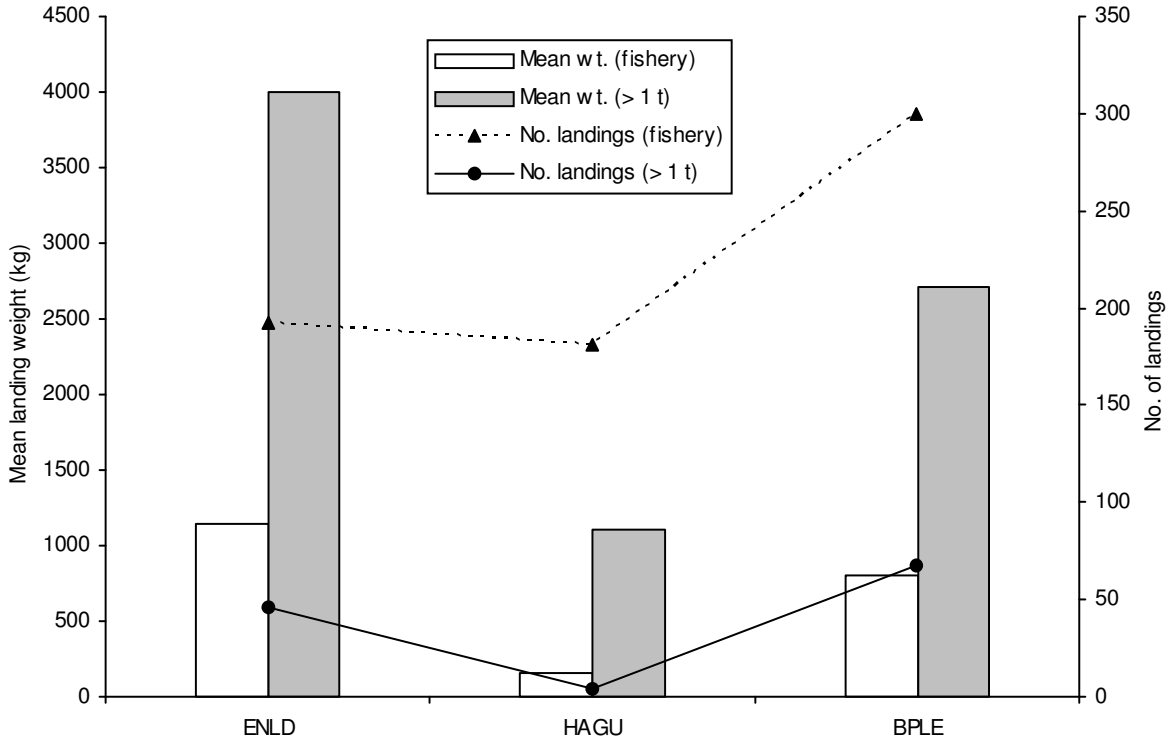



**Figure 4: Mean single trawl landing size and number of landings of trevally for all landings in the fishery and for those landings > 1 tonne in 2006–07 (ENLD, East Northland; HAGU, Hauraki Gulf; BPLE, Bay of Plenty).**

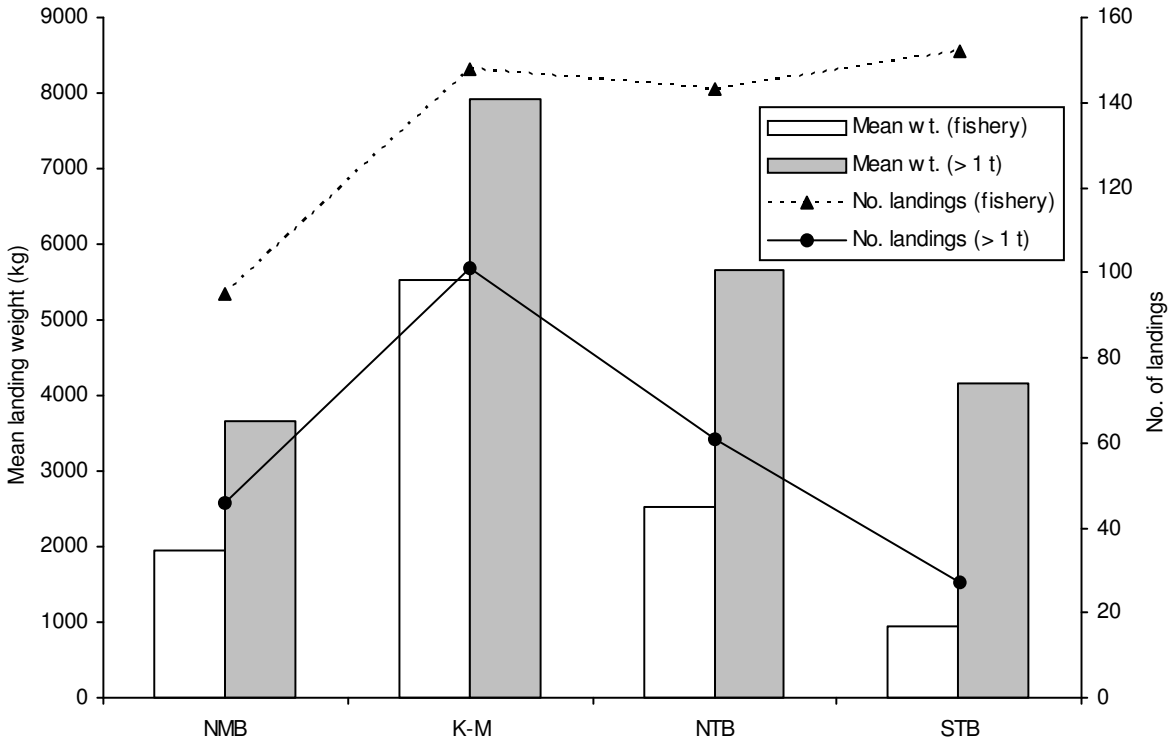



**Figure 5: Mean single trawl landing size and number of landings of trevally for all landings in the fishery and for those landings > 1 tonne in 2006–07 (NMB, Ninety Mile Beach; K-M, Kaipara-Manukau; NTB, North Taranaki Bight; STB, South Taranaki Bight).**

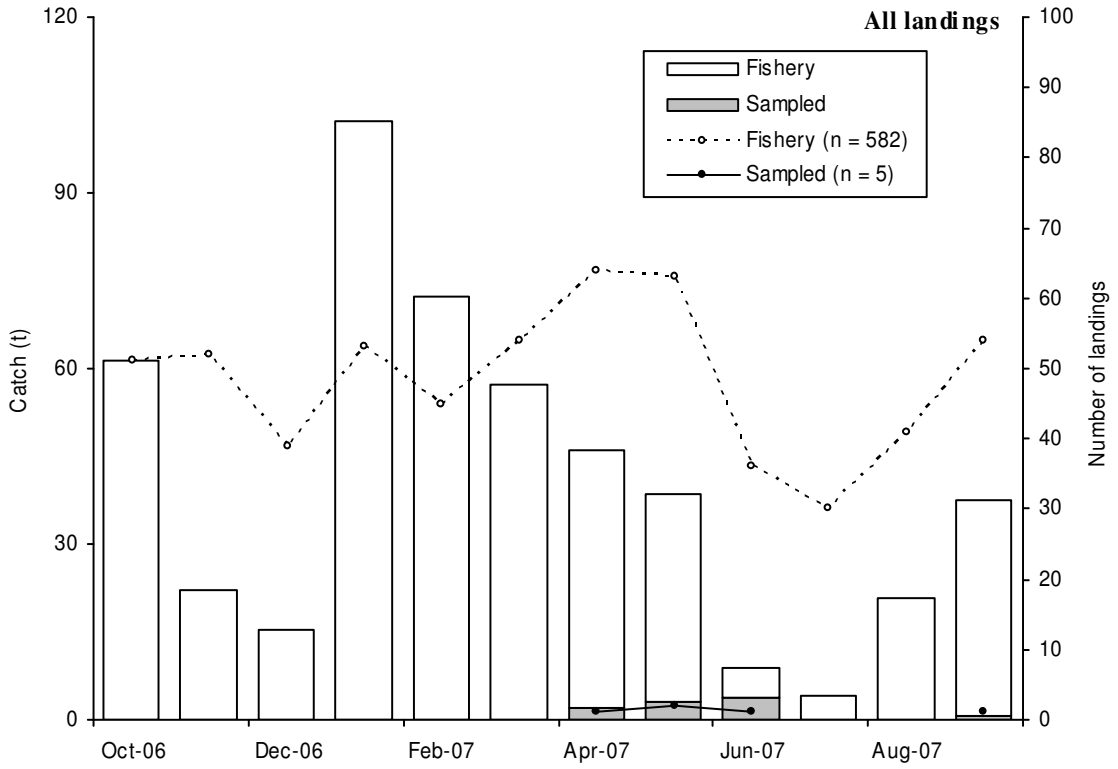



**Figure 6: Comparison of the monthly distribution of landed weight and numbers of landings of trevally in the TRE 1 single trawl fishery for all landings where trevally was caught. Included are corresponding estimates for all sampled landings to show representivity of collections.**

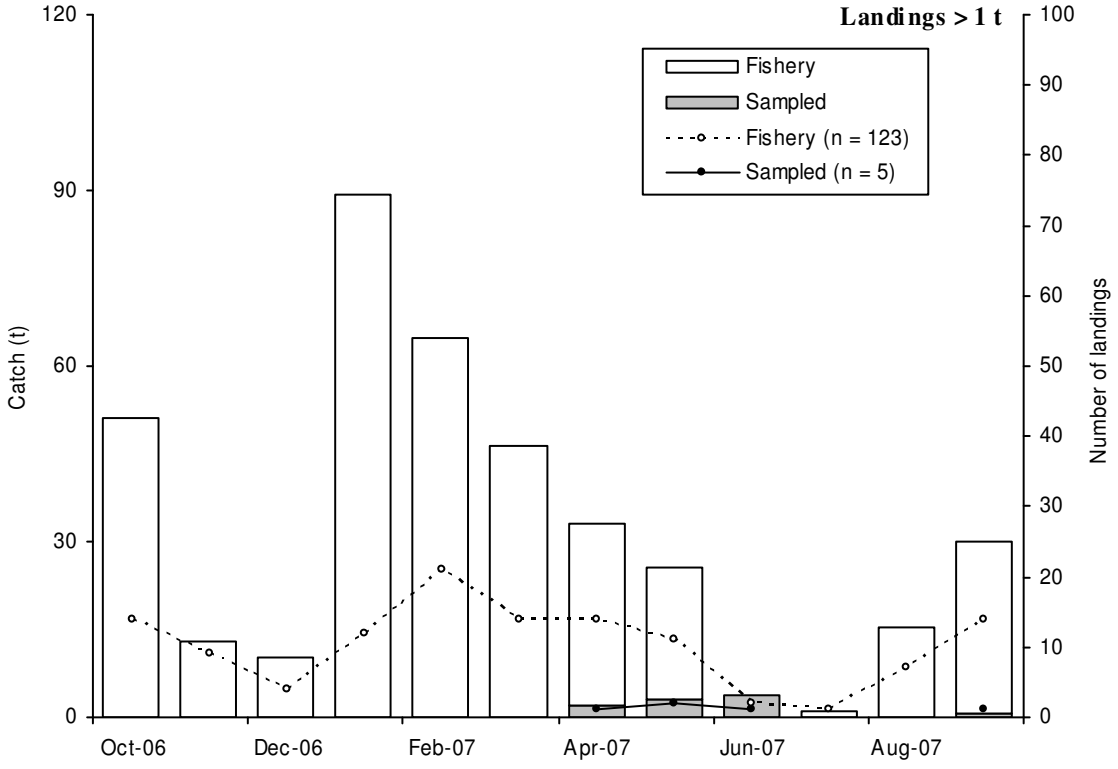



**Figure 7: Comparison of the monthly distribution of landed weight and numbers of landings of trevally in the TRE 1 single trawl fishery for all landings > 1 tonne. Included are corresponding estimates for all sampled landings to show representivity of collections.**

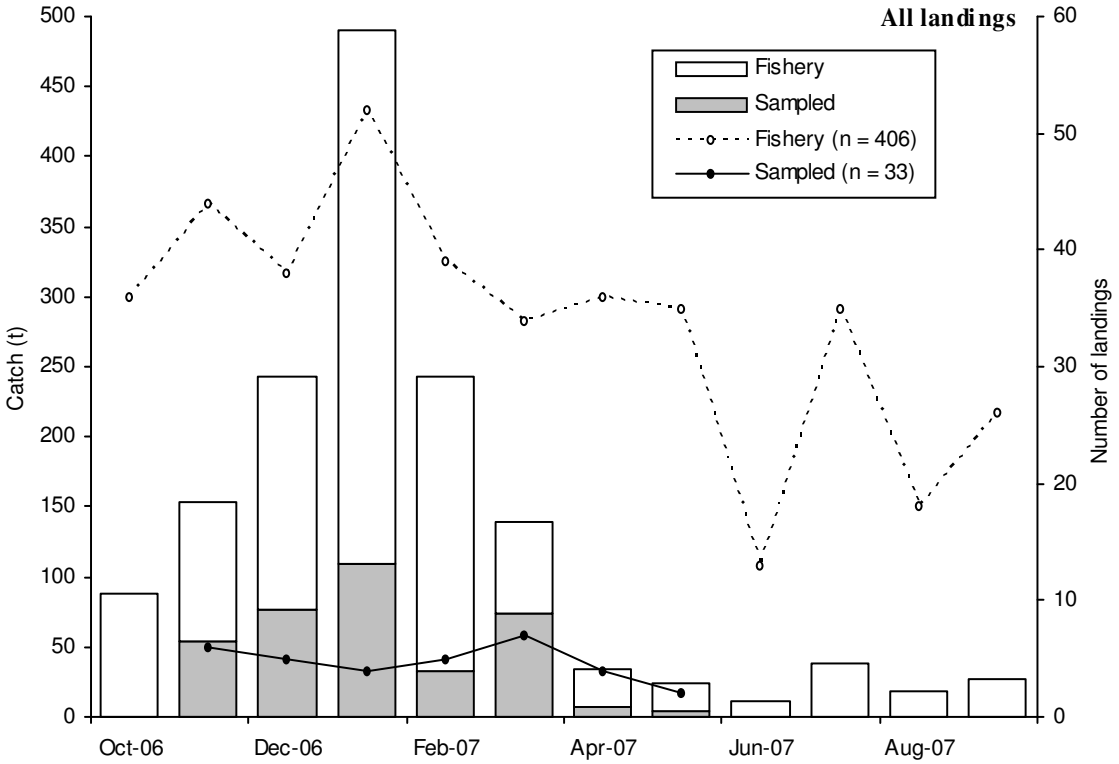



**Figure 8: Comparison of the monthly distribution of landed weight and numbers of landings of trevally in the TRE 7 single trawl fishery for all landings where trevally was caught. Included are corresponding estimates for all sampled landings to show representivity of collections.**

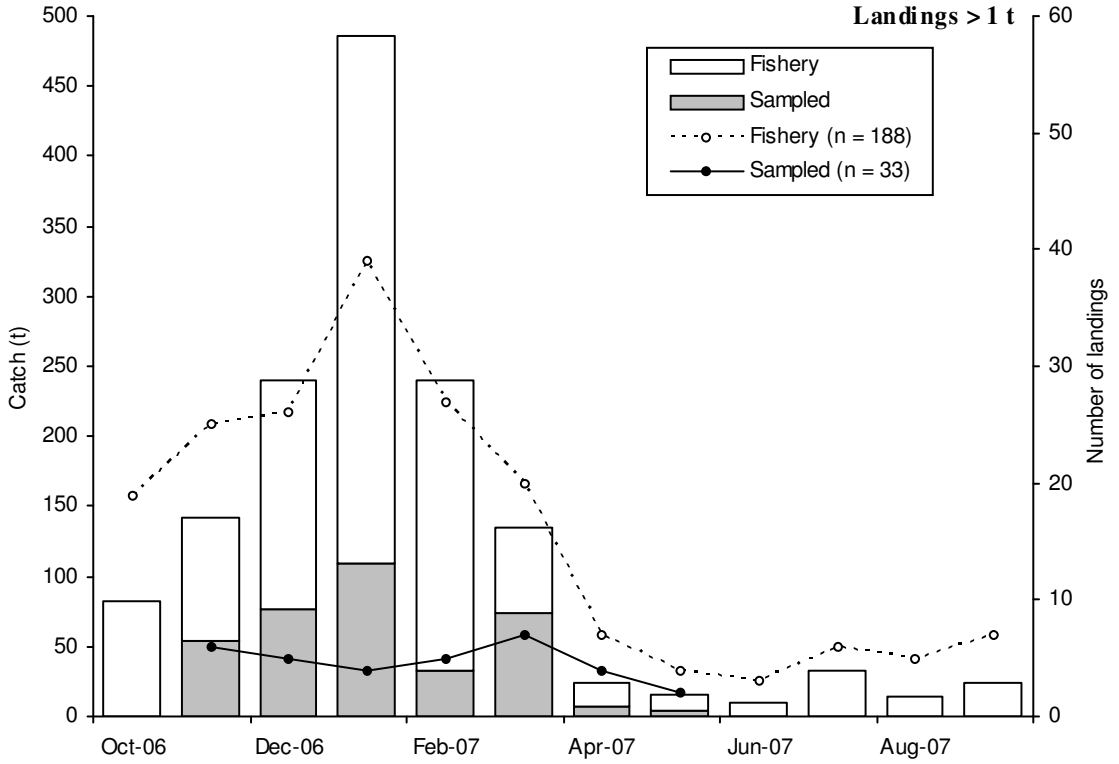



**Figure 9: Comparison of the monthly distribution of landed weight and numbers of landings of trevally in the TRE 7 single trawl fishery for all landings > 1 tonne. Included are corresponding estimates for all sampled landings to show representivity of collections.**

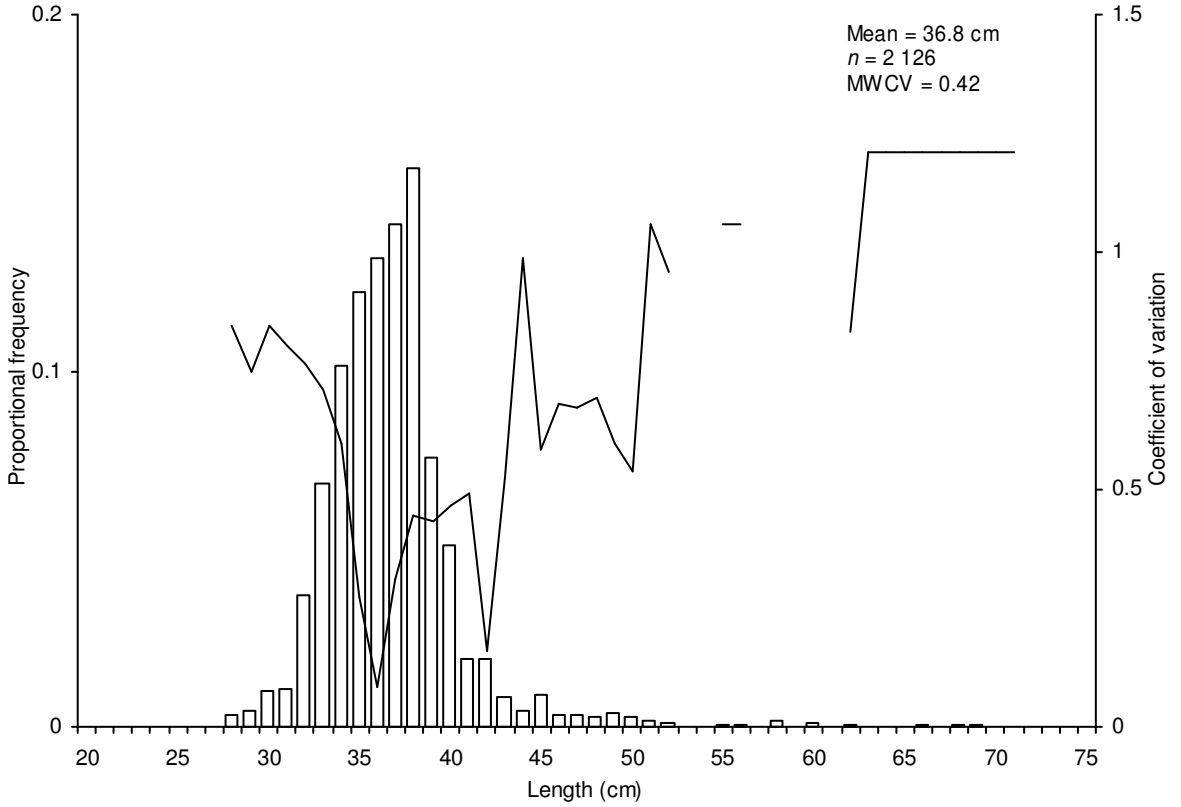



**Figure 10: Proportion at length distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the TRE 1 single trawl fishery in 2006–07 (*n*, length sample size; MWCV, mean weighted c.v.).**

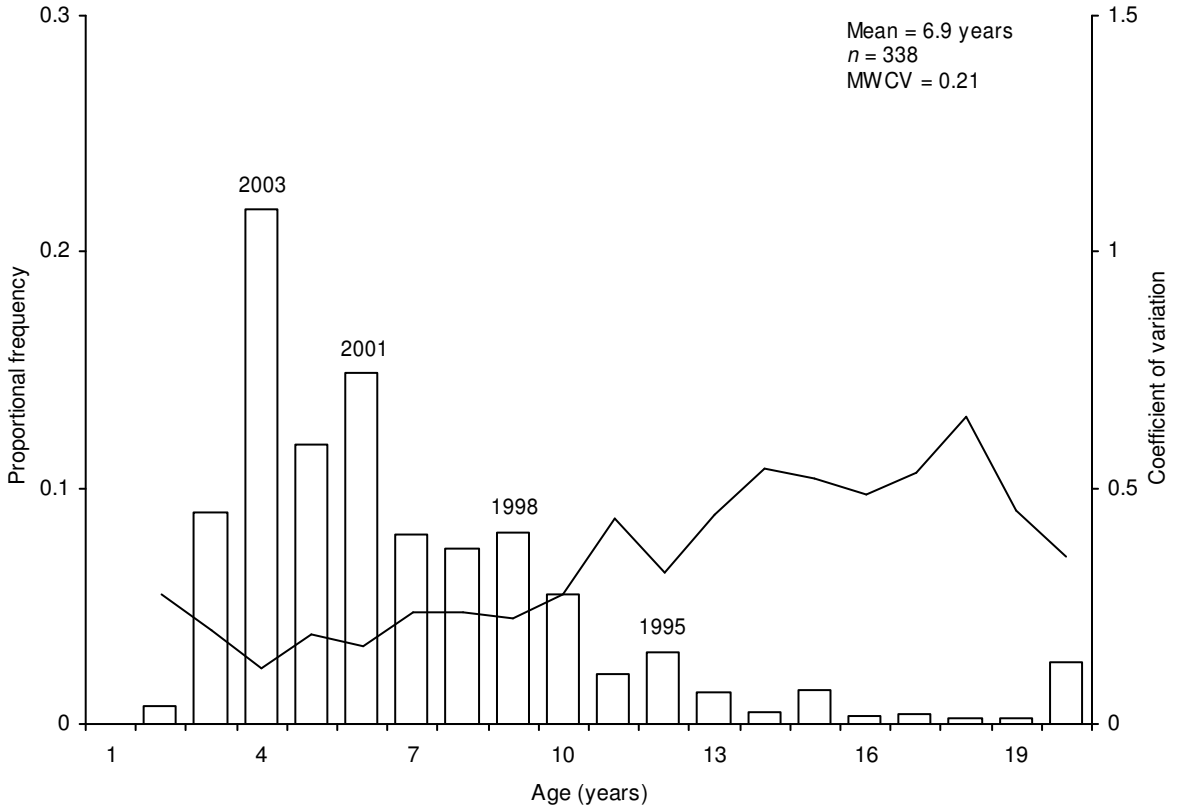



**Figure 11: Proportion at age distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the TRE 1 single trawl fishery in 2006–07 (*n*, otolith sample size; MWCV, mean weighted c.v.).**

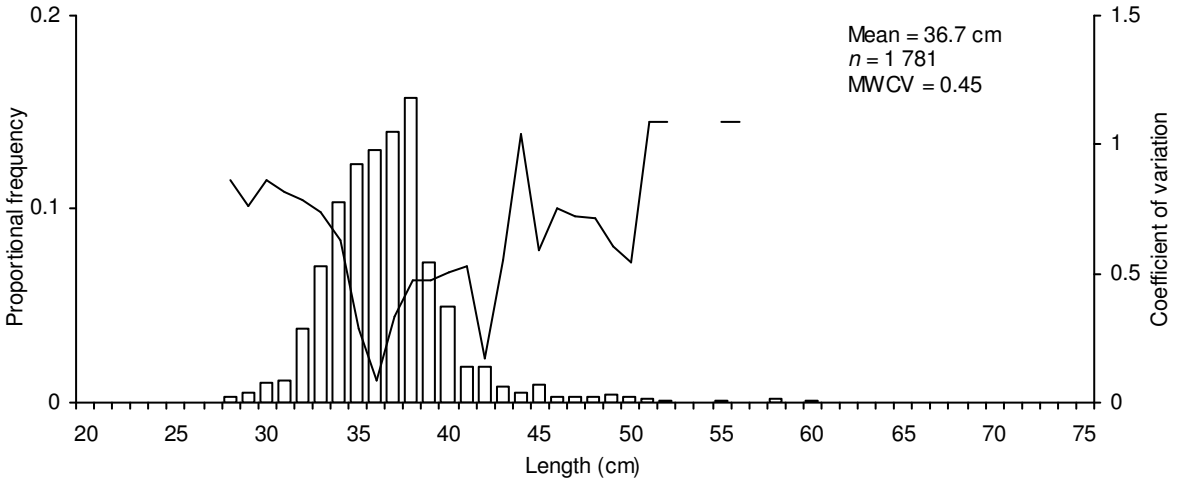



**Figure 12: Proportion at length distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the East Northland sub-area single trawl fishery in 2006–07 (*n*, length sample size; MWCV, mean weighted c.v.).**

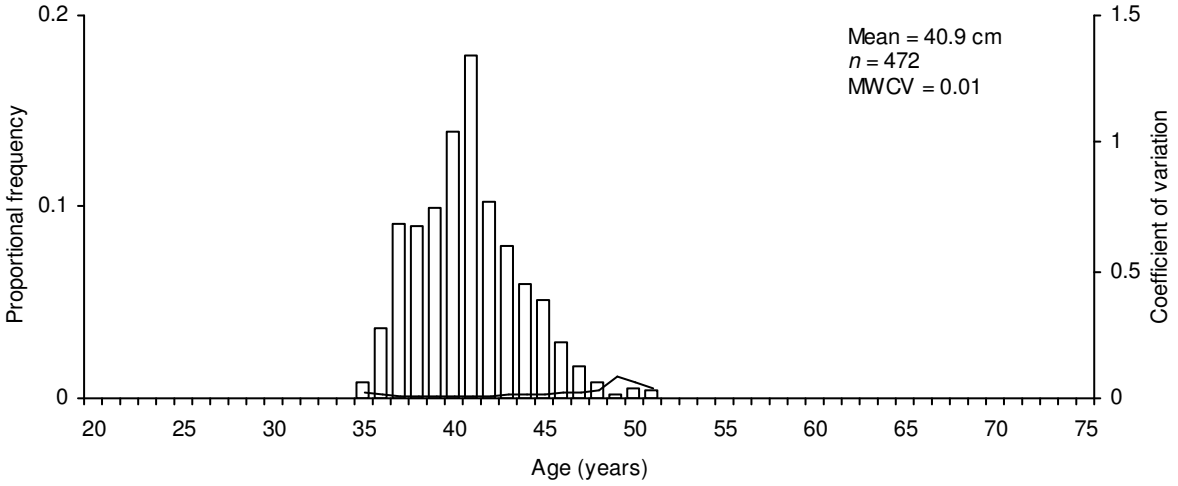



**Figure 13: Proportion at length distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the East Northland sub-area purse seine fishery in 2006–07 (*n*, length sample size; MWCV, mean weighted c.v.).**

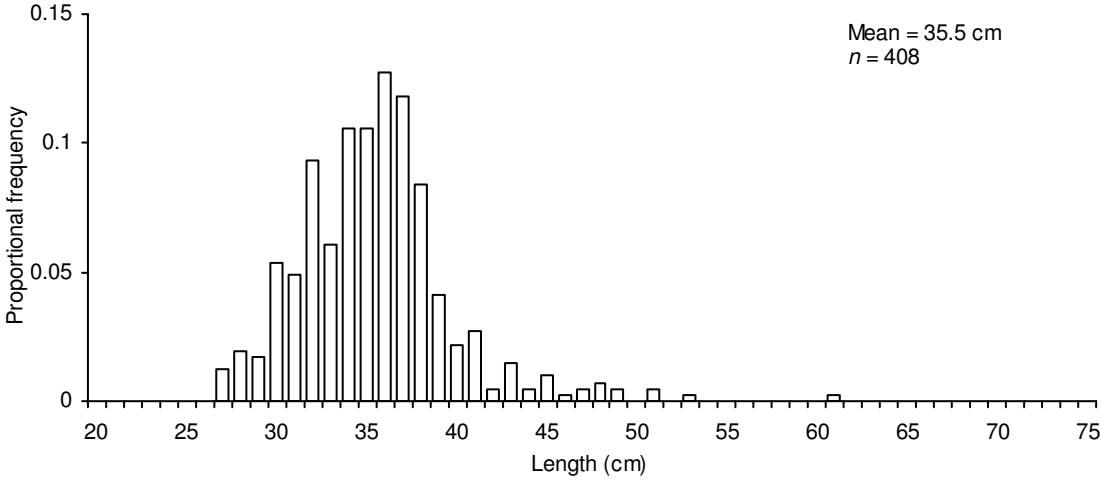



**Figure 14: Proportion at length distribution (histogram) determined from trevally landings sampled from the East Northland sub-area pair trawl fishery in 2006–07 (*n*, length sample size). Note: No c.v. estimates given as only one landing sampled.**

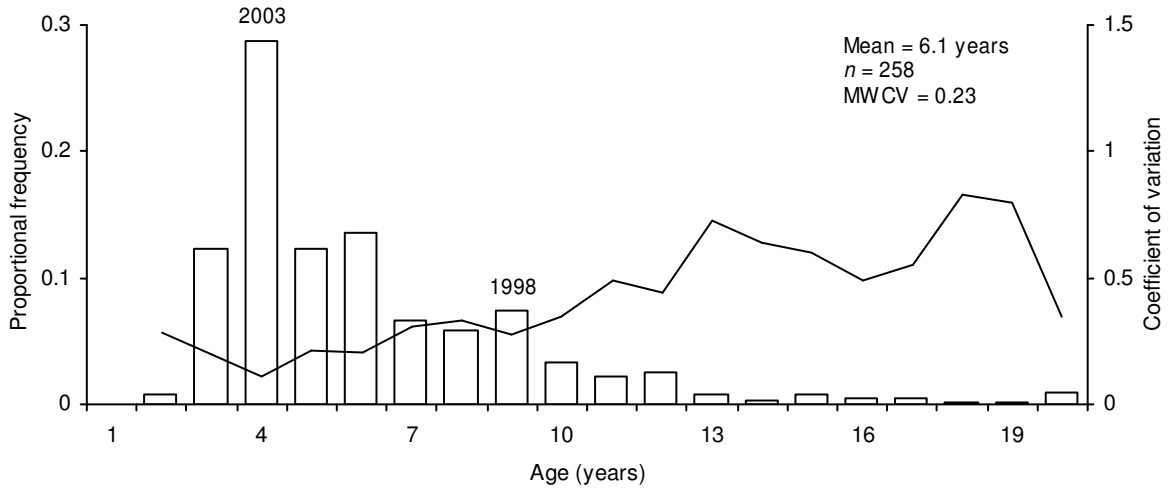



**Figure 15: Proportion at age distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the East Northland sub-area single trawl fishery in 2006–07 (*n*, otolith sample size; MWCV, mean weighted c.v.).**

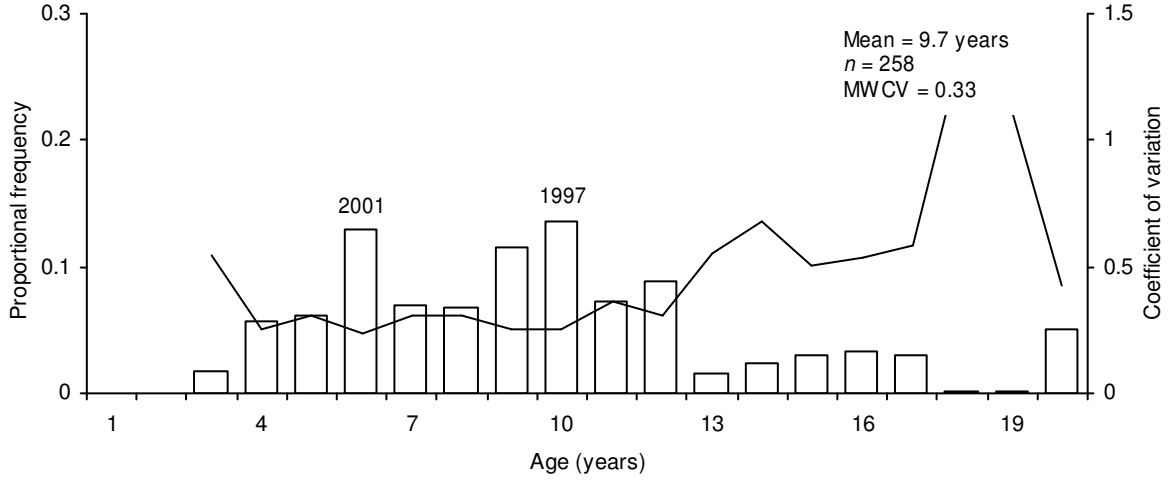



**Figure 16: Proportion at age distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the East Northland sub-area purse seine fishery in 2006–07 (*n*, otolith sample size; MWCV, mean weighted c.v.).**

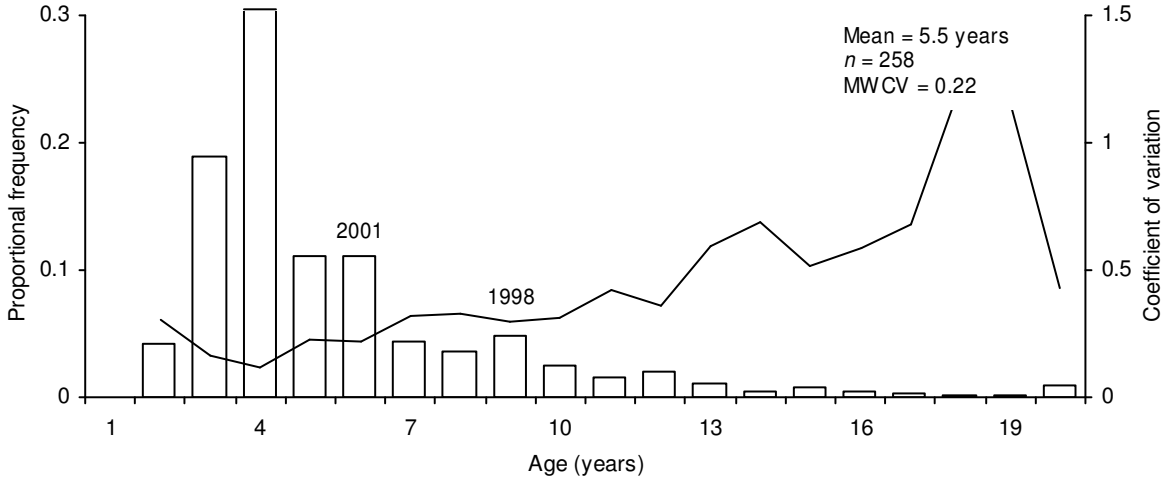



**Figure 17: Proportion at age distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the East Northland sub-area pair trawl fishery in 2006–07 (*n*, otolith sample size; MWCV, mean weighted c.v.).**

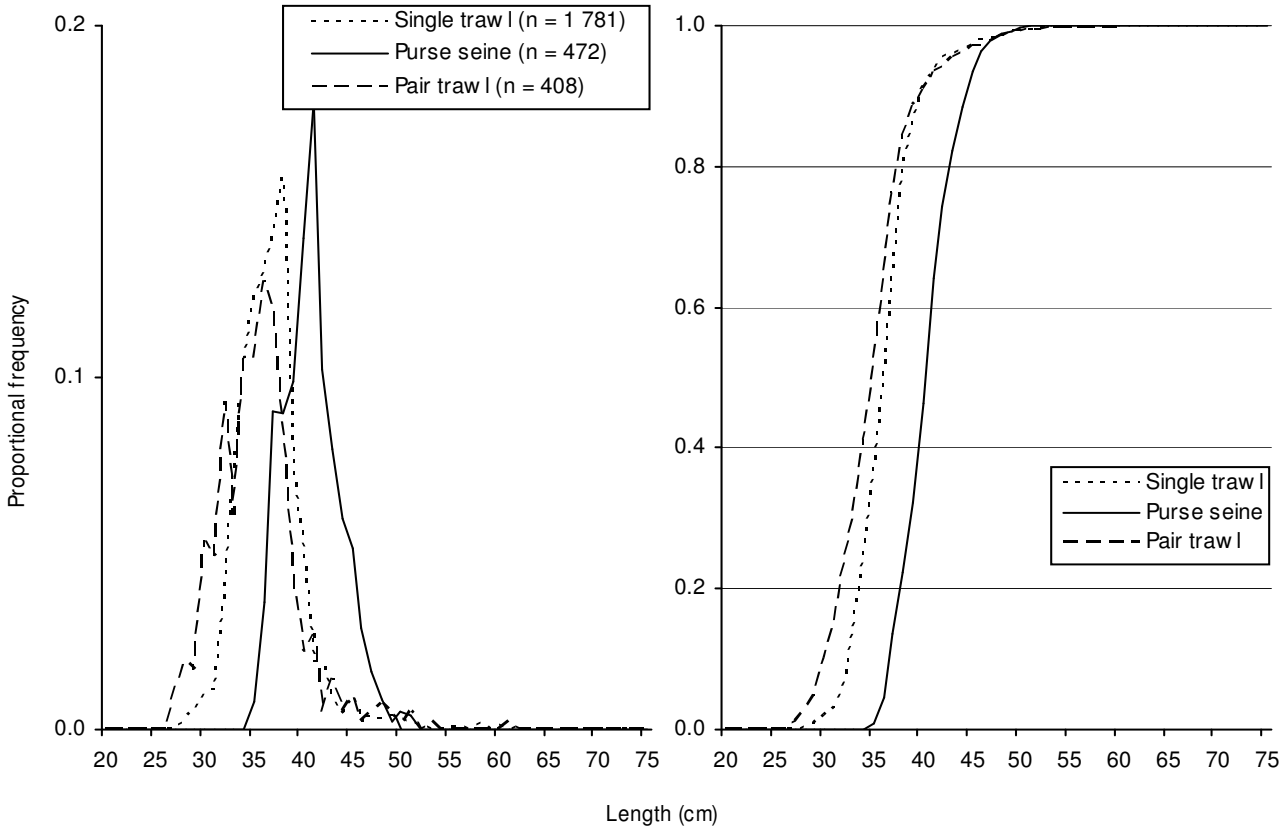



**Figure 18: Comparison of the proportion and cumulative proportion at length distributions determined from trevally landings sampled from the East Northland sub-area method fisheries of TRE 1 in 2006–07 (*n*, length sample size).**

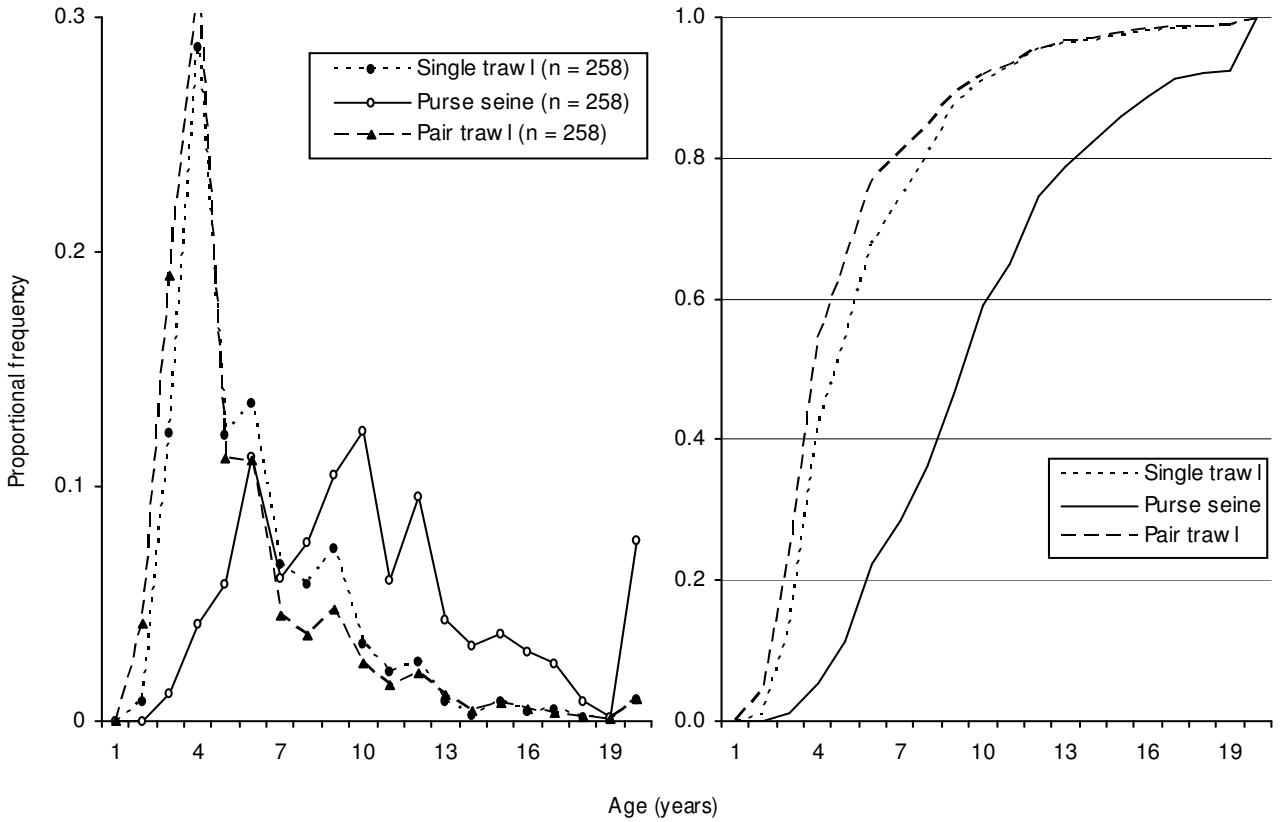



**Figure 19: Comparison of the proportion and cumulative proportion at age distributions determined from trevally landings sampled from the East Northland sub-area method fisheries of TRE 1 in 2006–07 (*n*, otolith sample size).**

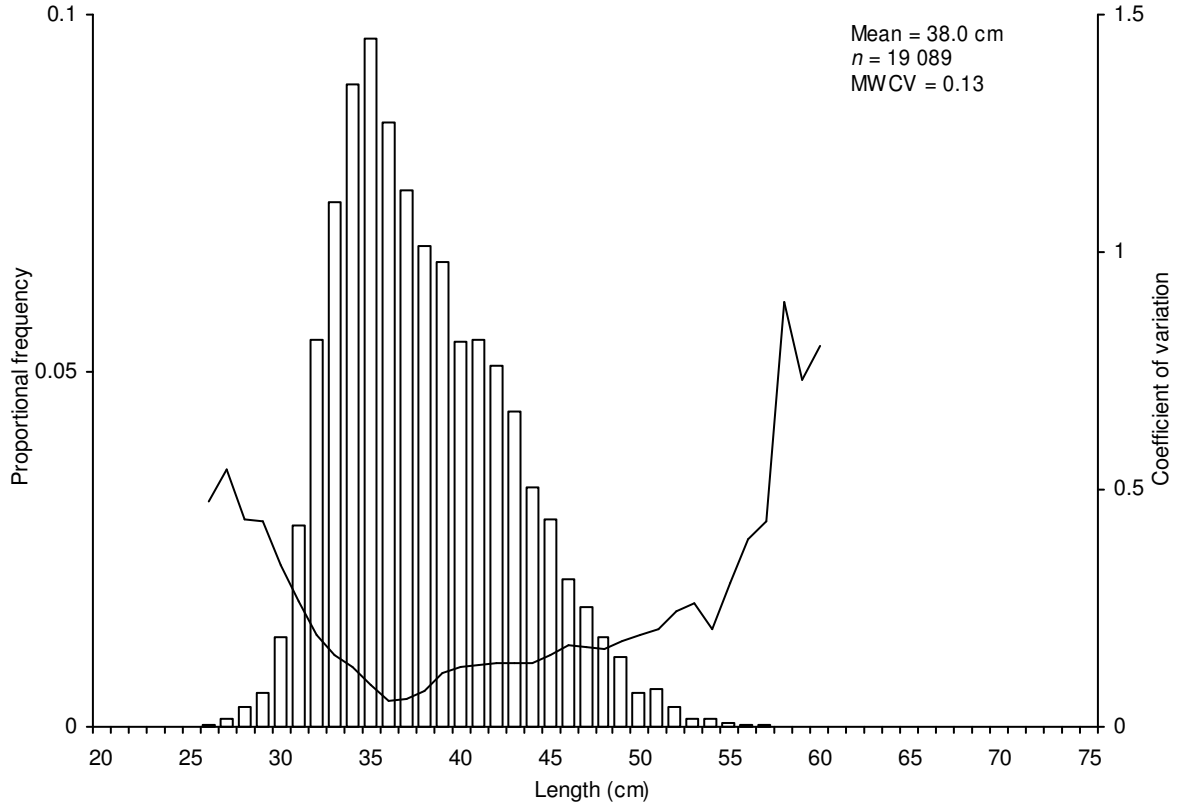



**Figure 20: Proportion at length distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the TRE 7 single trawl fishery in 2006–07 (*n*, length sample size; MWCV, mean weighted c.v.).**

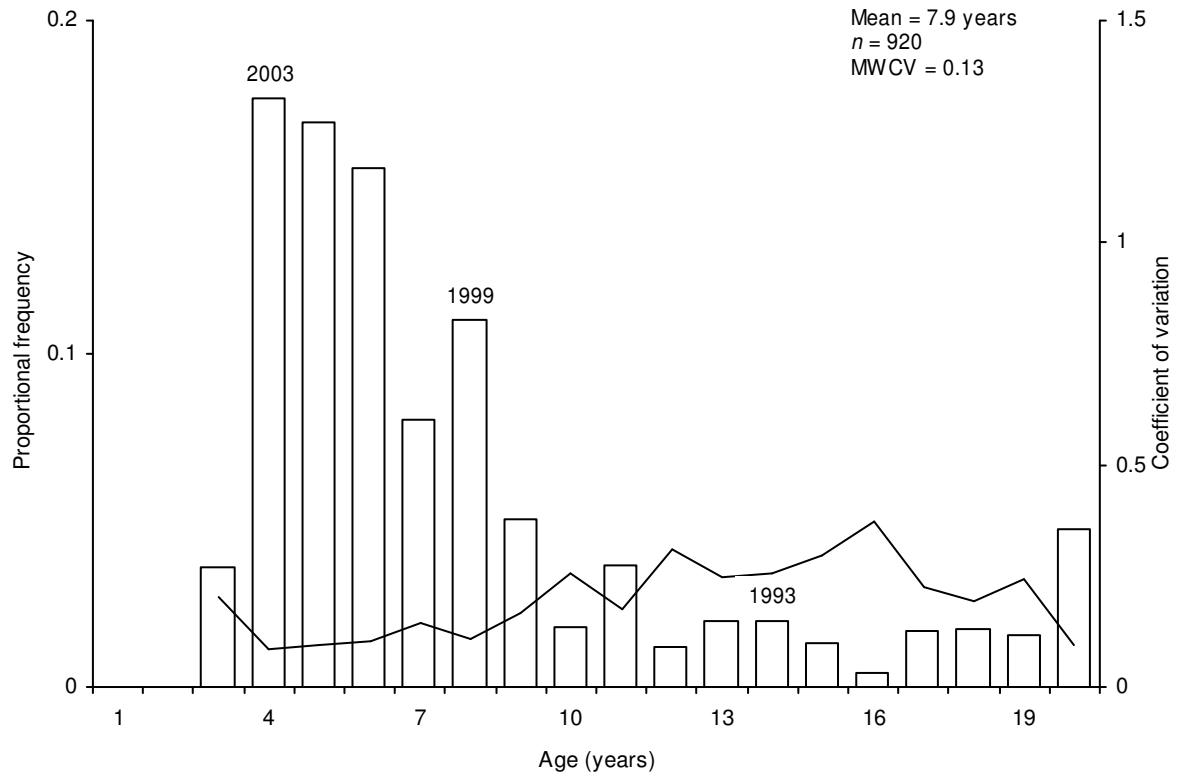



**Figure 21: Proportion at age distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the TRE 7 single trawl fishery in 2006–07 (*n*, otolith sample size; MWCV, mean weighted c.v.).**

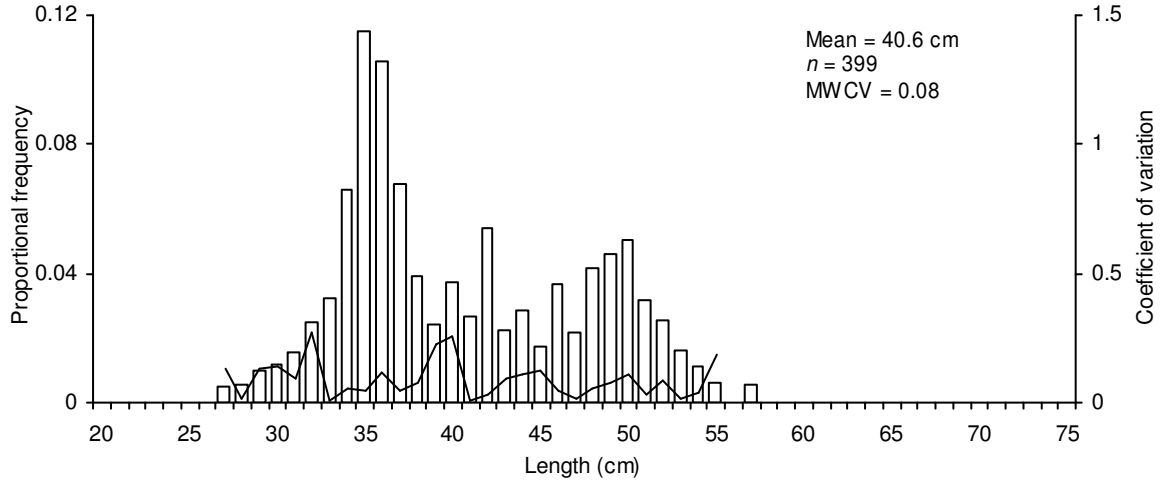



**Figure 22: Proportion at length distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the Ninety Mile Beach sub-area single trawl fishery in 2006–07 (*n*, length sample size; MWCV, mean weighted c.v.).**

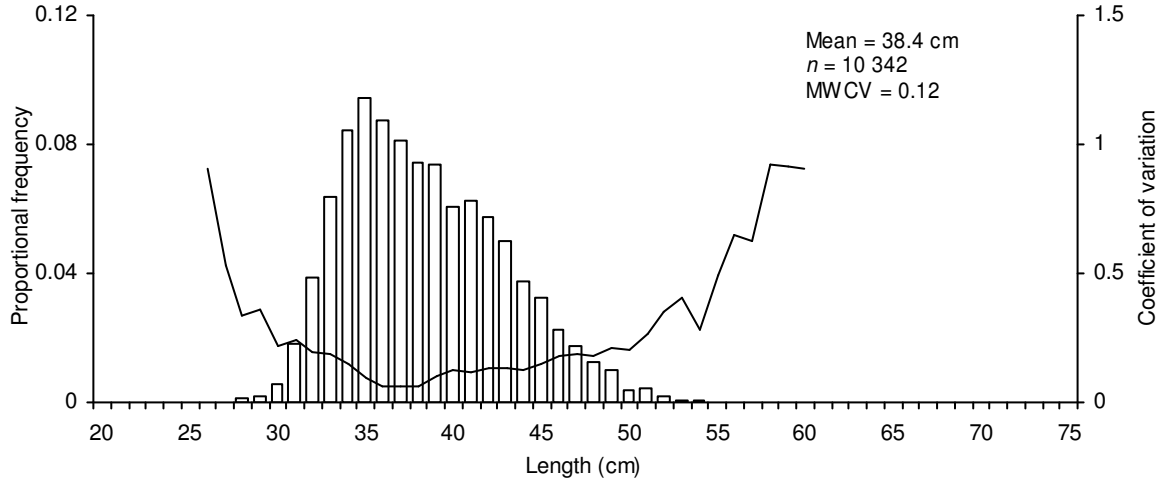



**Figure 23: Proportion at length distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the combined Kaipara-Manukau and North Taranaki Bight sub-area single trawl fishery in 2006–07 (*n*, length sample size; MWCV, mean weighted c.v.).**

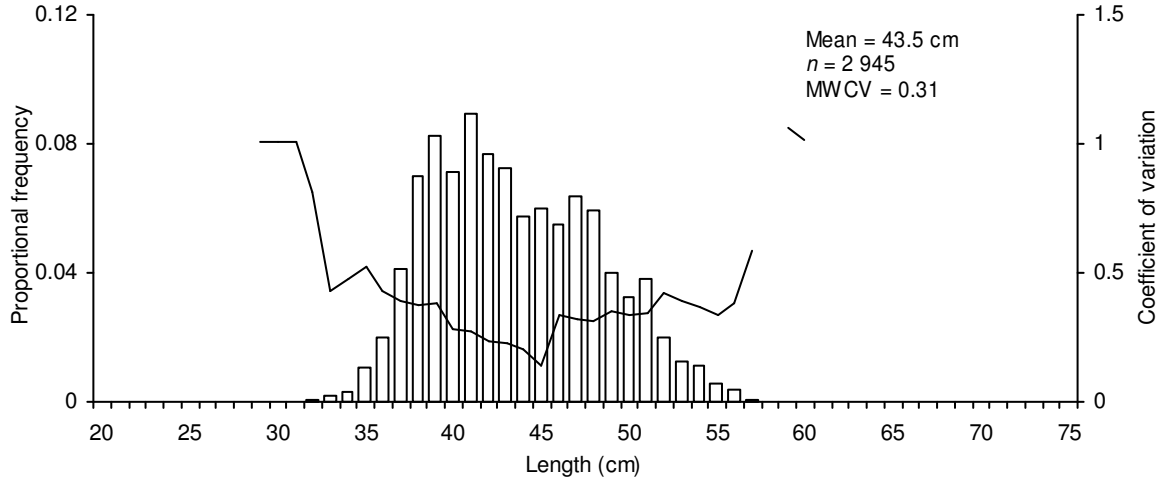



**Figure 24: Proportion at length distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the South Taranaki Bight sub-area single trawl fishery in 2006–07 (*n*, length sample size; MWCV, mean weighted c.v.).**

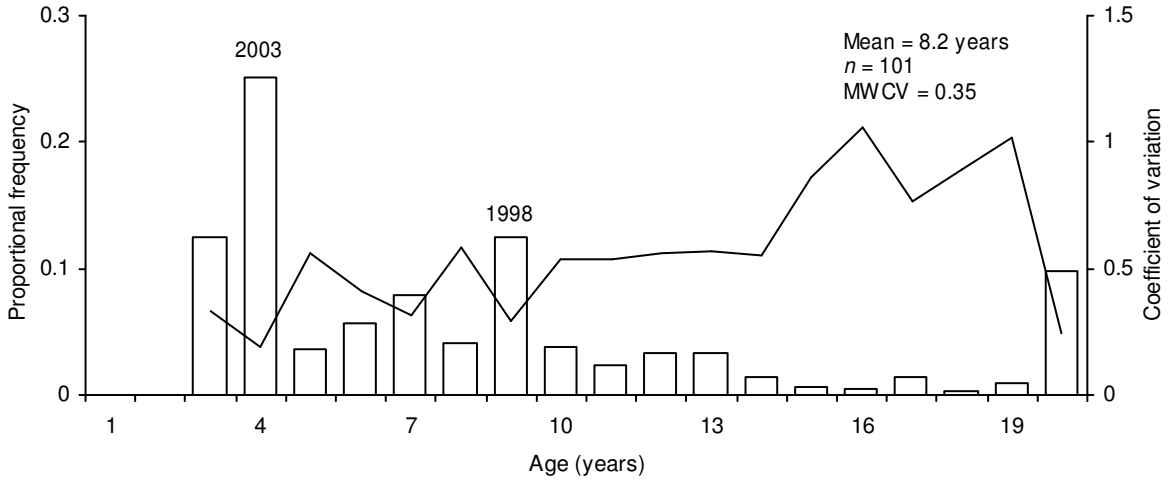



**Figure 25: Proportion at age distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the Ninety Mile Beach sub-area single trawl fishery in 2006–07 (*n*, otolith sample size; MWCV, mean weighted c.v.).**

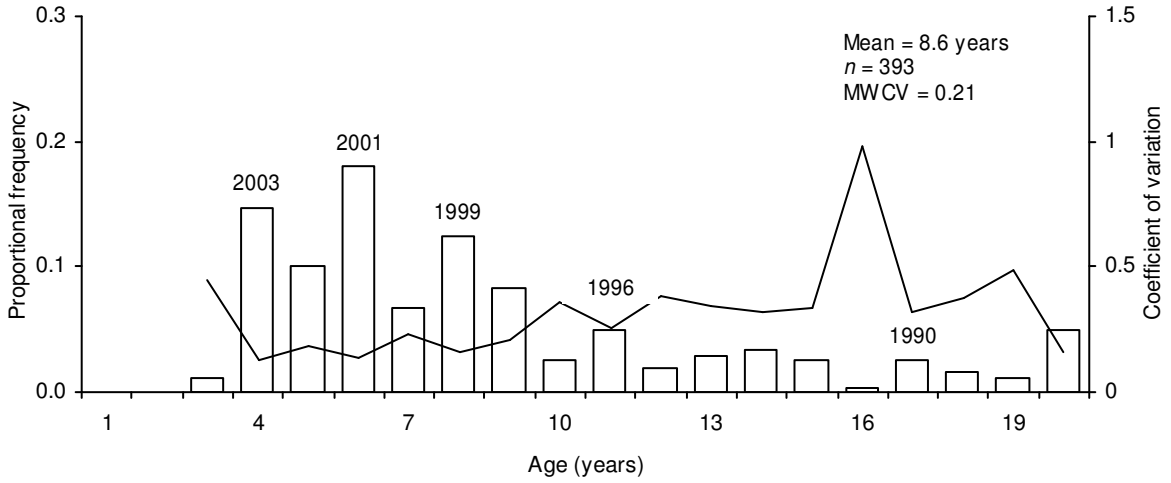



**Figure 26: Proportion at age distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the combined Kaipara-Manukau and North Taranaki Bight sub-areas single trawl fishery in 2006–07 (*n*, otolith sample size; MWCV, mean weighted c.v.).**

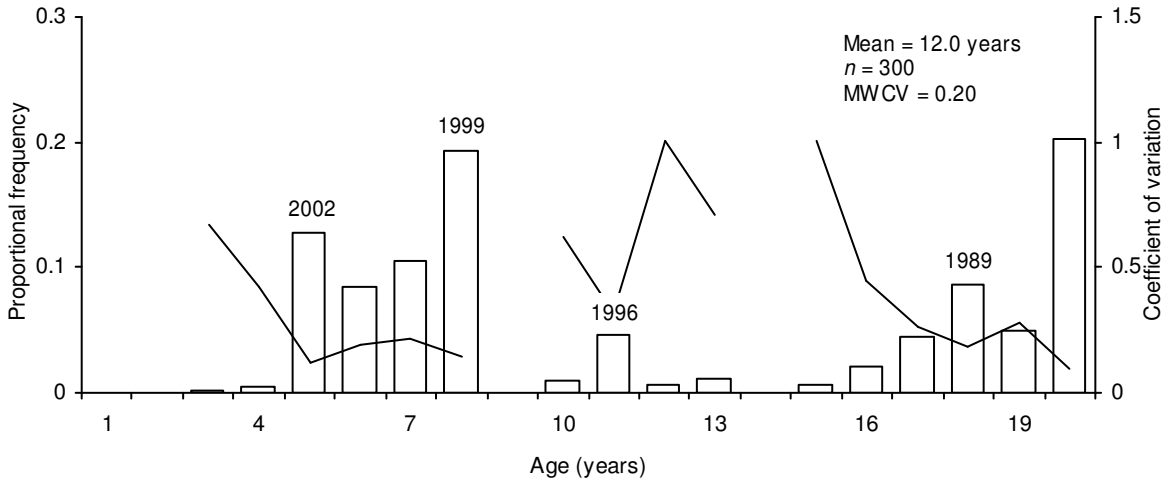



**Figure 27: Proportion at age distribution (histogram) and analytical (solid line) c.v.s determined from trevally landings sampled from the South Taranaki Bight sub-area single trawl fishery in 2006–07 (*n*, otolith sample size; MWCV, mean weighted c.v.).**

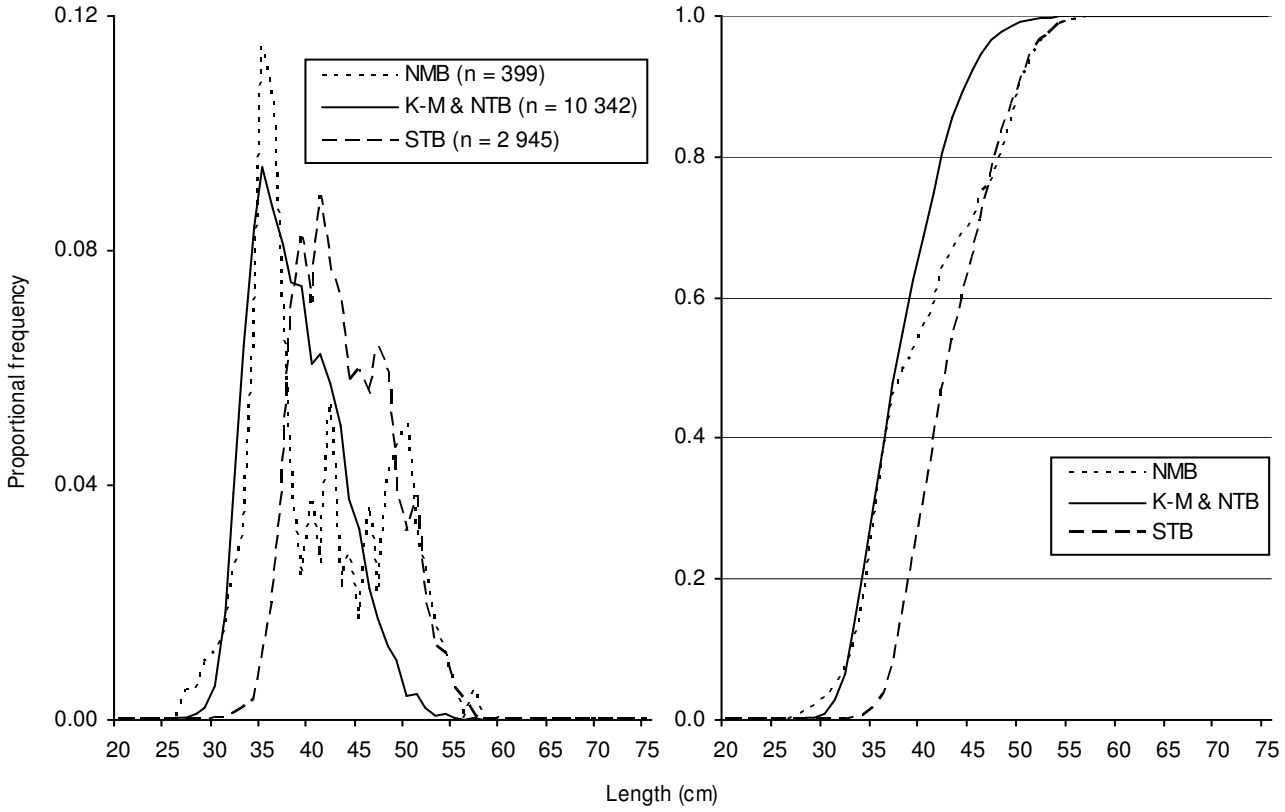



**Figure 28: Comparison of the proportion and cumulative proportion at length distributions determined from trevally landings sampled from the three TRE 7 sub-area single trawl fisheries in 2006–07 (*n*, length sample size).**

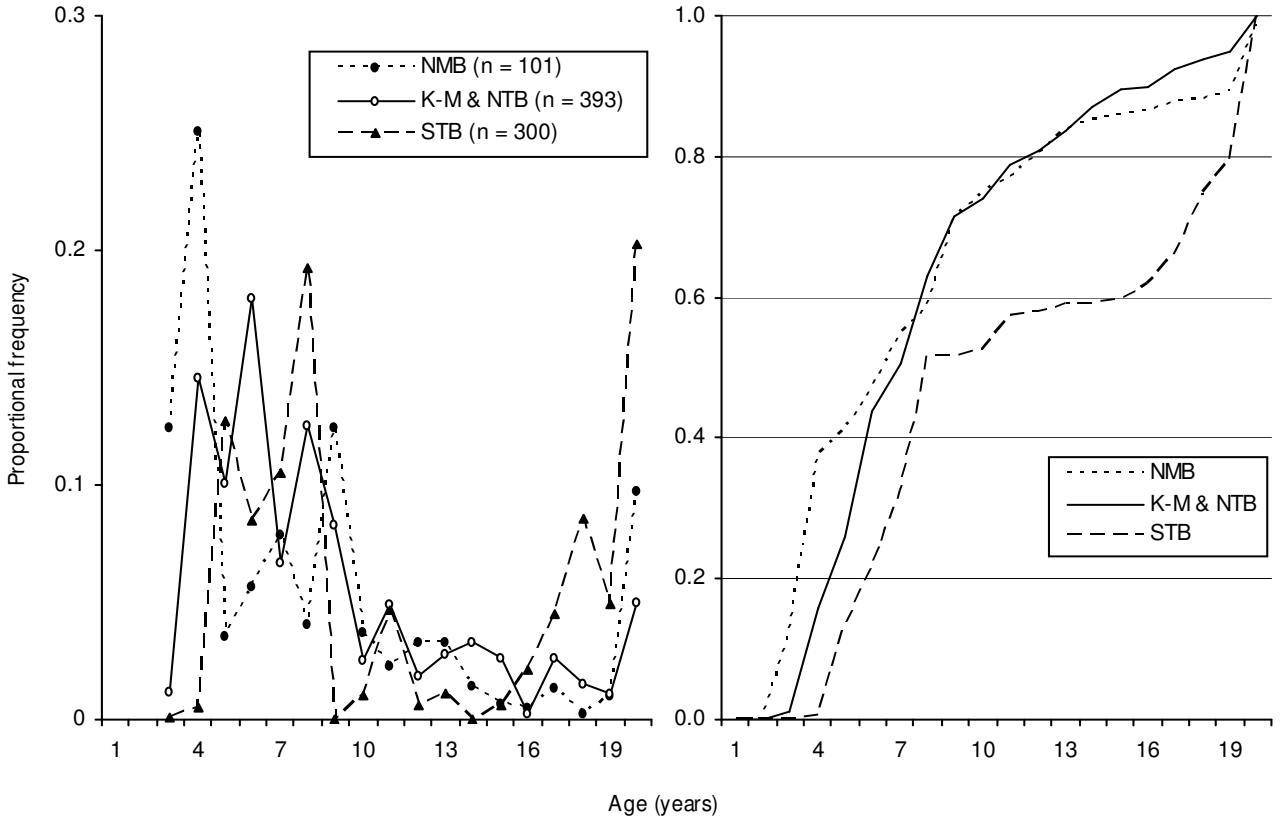



**Figure 29: Comparison of the proportion and cumulative proportion at age distributions determined from trevally landings sampled from the three TRE 7 sub-area single trawl fisheries in 2006–07 (*n*, otolith sample size).**

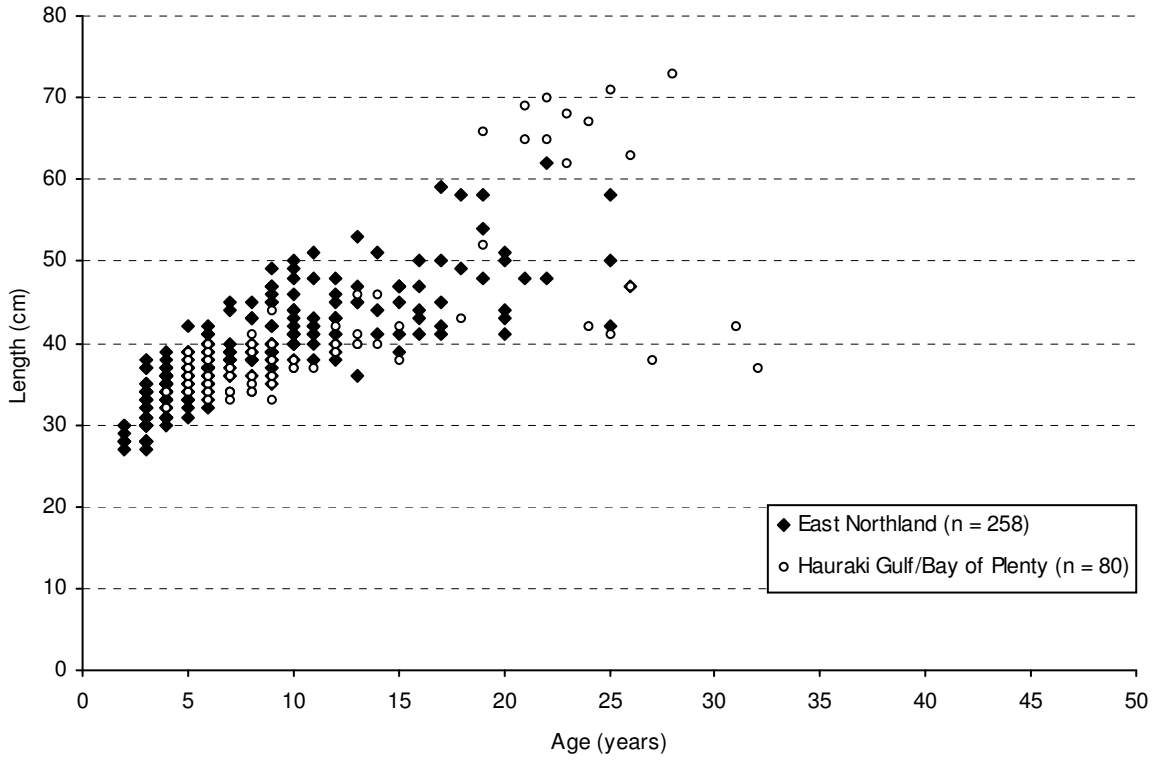



**Figure 30: Age-length scatterplot for trevally sampled from the TRE 1 stock in 2006–07 (Note: sub-area of collection displayed; *n*, sample size).**

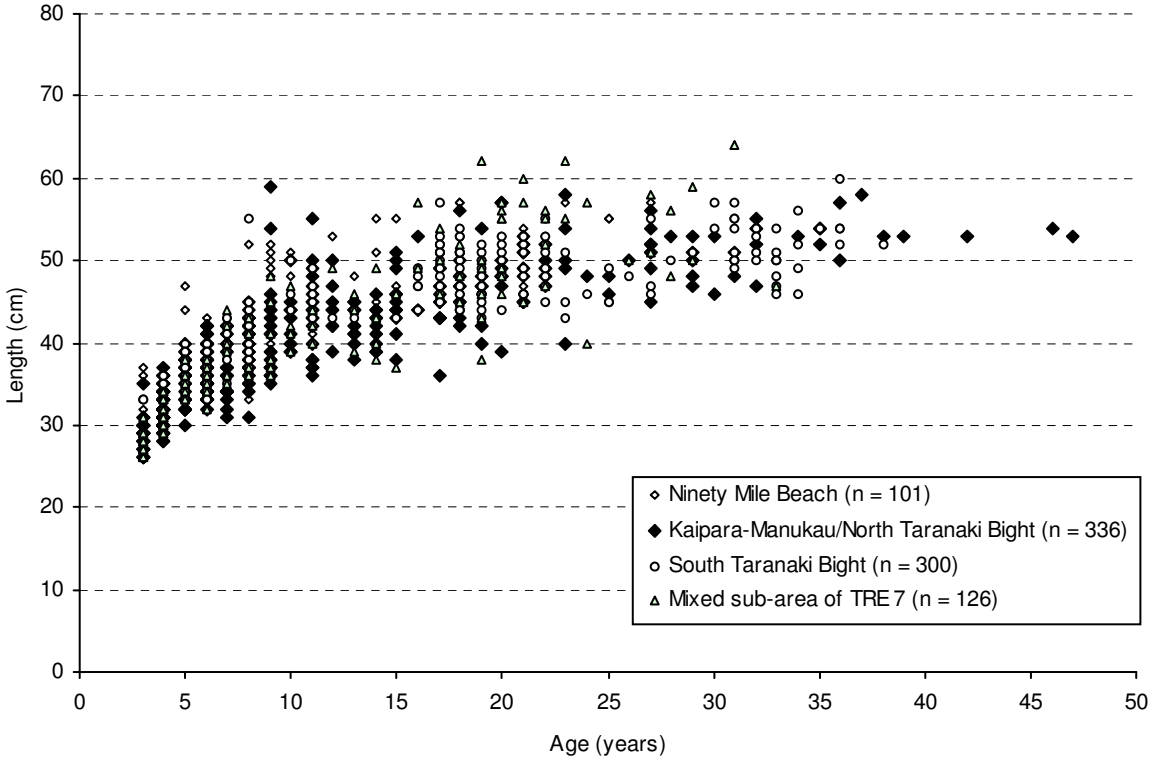
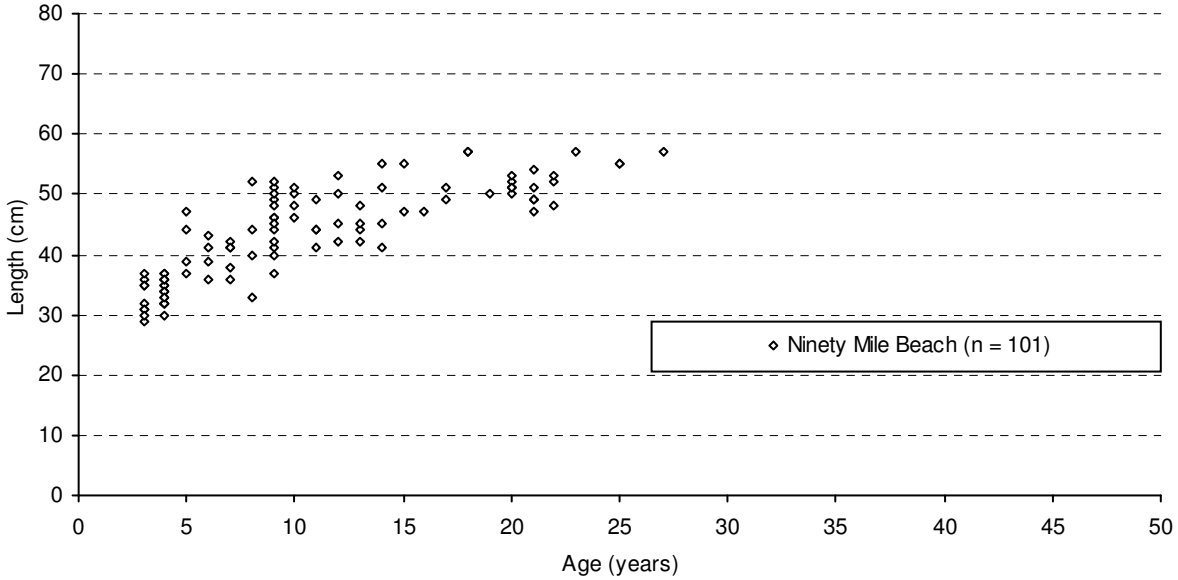
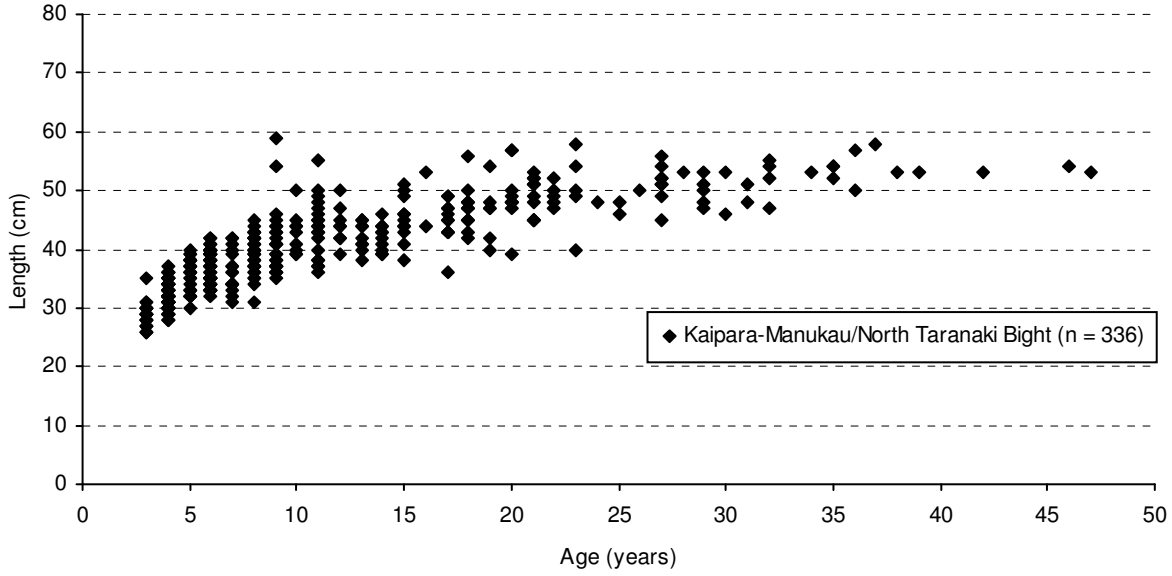



**Figure 31: Age-length scatterplot for trevally sampled from the TRE 7 stock in 2006–07 (Note: sub-area of collection displayed; *n*, sample size).**



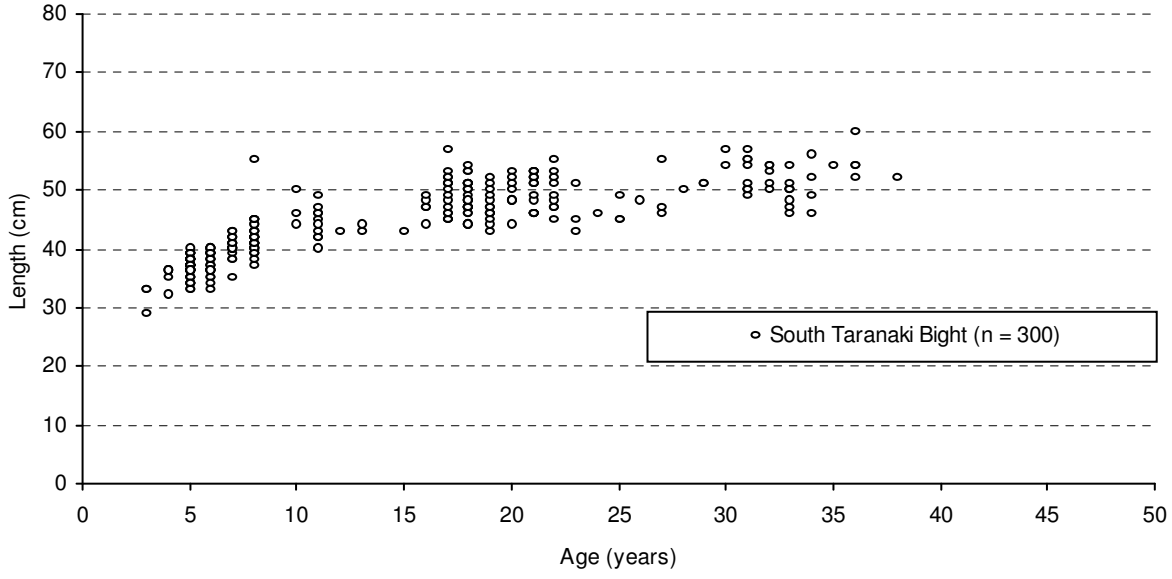




**Figure 32: Age-length scatterplots for trevally sampled from the three sub-areas of TRE 7 in 2006–07 (*n*, sample size).**

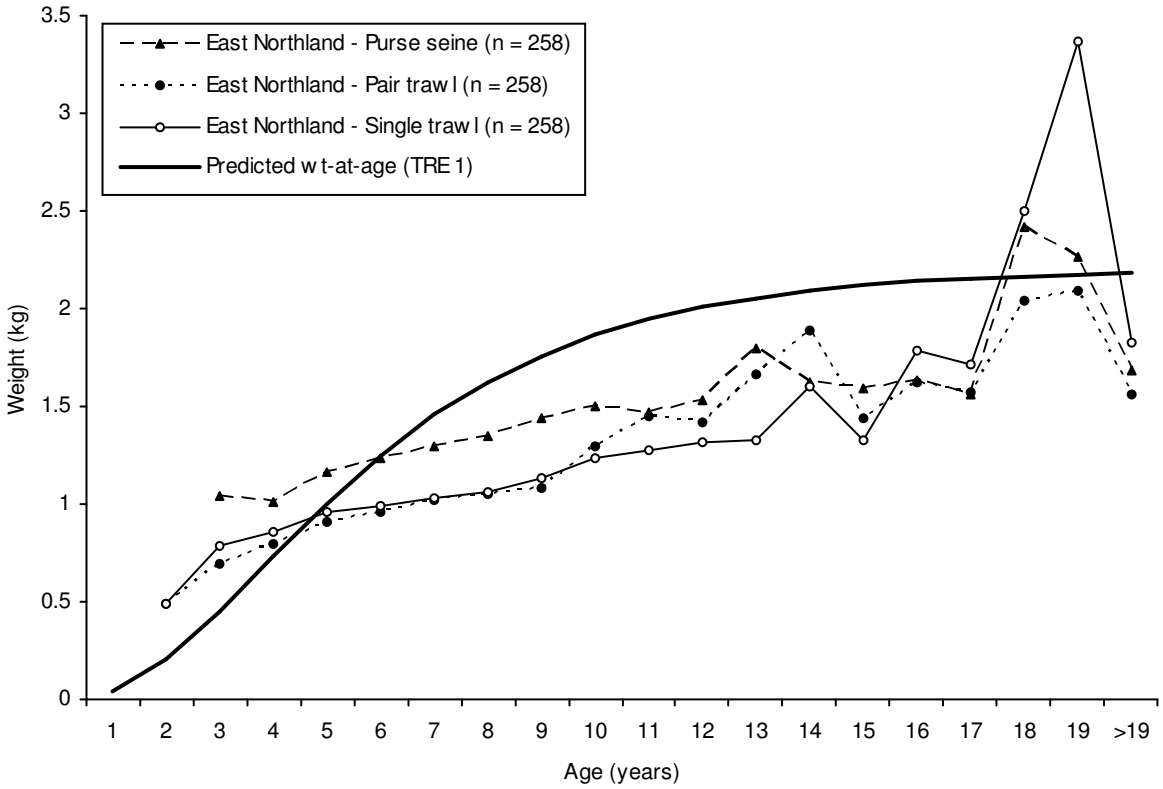



**Figure 33: Observed and predicted mean weight-at-age estimates from trevally landings sampled from three different methods in the East Northland sub-area of TRE 1 in 2006–07 (*n*, sample size). Note: Predicted estimates are based on published growth (Walsh et al. 1999) and length-weight (James 1984) parameters.**

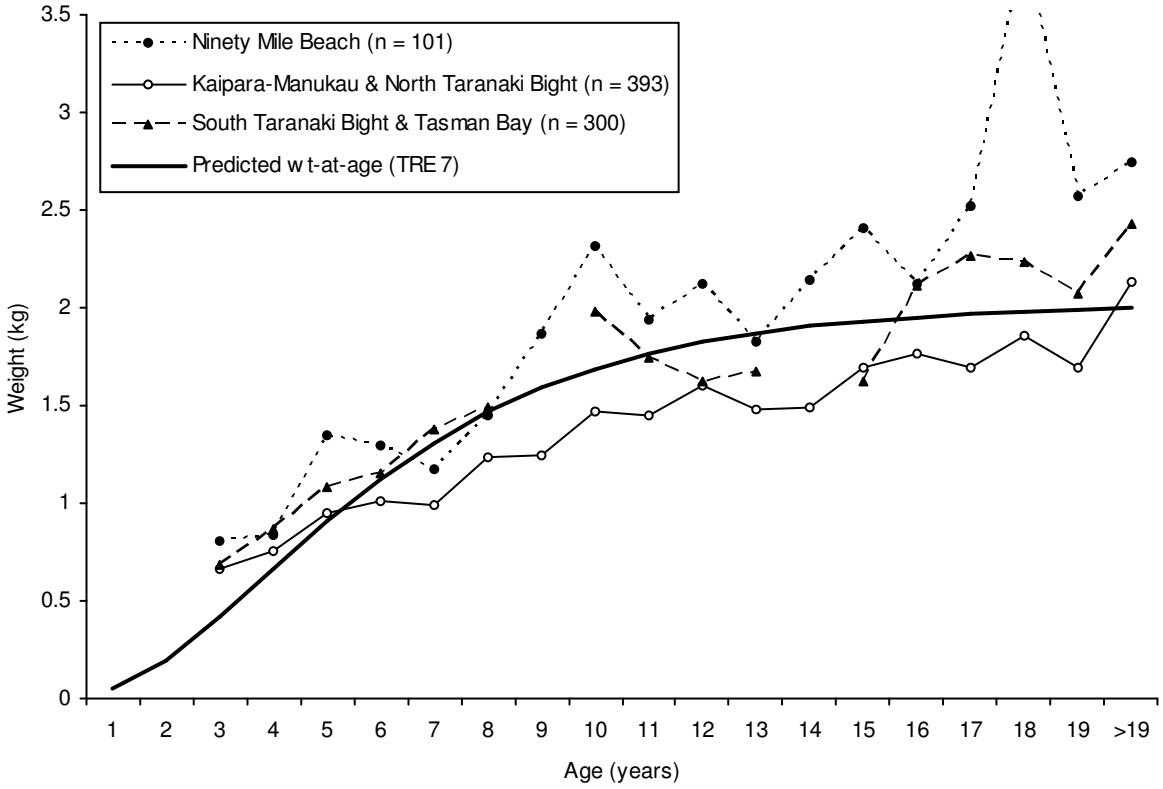



**Figure 34: Observed and predicted mean weight-at-age estimates from trevally single trawl landings sampled from three different sub-areas of TRE 7 in 2006–07 (*n*, sample size). Note: Predicted estimates are based on published growth (Walsh et al. 1999) and length-weight (James 1984) parameters.**

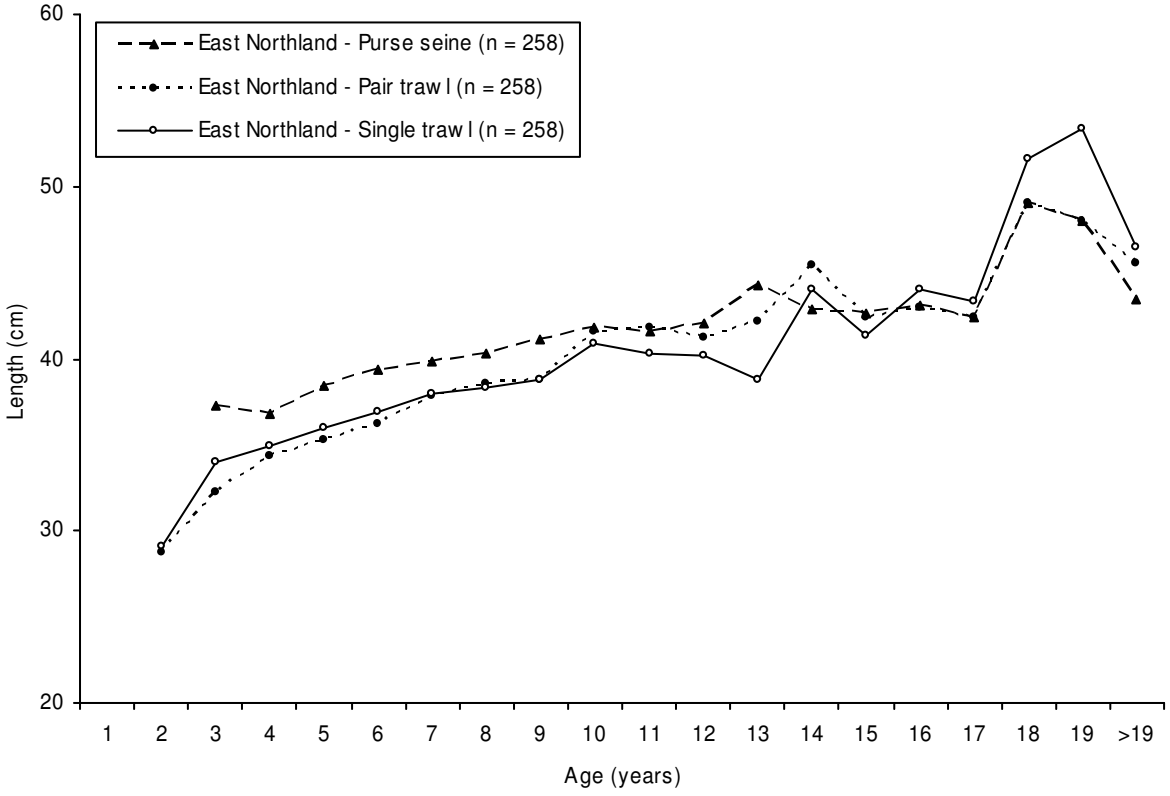



**Figure 35: Observed mean length-at-age estimates from trevally landings sampled from three different methods in the East Northland sub-area of TRE 1 in 2006–07 (*n*, sample size).**

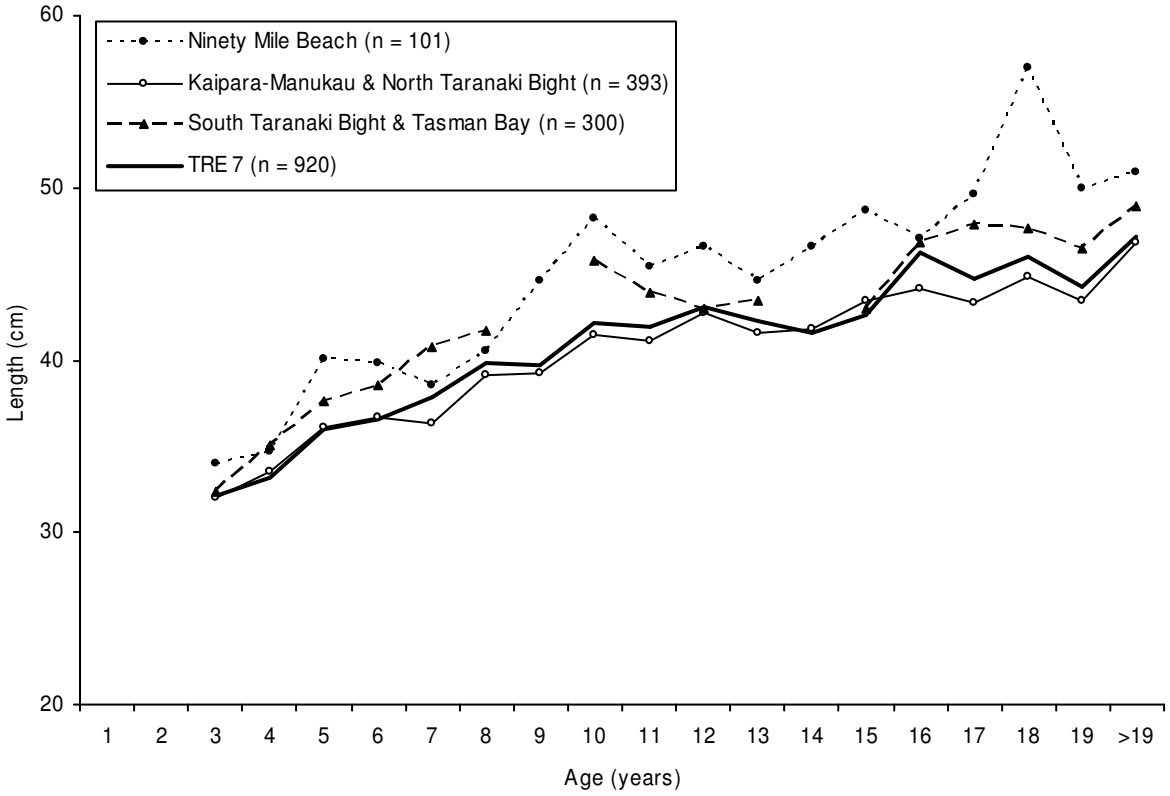



**Figure 36: Observed mean length-at-age estimates from trevally single trawl landings sampled from three different sub-areas of TRE 7 in 2006–07 (*n*, sample size).**

**Appendix 1: Estimates of the proportion at length of trevally from the TRE 1 single trawl, purse seine, and pair trawl fisheries in 2006–07. The proportion at length for each sub-area (where applicable) is also presented (Sub-area code: ENLD, East Northland).**

*P.i.* = proportion of fish in length class. *Nt* = scaled total number of fish caught.
c.v. = coefficient of variation. *n* = total number of fish sampled.

| | Single trawl | | | | Purse seine | | Pair trawl | |
|---|---|---|---|---|---|---|---|---|
| Length | Combined | | ENLD | | ENLD | | ENLD | |
| (cm) | *P.i.* | c.v. | *P.i.* | c.v. | *P.i.* | c.v. | *P.i.* | *c.v.* |
| 20 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 21 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 22 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 23 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 24 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 25 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 26 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 27 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0123 | – |
| 28 | 0.0034 | 0.85 | 0.0035 | 0.86 | 0.0000 | 0.00 | 0.0196 | – |
| 29 | 0.0046 | 0.75 | 0.0048 | 0.76 | 0.0000 | 0.00 | 0.0172 | – |
| 30 | 0.0101 | 0.85 | 0.0106 | 0.86 | 0.0000 | 0.00 | 0.0539 | – |
| 31 | 0.0105 | 0.80 | 0.0110 | 0.81 | 0.0000 | 0.00 | 0.0490 | – |
| 32 | 0.0371 | 0.76 | 0.0387 | 0.78 | 0.0000 | 0.00 | 0.0931 | – |
| 33 | 0.0684 | 0.71 | 0.0712 | 0.73 | 0.0000 | 0.00 | 0.0613 | – |
| 34 | 0.1015 | 0.60 | 0.1034 | 0.63 | 0.0000 | 0.00 | 0.1054 | – |
| 35 | 0.1223 | 0.27 | 0.1225 | 0.29 | 0.0081 | 0.03 | 0.1054 | – |
| 36 | 0.1319 | 0.08 | 0.1300 | 0.09 | 0.0364 | 0.01 | 0.1275 | – |
| 37 | 0.1412 | 0.31 | 0.1394 | 0.34 | 0.0902 | 0.01 | 0.1176 | – |
| 38 | 0.1570 | 0.45 | 0.1571 | 0.48 | 0.0896 | 0.01 | 0.0833 | – |
| 39 | 0.0754 | 0.43 | 0.0726 | 0.48 | 0.0991 | 0.01 | 0.0417 | – |
| 40 | 0.0508 | 0.47 | 0.0504 | 0.50 | 0.1394 | 0.01 | 0.0221 | – |
| 41 | 0.0192 | 0.49 | 0.0191 | 0.53 | 0.1785 | 0.01 | 0.0270 | – |
| 42 | 0.0190 | 0.16 | 0.0190 | 0.17 | 0.1021 | 0.01 | 0.0049 | – |
| 43 | 0.0082 | 0.52 | 0.0083 | 0.55 | 0.0798 | 0.01 | 0.0147 | – |
| 44 | 0.0046 | 0.99 | 0.0047 | 1.04 | 0.0601 | 0.01 | 0.0049 | – |
| 45 | 0.0090 | 0.58 | 0.0095 | 0.60 | 0.0514 | 0.01 | 0.0098 | – |
| 46 | 0.0035 | 0.68 | 0.0033 | 0.75 | 0.0291 | 0.02 | 0.0025 | – |
| 47 | 0.0035 | 0.67 | 0.0035 | 0.72 | 0.0165 | 0.02 | 0.0049 | – |
| 48 | 0.0028 | 0.69 | 0.0029 | 0.71 | 0.0084 | 0.03 | 0.0074 | – |
| 49 | 0.0040 | 0.60 | 0.0042 | 0.61 | 0.0024 | 0.09 | 0.0049 | – |
| 50 | 0.0028 | 0.54 | 0.0030 | 0.55 | 0.0048 | 0.06 | 0.0000 | – |
| 51 | 0.0016 | 1.06 | 0.0016 | 1.09 | 0.0041 | 0.04 | 0.0049 | – |
| 52 | 0.0013 | 0.96 | 0.0012 | 1.09 | 0.0000 | 0.00 | 0.0000 | – |
| 53 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0025 | – |
| 54 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 55 | 0.0008 | 1.06 | 0.0008 | 1.09 | 0.0000 | 0.00 | 0.0000 | – |
| 56 | 0.0004 | 1.06 | 0.0004 | 1.09 | 0.0000 | 0.00 | 0.0000 | – |
| 57 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 58 | 0.0016 | 0.55 | 0.0017 | 0.56 | 0.0000 | 0.00 | 0.0000 | – |
| 59 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 60 | 0.0008 | 0.85 | 0.0009 | 0.86 | 0.0000 | 0.00 | 0.0000 | – |
| 61 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0025 | – |
| 62 | 0.0008 | 0.83 | 0.0004 | 1.09 | 0.0000 | 0.00 | 0.0000 | – |
| 63 | 0.0001 | 1.21 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 64 | 0.0001 | 1.21 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 65 | 0.0001 | 1.21 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 66 | 0.0003 | 1.21 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 67 | 0.0001 | 1.21 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 68 | 0.0003 | 1.21 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 69 | 0.0003 | 1.21 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 70 | 0.0001 | 1.21 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 71 | 0.0001 | 1.21 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 72 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 73 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 74 | 0.0001 | 1.21 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| 75 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | – |
| *Nt* | 467 439 | | 212 724 | | 76 564 | | 44 418 | |
| *n* | 2 126 | | 1 781 | | 472 | | 408 | |

**Appendix 1 – continued:**
**Estimates of the proportion at length of trevally from the TRE 7 single trawl fishery in 2006–07.**
**The proportion at length for each sub-area is also presented (Area codes: NMB, Ninety Mile Beach; KMH-NTB, Kaipara-Manukau & North Taranaki Bight; STB, South Taranaki Bight).**

*P.i.* = proportion of fish in length class. *Nt* = scaled total number of fish caught.
c.v. = coefficient of variation. *n* = total number of fish sampled.

| Length | TRE 7 | | NMB | | KMH-NTB | | STB | |
|---|---|---|---|---|---|---|---|---|
| (cm) | *P.i.* | c.v. | *P.i.* | c.v. | *P.i.* | c.v. | *P.i.* | c.v. |
| 20 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 |
| 21 | 0.0001 | 0.87 | 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 |
| 23 | 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 |
| 25 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 |
| 26 | 0.0004 | 0.48 | 0.0000 | 0.00 | 0.0002 | 0.90 | 0.0000 | 0.00 |
| 27 | 0.0010 | 0.54 | 0.0050 | 0.13 | 0.0002 | 0.53 | 0.0000 | 0.00 |
| 28 | 0.0027 | 0.44 | 0.0053 | 0.02 | 0.0011 | 0.33 | 0.0000 | 0.00 |
| 29 | 0.0049 | 0.43 | 0.0100 | 0.13 | 0.0019 | 0.36 | 0.0001 | 1.01 |
| 30 | 0.0126 | 0.34 | 0.0116 | 0.14 | 0.0056 | 0.22 | 0.0002 | 1.01 |
| 31 | 0.0282 | 0.27 | 0.0153 | 0.09 | 0.0182 | 0.24 | 0.0002 | 1.01 |
| 32 | 0.0543 | 0.19 | 0.0250 | 0.27 | 0.0386 | 0.20 | 0.0009 | 0.81 |
| 33 | 0.0738 | 0.15 | 0.0321 | 0.01 | 0.0637 | 0.19 | 0.0019 | 0.43 |
| 34 | 0.0901 | 0.13 | 0.0662 | 0.06 | 0.0841 | 0.15 | 0.0034 | 0.48 |
| 35 | 0.0966 | 0.09 | 0.1148 | 0.05 | 0.0942 | 0.09 | 0.0104 | 0.52 |
| 36 | 0.0848 | 0.06 | 0.1057 | 0.12 | 0.0872 | 0.06 | 0.0202 | 0.43 |
| 37 | 0.0753 | 0.06 | 0.0677 | 0.05 | 0.0811 | 0.06 | 0.0410 | 0.39 |
| 38 | 0.0674 | 0.08 | 0.0390 | 0.08 | 0.0747 | 0.06 | 0.0699 | 0.38 |
| 39 | 0.0654 | 0.11 | 0.0244 | 0.23 | 0.0738 | 0.11 | 0.0824 | 0.38 |
| 40 | 0.0542 | 0.13 | 0.0373 | 0.26 | 0.0608 | 0.12 | 0.0711 | 0.28 |
| 41 | 0.0544 | 0.13 | 0.0268 | 0.01 | 0.0623 | 0.12 | 0.0896 | 0.28 |
| 42 | 0.0506 | 0.13 | 0.0543 | 0.03 | 0.0572 | 0.13 | 0.0768 | 0.24 |
| 43 | 0.0443 | 0.13 | 0.0225 | 0.09 | 0.0500 | 0.13 | 0.0722 | 0.23 |
| 44 | 0.0337 | 0.13 | 0.0284 | 0.11 | 0.0376 | 0.12 | 0.0573 | 0.20 |
| 45 | 0.0290 | 0.15 | 0.0172 | 0.12 | 0.0324 | 0.15 | 0.0597 | 0.14 |
| 46 | 0.0206 | 0.17 | 0.0365 | 0.05 | 0.0225 | 0.18 | 0.0551 | 0.34 |
| 47 | 0.0167 | 0.17 | 0.0215 | 0.01 | 0.0173 | 0.19 | 0.0636 | 0.32 |
| 48 | 0.0125 | 0.16 | 0.0415 | 0.06 | 0.0124 | 0.18 | 0.0594 | 0.31 |
| 49 | 0.0099 | 0.18 | 0.0461 | 0.08 | 0.0101 | 0.21 | 0.0398 | 0.35 |
| 50 | 0.0049 | 0.19 | 0.0505 | 0.11 | 0.0041 | 0.20 | 0.0323 | 0.33 |
| 51 | 0.0052 | 0.21 | 0.0315 | 0.03 | 0.0043 | 0.27 | 0.0384 | 0.34 |
| 52 | 0.0027 | 0.24 | 0.0256 | 0.08 | 0.0022 | 0.35 | 0.0203 | 0.43 |
| 53 | 0.0012 | 0.26 | 0.0159 | 0.02 | 0.0005 | 0.40 | 0.0126 | 0.39 |
| 54 | 0.0012 | 0.21 | 0.0109 | 0.04 | 0.0009 | 0.28 | 0.0111 | 0.37 |
| 55 | 0.0004 | 0.30 | 0.0059 | 0.19 | 0.0002 | 0.49 | 0.0055 | 0.33 |
| 56 | 0.0003 | 0.39 | 0.0000 | 0.00 | 0.0002 | 0.65 | 0.0035 | 0.38 |
| 57 | 0.0002 | 0.43 | 0.0053 | 0.02 | 0.0002 | 0.62 | 0.0007 | 0.58 |
| 58 | 0.0000 | 0.90 | 0.0000 | 0.00 | 0.0000 | 0.93 | 0.0000 | 0.00 |
| 59 | 0.0001 | 0.73 | 0.0000 | 0.00 | 0.0001 | 0.91 | 0.0001 | 1.06 |
| 60 | 0.0001 | 0.80 | 0.0000 | 0.00 | 0.0001 | 0.91 | 0.0002 | 1.02 |
| 61 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 |
| 62 | 0.0001 | 0.72 | 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 |
| 64 | 0.0001 | 0.91 | 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 |
| 66 | 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 |
| 68 | 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 |
| 70 | 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 |
| 72 | 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 |
| 74 | 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 |
| *Nt* | 1 298843 | | 124 560 | | 985 165 | | 83 118 | |
| *n* | 19 089 | | 399 | | 10 342 | | 2 945 | |

**Appendix 2: Estimates of proportion at age of trevally from the TRE 1 single trawl, purse seine, and pair trawl fisheries in 2006–07. The proportion at age for each sub-area is also presented (Area code: ENLD, East Northland).**

*P.j.* = proportion of fish in age class; c.v. = coefficient of variation; *n* = number of fish aged.

| | Single trawl | | | | Purse seine | | Pair trawl | |
|---|---|---|---|---|---|---|---|---|
| Age | TRE 1 | | ENLD | | ENLD | | ENLD | |
| (years) | *P.j.* | c.v. | *P.j.* | c.v. | *P.j.* | c.v. | *P.j.* | c.v. |
| 1 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 |
| 2 | 0.0079 | 0.28 | 0.0083 | 0.29 | 0.0000 | 0.00 | 0.0414 | 0.30 |
| 3 | 0.0900 | 0.20 | 0.1233 | 0.20 | 0.0117 | 0.55 | 0.1896 | 0.16 |
| 4 | 0.2177 | 0.12 | 0.2873 | 0.11 | 0.0416 | 0.25 | 0.3106 | 0.11 |
| 5 | 0.1184 | 0.19 | 0.1224 | 0.22 | 0.0587 | 0.26 | 0.1117 | 0.23 |
| 6 | 0.1487 | 0.16 | 0.1359 | 0.21 | 0.1125 | 0.22 | 0.1114 | 0.22 |
| 7 | 0.0801 | 0.24 | 0.0668 | 0.31 | 0.0609 | 0.28 | 0.0445 | 0.32 |
| 8 | 0.0746 | 0.24 | 0.0584 | 0.33 | 0.0765 | 0.27 | 0.0365 | 0.33 |
| 9 | 0.0811 | 0.22 | 0.0735 | 0.28 | 0.1047 | 0.22 | 0.0479 | 0.29 |
| 10 | 0.0551 | 0.28 | 0.0333 | 0.35 | 0.1234 | 0.23 | 0.0243 | 0.32 |
| 11 | 0.0214 | 0.44 | 0.0216 | 0.49 | 0.0603 | 0.35 | 0.0157 | 0.42 |
| 12 | 0.0301 | 0.32 | 0.0254 | 0.45 | 0.0956 | 0.26 | 0.0207 | 0.36 |
| 13 | 0.0135 | 0.44 | 0.0084 | 0.72 | 0.0435 | 0.39 | 0.0110 | 0.60 |
| 14 | 0.0054 | 0.54 | 0.0026 | 0.64 | 0.0323 | 0.50 | 0.0042 | 0.68 |
| 15 | 0.0146 | 0.52 | 0.0082 | 0.60 | 0.0373 | 0.41 | 0.0073 | 0.52 |
| 16 | 0.0035 | 0.49 | 0.0040 | 0.49 | 0.0293 | 0.53 | 0.0049 | 0.59 |
| 17 | 0.0041 | 0.53 | 0.0050 | 0.56 | 0.0244 | 0.57 | 0.0034 | 0.68 |
| 18 | 0.0027 | 0.65 | 0.0020 | 0.83 | 0.0088 | 0.93 | 0.0016 | 1.22 |
| 19 | 0.0026 | 0.45 | 0.0011 | 0.80 | 0.0014 | 1.12 | 0.0012 | 1.15 |
| >19 | 0.0262 | 0.36 | 0.0092 | 0.35 | 0.0771 | 0.30 | 0.0095 | 0.43 |
| *n* | 338 | | 258 | | 258 | | 258 | |

**Appendix 2 – continued:**
**Estimates of proportion at age of trevally from the TRE 7 single trawl fishery in 2006–07.**
**The proportion at age for each sub-area is also presented (Area codes: NMB, Ninety Mile Beach; KMH-NTB, Kaipara-Manukau & North Taranaki Bight; STB, South Taranaki Bight).**

*P.j.* = proportion of fish in age class; c.v. = coefficient of variation; *n* = number of fish aged.

| Age | TRE 7 | | NMB | | KMH-NTB | | STB | |
|---|---|---|---|---|---|---|---|---|
| (years) | *P.j.* | c.v. | *P.j.* | c.v. | *P.j.* | c.v. | *P.j.* | c.v. |
| 1 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 |
| 2 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 |
| 3 | 0.0359 | 0.20 | 0.1246 | 0.34 | 0.0115 | 0.45 | 0.0009 | 0.67 |
| 4 | 0.1769 | 0.08 | 0.2508 | 0.19 | 0.1461 | 0.13 | 0.0054 | 0.42 |
| 5 | 0.1692 | 0.09 | 0.0359 | 0.56 | 0.1012 | 0.19 | 0.1273 | 0.12 |
| 6 | 0.1560 | 0.10 | 0.0568 | 0.41 | 0.1801 | 0.13 | 0.0850 | 0.19 |
| 7 | 0.0801 | 0.15 | 0.0792 | 0.31 | 0.0666 | 0.24 | 0.1051 | 0.22 |
| 8 | 0.1102 | 0.11 | 0.0405 | 0.58 | 0.1252 | 0.16 | 0.1924 | 0.14 |
| 9 | 0.0506 | 0.17 | 0.1242 | 0.29 | 0.0833 | 0.21 | 0.0000 | 0.00 |
| 10 | 0.0182 | 0.26 | 0.0371 | 0.54 | 0.0257 | 0.36 | 0.0101 | 0.62 |
| 11 | 0.0366 | 0.18 | 0.0232 | 0.53 | 0.0492 | 0.25 | 0.0468 | 0.32 |
| 12 | 0.0117 | 0.31 | 0.0333 | 0.56 | 0.0190 | 0.38 | 0.0060 | 1.00 |
| 13 | 0.0198 | 0.25 | 0.0330 | 0.57 | 0.0283 | 0.34 | 0.0112 | 0.71 |
| 14 | 0.0200 | 0.26 | 0.0148 | 0.55 | 0.0327 | 0.32 | 0.0000 | 0.00 |
| 15 | 0.0130 | 0.30 | 0.0069 | 0.86 | 0.0261 | 0.34 | 0.0060 | 1.00 |
| 16 | 0.0044 | 0.37 | 0.0054 | 1.05 | 0.0024 | 0.98 | 0.0214 | 0.45 |
| 17 | 0.0165 | 0.23 | 0.0137 | 0.77 | 0.0260 | 0.32 | 0.0446 | 0.27 |
| 18 | 0.0174 | 0.19 | 0.0027 | 0.89 | 0.0156 | 0.37 | 0.0857 | 0.18 |
| 19 | 0.0158 | 0.24 | 0.0101 | 1.02 | 0.0107 | 0.49 | 0.0489 | 0.28 |
| >19 | 0.0476 | 0.10 | 0.0978 | 0.24 | 0.0502 | 0.16 | 0.2025 | 0.10 |
| *n* | 920 | | 101 | | 393 | | 300 | |

**Appendix 3: Estimates of mean weight-at-age (kg) of trevally from the TRE 1 single trawl, purse seine, and pair trawl fisheries in 2006–07. The mean weight-at-age for each sub-area is also presented (Area code: ENLD, East Northland).**

| | Single trawl | | | | Purse seine | | Pair trawl | |
|---|---|---|---|---|---|---|---|---|
| Age | TRE 1 | | ENLD | | ENLD | | ENLD | |
| (years) | Mean | c.v. | Mean | c.v. | Mean | c.v. | Mean | c.v. |
| 1 | – | – | – | – | – | – | – | – |
| 2 | 0.49 | 0.02 | 0.49 | 0.02 | – | – | 0.49 | 0.02 |
| 3 | 0.78 | 0.04 | 0.80 | 0.04 | 1.04 | 0.02 | 0.69 | 0.04 |
| 4 | 0.86 | 0.02 | 0.87 | 0.02 | 1.01 | 0.02 | 0.80 | 0.02 |
| 5 | 0.96 | 0.03 | 0.95 | 0.03 | 1.16 | 0.06 | 0.90 | 0.03 |
| 6 | 0.99 | 0.03 | 1.02 | 0.03 | 1.24 | 0.03 | 0.96 | 0.03 |
| 7 | 1.03 | 0.03 | 1.12 | 0.03 | 1.30 | 0.07 | 1.02 | 0.04 |
| 8 | 1.06 | 0.04 | 1.15 | 0.03 | 1.34 | 0.06 | 1.05 | 0.04 |
| 9 | 1.13 | 0.04 | 1.20 | 0.05 | 1.44 | 0.05 | 1.08 | 0.07 |
| 10 | 1.24 | 0.05 | 1.41 | 0.07 | 1.50 | 0.04 | 1.30 | 0.07 |
| 11 | 1.27 | 0.08 | 1.34 | 0.08 | 1.46 | 0.04 | 1.45 | 0.14 |
| 12 | 1.32 | 0.05 | 1.33 | 0.07 | 1.53 | 0.05 | 1.42 | 0.06 |
| 13 | 1.33 | 0.11 | 1.23 | 0.19 | 1.80 | 0.06 | 1.66 | 0.21 |
| 14 | 1.60 | 0.12 | 1.78 | 0.17 | 1.62 | 0.09 | 1.89 | 0.20 |
| 15 | 1.32 | 0.09 | 1.46 | 0.12 | 1.60 | 0.09 | 1.43 | 0.11 |
| 16 | 1.78 | 0.11 | 1.77 | 0.10 | 1.63 | 0.06 | 1.62 | 0.07 |
| 17 | 1.71 | 0.10 | 1.68 | 0.09 | 1.57 | 0.06 | 1.57 | 0.09 |
| 18 | 2.50 | 0.18 | 2.88 | 0.18 | 2.41 | – | 2.04 | 0.16 |
| 19 | 3.37 | 0.14 | 3.22 | 0.22 | 2.27 | – | 2.09 | 0.09 |
| >19 | 1.83 | 0.17 | 2.15 | 0.13 | 1.69 | 0.06 | 1.56 | 0.14 |

**Appendix 3 – continued:**
**Estimates of mean weight-at-age (kg) of trevally from the TRE 7 single trawl fishery in 2006–07.**
**The mean weight-at-age for each sub-area is also presented (Area codes: NMB, Ninety Mile Beach; KMH-NTB, Kaipara-Manukau & North Taranaki Bight; STB, South Taranaki Bight).**

| Age | TRE 7 | | NMB | | KMH-NTB | | STB | |
|---|---|---|---|---|---|---|---|---|
| (years) | Mean | c.v. | Mean | c.v. | Mean | c.v. | Mean | c.v. |
| 1 | – | – | – | – | – | – | – | – |
| 2 | – | – | – | – | – | – | – | – |
| 3 | 0.68 | 0.05 | 0.80 | 0.05 | 0.67 | 0.12 | 0.68 | 0.08 |
| 4 | 0.74 | 0.01 | 0.84 | 0.02 | 0.76 | 0.02 | 0.87 | 0.04 |
| 5 | 0.95 | 0.02 | 1.34 | 0.14 | 0.95 | 0.03 | 1.08 | 0.01 |
| 6 | 1.00 | 0.02 | 1.30 | 0.09 | 1.01 | 0.03 | 1.16 | 0.02 |
| 7 | 1.13 | 0.04 | 1.17 | 0.07 | 0.99 | 0.06 | 1.38 | 0.02 |
| 8 | 1.30 | 0.03 | 1.45 | 0.22 | 1.24 | 0.04 | 1.49 | 0.02 |
| 9 | 1.30 | 0.04 | 1.87 | 0.09 | 1.25 | 0.05 | – | – |
| 10 | 1.55 | 0.05 | 2.31 | 0.06 | 1.46 | 0.05 | 1.98 | 0.09 |
| 11 | 1.53 | 0.04 | 1.94 | 0.12 | 1.45 | 0.07 | 1.75 | 0.05 |
| 12 | 1.64 | 0.05 | 2.12 | 0.16 | 1.60 | 0.06 | 1.62 | – |
| 13 | 1.55 | 0.04 | 1.82 | 0.11 | 1.47 | 0.05 | 1.67 | 0.02 |
| 14 | 1.48 | 0.04 | 2.14 | 0.16 | 1.49 | 0.05 | – | – |
| 15 | 1.60 | 0.07 | 2.41 | 0.15 | 1.69 | 0.07 | 1.62 | – |
| 16 | 2.04 | 0.05 | 2.13 | – | 1.77 | 0.02 | 2.11 | 0.05 |
| 17 | 1.87 | 0.06 | 2.52 | 0.04 | 1.69 | 0.09 | 2.26 | 0.04 |
| 18 | 2.02 | 0.03 | 3.84 | – | 1.86 | 0.06 | 2.23 | 0.03 |
| 19 | 1.80 | 0.05 | 2.57 | – | 1.69 | 0.10 | 2.07 | 0.04 |
| >19 | 2.18 | 0.03 | 2.74 | 0.03 | 2.14 | 0.05 | 2.43 | 0.02 |

**Appendix 4: Estimates of mean length-at-age (cm) of trevally from the TRE 1 single trawl, purse seine, and pair trawl fisheries in 2006–07. The mean length-at-age for each sub-area is also presented (Area code: ENLD, East Northland).**

| | Single trawl | | | | Purse seine | | Pair trawl | |
|---|---|---|---|---|---|---|---|---|
| Age | TRE 1 | | ENLD | | ENLD | | ENLD | |
| (years) | Mean | c.v. | Mean | c.v. | Mean | c.v. | Mean | c.v. |
| 1 | – | – | – | – | – | – | – | – |
| 2 | 29.1 | 0.007 | 29.1 | 0.007 | – | – | 28.8 | 0.013 |
| 3 | 33.8 | 0.014 | 34.0 | 0.013 | 37.2 | 0.008 | 32.3 | 0.013 |
| 4 | 34.9 | 0.006 | 35.0 | 0.006 | 36.8 | 0.008 | 34.3 | 0.007 |
| 5 | 36.1 | 0.010 | 36.0 | 0.012 | 38.5 | 0.018 | 35.3 | 0.014 |
| 6 | 36.5 | 0.009 | 36.9 | 0.010 | 39.3 | 0.010 | 36.2 | 0.015 |
| 7 | 37.0 | 0.011 | 38.0 | 0.009 | 39.8 | 0.021 | 37.9 | 0.012 |
| 8 | 37.3 | 0.012 | 38.4 | 0.009 | 40.3 | 0.018 | 38.6 | 0.015 |
| 9 | 38.0 | 0.014 | 38.8 | 0.015 | 41.2 | 0.016 | 38.8 | 0.021 |
| 10 | 39.2 | 0.014 | 40.9 | 0.023 | 41.9 | 0.012 | 41.6 | 0.026 |
| 11 | 39.5 | 0.024 | 40.2 | 0.026 | 41.5 | 0.011 | 41.8 | 0.043 |
| 12 | 40.1 | 0.014 | 40.1 | 0.023 | 42.1 | 0.016 | 41.3 | 0.025 |
| 13 | 40.0 | 0.037 | 38.8 | 0.059 | 44.3 | 0.024 | 42.2 | 0.097 |
| 14 | 42.5 | 0.038 | 44.0 | 0.051 | 42.9 | 0.029 | 45.4 | 0.072 |
| 15 | 40.1 | 0.027 | 41.4 | 0.037 | 42.6 | 0.028 | 42.4 | 0.039 |
| 16 | 44.2 | 0.033 | 44.0 | 0.033 | 43.0 | 0.020 | 42.9 | 0.023 |
| 17 | 43.6 | 0.031 | 43.3 | 0.029 | 42.4 | 0.019 | 42.4 | 0.028 |
| 18 | 49.0 | 0.057 | 51.6 | 0.056 | 49.0 | – | 49.0 | – |
| 19 | 54.1 | 0.043 | 53.4 | 0.074 | 48.0 | – | 48.0 | – |
| >19 | 43.0 | 0.048 | 46.4 | 0.039 | 43.4 | 0.018 | 45.6 | 0.036 |

**Appendix 4 – continued:**
**Estimates of mean length-at-age (cm) of trevally from the TRE 7 single trawl fishery in 2006–07.**
**The mean length-at-age for each sub-area is also presented (Area codes: NMB, Ninety Mile Beach; KMH-NTB, Kaipara-Manukau & North Taranaki Bight; STB, South Taranaki Bight).**

| Age | TRE 7 | | NMB | | KMH-NTB | | STB | |
|---|---|---|---|---|---|---|---|---|
| (years) | Mean | c.v. | Mean | c.v. | Mean | c.v. | Mean | c.v. |
| 1 | – | – | – | – | – | – | – | – |
| 2 | – | – | – | – | – | – | – | – |
| 3 | 32.1 | 0.016 | 34.0 | 0.017 | 32.0 | 0.040 | 32.3 | 0.029 |
| 4 | 33.2 | 0.004 | 34.6 | 0.008 | 33.5 | 0.006 | 35.1 | 0.013 |
| 5 | 36.0 | 0.006 | 40.1 | 0.043 | 36.0 | 0.011 | 37.6 | 0.004 |
| 6 | 36.5 | 0.007 | 39.8 | 0.032 | 36.7 | 0.010 | 38.5 | 0.005 |
| 7 | 37.9 | 0.013 | 38.6 | 0.022 | 36.3 | 0.019 | 40.8 | 0.007 |
| 8 | 39.8 | 0.010 | 40.5 | 0.070 | 39.2 | 0.012 | 41.7 | 0.006 |
| 9 | 39.7 | 0.013 | 44.6 | 0.031 | 39.2 | 0.016 | – | – |
| 10 | 42.1 | 0.015 | 48.3 | 0.020 | 41.5 | 0.018 | 45.8 | 0.028 |
| 11 | 41.9 | 0.013 | 45.4 | 0.039 | 41.1 | 0.023 | 43.9 | 0.018 |
| 12 | 43.1 | 0.016 | 46.6 | 0.052 | 42.7 | 0.021 | 43.0 | – |
| 13 | 42.2 | 0.013 | 44.6 | 0.035 | 41.6 | 0.017 | 43.5 | 0.008 |
| 14 | 41.6 | 0.013 | 46.6 | 0.054 | 41.8 | 0.016 | – | – |
| 15 | 42.6 | 0.023 | 48.7 | 0.044 | 43.4 | 0.025 | 43.0 | – |
| 16 | 46.3 | 0.016 | 47.0 | – | 44.2 | 0.006 | 46.8 | 0.018 |
| 17 | 44.7 | 0.022 | 49.7 | 0.013 | 43.3 | 0.034 | 47.8 | 0.013 |
| 18 | 46.1 | 0.011 | 57.0 | – | 44.9 | 0.019 | 47.6 | 0.009 |
| 19 | 44.3 | 0.019 | 50.0 | – | 43.4 | 0.032 | 46.5 | 0.014 |
| >19 | 47.1 | 0.009 | 50.9 | 0.011 | 46.8 | 0.017 | 48.9 | 0.006 |

**Appendix 5: Age-length key derived from otolith samples collected from trevally fisheries in TRE 1 in 2006–07.**

**Estimates of proportion of age at length for trevally sampled from all TRE 1 sub-areas combined, 2006–07.**
**(Note: Aged to 01/01/2007)**

| 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 | 0.50 | 0.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 28 | 0 | 0.38 | 0.63 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 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 | 0.20 | 0.70 | 0.10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 31 | 0 | 0 | 0.27 | 0.64 | 0.09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 |
| 32 | 0 | 0 | 0.33 | 0.44 | 0.11 | 0.11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 33 | 0 | 0 | 0.22 | 0.33 | 0.17 | 0.17 | 0.06 | 0 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 |
| 34 | 0 | 0 | 0.22 | 0.33 | 0.11 | 0.11 | 0.11 | 0.11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 27 |
| 35 | 0 | 0 | 0.08 | 0.40 | 0.12 | 0.20 | 0 | 0.08 | 0.12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 |
| 36 | 0 | 0 | 0 | 0.41 | 0.14 | 0.17 | 0.10 | 0.07 | 0.07 | 0 | 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 |
| 37 | 0 | 0 | 0.08 | 0.17 | 0.21 | 0.21 | 0.13 | 0 | 0.04 | 0.08 | 0.04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.04 | 24 |
| 38 | 0 | 0 | 0.04 | 0.04 | 0.08 | 0.12 | 0.12 | 0.16 | 0.12 | 0.16 | 0.04 | 0.04 | 0 | 0 | 0.04 | 0 | 0 | 0 | 0 | 0.04 | 25 |
| 39 | 0 | 0 | 0 | 0.05 | 0.19 | 0.14 | 0.14 | 0.14 | 0.14 | 0 | 0 | 0.14 | 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | 0 | 21 |
| 40 | 0 | 0 | 0 | 0 | 0 | 0.24 | 0.05 | 0.10 | 0.19 | 0.14 | 0.05 | 0.10 | 0.10 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 21 |
| 41 | 0 | 0 | 0 | 0 | 0 | 0.11 | 0 | 0.06 | 0 | 0.22 | 0.11 | 0.11 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0 | 0 | 0.11 | 18 |
| 42 | 0 | 0 | 0 | 0 | 0.08 | 0.08 | 0 | 0 | 0.15 | 0.08 | 0.15 | 0.08 | 0 | 0 | 0.08 | 0 | 0.08 | 0 | 0 | 0.23 | 13 |
| 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.20 | 0 | 0.10 | 0.10 | 0.30 | 0 | 0 | 0 | 0.10 | 0 | 0.10 | 0 | 0.10 | 10 |
| 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0.14 | 0 | 0.14 | 0.29 | 0 | 0 | 0 | 0.14 | 0 | 0.14 | 0 | 0 | 0 | 0.14 | 7 |
| 45 | 0 | 0 | 0 | 0 | 0 | 0 | 0.11 | 0.11 | 0.22 | 0 | 0 | 0.11 | 0.22 | 0 | 0.11 | 0 | 0.11 | 0 | 0 | 0 | 9 |
| 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.20 | 0.20 | 0 | 0.20 | 0.20 | 0.20 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.22 | 0 | 0 | 0 | 0.11 | 0 | 0.33 | 0.11 | 0 | 0 | 0 | 0.22 | 9 |
| 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.17 | 0.17 | 0.17 | 0 | 0 | 0 | 0 | 0 | 0 | 0.17 | 0.33 | 6 |
| 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.33 | 0.33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.33 | 0 | 0 | 3 |
| 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.20 | 0 | 0 | 0 | 0 | 0 | 0.20 | 0.20 | 0 | 0 | 0.40 | 5 |
| 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.33 | 0 | 0 | 0.33 | 0 | 0 | 0 | 0 | 0 | 0.33 | 3 |
| 52 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 0 | 1 |
| 53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 0.33 | 0.33 | 0.33 | 3 |
| 59 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 0 | 0 | 0 | 1 |
| 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 | 1.00 | 2 |
| 63 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 1 |
| 64 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 65 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 2 |
| 66 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 0 | 1 |
| 67 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 1 |
| 68 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 1 |
| 69 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 1 |
| 70 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 1 |
| 71 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 1 |
| 72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 73 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 1 |
| 74 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | | | | | | | | | | | | | | | | | | | | | 338 |

**Appendix 5 – continued:**
**Estimates of proportion of age at length for trevally sampled from the East Northland sub-area of TRE 1, 2006–07.**
**(Note: Aged to 01/01/2007)**

| 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 | 0.50 | 0.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 28 | 0 | 0.38 | 0.63 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 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 | 0.20 | 0.70 | 0.10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 31 | 0 | 0 | 0.27 | 0.64 | 0.09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 |
| 32 | 0 | 0 | 0.38 | 0.38 | 0.13 | 0.13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 33 | 0 | 0 | 0.29 | 0.43 | 0.21 | 0.07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| 34 | 0 | 0 | 0.35 | 0.47 | 0.12 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 |
| 35 | 0 | 0 | 0.11 | 0.56 | 0.11 | 0.17 | 0 | 0 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 |
| 36 | 0 | 0 | 0 | 0.55 | 0.14 | 0.09 | 0.09 | 0.05 | 0.05 | 0 | 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 |
| 37 | 0 | 0 | 0.12 | 0.24 | 0.24 | 0.29 | 0.06 | 0 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 |
| 38 | 0 | 0 | 0.06 | 0.06 | 0.06 | 0.12 | 0.18 | 0.24 | 0.12 | 0.06 | 0.06 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 |
| 39 | 0 | 0 | 0 | 0.06 | 0.19 | 0.13 | 0.19 | 0.13 | 0.19 | 0 | 0 | 0.06 | 0 | 0 | 0.06 | 0 | 0 | 0 | 0 | 0 | 16 |
| 40 | 0 | 0 | 0 | 0 | 0 | 0.29 | 0.07 | 0.07 | 0.21 | 0.21 | 0.07 | 0.07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| 41 | 0 | 0 | 0 | 0 | 0 | 0.13 | 0 | 0 | 0 | 0.27 | 0.13 | 0.13 | 0 | 0.07 | 0.07 | 0.07 | 0.07 | 0 | 0 | 0.07 | 15 |
| 42 | 0 | 0 | 0 | 0 | 0.11 | 0.11 | 0 | 0 | 0.22 | 0.11 | 0.22 | 0 | 0 | 0 | 0 | 0 | 0.11 | 0 | 0 | 0.11 | 9 |
| 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.22 | 0 | 0.11 | 0.11 | 0.33 | 0 | 0 | 0 | 0.11 | 0 | 0 | 0 | 0.11 | 9 |
| 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0.17 | 0 | 0 | 0.33 | 0 | 0 | 0 | 0.17 | 0 | 0.17 | 0 | 0 | 0 | 0.17 | 6 |
| 45 | 0 | 0 | 0 | 0 | 0 | 0 | 0.11 | 0.11 | 0.22 | 0 | 0 | 0.11 | 0.22 | 0 | 0.11 | 0 | 0.11 | 0 | 0 | 0 | 9 |
| 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.33 | 0.33 | 0 | 0.33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.25 | 0 | 0 | 0 | 0.13 | 0 | 0.38 | 0.13 | 0 | 0 | 0 | 0.13 | 8 |
| 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.17 | 0.17 | 0.17 | 0 | 0 | 0 | 0 | 0 | 0 | 0.17 | 0.33 | 6 |
| 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.33 | 0.33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.33 | 0 | 0 | 3 |
| 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.20 | 0 | 0 | 0 | 0 | 0 | 0.20 | 0.20 | 0 | 0 | 0.40 | 5 |
| 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.33 | 0 | 0 | 0.33 | 0 | 0 | 0 | 0 | 0 | 0.33 | 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 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 0.33 | 0.33 | 0.33 | 3 |
| 59 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 0 | 0 | 0 | 1 |
| 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 | 1.00 | 1 |
| 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 | | | | | | | | | | | | | | | | | | | | | 258 |

**Appendix 6: Age-length key derived from otolith samples collected from trevally fisheries in TRE 7 in 2006–07.**

**Estimates of proportion of age at length for trevally sampled from all TRE 7 sub-areas combined, 2006–07.**
**(Note: Aged to 01/01/2007)**

| 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 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 27 | 0 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 28 | 0 | 0 | 0.80 | 0.20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 29 | 0 | 0 | 0.65 | 0.35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 |
| 30 | 0 | 0 | 0.29 | 0.67 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 |
| 31 | 0 | 0 | 0.25 | 0.65 | 0 | 0 | 0.05 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 |
| 32 | 0 | 0 | 0.03 | 0.73 | 0.13 | 0.07 | 0.03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 |
| 33 | 0 | 0 | 0.07 | 0.41 | 0.24 | 0.21 | 0.03 | 0.03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 |
| 34 | 0 | 0 | 0 | 0.39 | 0.23 | 0.19 | 0.16 | 0.03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31 |
| 35 | 0 | 0 | 0.09 | 0.23 | 0.20 | 0.34 | 0.06 | 0.06 | 0.03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35 |
| 36 | 0 | 0 | 0.02 | 0.19 | 0.33 | 0.19 | 0.08 | 0.06 | 0.08 | 0 | 0.02 | 0 | 0 | 0 | 0 | 0 | 0.02 | 0 | 0 | 0 | 48 |
| 37 | 0 | 0 | 0.02 | 0.06 | 0.40 | 0.17 | 0.04 | 0.13 | 0.13 | 0 | 0.04 | 0 | 0 | 0 | 0.02 | 0 | 0 | 0 | 0 | 0 | 48 |
| 38 | 0 | 0 | 0 | 0 | 0.40 | 0.21 | 0.07 | 0.10 | 0.07 | 0 | 0.05 | 0 | 0.02 | 0.02 | 0.02 | 0 | 0 | 0 | 0.02 | 0 | 42 |
| 39 | 0 | 0 | 0 | 0 | 0.22 | 0.32 | 0.07 | 0.15 | 0.05 | 0.07 | 0 | 0.02 | 0.02 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0.02 | 41 |
| 40 | 0 | 0 | 0 | 0 | 0.05 | 0.26 | 0.18 | 0.23 | 0.03 | 0.03 | 0.08 | 0 | 0.03 | 0.05 | 0 | 0 | 0 | 0 | 0.03 | 0.05 | 39 |
| 41 | 0 | 0 | 0 | 0 | 0 | 0.09 | 0.21 | 0.32 | 0.15 | 0.06 | 0.03 | 0 | 0.06 | 0.06 | 0.03 | 0 | 0 | 0 | 0 | 0 | 34 |
| 42 | 0 | 0 | 0 | 0 | 0 | 0.06 | 0.19 | 0.33 | 0.06 | 0.03 | 0.11 | 0.08 | 0.06 | 0.03 | 0 | 0 | 0 | 0.03 | 0.03 | 0 | 36 |
| 43 | 0 | 0 | 0 | 0 | 0 | 0.03 | 0.06 | 0.28 | 0.06 | 0.03 | 0.09 | 0.03 | 0.03 | 0.09 | 0.06 | 0 | 0.09 | 0.03 | 0.06 | 0.03 | 32 |
| 44 | 0 | 0 | 0 | 0 | 0.03 | 0 | 0.03 | 0.11 | 0.08 | 0.08 | 0.19 | 0.05 | 0.14 | 0.05 | 0.05 | 0.05 | 0 | 0.08 | 0.03 | 0.03 | 37 |
| 45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.14 | 0.08 | 0.03 | 0.08 | 0.05 | 0.08 | 0.03 | 0.03 | 0 | 0.14 | 0.08 | 0.03 | 0.24 | 37 |
| 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.08 | 0.06 | 0.08 | 0 | 0.03 | 0.03 | 0.08 | 0 | 0.11 | 0.06 | 0.14 | 0.33 | 36 |
| 47 | 0 | 0 | 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | 0.03 | 0.06 | 0.03 | 0 | 0 | 0.03 | 0.09 | 0.09 | 0.23 | 0.11 | 0.31 | 35 |
| 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.06 | 0.03 | 0.03 | 0 | 0.03 | 0 | 0 | 0.03 | 0.03 | 0.20 | 0.06 | 0.54 | 35 |
| 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.03 | 0 | 0.10 | 0.03 | 0 | 0.03 | 0.03 | 0.07 | 0.14 | 0.03 | 0.07 | 0.45 | 29 |
| 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.03 | 0.09 | 0.03 | 0.06 | 0 | 0 | 0.03 | 0 | 0.06 | 0.11 | 0.09 | 0.51 | 35 |
| 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.03 | 0.03 | 0 | 0 | 0 | 0.03 | 0.03 | 0 | 0.11 | 0.14 | 0.03 | 0.60 | 35 |
| 52 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.04 | 0.04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.08 | 0.04 | 0.04 | 0.75 | 24 |
| 53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.04 | 0 | 0 | 0 | 0.04 | 0.04 | 0.09 | 0 | 0.78 | 23 |
| 54 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.05 | 0.05 | 0.05 | 0.79 | 19 |
| 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.07 | 0 | 0 | 0.07 | 0 | 0 | 0.07 | 0.07 | 0 | 0 | 0 | 0 | 0.73 | 15 |
| 56 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.17 | 0 | 0.83 | 6 |
| 57 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.07 | 0.07 | 0.14 | 0 | 0.71 | 14 |
| 58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 3 |
| 59 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.50 | 2 |
| 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 2 |
| 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 | 0.50 | 0.50 | 2 |
| 63 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 64 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 1 |
| 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 | | | | | | | | | | | | | | | | | | | | | 920 |

**Appendix 6 – continued:**
**Estimates of proportion of age at length for trevally sampled from the Ninety Mile Beach sub-area of TRE 7, 2006–07. (Note: Aged to 01/01/2007)**

| 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 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 30 | 0 | 0 | 0.50 | 0.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 31 | 0 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 32 | 0 | 0 | 0.20 | 0.80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 33 | 0 | 0 | 0 | 0.67 | 0 | 0 | 0 | 0.33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 34 | 0 | 0 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 35 | 0 | 0 | 0.50 | 0.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 36 | 0 | 0 | 0.17 | 0.50 | 0 | 0.17 | 0.17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 37 | 0 | 0 | 0.20 | 0.40 | 0.20 | 0 | 0 | 0 | 0.20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 38 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 39 | 0 | 0 | 0 | 0 | 0.50 | 0.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.50 | 0.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 41 | 0 | 0 | 0 | 0 | 0 | 0.17 | 0.33 | 0 | 0.17 | 0 | 0.17 | 0 | 0 | 0.17 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 42 | 0 | 0 | 0 | 0 | 0 | 0 | 0.25 | 0 | 0.25 | 0 | 0 | 0.25 | 0.25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 43 | 0 | 0 | 0 | 0 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 44 | 0 | 0 | 0 | 0 | 0.17 | 0 | 0 | 0.17 | 0.17 | 0 | 0.33 | 0 | 0.17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.25 | 0 | 0 | 0.25 | 0.25 | 0.25 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.67 | 0.33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 47 | 0 | 0 | 0 | 0 | 0.25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.25 | 0.25 | 0 | 0 | 0 | 0.25 | 4 |
| 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.25 | 0.25 | 0 | 0 | 0.25 | 0 | 0 | 0 | 0 | 0 | 0 | 0.25 | 4 |
| 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.20 | 0 | 0.20 | 0 | 0 | 0 | 0 | 0 | 0.20 | 0 | 0 | 0.40 | 5 |
| 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.20 | 0.20 | 0 | 0.20 | 0 | 0 | 0 | 0 | 0 | 0 | 0.20 | 0.20 | 5 |
| 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.14 | 0.14 | 0 | 0 | 0 | 0.14 | 0 | 0 | 0.14 | 0 | 0 | 0.43 | 7 |
| 52 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.25 | 0.25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.50 | 4 |
| 53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.67 | 3 |
| 54 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 1 |
| 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.25 | 0.25 | 0 | 0 | 0 | 0 | 0.50 | 4 |
| 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 | 0.50 | 0 | 0.50 | 4 |
| 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 | | | | | | | | | | | | | | | | | | | | | 101 |

**Appendix 6 – continued:**

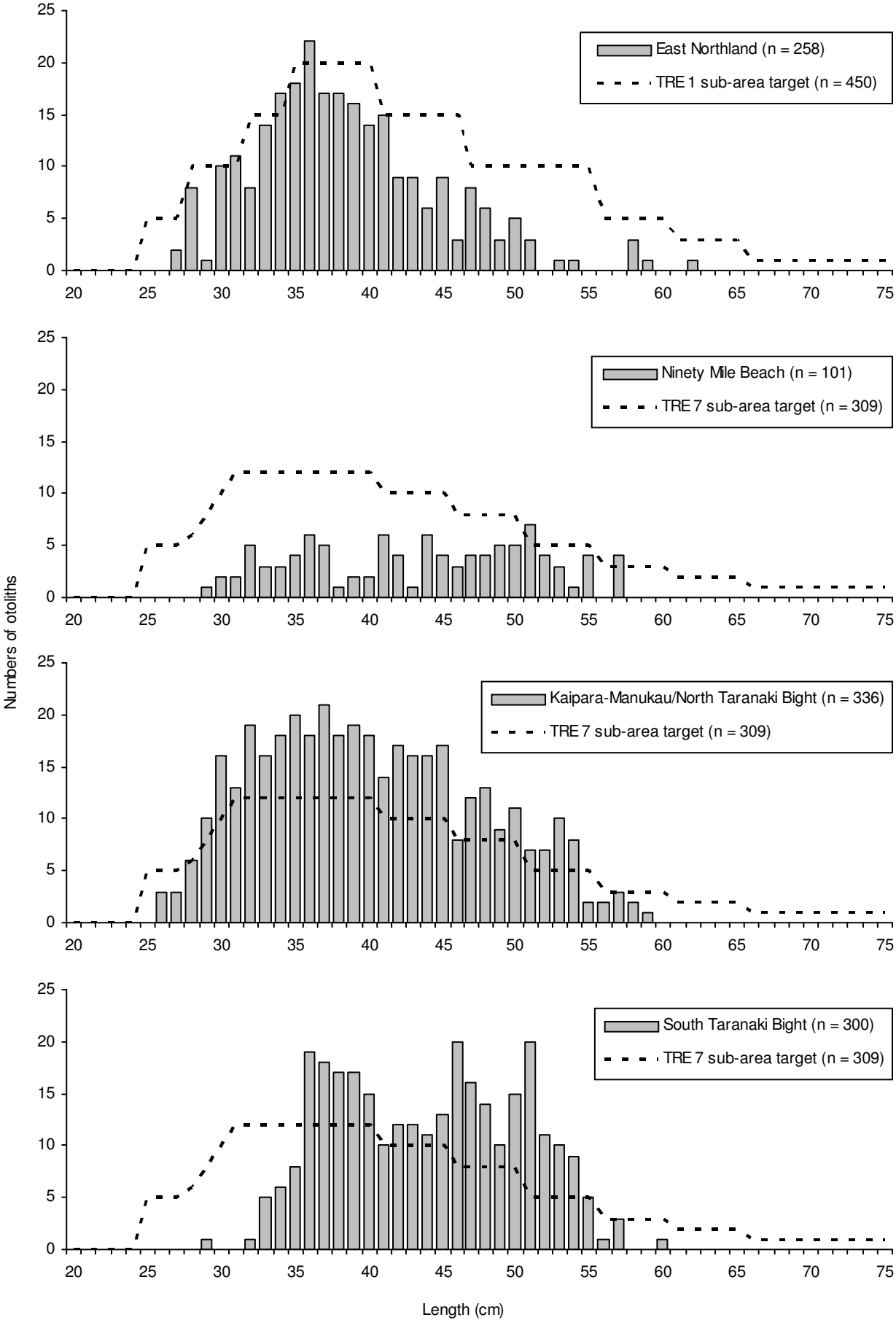
**Estimates of proportion of age at length for trevally sampled from the combined Kaipara-Manukau and North Taranaki Bight sub-areas of TRE 7, 2006–07 (Note: Aged to 01/01/2007).**

| 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 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 27 | 0 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 28 | 0 | 0 | 0.67 | 0.33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 29 | 0 | 0 | 0.60 | 0.40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 30 | 0 | 0 | 0.31 | 0.63 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |
| 31 | 0 | 0 | 0.15 | 0.69 | 0 | 0 | 0.08 | 0.08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 |
| 32 | 0 | 0 | 0 | 0.68 | 0.21 | 0.05 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 |
| 33 | 0 | 0 | 0 | 0.44 | 0.19 | 0.31 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |
| 34 | 0 | 0 | 0 | 0.39 | 0.06 | 0.22 | 0.28 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 |
| 35 | 0 | 0 | 0.05 | 0.25 | 0.10 | 0.45 | 0 | 0.10 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 |
| 36 | 0 | 0 | 0 | 0.17 | 0.22 | 0.11 | 0.11 | 0.11 | 0.17 | 0 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0.06 | 0 | 0 | 0 | 18 |
| 37 | 0 | 0 | 0 | 0.05 | 0.19 | 0.19 | 0.10 | 0.19 | 0.19 | 0 | 0.10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 |
| 38 | 0 | 0 | 0 | 0 | 0.28 | 0.22 | 0 | 0.17 | 0.11 | 0 | 0.11 | 0 | 0.06 | 0 | 0.06 | 0 | 0 | 0 | 0 | 0 | 18 |
| 39 | 0 | 0 | 0 | 0 | 0.11 | 0.26 | 0.05 | 0.16 | 0.11 | 0.11 | 0 | 0.05 | 0 | 0.11 | 0 | 0 | 0 | 0 | 0 | 0.05 | 19 |
| 40 | 0 | 0 | 0 | 0 | 0.06 | 0.33 | 0.06 | 0.22 | 0 | 0.06 | 0.06 | 0 | 0.06 | 0.06 | 0 | 0 | 0 | 0 | 0.06 | 0.06 | 18 |
| 41 | 0 | 0 | 0 | 0 | 0 | 0.14 | 0.07 | 0.21 | 0.21 | 0.07 | 0 | 0 | 0.14 | 0.07 | 0.07 | 0 | 0 | 0 | 0 | 0 | 14 |
| 42 | 0 | 0 | 0 | 0 | 0 | 0.12 | 0.12 | 0.29 | 0.06 | 0 | 0.06 | 0.12 | 0.06 | 0.06 | 0 | 0 | 0 | 0.06 | 0.06 | 0 | 17 |
| 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.25 | 0.13 | 0.06 | 0.13 | 0 | 0 | 0.13 | 0.06 | 0 | 0.19 | 0.06 | 0 | 0 | 16 |
| 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.06 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.06 | 0 | 0 | 0 | 0 | 16 |
| 45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.06 | 0.06 | 0.06 | 0.12 | 0.06 | 0.12 | 0 | 0.06 | 0 | 0.12 | 0.12 | 0 | 0.24 | 17 |
| 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.13 | 0 | 0.13 | 0 | 0 | 0.13 | 0.25 | 0 | 0.13 | 0 | 0 | 0.25 | 8 |
| 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.08 | 0.08 | 0 | 0 | 0 | 0 | 0.17 | 0.17 | 0.17 | 0.33 | 12 |
| 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.08 | 0 | 0 | 0 | 0 | 0 | 0 | 0.15 | 0.08 | 0.69 | 13 |
| 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.11 | 0 | 0 | 0 | 0.11 | 0 | 0.22 | 0 | 0 | 0.56 | 9 |
| 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.09 | 0.09 | 0.09 | 0 | 0 | 0.09 | 0 | 0 | 0.09 | 0 | 0.55 | 11 |
| 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.14 | 0 | 0 | 0 | 0 | 0.86 | 7 |
| 52 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 7 |
| 53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.10 | 0 | 0 | 0 | 0.90 | 10 |
| 54 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.13 | 0.75 | 8 |
| 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.50 | 2 |
| 56 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.50 | 0 | 0.50 | 2 |
| 57 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 3 |
| 58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 2 |
| 59 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 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 | | | | | | | | | | | | | | | | | | | | | 393 |

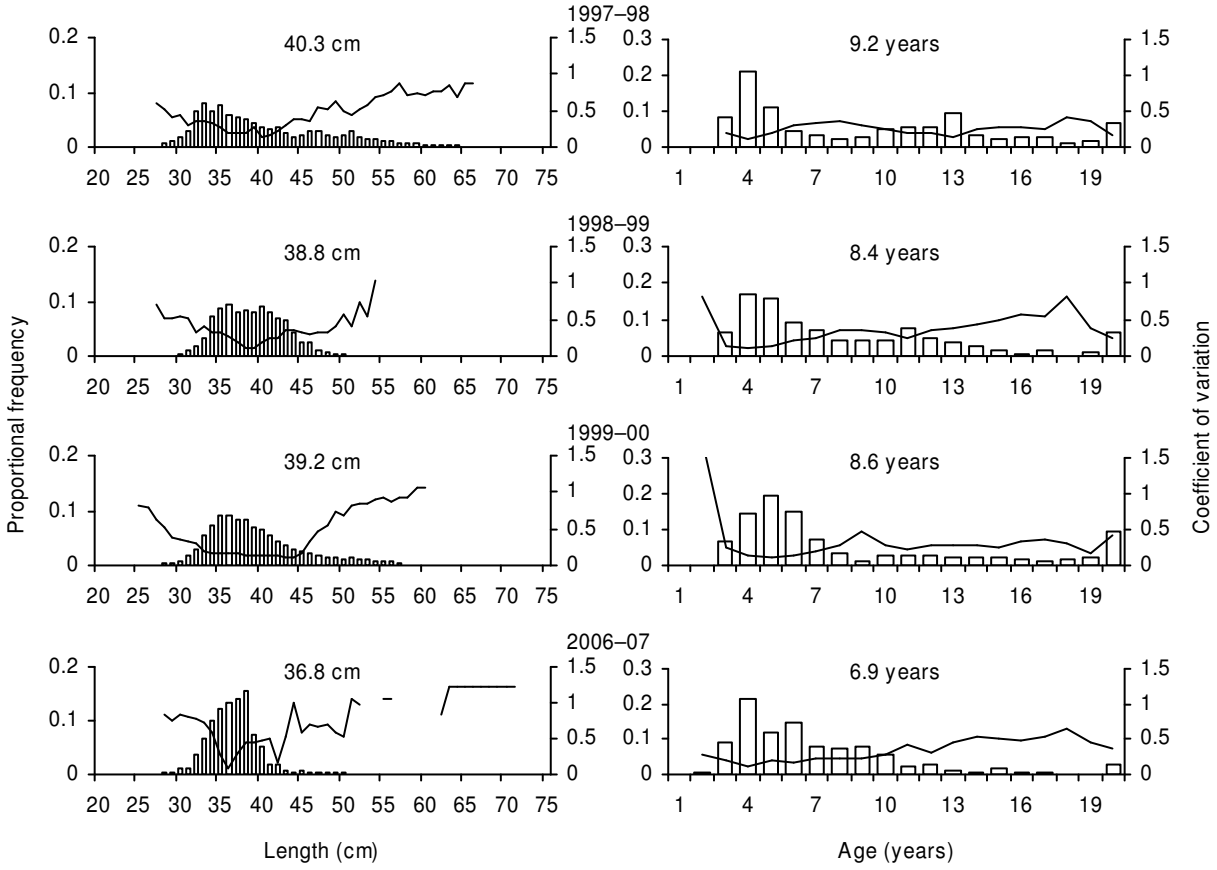
**Appendix 6 – continued:**
**Estimates of proportion of age at length for trevally sampled from the South Taranaki Bight sub-area of TRE 7, 2006–07. (Note: Aged to 01/01/2007)**

| 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 | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 32 | 0 | 0 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 33 | 0 | 0 | 0.40 | 0 | 0.40 | 0.20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 34 | 0 | 0 | 0 | 0 | 0.83 | 0.17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 35 | 0 | 0 | 0 | 0.13 | 0.50 | 0.25 | 0.13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 36 | 0 | 0 | 0 | 0.16 | 0.58 | 0.26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 |
| 37 | 0 | 0 | 0 | 0 | 0.78 | 0.17 | 0 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 |
| 38 | 0 | 0 | 0 | 0 | 0.59 | 0.24 | 0.12 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 |
| 39 | 0 | 0 | 0 | 0 | 0.35 | 0.41 | 0.06 | 0.18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 |
| 40 | 0 | 0 | 0 | 0 | 0.07 | 0.27 | 0.33 | 0.27 | 0 | 0 | 0.07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0.40 | 0.60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 42 | 0 | 0 | 0 | 0 | 0 | 0 | 0.25 | 0.58 | 0 | 0 | 0.17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 |
| 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0.17 | 0.33 | 0 | 0 | 0.08 | 0 | 0.08 | 0 | 0.08 | 0 | 0 | 0 | 0.08 | 0.08 | 12 |
| 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.18 | 0 | 0.09 | 0.09 | 0 | 0.09 | 0 | 0 | 0.09 | 0 | 0.27 | 0.09 | 0.09 | 11 |
| 45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.31 | 0 | 0 | 0.08 | 0 | 0 | 0 | 0 | 0 | 0.23 | 0 | 0.08 | 0.31 | 13 |
| 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.05 | 0.10 | 0 | 0 | 0 | 0 | 0 | 0.10 | 0.10 | 0.20 | 0.45 | 20 |
| 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.06 | 0 | 0 | 0 | 0 | 0.13 | 0.06 | 0.38 | 0.13 | 0.25 | 16 |
| 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.07 | 0.07 | 0.29 | 0.07 | 0.50 | 14 |
| 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.10 | 0 | 0 | 0 | 0 | 0.10 | 0.10 | 0.10 | 0.10 | 0.50 | 10 |
| 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.07 | 0 | 0 | 0 | 0 | 0 | 0 | 0.07 | 0.20 | 0.07 | 0.60 | 15 |
| 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.15 | 0.25 | 0.05 | 0.55 | 20 |
| 52 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.18 | 0 | 0.09 | 0.73 | 11 |
| 53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.10 | 0.20 | 0 | 0.70 | 10 |
| 54 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.11 | 0 | 0.89 | 9 |
| 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.80 | 5 |
| 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 | 0.33 | 0 | 0 | 0.67 | 3 |
| 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 | 1.00 | 1 |
| 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 | | | | | | | | | | | | | | | | | | | | | 300 |

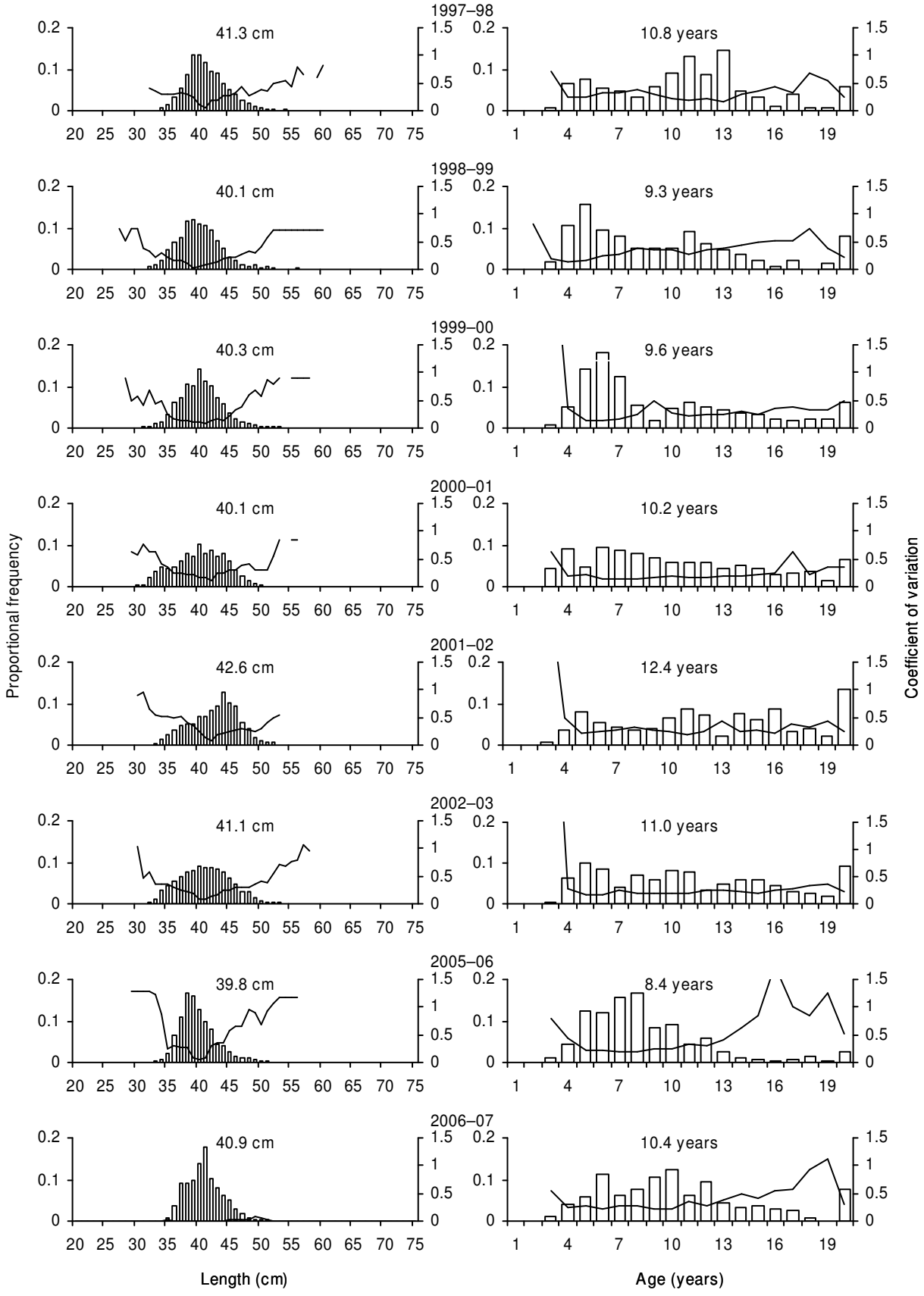
**Appendix 7: Length distributions of the target fixed allocation otolith samples (dashed lines) and the achieved otolith collections (histograms) for the sub-area strata of the TRE 1 and TRE 7 stocks in 2006–07.**



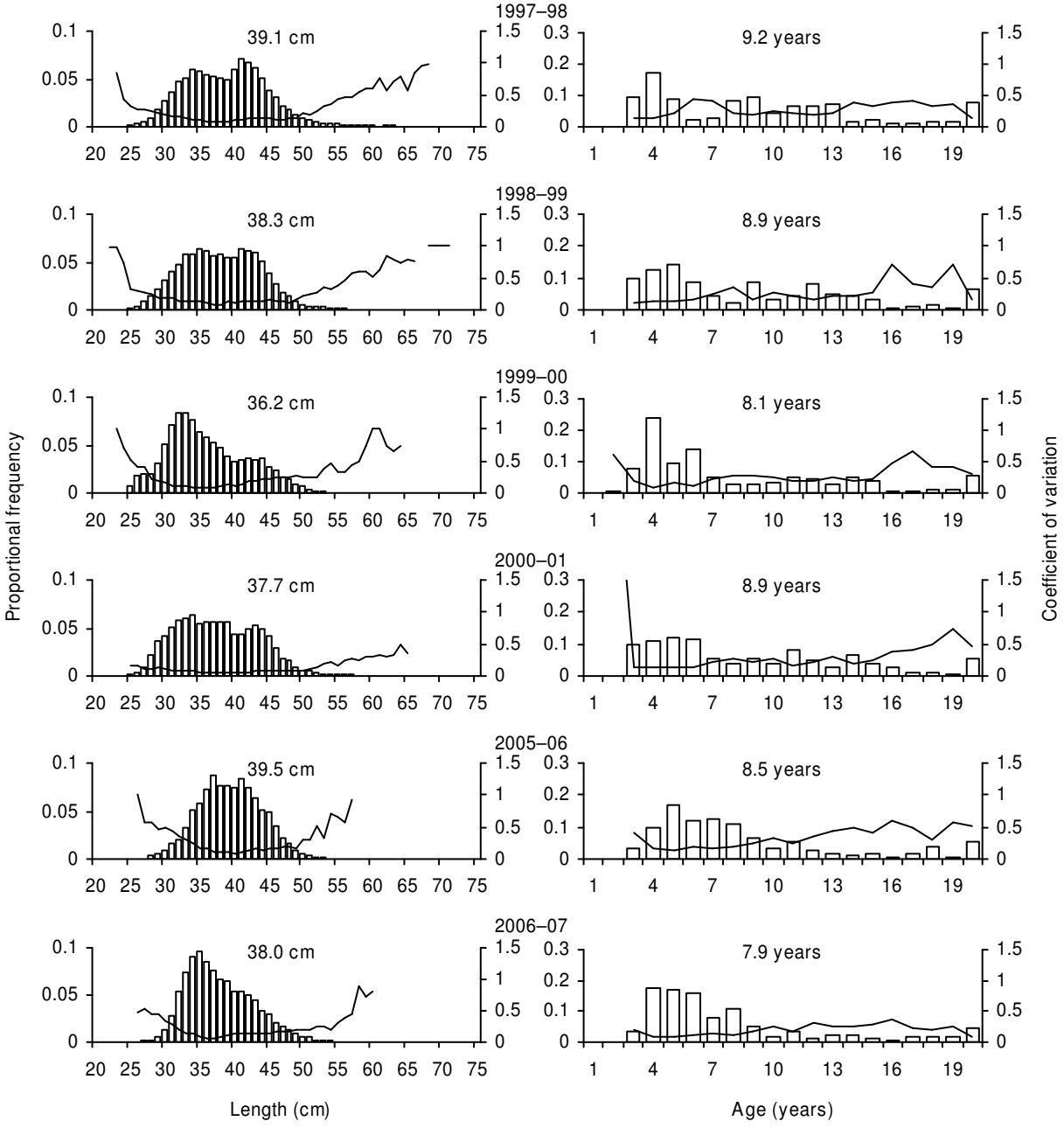
**Appendix 8: A discontinuous time series of proportion at length and age distributions and c.v.s for trevally from the TRE 1 single trawl fishery from 1997–98 to 2006–07. Average length and age are also given.**



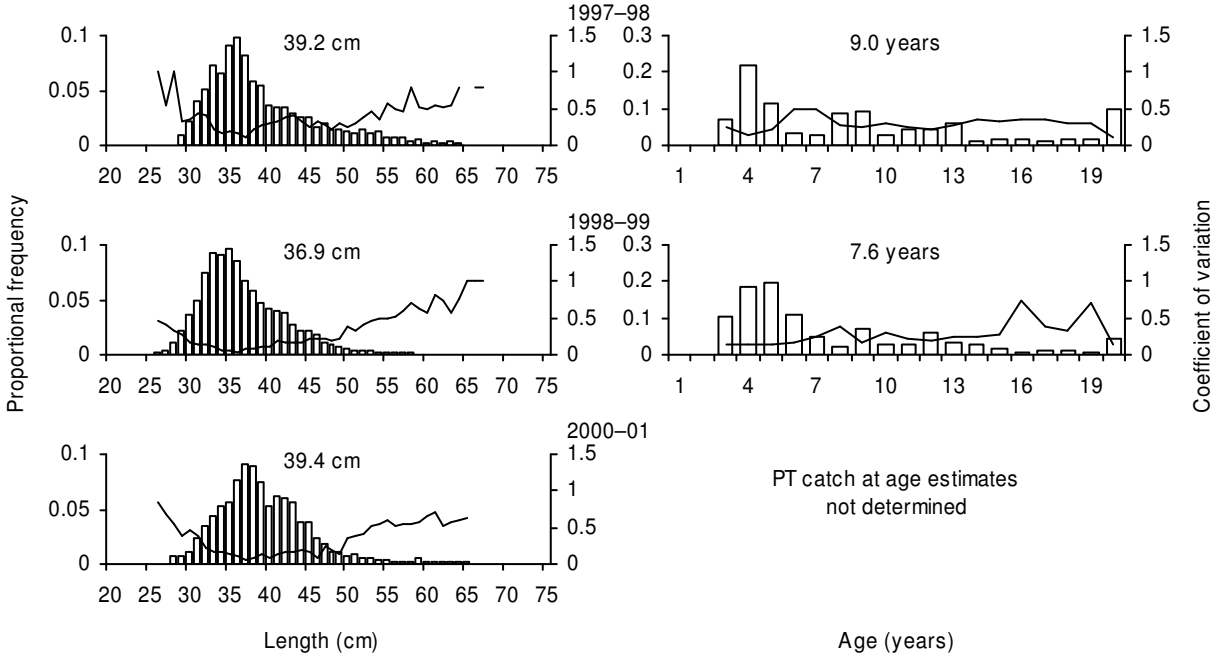
**Appendix 8 – continued: A discontinuous time series of proportion at length and age distributions and c.v.s for trevally from the TRE 1 purse seine fishery from 1997–98 to 2006–07. Average length and age are also given.**



**Appendix 8 – continued: A discontinuous time series of proportion at length and age distributions and c.v.s for trevally from the TRE 7 single trawl fishery from 1997–98 to 2006–07. Average length and age are also given.**



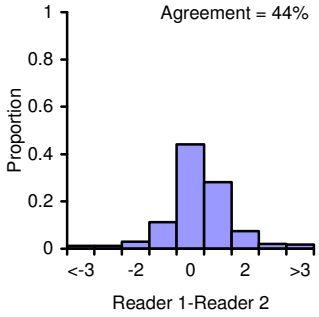
**Appendix 8 – continued: A discontinuous time series of proportion at length and age distributions and c.v.s for trevally from the TRE 7 pair trawl fishery from 1997–98 to 2000–01. Average length and age are also given.**



**Appendix 9a: Reader comparisons for otolith data (readings only) collected from the TRE 1 stock in 2006–07.**

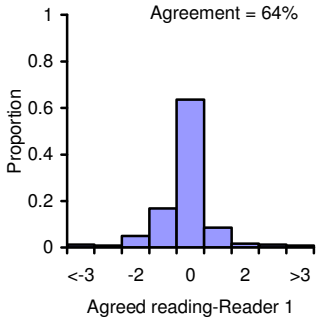
Reader 1-Reader 2 — Age class

| Difference | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | >19 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <-3 | | | | | | | | | | | | | | | | | | | | 4 | 4 |
| -3 | | | | | | | 2 | 1 | | | | | | | | | | | | 1 | 4 |
| -2 | | | | | 1 | 3 | 2 | 1 | | | | | | 1 | | 1 | | | 1 | | 10 |
| -1 | | | 1 | 6 | 5 | 7 | 3 | 1 | 2 | 2 | 1 | 1 | 2 | | 1 | | 1 | | 1 | 4 | 38 |
| 0 | | 3 | 25 | 43 | 12 | 16 | 5 | 6 | 8 | 5 | 3 | 10 | | 2 | 4 | | 2 | 1 | 1 | 3 | 149 |
| 1 | | 4 | 8 | 5 | 8 | 7 | 6 | 8 | 14 | 12 | 2 | 3 | 3 | | 2 | 3 | 2 | | | 8 | 95 |
| 2 | | | | 1 | | 2 | 1 | 2 | 2 | | 3 | | 3 | 2 | 1 | 1 | | 1 | 2 | 4 | 25 |
| 3 | | | | | | | | | | 2 | 1 | | 1 | | | | | 1 | | 2 | 7 |
| >3 | | | | | 1 | 1 | | 1 | | | | 1 | | | | | | | | 2 | 6 |
| Total | | 7 | 34 | 55 | 27 | 36 | 19 | 20 | 26 | 21 | 10 | 15 | 9 | 5 | 8 | 5 | 5 | 3 | 5 | 28 | 338 |
| % agreement | | 43 | 74 | 78 | 44 | 44 | 26 | 30 | 31 | 24 | 30 | 67 | 0 | 40 | 50 | 0 | 40 | 33 | 20 | 11 | 44 |



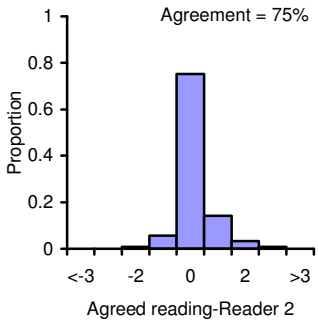

Agreed reading-Reader 1 — Age class

| Difference | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | >19 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <-3 | | | | | 1 | 1 | | 1 | | | | | | | | | | | | 1 | 4 |
| -3 | | | | | | | | | | | 1 | 1 | | | | | | | | 1 | 3 |
| -2 | | | | 1 | | 2 | 1 | 2 | 2 | 1 | | 1 | 1 | 1 | | | | 1 | 1 | 3 | 17 |
| -1 | | 6 | 6 | 2 | 3 | 4 | 1 | 5 | 12 | 5 | 4 | 1 | 1 | | | | 1 | | 1 | 5 | 57 |
| 0 | | 1 | 28 | 46 | 19 | 20 | 12 | 9 | 10 | 15 | 5 | 11 | 6 | 3 | 7 | 5 | 3 | 2 | 2 | 11 | 215 |
| 1 | | | | 6 | 3 | 7 | 3 | 1 | 2 | | | 1 | 1 | | 1 | | 1 | | 1 | 2 | 29 |
| 2 | | | | | 1 | 2 | | 1 | | | | | | 1 | | | | | | 1 | 6 |
| 3 | | | | | | | 2 | 1 | | | | | | | | | | | | 1 | 4 |
| >3 | | | | | | | | | | | | | | | | | | | | 3 | 3 |
| Total | | 7 | 34 | 55 | 27 | 36 | 19 | 20 | 26 | 21 | 10 | 15 | 9 | 5 | 8 | 5 | 5 | 3 | 5 | 28 | 338 |
| % agreement | | 14 | 82 | 84 | 70 | 56 | 63 | 45 | 38 | 71 | 50 | 73 | 67 | 60 | 88 | 100 | 60 | 67 | 40 | 39 | 64 |




Agreed reading-Reader 2 — Age class

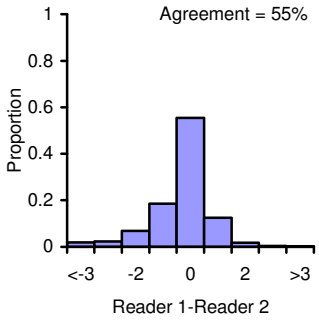
| Difference | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | >19 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <-3 | | | | | | | | | | | | | | | | | | | | | |
| -3 | | | | | | | | | | | | | | | | | | | | | |
| -2 | | | | | | | 1 | | | | | | | | | 1 | | | | 1 | 3 |
| -1 | | 2 | 2 | | 2 | 2 | 2 | | | 2 | 1 | 1 | 1 | | | | | | 2 | 2 | 19 |
| 0 | | 5 | 29 | 52 | 20 | 31 | 11 | 17 | 24 | 10 | 6 | 12 | 3 | 4 | 5 | | 4 | 2 | 2 | 17 | 254 |
| 1 | | | 3 | 3 | 5 | 3 | 5 | 3 | 2 | 8 | 2 | 1 | 2 | | 2 | 3 | 1 | | 1 | 4 | 48 |
| 2 | | | | | | | | | | | 1 | 1 | 2 | 1 | 1 | 1 | | | | 4 | 11 |
| 3 | | | | | | | | | | 1 | | | 1 | | | | | 1 | | | 3 |
| >3 | | | | | | | | | | | | | | | | | | | | | |
| Total | | 7 | 34 | 55 | 27 | 36 | 19 | 20 | 26 | 21 | 10 | 15 | 9 | 5 | 8 | 5 | 5 | 3 | 5 | 28 | 338 |
| % agreement | | 71 | 85 | 95 | 74 | 86 | 58 | 85 | 92 | 48 | 60 | 80 | 33 | 80 | 63 | 0 | 80 | 67 | 40 | 61 | 75 |



**Appendix 9b: Reader comparisons for otolith data (readings only) collected from the TRE 7 stock in 2006–07.**

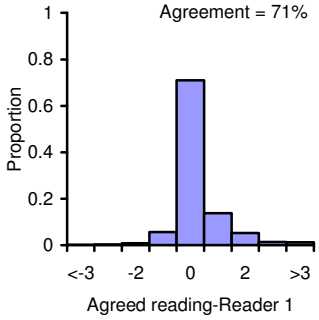
Reader 1-Reader 2 — Age class

| Difference | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | >19 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <-3 | | | | | | | | | | | | | | | | 1 | | 1 | 1 | 15 | 18 |
| -3 | | | | | 1 | 2 | 2 | 4 | | | | 1 | | | | 2 | | 1 | 2 | 7 | 22 |
| -2 | | | 1 | 2 | 5 | 7 | 5 | 5 | 2 | 6 | | | | 3 | 1 | 2 | | 1 | 2 | 21 | 63 |
| -1 | | 6 | 14 | 12 | 13 | 11 | 18 | 8 | 3 | 10 | 5 | 3 | 4 | 2 | 2 | 7 | 6 | 6 | 6 | 34 | 170 |
| 0 | | 30 | 76 | 81 | 63 | 19 | 47 | 16 | 15 | 15 | 7 | 10 | 9 | 7 | 3 | 12 | 27 | 11 | 10 | 52 | 510 |
| 1 | | 7 | 4 | 5 | 1 | 7 | 4 | 3 | 7 | 4 | 3 | 4 | 5 | 5 | 2 | 7 | 8 | 7 | 2 | 30 | 115 |
| 2 | | | | | | | | 1 | 1 | | | | | 1 | 3 | | | 1 | 2 | 7 | 16 |
| 3 | | | | | | | | | | 2 | | | | | | | 1 | | | 1 | 4 |
| >3 | | | | | | | | | | | | | | | | | | | | 2 | 2 |
| Total | | 43 | 95 | 100 | 83 | 46 | 76 | 37 | 28 | 37 | 15 | 18 | 18 | 18 | 11 | 31 | 42 | 28 | 25 | 169 | 920 |
| % agreement | | 70 | 80 | 81 | 76 | 41 | 62 | 43 | 54 | 41 | 47 | 56 | 50 | 39 | 27 | 39 | 64 | 39 | 40 | 31 | 55 |



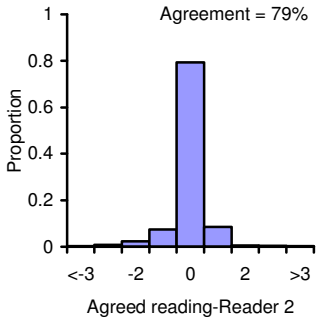

Agreed reading-Reader 1 — Age class

| Difference | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | >19 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <-3 | | | | | | | | | | | | | | | | | | | | 1 | 1 |
| -3 | | | | | | | | | 1 | 1 | | | | | | | 1 | | | | 3 |
| -2 | | | | | | | | 1 | 1 | | | | | | 1 | 1 | | 1 | | 2 | 7 |
| -1 | | 1 | 1 | 1 | | 4 | 2 | | 4 | 2 | | 3 | | 2 | 2 | 4 | 8 | 1 | 1 | 17 | 53 |
| 0 | | 41 | 84 | 88 | 70 | 26 | 60 | 22 | 18 | 23 | 11 | 12 | 16 | 11 | 7 | 18 | 28 | 19 | 15 | 84 | 653 |
| 1 | | 1 | 10 | 10 | 9 | 10 | 11 | 6 | 2 | 6 | 3 | 2 | 1 | 3 | 1 | 7 | 4 | 6 | 7 | 29 | 128 |
| 2 | | | | 1 | 4 | 5 | 2 | 4 | 2 | 5 | 1 | | 1 | 2 | | | 1 | 1 | 2 | 18 | 49 |
| 3 | | | | | | 1 | 1 | 4 | | | | 1 | | | | | | | | 7 | 14 |
| >3 | | | | | | | | | | | | | | | | 1 | | | | 11 | 12 |
| Total | | 43 | 95 | 100 | 83 | 46 | 76 | 37 | 28 | 37 | 15 | 18 | 18 | 18 | 11 | 31 | 42 | 28 | 25 | 169 | 920 |
| % agreement | | 95 | 88 | 88 | 84 | 57 | 79 | 59 | 64 | 62 | 73 | 67 | 89 | 61 | 64 | 58 | 67 | 68 | 60 | 50 | 71 |




Agreed reading-Reader 2 — Age class

| Difference | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | >19 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <-3 | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | 3 |
| -3 | | | | | | 1 | 1 | | | | | | | | | 1 | | 1 | | 3 | 7 |
| -2 | | | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | | | | | 1 | 1 | | | 2 | 7 | 22 |
| -1 | | 5 | 4 | 2 | 5 | 4 | 9 | 2 | 1 | 3 | 1 | 1 | 2 | 1 | 1 | 7 | 1 | 3 | 4 | 12 | 68 |
| 0 | | 32 | 87 | 93 | 75 | 36 | 62 | 31 | 24 | 28 | 10 | 16 | 10 | 12 | 6 | 20 | 40 | 17 | 14 | 116 | 729 |
| 1 | | 6 | 3 | 4 | 1 | 4 | 2 | 3 | 2 | 3 | 4 | 1 | 6 | 5 | 2 | 2 | 1 | 5 | 2 | 24 | 80 |
| 2 | | | | | | | | | | | | | | | 1 | | | | 2 | 2 | 5 |
| 3 | | | | | | | | | | 1 | | | | | | | | 1 | | 2 | 4 |
| >3 | | | | | | | | | | | | | | | | | | | | 1 | 2 |
| Total | 0 | 43 | 95 | 100 | 83 | 46 | 76 | 37 | 28 | 37 | 15 | 18 | 18 | 18 | 11 | 31 | 42 | 28 | 25 | 169 | 920 |
| % agreement | | 74 | 92 | 93 | 90 | 78 | 82 | 84 | 86 | 76 | 67 | 89 | 56 | 67 | 55 | 65 | 95 | 61 | 56 | 69 | 79 |



**Appendix 10: Age-bias plots for trevally otolith data (readings only) collected from the TRE 1 and TRE 7 stocks in 2006–07. Dotted line denotes final agreed reading (one-to-one line); error bars denote 95% confidence intervals of reader's initial reading estimates.**