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Te Tautiaki i nga tini a Tangaroa

**Length and age composition of trevally in commercial landings
from TRE 1 and TRE 7, 2000-01**

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EXECUTIVE SUMMARY

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During 2000–01, the trevally catch from the target TRE 7 single trawl fishery and the TRE 1 purse-seine fisheries was sampled. The length and age composition of the catch was determined for each fishery.

The TRE 1 purse-seine catch was sampled from the Bay of Plenty and east Northland. The length composition of the catch was characterised by a strong unimodal distribution, occupying the 30–55 cm F.L. length range with a modal peak at 40 cm F.L.. The age composition comprised a wide range of age classes, dominated by 4–9 year age classes. There was a general decline in the proportion of fish in each age class with increasing age and a relatively high proportion of older fish (20+ years). The age composition reveals the presence of a weak 1996 year class (age 5 years).

Trevally recruit to the TRE 7 single trawl fishery from age 3 years and the 2000–01 catch was dominated by fish in the 3–15 year age classes. There was a high proportion of younger fish in the catch from the 3–6 year age classes, representing the 1995 to 1998 year classes. The age composition also reveals the presence of the strong 1987 and 1990 year classes, at age 14 and 11 years, and a relatively high proportion of old fish (20+ years), while the 1988 year class appears weak (13 year age class).

Trends in length and age composition from the sampled catch are generally consistent with the results of sampling from 1997–98, 1998–99, and 1999–2000. The time series of age compositions derived from the TRE 7 fishery will be incorporated in an updated stock assessment scheduled for 2001–02.

The report summarises recommendations for future sampling of the catch from the TRE 1 and TRE 7 fisheries.

1. INTRODUCTION

The TRE 1 and TRE 7 fishstocks support an important inshore fishery for trevally around the northern North Island (Figure 1). The current TACCs for TRE 1 and TRE 7 are 1506 t and 2153 t, respectively. Most of the catch from TRE 7 is taken by trawl, either targeting trevally or as a bycatch of the target snapper fishery (Annala et al. 2000). Similarly, a large proportion of the TRE 1 catch is taken as a bycatch of the snapper trawl fishery, although an important target purse-seine fishery also operates in TRE 1 (Walsh et al. 1999).

In 1997–98, the Ministry of Fisheries instigated a catch sampling programme to monitor the length and age composition of the main commercial trevally fisheries in TRE 1 and TRE 7. The programme initially included the single trawl and purse-seine fisheries in TRE 1 and the single trawl (peak season and off-peak) and pair trawl fisheries in TRE 7 (Walsh et al. 1999). The four method fisheries were resampled during the 1998–99 fishing year, though sampling of the off-peak TRE 7 fishery was discontinued (Walsh et al. 2000). For the 1999–2000 fishing year, catch sampling was maintained in the single trawl and purse-seine fisheries in TRE 1 and the peak-season single trawl fishery in TRE 7 (Langley 2001).

The age composition of the TRE 7 catch from the 1997–98 single trawl fishery was incorporated in a preliminary stock assessment of TRE 7 (Hanchet 1999). It is intended to update the stock assessment to include the age compositions from the additional years of sampling during 2001–02.

This report provides a summary of the catch sampling data collected from the main TRE 1 and TRE 7 fisheries during the 2000–01 fishing year under the Ministry of Fisheries contract TRE2000/01. The specific objective of the project was to conduct the sampling and determine the length and age composition of commercial catches in TRE 1 and TRE 7 during the 2000–01 fishing year. The principal fisheries sampled were the target purse-seine in TRE 1 and the peak season single trawl fishery in TRE 7. The report also compares the time-series of length and age compositions derived from these fisheries from 1997–98 to 2000–01.

2. METHODS

2.1 Sample collection

During the 2000–01 fishing year, the landed catch of the purse-seine fishery in TRE 1 and the peak-season (November 2000 to April 2001) single trawl fishery in TRE 7 was sampled. In addition, a few TRE 7 pair trawl landings were sampled opportunistically from the fishery. For the pair trawl fishery, a landing was defined as the catch landed by an individual vessel.

A two-stage sampling procedure was used to determine the length composition of the catch, where the first stage in the sampling selection was the unbiased selection of the landed catches of trevally from vessels operating exclusively within a given fishery. All sampling was conducted from the trevally catch discharged to Sanford Limited processing plants in either Auckland or Tauranga.

The sampling regime specified a target sample size of 40 landings from the TRE 7 single trawl fishery. Only landings from TRE 7 exceeding a minimum catch weight of 1 t were considered for sampling. The sampling regime for the TRE 1 purse-seine fishery required the sampling of all trevally landings exceeding 10 t.

The second stage of the sampling procedure was the random selection of a sub-sample of the catch from the individual landing. For the single trawl fisheries, this involved the random selection of 20–30 bins containing 400–600 fish. All fish in the selected bins were measured to the nearest centimetre below the fork length F.L. The growth rate of trevally is comparable between sexes (James 1984) and,

consequently, it was not necessary to determine the sex of the fish sampled. The sampling strategy was slightly modified for sampling purse-seine landings, with each of the four fish holds (wells) treated as a separate stratum. A random sample of two bins of trevally was selected from the top, middle, and bottom of each hold during discharge.

Where possible, individual purse-seine landings were assigned to one of the two sub-areas of the TRE 1 fishery (east Northland and Bay of Plenty) and TRE 7 landings were assigned to four sub-areas within TRE 7 (Ninety Mile Beach, Kaipara/Manukau, North Taranaki Bight, and South Taranaki Bight) (Figure 1). Landings were assigned to each of these areas based on the location of the trevally catch recorded on the Ministry of Fisheries catch and effort returns. Landings from the TRE 7 fishery often comprised catches from more than one sub-area.

For each landing, the total weight of the landed catch of trevally and the sampled fraction were recorded.

2.2 Otolith collections and ageing

Otoliths were collected from the TRE 1 purse-seine and TRE 7 single trawl fisheries. The TRE 1 otoliths were collected from all landings sampled between November 2000 and September 2001 and the TRE 7 otoliths were collected between November 2000 and February 2001. Otoliths were collected in accordance with a fixed allocation per length interval, with the allocation skewed towards the dominant length classes in the length composition.

An initial target of 544 pairs of otoliths was required from the TRE 1 fishery, although the allocation was subsequently revised to augment the number of otoliths collected in the main length range sampled (34–48 cm).

A target of 492 otoliths was required from the TRE 7 fishery. The otoliths were assigned to one of the four sub-areas of the TRE 7 fishery when the sampled catch was taken exclusively from one area. This was to determine the potential to investigate possible differences in growth rates (and age composition) between sub-areas.

Ageing of the two otolith collections was conducted by NIWA Ltd, in accordance to the procedures documented by Walsh et al. (1999).

2.3 Data analysis

For each fishery-method, the sampling coverage was determined by comparing the monthly and, where available, the areal distribution of the sampled component of the catch with the total fishery. The latter was determined from an extract of catch and effort data provided by the Information Group of the Ministry of Fisheries (Report No. 3854). Catch and effort data from each fishery-method were summarised to determine the total number of landings and cumulative weight of landings in the sampled population by month and statistical area.

Combined length compositions were determined for each fishery-method by scaling the individual samples by the weight of the landing. The c.v. of the estimate of the proportion at length for each length interval was determined following the statistical approach described by Davies & Walsh (1995). Separate amalgamated length compositions were also determined for the individual sub-areas sampled from the TRE 7 fishery and the TRE 1 purse-seine fishery.

Separate age-length keys were derived from the age readings of the otolith collections from the TRE 1 and TRE 7 fisheries. The age-length keys determine the proportion of fish at each age in each length interval (Gavaris & Gavaris 1983). The age-length key was applied to the amalgamated length

frequency distribution to determine the estimate of the age composition for the individual method fishery. All fish older than 19 years were amalgamated in a single age class ("plus group"). The c.v. of the individual age classes was determined following the approach of Southward (1976). The overall precision of the age composition was calculated as the average coefficient of variation for each age class, weighted by the proportion of the fish in the interval (MWCV).

For the TRE 1 and TRE 7 otolith collections, Von Bertalanffy growth parameter estimates were determined by least squares *minimisation* of the age-length dataset.

3. RESULTS

3.1 TRE 1 purse-seine

3.1.1 Sampling coverage

Seven landings were sampled from the TRE 1 purse-seine fishery during 2000–01. The sampled landings represented most of the significant landings (over 10 t) of trevally from the TRE 1 purse-seine fishery and accounted for 88% of the total TRE 1 catch taken by this method. A total of 3617 fish were measured from the sampled catch of 238 t. Otoliths were collected from each sampled landing and a total of 745 otoliths were aged (Appendix 1).

The sampled catch was all taken by a single vessel operating from the Tauranga branch of Sanford Limited (Appendix 1). All landings were taken during November 2000–February 2001 and September 2001. Two landings sampled were from catches taken exclusively from along the east Northland coast and the remainder of the sampled catches were taken in the Bay of Plenty (Appendix 1).

The fixed allocation otolith sample from the TRE 1 fishery required the collection of 20 otoliths per centimetre length class from the 32–50 cm F.L. length range, with an additional 8 otoliths collected from each length class beyond the extremes of this range. The target otolith sample was achieved for each length class within the 32–49 cm length range, although only a few otoliths were collected from the length classes beyond this range (Figure 2). To supplement the otolith collection, additional otoliths were sampled from fish in the 33–49 cm F.L. length range. Most of the otoliths collected were subsequently aged (see Appendix 8).

3.1.2 Length and age composition

The length composition of the 2000–01 TRE 1 purse-seine catch was characterised by a strong unimodal distribution, occupying the 30–50 cm F.L. length range with a modal peak around 40 cm F.L. (Figure 3). The length composition was determined with moderate precision, with a c.v. of about 20% for the main length classes (35–45 cm) and a MWCV of 26.6%. The level of variance in the estimates of the proportion at length is consistent with the observed variation in length composition between the individual landings sampled (see Appendix 10).

There was a difference in the length composition of the trevally catch between the two sub-areas fished within TRE 1, east Northland, and Bay of Plenty. The length composition of the east Northland catch was dominated by fish in the 33–45 cm length range, while the catch from the Bay of Plenty sub-area mainly comprised fish in the 37–47 cm length range (Figure 4). However, the length composition of the east Northland catch was poorly determined, being derived from two samples only.

The Von Bertalanffy growth parameters derived from the TRE 1 otolith collection were: L_{inf} , 50.06 (standard error 0.649); k , 0.098 (s.e. 0.008); t_0 , -7.71 (s.e. 0.741). The growth function is poorly defined at the younger age classes due to the absence of data from the 1 and 2 year age classes. The growth parameters are also strongly influenced by the relative weighting of the number of otoliths

collected from each length class as determined by the fixed otolith sample allocation. Consequently, the resulting growth parameters should not be interpreted as defining the underlying growth function of the TRE 1 stock, but rather the best fit to the data from the otolith collection (Figure 5).

The estimated age composition of the 2000–01 TRE 1 purse-seine catch included a wide range of age classes and was dominated by 4–9 year age classes. There was a general decline in the proportion of fish in each age class with increasing age and a relatively high proportion of older fish (20+ years) (Figure 6). The age composition reveals the presence of a weak 1996 year class (age 5 years). The c.v. associated with the estimate of proportion at age is about 15–20% for the dominant 4–15 year age classes (Figure 6). The MWCV for the entire age composition is 22.6%.

3.2 TRE 7 single trawl

3.2.1 Sampling coverage

During 2000–01, 49 landings were sampled from the TRE 7 single trawl fishery between November 2000 and April 2001 (Appendix 2). The sampled landings represented 33% by weight and 22% by number of the TRE 7 landings exceeding 1 t. The level of sampling resulted in the measurement of 23 072 fish from a sampled catch of 365.4 t.

In addition, 13 landings were sampled from the catch of individual vessels operating in the TRE 7 pair trawl fishery between November 2000 and February 2001 (Appendix 3). In most cases, the catch landed by the two vessels of a pair unit was sampled, although the catch from each vessel was defined as a separate landing. During 2000–01, the TRE 7 pair trawl fishery landed a total catch of 388 t from 55 landings exceeding 1 t of trevally. The sampled landings represented 26% of the total catch by weight and 24% of the total number of landings.

Sampling of the 2000–01 TRE 7 single trawl fishery was conducted throughout the November–April period. This period accounted for 87% of the single trawl TRE 7 catch from landings exceeding 1 t (Table 1).

In 2000–01, most of the TRE 7 single trawl catch was taken from the South Taranaki Bight (statistical area 040) and north of Cape Egmont (Statistical areas 041 to 047) (Figure 7). These areas accounted for virtually all of the trevally catch from the sampled landings. In general, the sampled catch was distributed between these statistical areas in proportion to the total catch from the fishery, although catches from statistical area 045 were over-represented in the sample (Figure 7).

During 2000–01, about 20% of the total TRE 7 single trawl catch was taken off the southwest of the North Island (Statistical areas 037 and 039) and from Tasman Bay/Golden Bay (Statistical area 038). However, no samples were collected from this area of the fishery (Figure 7).

The fixed allocation otolith sample from the TRE 7 fishery required the collection of 18 otoliths per centimetre length class from the 31–48 cm F.L. length range, with an additional 8 otoliths collected from each length class beyond the extremes of this range. The target otolith sample was achieved for each length class within the 25–58 cm length range, although only a few otoliths were collected from the larger length classes (Figure 8). To supplement the otolith collection, additional otoliths were sampled from fish in the 31–48 cm F.L. length range. However, only a subset of the additional otoliths was aged (see Appendix 9).

A minor objective of the TRE2000–01 project was to determine whether the growth rate of trevally varied between the main sub-areas of the TRE 7 fishery. For this purpose, it was intended to collect sub-samples of otoliths from each of the defined areas. This was reliant on identifying fishing trips that operated exclusively within a single sub-area and collecting otoliths solely from these landings. However, opportunities to collect otoliths from a distinct area were limited (Table 2) and often in

conflict with the other requirements of the sampling programme, principally the requirement to collect all otoliths during a relatively short time period. As a result, most of the aged otoliths were collected from a single sub-area; Kaipara/Manukau (Table 3). Most of the remaining otoliths were collected from landings that combined catches from more than one of the sub-areas. Consequently, insufficient otoliths were available from the individual sub-areas to investigate potential differences in growth rate within TRE 7.

3.2.2 Length and age composition

The length composition of the 2000–01 TRE 7 single trawl catch was dominated by a broad mode of fish in the 30–47 cm F.L. length range (Figure 9). The length composition was determined with a high level of precision, with c.v.s of 5–10% for the estimates of proportion at length for the main length classes (30–50 cm F.L.) and a MWCV of 7.5% (Figure 9).

The combined length composition derived from the sampled catch from the pair trawl fishery was broadly similar to the single trawl length composition (Figure 10). However, the proportion of smaller fish (less than 35 cm) in the pair trawl catch was considerably less than for the single trawl catch, and the length composition of pair trawl catch was dominated by fish in the 36–39 cm length range (Figure 10).

Separate length compositions were derived for three of the sub-areas of the fishery; Kaipara/Manukau, Ninety Mile Beach, and North Taranaki Bight. A few samples were collected from the latter sub-area (see Table 2) and these landings were dominated by smaller trevally, with a strong mode of fish in the 29–36 cm length range (Figure 11). The length composition derived for the Ninety Mile Beach sub-area was also dominated by trevally in the 30–40 cm length range.

Landings sampled from catches taken exclusively from the Kaipara/Manukau sub-area had a broad mode occupying the 31–45 cm length range (Figure 11). The length frequency distribution is comparable to the length composition for the total bottom trawl catch (see Figure 9), reflecting the high proportion of the sampled landings that included catch from this sub-area (see Table 2).

The age length key from the TRE 7 fishery shows that fish in the 26–30 cm F.L. length range are predominantly 3 years old, while the 30–32 cm length range is dominated by the 4 year age class (Appendix 9). Von Bertalanffy growth parameters were determined from the TRE 7 otolith data were: L_{inf} 60.87 (standard error 1.53); k , 0.068 (s.e. 0.006); t_0 , -6.41 (s.e. 0.700). However, as with the TRE 1 data, the data set does not include records for the 1 and 2 year age classes and the collection of the data set was non-random with respect to either the single trawl length composition or the length structure of the TRE 7 population. Consequently, although the resulting Von Bertalanffy parameters represent the best fit to the available data, they do not represent the true growth function of the TRE 7 stock (Figure 12).

Trevally recruit to the TRE 7 single trawl fishery from age 3 years and the 2000–01 catch was dominated by fish in the 3–15 year age classes (Figure 13). There was a high proportion of younger fish in the catch from the 3–6 year age classes, representing the 1995 to 1998 year classes. The age composition also reveals the presence of the strong 1987 and 1990 year classes, at age 14 and 11 years, and a relatively high proportion of old fish (20+ years), while the 1988 year class appears weak (13 year age class). The c.v.s of the estimates of proportion at age are about 15–25% for most of the main age classes and the MWCV is 22% (Figure 13).

4. DISCUSSION

This report summarises the results of the fourth year of length and age sampling of the peak-season single trawl fishery in TRE 7 and the single trawl and purse-seine fishery in TRE 1. For each of the two fisheries, the sampling programme achieved the target level of sampling and yielded length and

age compositions of the specified level of precision. The peak-season pair trawl fishery in TRE 7 was also sampled.

During 2000–01, the sampling programme achieved a high level of coverage for the two main fisheries. Almost all the significant landings from the TRE 1 purse-seine fishery were sampled and about 33% of the catch landed from the entire TRE 7 single trawl fishery was sampled. In general, the distribution of sampling effort in TRE 7 was broadly consistent with the seasonal and areal distribution of the entire TRE 7 single trawl fishery. Given the intensity of sampling of the TRE 1 purse-seine and TRE 7 single trawl fisheries, and the high level of precision associated with the amalgamated length compositions, it appears that the level of coverage was adequate to reliably determine the length frequency distribution of the catch from these two fisheries.

The annual length frequency distributions of the catch sampled from the TRE 1 purse-seine fishery from the four-year period were very similar, with a strong unimodal distribution occupying the 30–50 cm F.L. length range and a modal peak at around 40 cm F.L. (Appendix 11a). Walsh et al. (2000) identified variation in the length composition of the catch between the Bay of Plenty and east Northland sub-areas of TRE 1 from the 1998–99 fishing year. The present study also identified differences in the length composition between the two areas, though these differences were not consistent with the results of Walsh et al. (2000).

Although there was no apparent trend in the amalgamated length composition of the purse-seine catch between years, there was a considerable shift in the estimated age composition during the same period. From 1997–98 to 1999–2000, the proportion of fish in the 5–7 year age classes increased with a corresponding decline in the proportion of fish in the 10–13 year age classes (Appendix 11a). However, the age composition derived from the present study revealed a broader distribution of age classes and a higher proportion of older fish.

For the previous years, the purse-seine age composition was determined using age-length keys derived from otoliths collected from the TRE 1 single trawl fishery. This approach assumed that the distribution of age at length was comparable for fish vulnerable to each method. The validity of this assumption was examined by comparing the distributions of length at age from the 1999–2000 TRE 1 single trawl otolith collection and the data from the current study.

The comparison indicated that over the 35–42 cm length range the age at length of the purse-seine sample was generally 1–2 years older than for the single trawl sample. For larger fish, the distribution of age at length was comparable between the two otolith collections (Figure 14). This apparent difference in growth rate may be an expression of the factors that influence the recruitment of trevally to the surface schooling component of the TRE 1 population that is vulnerable to the purse-seine method. For example, if the schooling trevally principally represent mature fish, then the onset of maturity may reduce the growth rate relative to the immature fish of the same age that remain more vulnerable to the single trawl method.

Any strong differences in the distribution of age at length between the two methods would necessitate the collection of method specific age-length keys. Further information is required to determine the extent of any difference in the distribution of age at length between the single trawl and purse-seine methods. However, in the absence of additional information, it is recommended that specific age-length keys are derived for each method.

The monitoring of the length and age composition of the purse-seine catch from TRE 1 is ongoing in 2001–02 under MFish project TRE2001/01. It is intended that monitoring the time series of age frequency data from the fishery will enable a qualitative assessment of the state of the TRE 1 stock. However, the reliability of the earlier age compositions (1997–98 to 1999–2000) may need to be reconsidered given that the age compositions were determined from age-length keys derived from the single trawl fishery.

Length compositions of the peak-season TRE 7 catch were comparable between 1997–98 and 1998–99, but there was a substantial increase in the proportion of smaller (less than 35 cm F.L.) fish in the catch taken in 1999–2000 (Appendix 11b). The increase in the proportion of smaller fish in the catch is apparent with a high proportion of the 4 year old age class in the age composition, indicating the recruitment of a strong 1996 year class to the fishery. This strong year class persisted in the fishery in 2000–01 at age 5 years, although the strength of year class relative to the adjacent years was reduced. Nevertheless, there appears to have been a period of recent strong recruitment, with the 1995–98 year classes (ages 3–6 years) making up a high proportion of the catch in 2000–01. The time-series of age composition data also reveals the persistence of the strong 1987 and 1990 year classes in the catch from 1997–98 to 2000–01 (see Appendix 11b).

In general, there is a high level of consistency between the four successive age compositions derived from the TRE 7 single trawl catch from 1997–98 to 2000–01. These data will contribute significantly to improving the current stock assessment for TRE 7 (Hanchet 1999) which is scheduled to be updated during the 2001–2002 fishing year.

Catch sampling data collected from the TRE 7 single trawl fishery in 1997–98 and 1998–99 revealed differences in length composition between the Ninety Mile Beach, Kaipara/Manukau, and North Taranaki Bight sub-areas of TRE 7 (Walsh et al. 1999, 2000). However, these differences were not consistent between fishing years and no significant differences in the length composition were apparent between these sub-areas for 1999–2000, although recent sampling revealed catches from the South Taranaki Bight comprised large trevally. Differences in the length composition of the trevally catch between sub-areas of TRE 7 was also apparent from the present study.

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 catch.

5. ACKNOWLEDGMENTS

The trevally catches were sampled by Fay Anderson and Geoff Plowman (Sanford Ltd, Tauranga) and Kwang Hwan Choi (Sanford Ltd, Auckland). The project was managed by Jim FitzGerald and Andrew Bond (Sanford Ltd). Ageing of the otolith collections was undertaken by Caoimhghin Ó Maolagáin and Gavin James of NIWA. Catch and effort data were provided by the Information Group, Ministry of Fisheries. Funding for the project (TRE2000/01) was provided by the Ministry of Fisheries.

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Table 1: Comparison of the number of length frequency samples collected from the TRE 7 single trawl fishery and the monthly distribution of the total 2000-01 TRE 7 single trawl fishery, expressed as a percentage of the total annual number of landings and the total annual weight of the catch for landings exceeding 1 t of trevally.

	Month												Total (t)
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
Number landings	8	14	17	19	14	10	8	4	2	1	0	3	224
Landed weight	5	14	22	21	15	9	6	2	1	0	0	3	1 092
Samples	0	4	7	11	10	15	2	0	0	0	0	0	49

Table 2: Areal distribution of catch from sampled landings from the TRE 7 BT fishery from 2000-01.

Fishery sub-area(s)	Number of samples
Ninety Mile Beach	5
Kaipara/Manukau and Ninety Mile Beach	12
Kaipara/Manukau	16
Kaipara/Manukau, Ninety Mile Beach and North Taranaki Bight	1
Kaipara/Manukau and North Taranaki Bight	6
Kaipara/Manukau and North and South Taranaki Bight	1
North Taranaki Bight	3
North and South Taranaki Bight	5
South Taranaki Bight	0
Total	49

Table 3: Summary of 2000-01 TRE 7 collection of aged otoliths by fishery sub-area.

Fishery sub-area	No. of otoliths	Length range (cm)	
		Min	Max
Ninety Mile Beach	12	53	65
Kaipara/Manukau	325	25	58
North Taranaki Bight	0	-	-
South Taranaki Bight	0	-	-
Other	159	25	65
Total	496	25	65

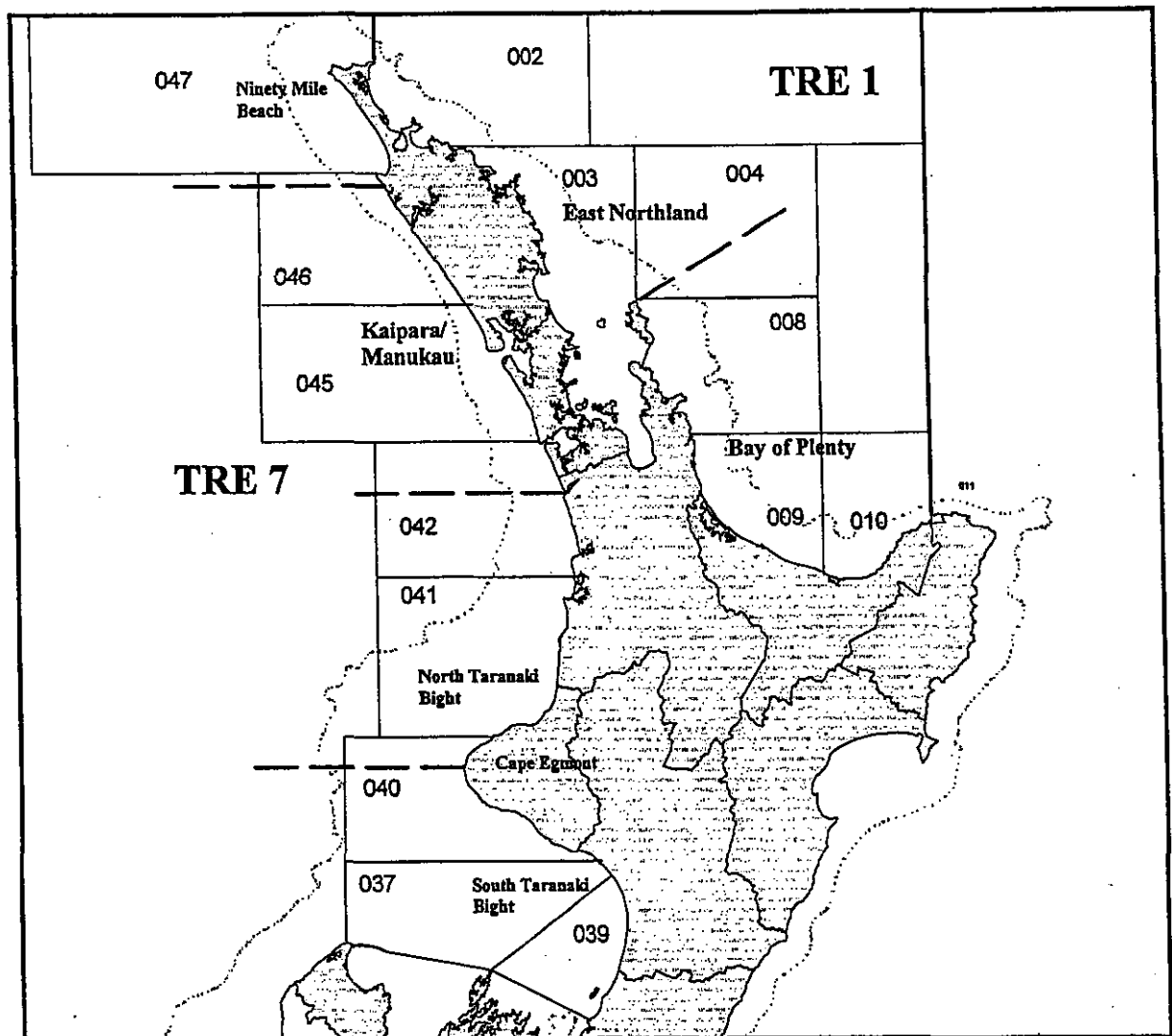


Figure 1: Map of the TRE 1 and TRE 7 fishstock areas including the sub-areas of each fishery and the Ministry of Fisheries statistical areas. The grey dotted line represents the 200 m depth contour.

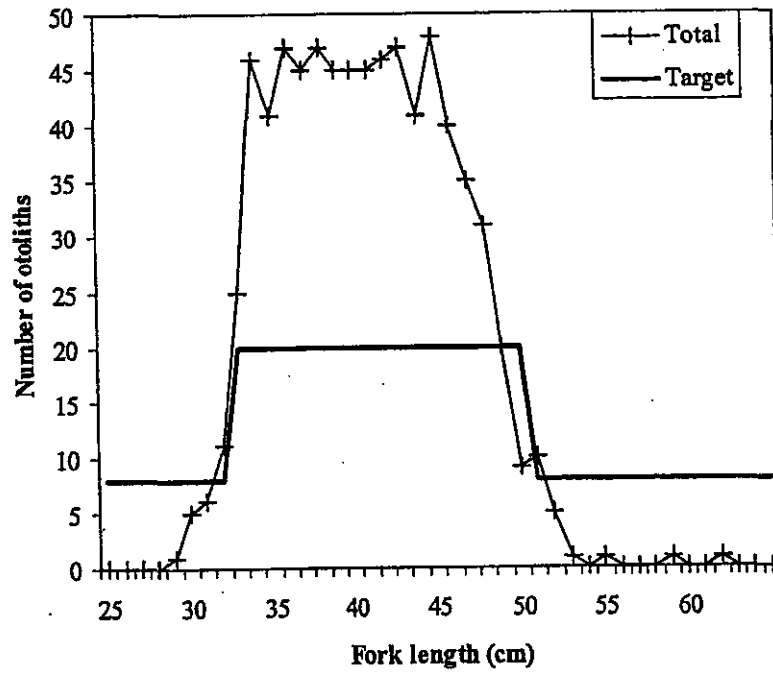


Figure 2: Length distribution of the target fixed allocation otolith sample (solid line) and the achieved otolith collection (crosses) for the 2000-01 TRE 1 purse-seine fishery.

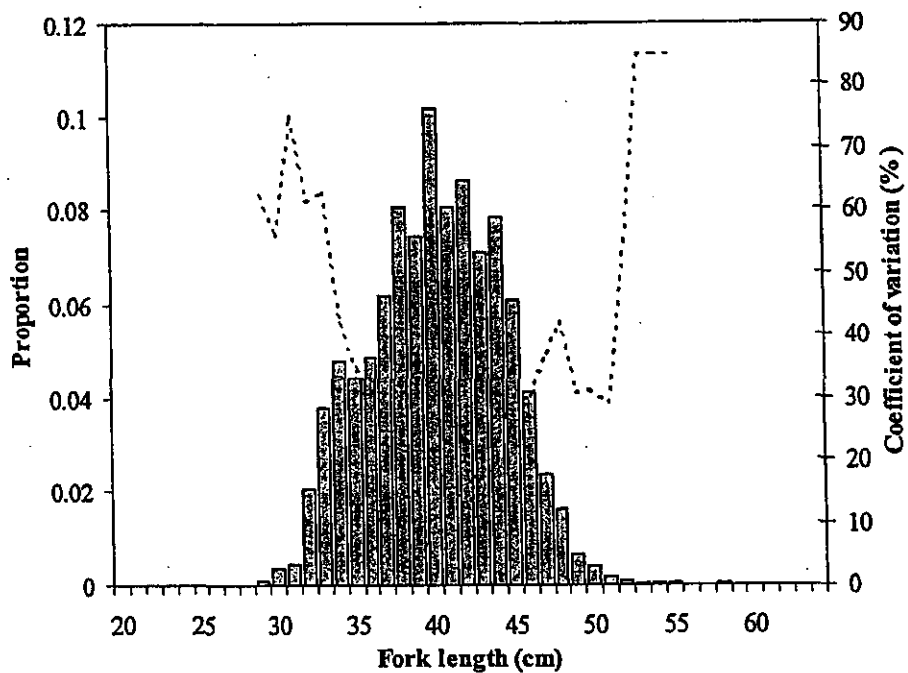


Figure 3: Length composition of the TRE 1 purse-seine catch from the 2000-01 fishing year. The dashed line represents the coefficient of variation associated with the estimates of proportion at length. Number of samples, 7; number of fish measured, 3617; MWCV, 26.6%.

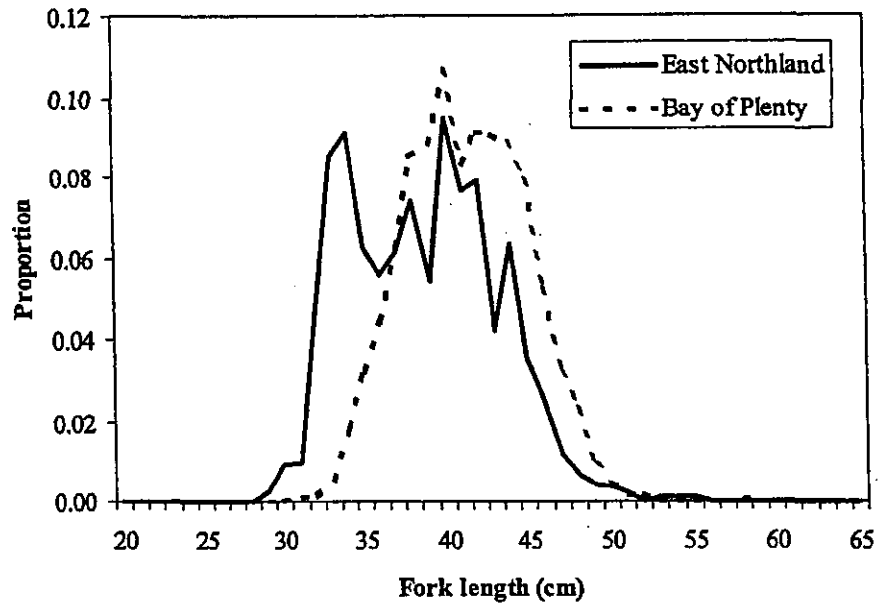


Figure 4: Comparison of the length compositions of trevally from the purse-seine catch from the East Northland and Bay of Plenty regions of TRE 1 for the 2000-01 fishing year.

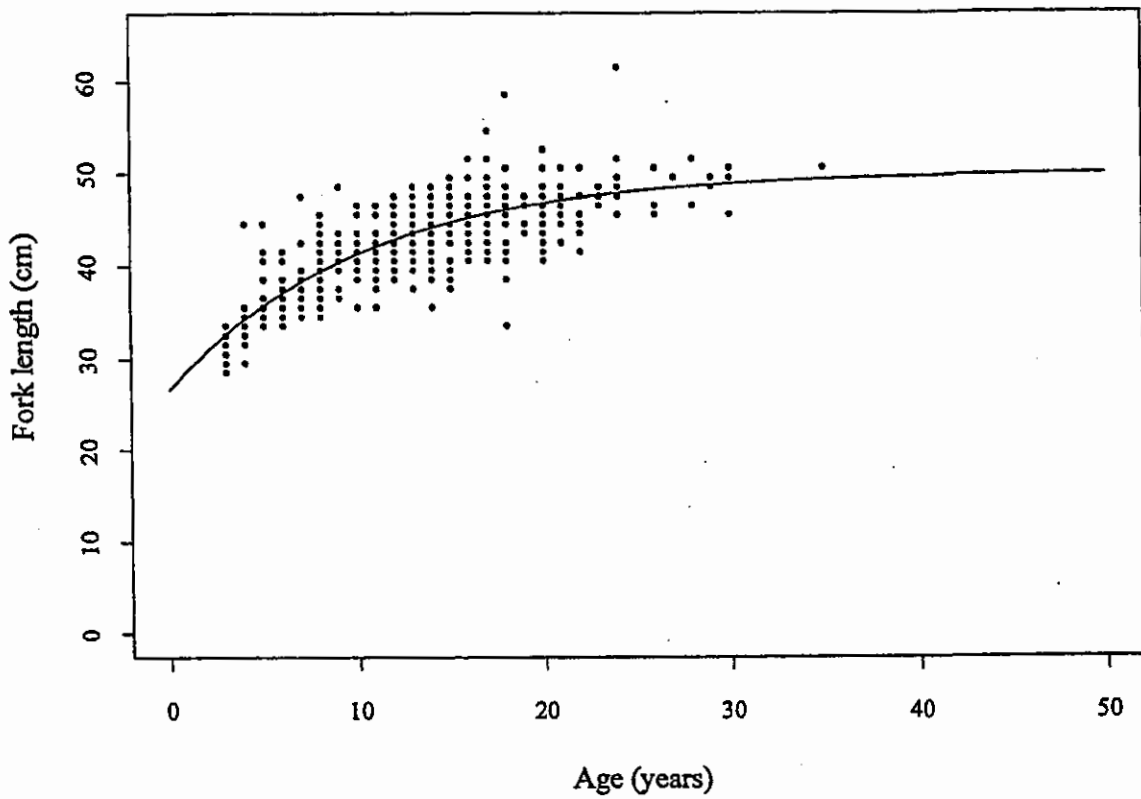


Figure 5: Relationship between age and length for trevally sampled from the 2000–01 TRE 1 single trawl fishery. The line represents the Von Bertalanffy growth function fitted to the data.

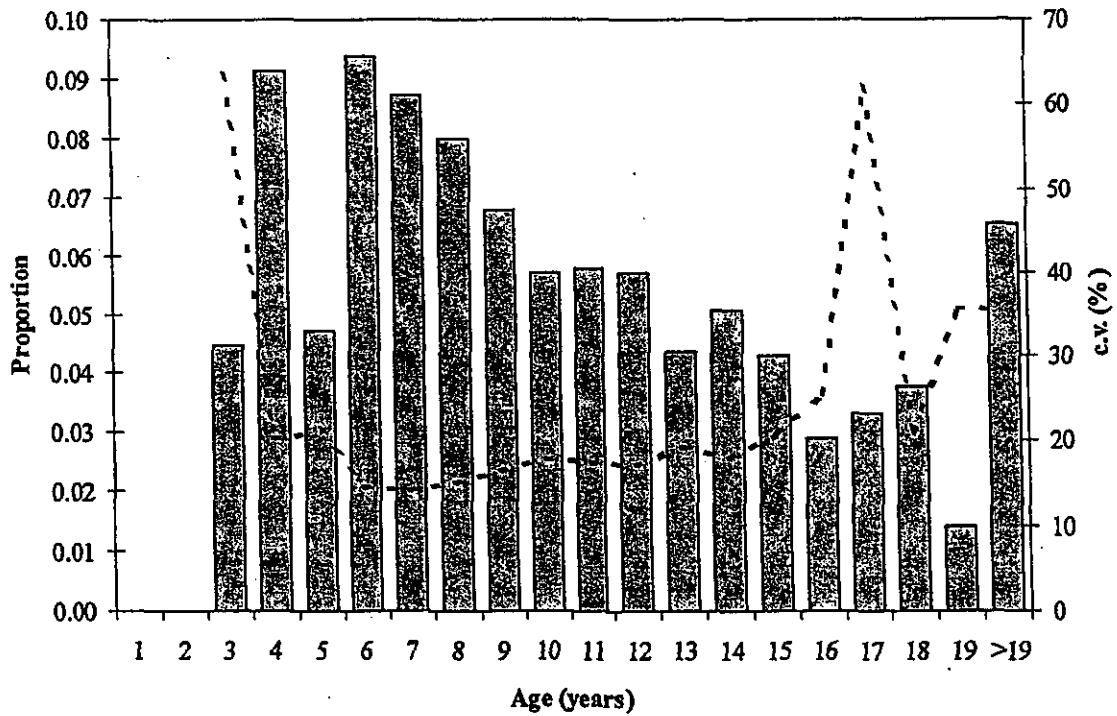


Figure 6: Age composition of the TRE 1 purse-seine catch for 2000-01. The dashed line represents the coefficient of variation associated with the estimates of proportion at age. The age composition was determined using an otolith collection from the TRE 1 single trawl fishery. Number of otoliths in the sample, 745; MWCV, 22.6%.

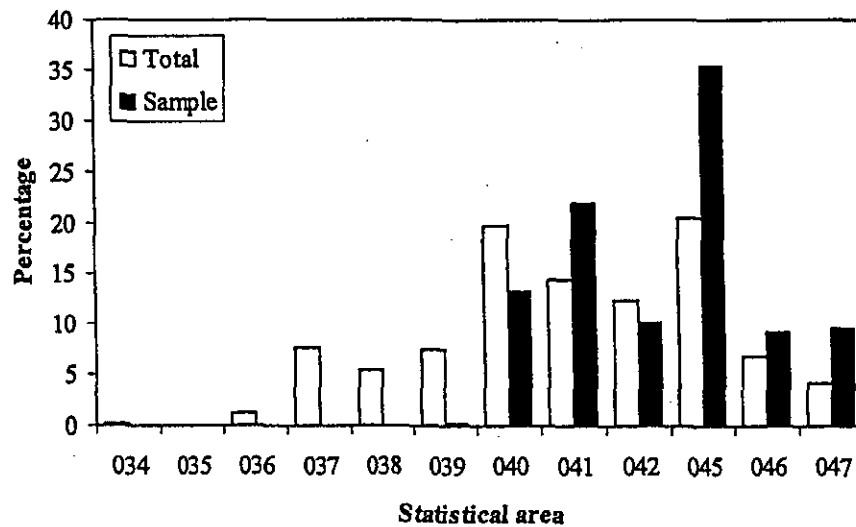


Figure 7: Comparison of the percentage distribution of the total TRE 7 bottom trawl catch and the sampled component by statistical area for the 2000-01 fishing year.

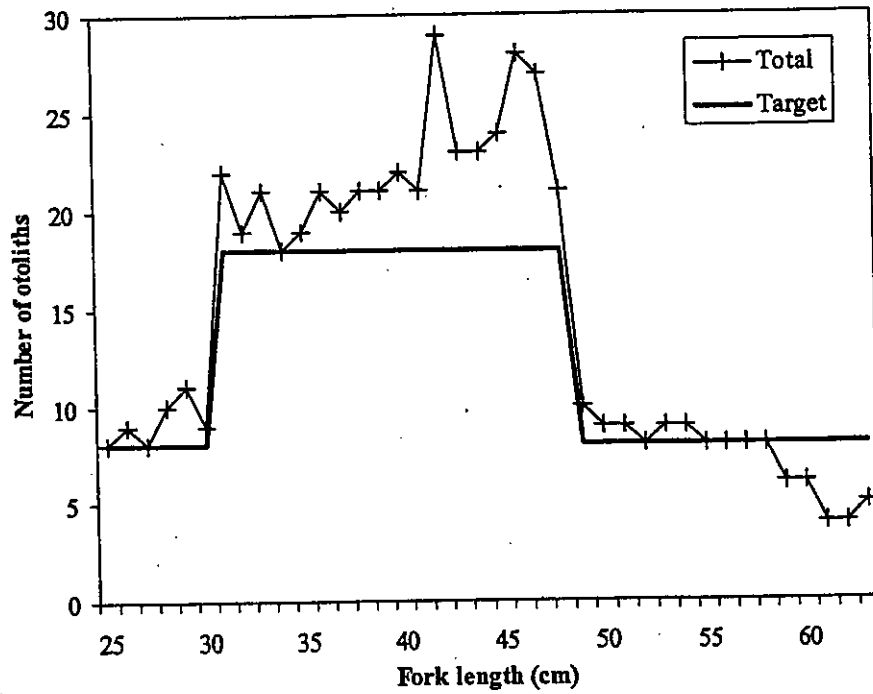


Figure 8: Length distribution of the target fixed allocation otolith sample (solid line) and the achieved otolith collection (crosses) for the 2000–01 TRE 7 single trawl fishery.

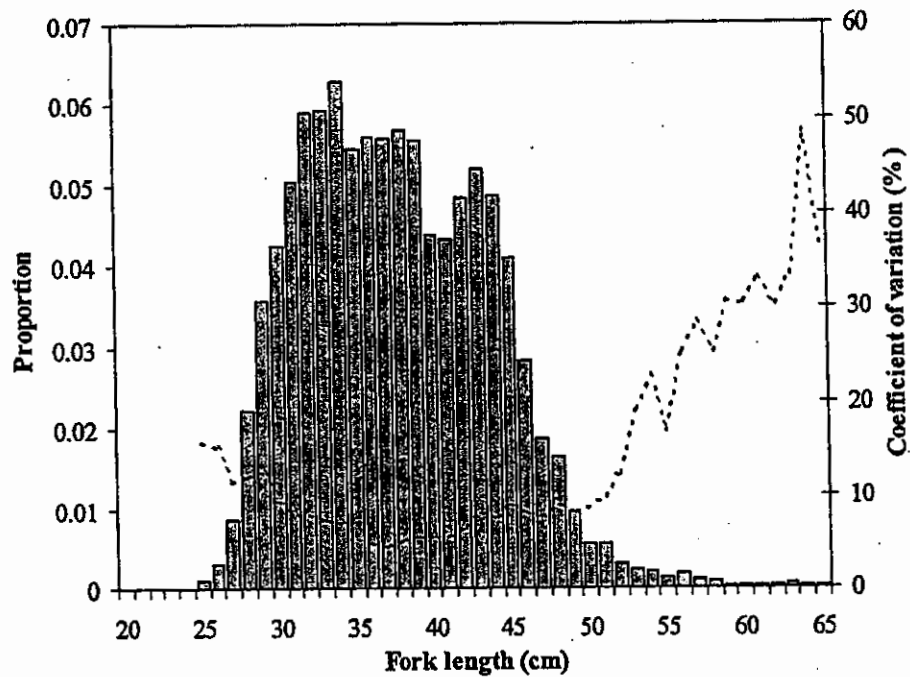


Figure 9: Length composition of the catch from the TRE 7 single trawl peak season fishery for 2000-01. Number of samples, 49; number of fish measured, 23 072; MWCV, 7.5%.

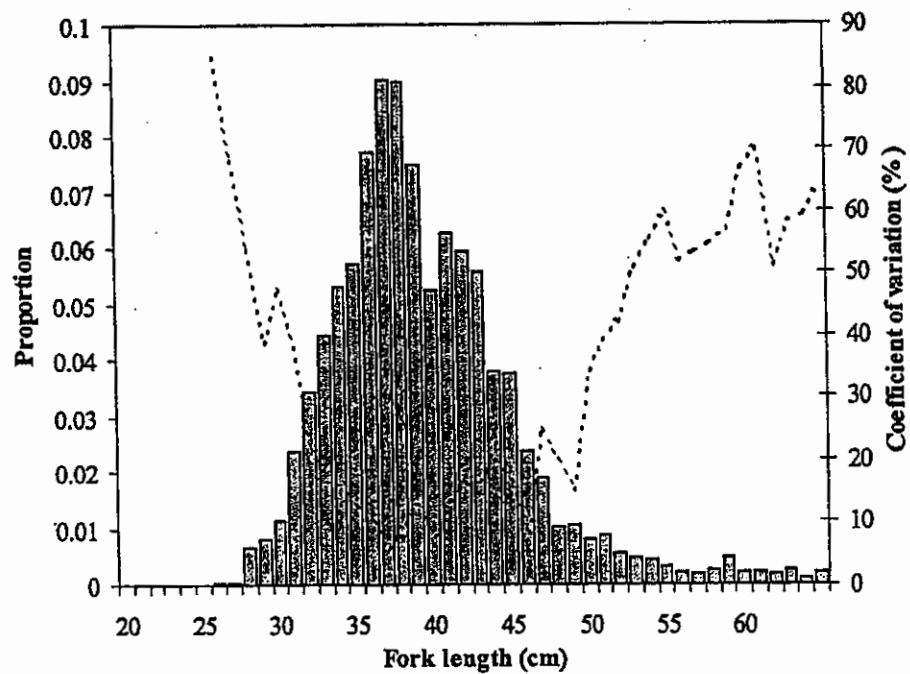


Figure 10: Length composition of the catch from the TRE 7 pair trawl peak season fishery for 2000-01. Number of samples, 13; number of fish measured, 5 209; MWCV, 16.8%.

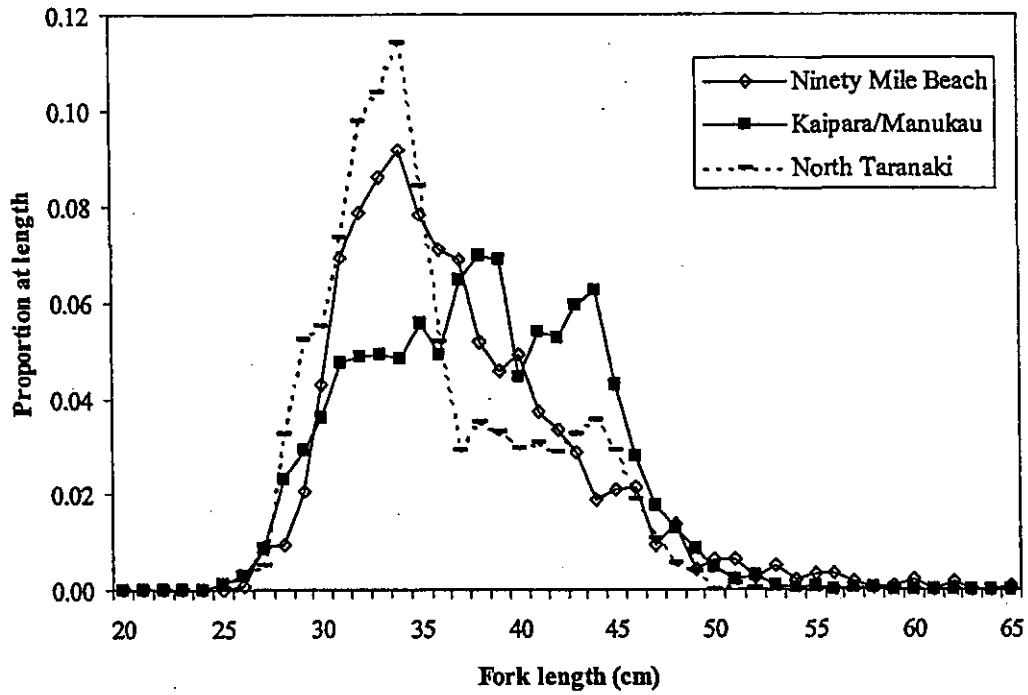


Figure 11: Comparison between length compositions of the bottom trawl catch from sub-areas of TRE 7 sampled in 2000–01.

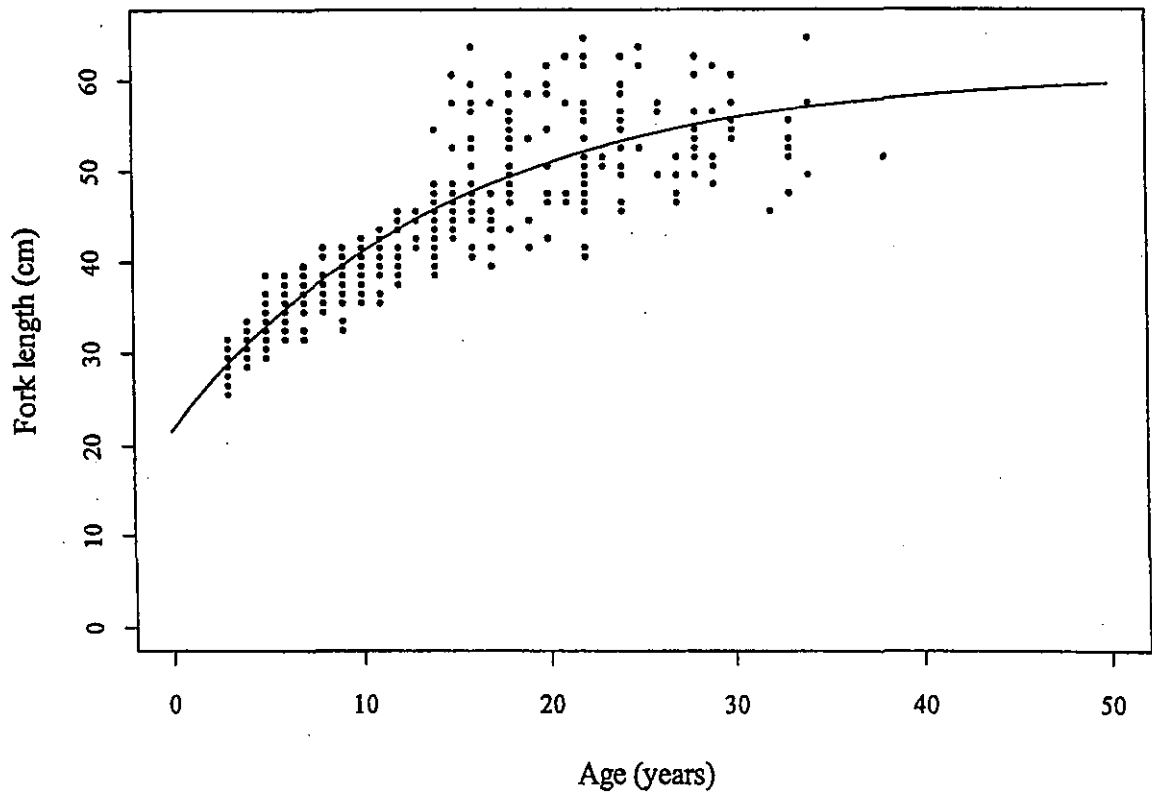


Figure 12: Relationship between age and length for trevally sampled from the 2000–01 TRE 7 single trawl fishery. The line represents the Von Bertalanffy growth function fitted to the data.

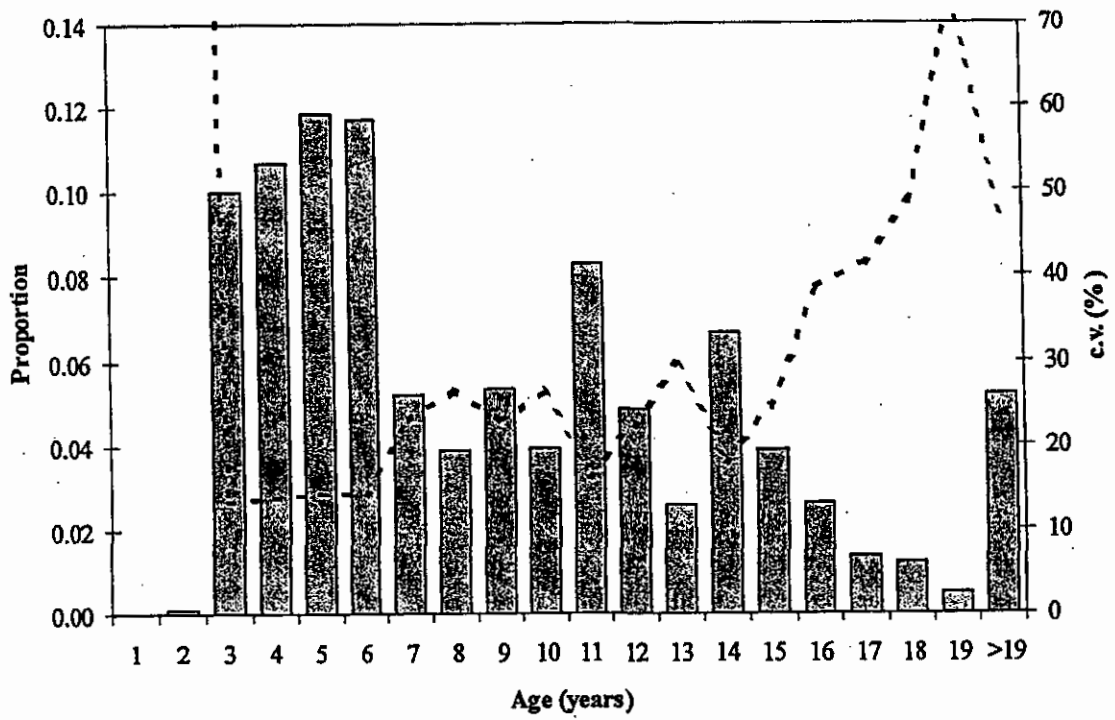


Figure 13: Age composition of the peak-season TRE 7 single trawl catch for 2000-01. The dashed line represents the coefficient of variation associated with the estimates of proportion at age. Number of otoliths in the sample, 496; MWCV, 21.5%.

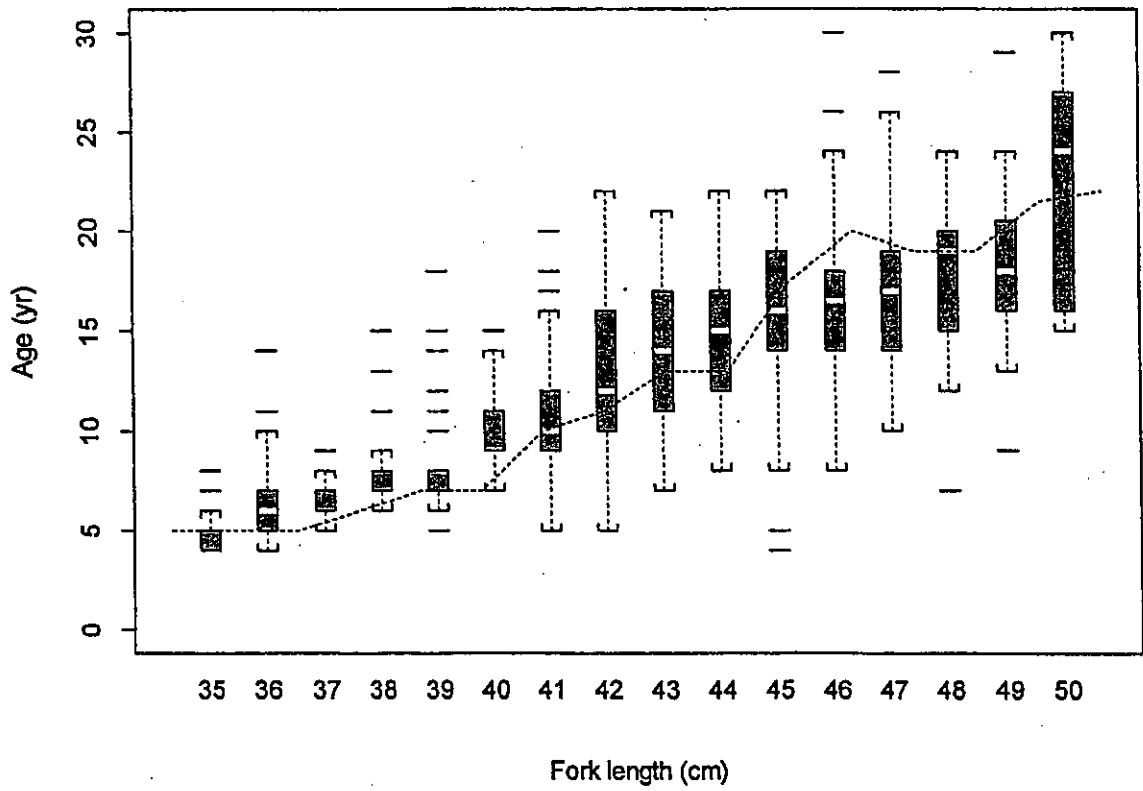


Figure 14: Box plot of the distribution of age at length for the TRE 1 aged otolith collection from the 2000-01 purse-seine fishery. The dashed line represents the median age at length for the TRE 1 aged otolith collection from the 1999-2000 single trawl fishery.

Appendix 1. Summary of individual landings sampled from F.V. Lindberg from the TRE 1 purse-seine fishery during 2000–01 fishing year

Landing number	Landing date	Sampling date	Landed weight (t)	No. fish measured	No. otoliths	Area(s) fished
20161	29-Nov-00	30-Nov-00	20.9	411	84	East Northland
20162	05-Dec-00	05-Dec-00	49.5	467	107	Bay of Plenty
20163	15-Dec-00	15-Dec-00	65.3	709	98	East Northland
20164	08-Jan-01	08-Jan-01	16.6	680	68	Bay of Plenty
20165	13-Jan-01	13-Jan-01	23.7	545	16	Bay of Plenty
20166	22-Sep-01	24-Sep-01	22.0	378	233	Bay of Plenty
20167	26-Sep-01	26-Sep-01	39.7	427	139	Bay of Plenty
Total			237.6	3 617	745	

Appendix 2. Summary of individual landings sampled from the TRE 7 single trawl fishery during 2000–01 fishing year

Landing number	Vessel name	Landing date	Sampling date	Landed weight (t)	No. fish measured	Area(s) fished
20041	<i>San Rakaia</i>	23-Nov-00	23-Nov-00	5.2	443	Kaipara/Manukau
20042	<i>Albert Sanford</i>	24-Nov-00	24-Nov-00	1.8	493	Kaipara/Manukau
20044	<i>San Kaipara</i>	27-Nov-00	27-Nov-00	2.2	389	Kaipara/Manukau
20046	<i>San Rakaia</i>	29-Nov-00	29-Nov-00	12.4	357	Kaipara/Manukau
20047	<i>Albert Sanford</i>	07-Dec-00	07-Dec-00	14.5	372	Kaipara/Manukau
20048	<i>Sea Hunter</i>	08-Dec-00	08-Dec-00	3.9	381	Kaipara/Manukau
20051	<i>San Rakaia</i>	13-Dec-00	13-Dec-00	11.1	357	Kaipara/Manukau and North Taranaki Bight
20052	<i>Albert Sanford</i>	14-Dec-00	14-Dec-00	15.2	330	Kaipara/Manukau
20053	<i>Sea Hunter</i>	18-Dec-00	18-Dec-00	20.1	367	Kaipara/Manukau
20056	<i>San Rakaia</i>	19-Dec-00	19-Dec-00	35.2	303	Kaipara/Manukau and North Taranaki Bight
20059	<i>Albert Sanford</i>	21-Dec-00	22-Dec-00	7.7	350	Kaipara/Manukau
20060	<i>Albert Sanford</i>	05-Jan-01	05-Jan-01	6.5	461	Kaipara/Manukau
20061	<i>San Rakaia</i>	10-Jan-01	10-Jan-01	24.3	425	Kaipara/Manukau and North Taranaki Bight
20062	<i>Sea Hunter</i>	11-Jan-01	11-Jan-01	1.4	507	Kaipara/Manukau
20063	<i>Albert Sanford</i>	12-Jan-01	12-Jan-01	9.0	347	Kaipara/Manukau and North Taranaki Bight
20064	<i>Sea Hunter</i>	17-Jan-01	17-Jan-01	8.6	408	Ninety Mile Beach
20065	<i>San Rakaia</i>	18-Jan-01	18-Jan-01	19.0	556	Kaipara/Manukau and Ninety Mile Beach
20066	<i>Albert Sanford</i>	19-Jan-01	19-Jan-01	9.1	411	Kaipara/Manukau
20067	<i>Albert Sanford</i>	24-Jan-01	24-Jan-01	5.5	616	Kaipara/Manukau
20068	<i>San Rakaia</i>	24-Jan-01	24-Jan-01	32.4	262	North and South Taranaki Bight
20070	<i>Sea Hunter</i>	30-Jan-01	30-Jan-01	2.7	513	Kaipara/Manukau and Ninety Mile Beach
20071	<i>Albert Sanford</i>	31-Jan-01	31-Jan-01	2.0	397	Kaipara/Manukau and Ninety Mile Beach
20074	<i>Albert Sanford</i>	08-Feb-01	08-Feb-01	5.9	236	Kaipara/Manukau and Ninety Mile Beach
20075	<i>San Rakaia</i>	09-Feb-01	09-Feb-01	13.9	437	North and South Taranaki Bight
20077	<i>Sea Hunter</i>	12-Feb-01	12-Feb-01	4.5	677	Kaipara/Manukau and Ninety Mile Beach
20078	<i>San Rakaia</i>	16-Feb-01	16-Feb-01	3.8	290	North and South Taranaki Bight
20079	<i>Albert Sanford</i>	19-Feb-01	19-Feb-01	9.4	373	Kaipara/Manukau, Ninety Mile Beach and North Taranaki Bight
20080	<i>Sea Hunter</i>	21-Feb-01	21-Feb-01	5.0	754	Kaipara/Manukau
20081	<i>San Kaipara</i>	22-Feb-01	22-Feb-01	2.5	661	Kaipara/Manukau and Ninety Mile Beach
20082	<i>San Kawhia</i>	23-Feb-01	23-Feb-01	1.1	604	Kaipara/Manukau and Ninety Mile Beach
20084	<i>Albert Sanford</i>	27-Feb-01	27-Feb-01	3.3	443	Kaipara/Manukau and North Taranaki Bight
20085	<i>San Rakaia</i>	28-Feb-01	28-Feb-01	6.7	372	North and South Taranaki Bight
20086	<i>San Kaipara</i>	01-Mar-01	01-Mar-01	1.8	760	Kaipara/Manukau and Ninety Mile Beach
20087	<i>San Hauraki</i>	05-Mar-01	05-Mar-01	0.5	183	Kaipara/Manukau and North Taranaki Bight
20088	<i>Albert Sanford</i>	06-Mar-01	06-Mar-01	3.9	604	Kaipara/Manukau and Ninety Mile Beach
20089	<i>Sea Hunter</i>	06-Mar-01	07-Mar-01	4.4	731	Kaipara/Manukau and Ninety Mile Beach

Appendix 2 (continued).

Landing number	Vessel name	Landing date	Sampling date	Landed weight (t)	No. fish measured	Area(s) fished
20090	<i>San Rakaia</i>	07-Mar-01	07-Mar-01	2.9	414	North Taranaki Bight
20091	<i>San Rakino</i>	08-Mar-01	08-Mar-01	1.9	360	Ninety Mile Beach
20092	<i>San Kaipara</i>	09-Mar-01	09-Mar-01	1.9	784	Kaipara/Manukau
20093	<i>San Hauraki</i>	13-Mar-01	13-Mar-01	1.0	466	Kaipara/Manukau and Ninety Mile Beach
20094	<i>Albert Sanford</i>	13-Mar-01	14-Mar-01	3.0	466	Kaipara/Manukau and Ninety Mile Beach
20095	<i>San Rakaia</i>	15-Mar-01	15-Mar-01	2.4	490	North and South Taranaki Bight
20096	<i>San Kaipara</i>	19-Mar-01	19-Mar-01	2.9	443	Ninety Mile Beach
20097	<i>Sea Hunter</i>	21-Mar-01	21-Mar-01	1.3	784	Kaipara/Manukau
20098	<i>San Rakaia</i>	22-Mar-01	22-Mar-01	4.3	529	Kaipara/Manukau and North and South Taranaki Bight
20111	<i>San Rakaia</i>	29-Mar-01	29-Mar-01	17.3	574	North Taranaki Bight
20112	<i>San Kawhia</i>	30-Mar-01	30-Mar-01	0.9	662	Ninety Mile Beach
20113	<i>San Rakino</i>	09-Apr-01	09-Apr-01	4.8	488	Ninety Mile Beach
20114	<i>San Rakaia</i>	10-Apr-01	11-Apr-01	4.6	442	North Taranaki Bight
Total				365.4	23072	

Appendix 3. Summary of individual landings sampled from the TRE 7 bottom pair trawl fishery during 2000–01 fishing year

Landing number	Vessel name	Landing date	Sampling date	Landed weight (t)	No. fish measured	Area(s) fished
20043	<i>San Rakino</i>	27-Nov-00	27-Nov-00	1.5	456	Kaipara/Manukau
20045	<i>San Hauraki</i>	27-Nov-00	28-Nov-00	0.7	500	Kaipara/Manukau
20049	<i>San Rakino</i>	11-Dec-00	11-Dec-00	13.4	367	Kaipara/Manukau
20050	<i>San Hauraki</i>	11-Dec-00	11-Dec-00	11.5	343	Kaipara/Manukau
20054	<i>San Kawhia</i>	19-Dec-00	19-Dec-00	4.3	330	Kaipara/Manukau
20055	<i>San Kaipara</i>	19-Dec-00	19-Dec-00	3.5	418	Kaipara/Manukau
20057	<i>San Hauraki</i>	20-Dec-00	20-Dec-00	10.3	457	Kaipara/Manukau and Ninety Mile Beach
20058	<i>San Rakino</i>	20-Dec-00	21-Dec-00	17.4	376	Kaipara/Manukau and Ninety Mile Beach
20069	<i>San Hauraki</i>	26-Jan-01	26-Jan-01	11.3	325	Ninety Mile Beach
20072	<i>San Kaipara</i>	31-Jan-01	31-Jan-01	2.7	467	Kaipara/Manukau and Ninety Mile Beach
20073	<i>San Hauraki</i>	07-Feb-01	07-Feb-01	14.2	316	Ninety Mile Beach
20076	<i>San Kawhia</i>	12-Feb-01	12-Feb-01	3.2	407	Kaipara/Manukau and Ninety Mile Beach
20083	<i>San Rakino</i>	26-Feb-01	26-Feb-01	5.5	447	Kaipara/Manukau
				99.5	5209	

Appendix 4. Estimates of the proportion at length of trevally from the TRE 1 purse-seine fishery in 2000-01

Length (cm)	Prop.	c.v. (%)
20	0.0000	0.00
21	0.0000	0.00
22	0.0000	0.00
23	0.0000	0.00
24	0.0000	0.00
25	0.0000	0.00
26	0.0000	0.00
27	0.0000	0.00
28	0.0000	0.00
29	0.0010	62.10
30	0.0036	56.09
31	0.0045	75.04
32	0.0207	61.44
33	0.0376	62.76
34	0.0476	41.75
35	0.0444	34.56
36	0.0487	25.80
37	0.0620	24.76
38	0.0806	21.62
39	0.0743	21.57
40	0.1014	15.78
41	0.0806	15.64
42	0.0864	11.65
43	0.0711	24.27
44	0.0785	25.20
45	0.0610	29.34
46	0.0413	30.38
47	0.0237	37.23
48	0.0161	42.07
49	0.0066	30.74
50	0.0041	31.25
51	0.0017	29.25
52	0.0010	55.33
53	0.0004	85.19
54	0.0000	0.00
55	0.0004	85.19
56	0.0004	85.19
57	0.0000	0.00
58	0.0000	0.00
59	0.0004	0.00
60	0.0000	0.00
61	0.0000	0.00
62	0.0000	0.00
63	0.0000	0.00
64	0.0000	0.00
65	0.0000	0.00

Appendix 5. Estimates of the proportion at length of trevally from the TRE 7 single trawl fishery in 2000–01. The proportion at length for each sub-area is also presented (Area codes: NMB, Ninety Mile Beach; KMH, Kaipara/Manukau; NTB, Northern Taranaki Bight; STB, Southern Taranaki Bight).

Length (cm)	Total		Sub Areas		
	Prop.	c.v	NMB	KMH	NTB
20	0.0000	0.00	0.0000	0.0000	0.0000
21	0.0000	0.00	0.0000	0.0000	0.0000
22	0.0000	0.00	0.0000	0.0000	0.0000
23	0.0000	0.00	0.0000	0.0000	0.0000
24	0.0000	0.00	0.0000	0.0000	0.0000
25	0.0011	15.81	0.0000	0.0014	0.0004
26	0.0029	15.26	0.0008	0.0029	0.0036
27	0.0087	11.60	0.0090	0.0084	0.0052
28	0.0223	12.25	0.0096	0.0230	0.0326
29	0.0356	12.56	0.0204	0.0290	0.0525
30	0.0425	9.58	0.0428	0.0360	0.0551
31	0.0505	8.06	0.0696	0.0476	0.0737
32	0.0590	7.98	0.0790	0.0491	0.0978
33	0.0594	7.30	0.0860	0.0491	0.1038
34	0.0630	7.20	0.0918	0.0485	0.1141
35	0.0546	5.53	0.0784	0.0557	0.0846
36	0.0559	4.92	0.0711	0.0493	0.0519
37	0.0559	4.50	0.0690	0.0649	0.0293
38	0.0569	5.23	0.0520	0.0699	0.0353
39	0.0556	5.72	0.0457	0.0688	0.0330
40	0.0440	5.67	0.0491	0.0447	0.0296
41	0.0434	5.60	0.0373	0.0540	0.0308
42	0.0483	6.48	0.0333	0.0528	0.0289
43	0.0520	8.18	0.0289	0.0597	0.0326
44	0.0487	7.50	0.0187	0.0626	0.0355
45	0.0411	9.13	0.0209	0.0427	0.0291
46	0.0284	8.17	0.0214	0.0277	0.0187
47	0.0187	7.77	0.0095	0.0177	0.0106
48	0.0165	9.11	0.0137	0.0127	0.0057
49	0.0096	8.16	0.0043	0.0088	0.0038
50	0.0057	8.75	0.0064	0.0048	0.0000
51	0.0056	9.83	0.0065	0.0023	0.0013
52	0.0030	12.29	0.0026	0.0030	0.0006
53	0.0022	19.04	0.0051	0.0007	0.0000
54	0.0019	22.50	0.0021	0.0003	0.0000
55	0.0013	16.88	0.0034	0.0007	0.0000
56	0.0017	25.26	0.0032	0.0002	0.0000
57	0.0011	28.34	0.0018	0.0006	0.0000
58	0.0009	25.13	0.0005	0.0005	0.0000
59	0.0002	30.75	0.0010	0.0001	0.0000
60	0.0003	30.41	0.0023	0.0000	0.0000
61	0.0004	32.78	0.0000	0.0000	0.0000
62	0.0004	30.16	0.0016	0.0000	0.0000
63	0.0004	33.43	0.0000	0.0000	0.0000
64	0.0002	48.56	0.0000	0.0000	0.0000
65	0.0001	36.53	0.0010	0.0000	0.0000

Appendix 6. Estimates of the proportion at length of trevally from the TRE 7 pair trawl fishery in 2000-01.

Length (cm)	Prop.	c.v. (%)
20	0.0000	0.00
21	0.0000	0.00
22	0.0000	0.00
23	0.0000	0.00
24	0.0000	0.00
25	0.0000	0.00
26	0.0003	84.79
27	0.0004	68.17
28	0.0064	53.79
29	0.0081	38.69
30	0.0114	47.10
31	0.0237	37.81
32	0.0342	21.69
33	0.0443	16.71
34	0.0532	16.05
35	0.0570	12.39
36	0.0772	9.81
37	0.0901	5.64
38	0.0898	9.49
39	0.0749	12.36
40	0.0524	7.60
41	0.0624	13.06
42	0.0594	15.98
43	0.0555	16.33
44	0.0379	19.57
45	0.0374	16.21
46	0.0238	8.33
47	0.0190	24.43
48	0.0103	19.71
49	0.0105	14.95
50	0.0081	34.18
51	0.0086	38.93
52	0.0055	42.01
53	0.0049	50.73
54	0.0043	55.19
55	0.0032	59.53
56	0.0022	52.00
57	0.0017	53.46
58	0.0027	54.51
59	0.0046	57.04
60	0.0020	66.64
61	0.0022	69.78
62	0.0019	51.13
63	0.0026	58.35
64	0.0013	59.09
65	0.0023	63.09

Appendix 7. Estimates of proportion at age.

Estimates of proportion at age of trevally from the TRE 1 purse-seine fishery in 2000-01 and the associated coefficient of variations.

Age (years)	Prop.	c.v
1	0.000	0.000
2	0.000	0.000
3	0.044	0.635
4	0.091	0.203
5	0.047	0.212
6	0.094	0.144
7	0.087	0.141
8	0.080	0.149
9	0.068	0.166
10	0.057	0.179
11	0.058	0.176
12	0.057	0.172
13	0.044	0.195
14	0.050	0.178
15	0.043	0.206
16	0.029	0.254
17	0.033	0.620
18	0.038	0.208
19	0.014	0.357
>19	0.065	0.353

Estimates of proportion at age of trevally from the TRE 7 single trawl fishery in 2000-01 and the associated coefficient of variations.

Age (years)	Prop.	c.v
1	0.000	0.000
2	0.001	3.939
3	0.100	0.133
4	0.107	0.139
5	0.119	0.143
6	0.117	0.143
7	0.052	0.231
8	0.039	0.268
9	0.053	0.228
10	0.039	0.263
11	0.083	0.164
12	0.048	0.223
13	0.026	0.296
14	0.066	0.180
15	0.039	0.242
16	0.026	0.386
17	0.013	0.416
18	0.012	0.486
19	0.005	0.735
>19	0.052	0.466

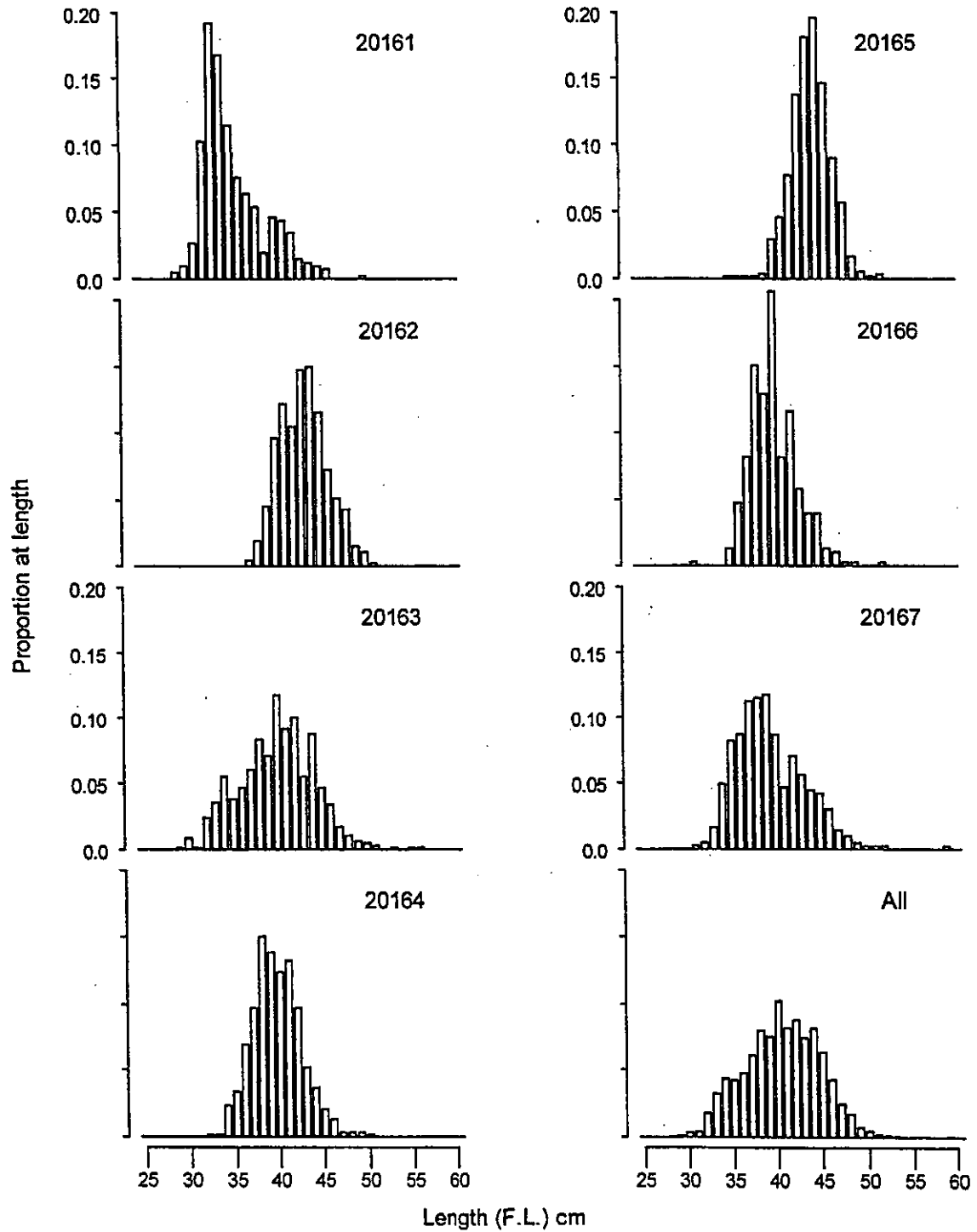
Appendix 8. TRE 1 age-length key for the 2000-01 fishing year.

Length (cm)	Age (years)																			No. Aged	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		>19
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	0
30	0	0	0.80	0.20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0.91	0.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0.32	0.68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0.11	0.72	0.13	0.02	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0
35	0	0	0	0.46	0.41	0.07	0.02	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0.15	0.21	0.38	0.15	0.04	0	0.02	0.02	0	0	0.02	0	0	0	0	0	0	0
37	0	0	0	0	0.09	0.53	0.27	0.09	0.02	0	0	0	0	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0.23	0.36	0.23	0.09	0	0.02	0	0.04	0	0.02	0	0	0	0	0	0
39	0	0	0	0	0.02	0.16	0.27	0.33	0	0.02	0.04	0.09	0	0.02	0.02	0	0	0.02	0	0	0
40	0	0	0	0	0	0	0.11	0.11	0.29	0.16	0.11	0.07	0.04	0.09	0.02	0	0	0	0	0	0
41	0	0	0	0	0.02	0.07	0	0.11	0.16	0.20	0.11	0.11	0.07	0.04	0.02	0.02	0.02	0.02	0	0.02	0
42	0	0	0	0	0.02	0.02	0	0.02	0.09	0.11	0.20	0.17	0.07	0.04	0	0.07	0.02	0.09	0	0.09	0
43	0	0	0	0	0	0	0.02	0.02	0.09	0.11	0.09	0.09	0.09	0.09	0.09	0.02	0.13	0.13	0	0.06	0
44	0	0	0	0	0	0	0	0.02	0.05	0.05	0.07	0.07	0.12	0.10	0.17	0.07	0.07	0	0.07	0.12	0
45	0	0	0	0.02	0.02	0	0	0.02	0	0	0	0.08	0.08	0.13	0.13	0.08	0.04	0.13	0.06	0.21	0
46	0	0	0	0	0	0	0	0.03	0	0.03	0.05	0.03	0.03	0.15	0.10	0.10	0.18	0.10	0	0.23	0
47	0	0	0	0	0	0	0	0	0	0.03	0.03	0.03	0.09	0.09	0.09	0.14	0.11	0.09	0.09	0.23	0
48	0	0	0	0	0	0	0.03	0	0	0	0	0.06	0.03	0.10	0.03	0.06	0.03	0.06	0.16	0.42	0
49	0	0	0	0	0	0	0	0	0.05	0	0	0	0.05	0.05	0.10	0	0.10	0.20	0	0.45	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.22	0.11	0.11	0	0	0.56	0
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0	0.90	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.20	0.20	0	0	0.60	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	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	1.00
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
Total	0	0	34	79	41	68	56	48	36	32	33	35	29	37	33	25	30	34	14	81	745

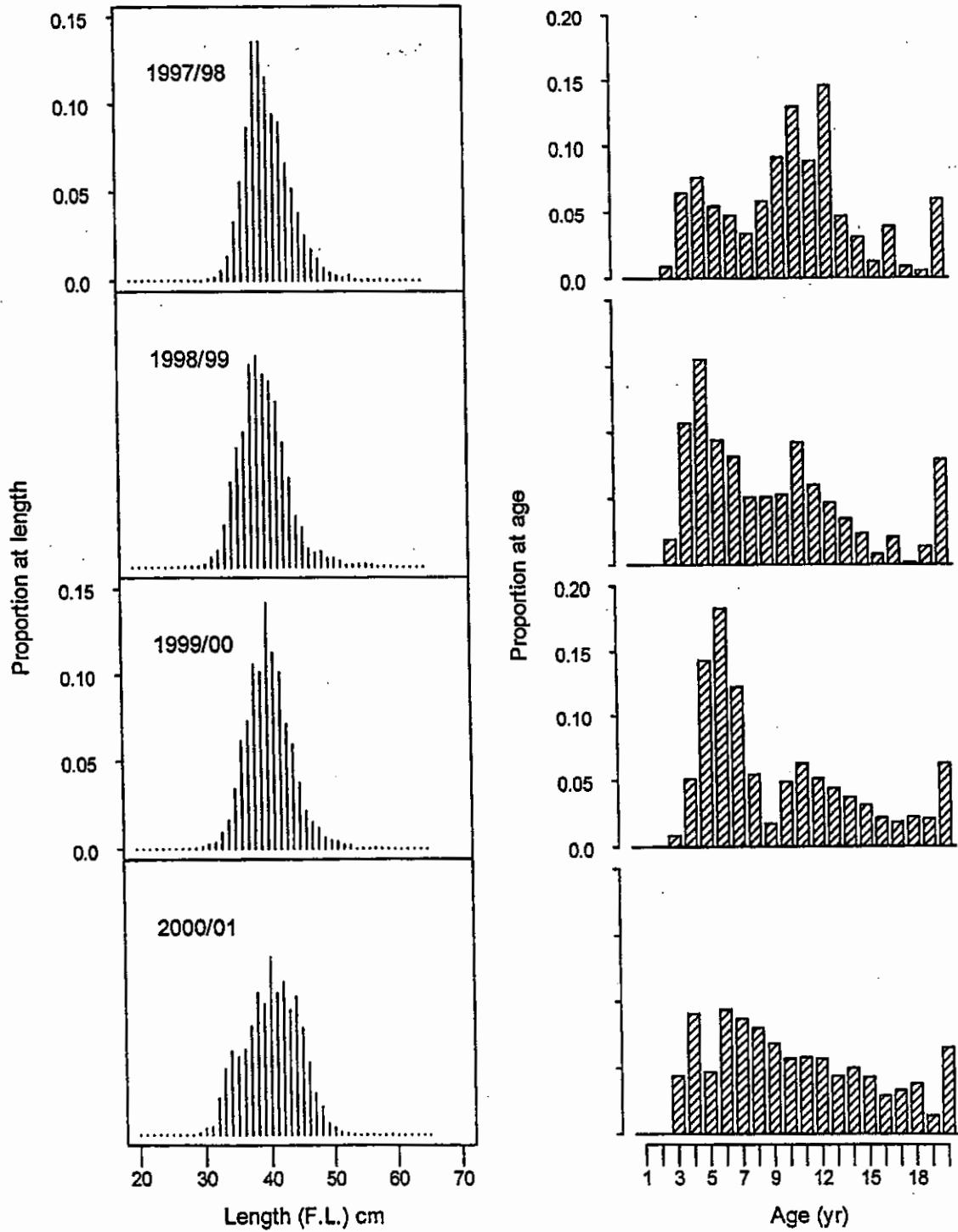
Appendix 9. TRE 7 age-length key for the 2000-01 fishing year.

Length (cm)	Age (years)																			No. Aged	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		>19
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
26	0	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
27	0	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
28	0	0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
29	0	0	0.91	0.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
30	0	0	0.33	0.56	0.11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
31	0	0	0.26	0.68	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19
32	0	0	0.11	0.44	0.28	0.11	0.06	0	0	0	0	0	0	0	0	0	0	0	0	0	18
33	0	0	0	0.21	0.47	0.16	0.11	0	0.05	0	0	0	0	0	0	0	0	0	0	0	19
34	0	0	0	0.11	0.28	0.39	0	0	0.22	0	0	0	0	0	0	0	0	0	0	0	18
35	0	0	0	0	0.28	0.50	0.17	0.06	0	0	0	0	0	0	0	0	0	0	0	0	18
36	0	0	0	0	0.44	0.17	0.06	0.06	0.11	0.11	0.06	0	0	0	0	0	0	0	0	0	18
37	0	0	0	0	0.11	0.28	0.06	0.22	0.17	0.11	0.06	0	0	0	0	0	0	0	0	0	18
38	0	0	0	0	0	0.28	0.28	0.17	0.06	0.11	0	0.11	0	0	0	0	0	0	0	0	18
39	0	0	0	0	0.05	0.16	0.16	0.11	0.05	0.05	0.32	0.05	0	0.05	0	0	0	0	0	0	19
40	0	0	0	0	0	0	0.06	0.00	0.17	0.06	0.39	0.11	0	0.17	0	0	0.06	0	0	0	18
41	0	0	0	0	0	0	0	0.06	0.11	0.22	0.22	0.11	0	0.17	0	0.06	0	0	0	0.06	18
42	0	0	0	0	0	0	0	0.05	0.05	0.05	0.26	0.16	0.16	0.05	0	0.05	0.05	0	0.05	0.05	19
43	0	0	0	0	0	0	0	0	0	0.06	0.33	0.00	0.06	0.33	0.17	0	0	0	0	0.06	18
44	0	0	0	0	0	0	0	0	0	0	0.06	0.28	0	0.28	0.22	0	0.06	0.11	0	0	18
45	0	0	0	0	0	0	0	0	0	0	0	0.17	0.33	0.11	0.17	0.11	0.06	0	0.06	0	18
46	0	0	0	0	0	0	0	0	0	0	0	0.05	0.05	0.21	0.21	0.21	0.05	0	0	0.21	19
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0.06	0.11	0.28	0	0.06	0	0.50	18
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0.17	0.06	0.11	0.11	0.11	0	0.44	18
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0.11	0.33	0.22	0	0.11	0	0.22	9
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.13	0	0.88	8
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.11	0	0.11	0	0.78	9
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	8
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.13	0.13	0	0.25	0	0.50	8
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.22	0	0.11	0.11	0.56	9
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.13	0	0	0	0.25	0.63	8
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.13	0	0.88	8
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.13	0	0.13	0	0.75	8
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.13	0.13	0.13	0	0	0.63	8
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.17	0.17	0.67	6
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.33	0	0	0	0.67	6
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0	0.25	0.50	4
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	4
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	5
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.50	0	0	0	0.50	2
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00	2
Total	0	8	47	33	37	37	17	13	18	14	31	19	11	31	23	26	8	17	4	102	496

Appendix 10. Length frequency distributions for individual landing sampled from the TRE 1 purse seine fishery and the combined length frequency.



Appendix 11a. Estimates of length and age composition of the catch from the TRE 1 purse-seine fishery for the 1997-98, 1998-99, 1999-2000, and 2000-01 fishing years. Data from 1997-98 and 1998-99 were sourced from Walsh et al. (1999, 2000) and data from 1999-2000 are from Langley (2001).



Appendix 11b. Estimates of the length and age composition of the catch from the peak-season TRE 7 single trawl fishery for the 1996-97, 1997-98, 1998-99, 1999-2000, and 2000-01 fishing years. Data from 1997-98 and 1998-99 were sourced from Walsh et al. (1999, 2000) and data from 1999-2000 are from Langley (2001). Length frequency data from 1996-97 are from unpublished data held by Sanford Limited.

