



ISSN 1175-1584

**MINISTRY OF FISHERIES**

*Te Tautiaki i nga tini a Tangaroa*

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CPUE standardisations, 1979-80 to 2003-04**

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Paul J. Starr<sup>1</sup>  
Nokome Bentley<sup>2</sup>

<sup>1</sup>61A Rhine Street  
Island Bay  
Wellington

<sup>2</sup>Trophia Ltd  
P O Box 60  
Kaikoura

**Published by Ministry of Fisheries  
Wellington  
2005**

**ISSN 1175-1584**

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**Ministry of Fisheries  
2005**

**Citation:**

**Starr, P.J.; Bentley, N. (2005).**

**Rock lobster catch and effort data: summaries and CPUE standardisations, 1979–80 to 2003–04.  
*New Zealand Fisheries Assessment Report 2005/50. 68 p.***

This series continues the informal  
New Zealand Fisheries Assessment Research Document series  
which ceased at the end of 1999.

## EXECUTIVE SUMMARY

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Commercial catch and effort data are an important source of information for stock assessments of rock lobster. We provide summaries of these data for fishing years 1979–80 through to 2003–04 and standardisations of catch per unit effort (CPUE) for each of the nine rock lobster quota management Areas (QMAs) for the same period. We also provide summaries of the two standardisation procedures performed in support of the 2004 CRA 3 stock assessment.

In some QMAs there have been substantial changes in the spatial distribution of catch. For example, in CRA 1 the proportion of catch taken in Area 901 rose from 17% in 1979–80 to 52% in 2000–01. In CRA 5, the proportion of catch taken in Area 917 has fallen from 65% in 1986–87 to 35% in 2003–04; meanwhile the proportion of the catch taken in Area 916 has increased substantially. In other QMAs, such as CRA 2 and CRA 7, there has been less change in the spatial distribution of catch.

There has been an increase in the proportion of catch taken during autumn and winter in most QMAs. The shift from a spring–summer to an autumn–winter fishery occurred quite rapidly in the 1990s in most of the east coast QMAs, first in the North Island and then followed by CRA 5 in the South Island. For example, in CRA 2, the proportion of catch taken in July rose from 8% to 35% in the six years from 1990–91 to 1996–97. In CRA 5, the proportion of catch taken during spring and summer (October to March) decreased from a peak of 83% in 1990–91 to 10% in 2001–02. An even more rapid shift occurred in CRA 3 associated with the change in the management regime in 1992–93. Only in CRA 6, CRA 7, and CRA 8 has the seasonal distribution of catch remained relatively constant.

There is a reasonable level of consistency within most QMAs in the overall trends shown by the CPUE series for the constituent statistical areas. This consistency exists in spite of considerable year-to-year variation in these series. CRA 3 is the QMA with the greatest similarity in the CPUE trends between statistical areas.

The standardisation procedure applied to each QMA did not usually result in much change relative to the arithmetic and unstandardised annual indices of CPUE. However, there was a general tendency for the standardisation procedure to upwardly adjust the relative CPUE at peak CPUEs in the late 1990s, accounting for shifts in effort to winter/early spring because the unstandardised catch rates tend to be lower in winter.

Standardised CPUE for CRA 1 to CRA 5 show a similar pattern: catch rates that peaked in the early 1980s, declined during the mid to late 1980s, and then rose rapidly in the early 1990s. In CRA 2, CRA 3, and CRA 4 there was a decline in CPUE in the late 1990s and early 2000s. CRA 5 has continued to show an increasing trend in CPUE and there is a suggestion that CRA 4 may also be increasing in the two most recent fishing years. The timing of these events differ slightly. For example, CRA 2 reached its lowest CPUE in 1987–88 but all the other Areas reached it in 1992–93. The year achieved and the relative magnitude of the peak CPUE also differ between these QMAs.

Standardised analyses used in the 2004 CRA 3 stock assessment have been documented in this report. These include an analysis of CPUE separated into half-yearly seasonal periods from 1979–80 to 2003–04. Also included is an analysis of the relative catchability of male and female pre-recruits (below the size limit) by half-yearly seasonal period from 1993–94 to 2003–04.

## 1. INTRODUCTION

Commercial catch and effort data are an important source of information for stock assessments of rock lobster. They are used to provide an annual index of vulnerable biomass for each stock and to estimate the distribution of catch between seasons and among month/Area strata. Over the last decade, there have been continuing refinements to the way in which catch and effort data are checked and corrected (Booth et al. 1994, Vignaux & Kendrick 1998) and the way in which standardised indices of vulnerable biomass are calculated from them (Maunder & Starr 1995).

While the primary use of catch and effort data in stock assessments is to estimate annual indices that are assumed to be proportional to vulnerable biomass, the same data can also be used to examine the spatial and temporal distribution of catch and effort. Such analyses can be important for interpreting changes in overall catch rates for a quota management Area. They can also provide information for use in monitoring the fishery. For example, the proportion of catch by month and statistical area is used as a guideline for the allocation of rock lobster catch sampling effort.

In this report, we present summaries of the spatial and temporal distribution of the catch and standardised indices of vulnerable biomass. For each QMA we present,

- (a) the number of vessels targeting rock lobster using pots by statistical area and fishing year;
- (b) the percentage of catch by statistical area and fishing year,
- (c) the percentage of catch by month and fishing year,
- (d) the percentage of catch by month and statistical area for the 2003–04 fishing year,
- (e) the cumulative monthly catch by fishing year,
- (f) the arithmetic catch per unit effort by statistical area and fishing year,
- (g) arithmetic, unstandardised, and standardised indices of catch per unit effort for each fishing year.

We also document the standardisation procedure and results for the CPUE and the pre-recruit index (PRI) analyses performed for the 2004 CRA 3 assessment (Haist et al. 2005). This information is not presented elsewhere, but requires documentation because the analyses represent key model inputs into the CRA 3 stock assessment.

The standardised indices of CPUE are assumed to reflect changes in vulnerable biomass; that is, the total weight of the lobsters that is vulnerable to the fishery and can be legally retained. The annual vulnerable biomass will be affected by changes in management of the fishery (e.g., changes in the size limit), in addition to other factors. The standardisation takes into account changes in the spatial distribution of fishing effort (at the scale of statistical area) and changes in the seasonality of fishing, but it cannot adjust for changes in vulnerable biomass caused by management changes. Therefore, the CPUE indices within each series will not be comparable over the entire range of years.

The failure to account for changes in the definition of vulnerable biomass due to management actions needs to be considered when interpreting the CPUE indices presented in this report. For example, there were significant management changes to the CRA 3 fishery in 1992–93, including a change in the size limit for males in the winter. The CPUE indices will reflect the different definitions of the vulnerable biomass before and after this change. We do not draw conclusions about the state of the stock based on these results because this requires consideration of other data, such as catch sampling and tagging data, and is best done as part of a stock assessment model.

## 2. METHODS

### 2.1 Data

The catch and effort data from 1 April 1979 to 30 June 1989 were obtained from the Fisheries Statistics Unit (FSU), and the equivalent data from 1 July 1989 to 31 March 2004 were obtained from the Ministry of Fisheries Catch Effort Landing Returns (CELR ; MFish relog 5510). These data sources were documented by Bentley et al. (2005) and the data are stored and maintained in the CRACE database (Bentley et al. 2005).

### 2.2 Error checking

All records with error ratings greater than or equal to 2, for the fields FSU statistical area, CELR pots lifted and CELR statistical area, were excluded from this analysis. The documentation of these error designations, including how they are defined and generated, is described in Bentley et al. (2005).

All records for vessel 4548 fishing in CRA 2 have been dropped from this analysis because of an extreme number of outliers from this vessel. All other data have been retained in the analyses.

### 2.3 Catch correction

A corrected catch weight was calculated by adjusting the estimated catch weight in the effort part of the CELR form by the corresponding landed weight from the landing part of the form. This was done using method B4, described in Bentley et al. (2005). This algorithm summarises the data for every vessel by month and statistical area and corrects the total estimated catch based on the total landed catch for the month. Data for any vessel in a month where the landed catch is zero but the effort is not zero are excluded, and data from the following month for that vessel are also excluded. The presumption is that some of the catch landed in the second month was held over from the first month, thus breaking the link between the catch and effort data.

### 2.4 Calculation of number of vessels fishing rock lobster

We counted the number of vessels that fished within each statistical area for each fishing year using the same data set as used for the catch summaries and the CPUE standardisation. This data set is based on vessels that target rock lobster and for which the primary method is rock lobster potting.

There are often a relatively large number of vessels that report small quantities of rock lobster in an Area during a fishing year. For example, on the landings part of CELR forms, 67 vessels reported landing rock lobsters in CRA 5 during 2001–02. However, 30 of these vessels had a total catch for the year of less than 1 t (5 had less than 10 kg). These vessels may have caught lobster accidentally as bycatch or mistakenly recorded CRA on returns. We have defined “rock lobster” vessels as those which caught at least 1 t of CRA in a QMA in a fishing year.

For some quota management Areas, there is a significant jump in the estimated number of vessels in the 1989–90 fishing year. This fishing year had two different data sources (FSU and CELR), switching between systems on 1 July 1989. It is possible that, in some instances, each data source may have used different vessel identifiers for the same vessel, causing some duplicate counting. This problem is restricted to the 1989–90 fishing year, and estimates of vessel numbers for that fishing year should be considered less accurate than for other years.

## 2.5 Annual indices of CPUE

'Arithmetic', 'unstandardised', and standardised indices of annual CPUE were calculated for each QMA. Arithmetic CPUE ( $A_y$ ) is calculated as the total catch for the year divided by the total number of pot lifts in the year:

$$A_y = \frac{\sum_{i \in y} C_i}{\sum_{i \in y} P_i} \quad \text{Eq. 1}$$

where  $C_i$  and  $P_i$  are the catch and pot lifts for the vessel-month-Area combination  $i$  in year  $y$ .

Unstandardised CPUE ( $G_y$ ) is the geometric mean of the ratio of catch to potlifts for each vessel, month, statistical area combination:

$$G_y = \exp \left[ \frac{\sum_{i \in y} \ln \left( \frac{C_i}{P_i} \right)}{n_y} \right] \quad \text{Eq. 2}$$

where,  $n_y$  is the number of vessel-month-Area combinations in the year  $y$ . It has the same distributional assumptions as the standardised CPUE, but does not take into account changes in the seasonal and spatial distribution of fishing effort.

Standardised CPUE is calculated from a generalised linear model (GLM; Maunder & Starr 1995) using fishing year, month, and statistical area as explanators. Maunder & Starr (1995) examined alternative methods for standardising rock lobster catch and effort data to obtain indices of abundance. They found that vessel effects were small and suggested that a standardisation based on year, month and Area was superior to a model including vessel effects because it allowed more data to be used. Canonical coefficients and standard errors were calculated for each factor (Francis 1999).

The unstandardised and standardised coefficients (the geometric mean of these series equal 1.0) were multiplied by the geometric mean of the arithmetic CPUE indices (Eq. 1) so that all three sets of indices were scaled to the same mean for comparability.

## 2.6 Indices by assessment (seasonal) period for CRA 3

The assessment model (Haist et al. 2005) requires standardised indices of vulnerable biomass by assessment period. A period is defined as one of two six month seasons, either autumn-winter (1 April to 30 September) or spring-summer (1 October to 31 March). Thus, the fishing year explanatory variable is replaced in the standardisation model by a period explanatory variable. The model becomes

$$\ln(\text{CPUE}) = \text{Intercept} + \text{Period} + \text{Month} + \text{Area} + \varepsilon \quad \text{Eq. 3}$$

The interpretation of the month explanatory variable in this model differs from the more usual model based on a complete fishing year. In the case of the month categorical variable for an annual model, 11 of 12 months are estimated, with the remaining month set to 1 because of confounding. When the fishing year is split into two seasons, further confounding occurs with the month effects, resulting in dropping one of the month coefficients in each period. The indices are slightly sensitive to the choice of the month dropped, with the estimated coefficients changing by small amounts when different months are successively dropped. We standardised on dropping the month with the most records in each six-month period because this month would generally have the lowest error. The month coefficients in this model do not show as much variation as the month effects in an annual model because part of the seasonal variation would be explained by differences between periods. Therefore,

the month effect will take into account only the within-period variation, rather than the full seasonal variation within a fishing year.

## 2.7 Standardised pre-recruitment index (PRI) for the CRA 3 assessment

The assessment model (Haist et al. 2005) also uses standardised indices of relative catchability of sub-legal lobster by assessment period as a model data input. The same definition of seasonal assessment period is used as in the main CPUE analysis (see Section 2.6). This analysis is based on length frequency data obtained from sampling the catch as it is brought on board the fishing vessel using either a voluntary fisher-based logbook programme or direct sampling of the fishery by observers.

Length frequency data from the combined logbook and catch sampling (observer) data sets were summarised from each sampling event (a single potlift) to provide the number of lobsters below the size limit by sex for CRA 3. The CRA 3 male size limit was treated as being 52 mm, the autumn-winter size limit, regardless of the season of capture. The berried and maturity state of the females were not considered when classifying lobsters against the size limit. Only data from 1993 and later were used because a change in escape gap regulations in that year precludes comparison between earlier and later data. This analysis did not include pots with recorded catch but without measured fish.

The standardised model used depth (treated as a categorical variable in 10 m bins with all depths 60 m or greater pooled), statistical area of capture, month, season, and period of capture as explanatory variables. The source of the data (logbook or catch sampling) was also offered to the model as an explanatory variable. A separate relative month effect was estimated for each season (autumn/winter and spring/summer) by using the first month in each season (April and October) as the reference month. Periods with fewer than 200 potlifts were dropped from the analysis.

Two standardised regression analyses were performed on the pre-recruit numbers from the sampling data.

- A lognormal model, which regressed the logarithm of pre-recruit numbers against the five available explanatory variables for positive catch records only.
- A binomial (logit) model, which regressed the presence or absence of pre-recruits in the sample against the same five explanatory variables. This additional regression model was required because of the large number of pots with no pre-recruits.

The two regressions were combined into a single standardised index using the method of Vignaux (1994).

## 3. RESULTS

### 3.1 Landed catch and TACC

Total landed New Zealand rock lobster catch in 2003–04 was about 200 t below the total New Zealand TACC for rock lobster (Table 1), which continues the close correspondence between landings and TACC that has existed since 1998–99. The QMAs that show a shortfall between the TACC and landings are CRA 2, CRA 3, and CRA 6 (Table 1). There is a reasonably close correspondence in all rock lobster QMAs between the catch reported to the QMR and the sum of the landings from the bottom section of the CELR form (Table 2). The larger shortfall in some QMAs (such as CRA 8 and CRA 6) is likely due to the common practice of holding fish after capture in these QMAs and the consequent exclusion of these landings from this analysis using the procedure described in Section 2.3.

### 3.2 CRA 1

Since the 1979–80 fishing year, there has been a decrease in the number of vessels that report catch from CRA 1 (Table 3). The number of vessels currently reporting in this fishery appears to have



stabilised near or below 20, a decline of almost half from the early 1980s. There was a large increase in the proportion of the CRA 1 catch taken from Area 901 during the late 1990s, and a corresponding drop in the proportion of catch taken in Areas 902 and 903 (Table 4). This pattern changed in 2003–04 with over 50% of the catch taken in Area 902, which is consistent with the drop in the number of active vessels in Area 901 (Table 3, Table 4). The proportion of catch taken from Area 939 has varied around 0.20 for the last decade, with some increase in 1998–99 and 1999–2000.

Trends in cumulative monthly catch by fishing year show a relatively stable catch distribution in the early 1980s, with most catch taken in the spring and summer months (Table 5, Figure 2). There was a shift towards a winter and spring fishery in the early 1990s. In 2003–04, the major portion of the catch was taken in Areas 901 and 939 between July and October (Table 6).

Arithmetic CPUE trajectories for 1979–80 to 2001–02 show variable trends between Areas, although Area 901 has shown the most increase and has the highest overall CPUE (Table 7, Figure 3). CPUE from all Areas combined shows a shallow peak in 1982–83 followed by a long steady decline to 1992–93 (Table 8, Figure 4). Catch rates then increased rapidly to over 1 kg/potlift in 1995–96 and have remained stable above this level since then.

### 3.3 CRA 2

There has been a decrease in the number of vessels which report catch from CRA 2 since the 1979–80 fishing year (Table 9). The present number of vessels is low relative to the number reporting in the early 1980s, declining over 20 years from over 80 vessels to below 40. The relative importance of the four rock lobster statistical areas which make up this QMA has remained relatively constant over the last decade, with Area 906 (western Bay of Plenty) being the most important (Table 10). The percentage of catch coming from the eastern Bay of Plenty (Areas 907 and 908) has remained relatively constant at about 40%, but the relative contribution between these two statistical areas has varied annually.

The trends in cumulative monthly catch by fishing year show a relatively stable catch distribution in the early 1980s with most of the catch taken in the spring and summer, apart from a high level of catch in July 1989 (Table 11, Figure 5). There was a gradual shift towards a winter fishery in the early 1990s, with about 60% of the 1994–95 catch taken from April to September. This shift peaked between 1996–97 and 1998–99 with over 85% of the catch in each of those three fishing years taken between April and September. The shift now appears to be reversing, with over 40% of the catch remaining at the end of October in 2002–03 and 2003–04, while in the latter half of the 1990s less than 10% of the catch was taken after October (Table 11). In 2003–04, most of the catch was taken between July and February, spread between the four statistical areas with Area 906 predominating (Table 12).

Arithmetic CPUE trajectories for 1979–80 to 2003–04 show increasing trends in all Areas from the early 1990s, with Area 907 showing by far the strongest increase (Table 13, Figure 6). The overall trend in CPUE for the entire QMA shows a steady increase from the early 1990s to a peak in 1997–98 and 1998–99 followed by a decline to a current level (Table 14, Figure 7). The unstandardised and standardised CPUE trends are very similar, except that the standardised analysis estimates a higher peak for the period 1997–98 and 1998–99. This was probably caused by the shift in effort towards winter months causing a reduction in the arithmetic and unstandardised CPUE. There was very little change in the standardised indices between 2002–03 and 2003–04.

### 3.4 CRA 3

As with other QMAs, there has been a decrease since the 1979–80 fishing year in the number of vessels that report catch from CRA 3 (Table 15). The number of vessels declined from about 80 vessels in the early 1980s to about 30 in the mid 1990s. It is possible that this trend is reversing in this QMA because the number of vessels has recently increased to the high 30s. Relatively high numbers

of vessels (over 50) continued to report catch until the 1993–94 fishing year, the year after the TACC was cut by 50% and the fishery shifted to primarily the winter months.

The relative importance of the three rock lobster statistical areas which make up this QMA remained relatively constant to 2000–01, with Area 910 (Gisborne) being the most important (Table 16). Area 911 (Mahia Peninsula) has become the statistical area providing the highest catch since the 2001–02 fishing year, probably because of the higher catch rates occurring in that Area.

This fishery was primarily a summer fishery until regulations were changed in 1992–93 to encourage a winter fishery aimed at males by lowering the minimum size limit to 52 mm tail width from 54 mm tail width only for June through August. The cumulative monthly catch proportions by fishing year show this shift clearly, with over 60% of the catch taken by the end of August in 1992–93 rising to nearly 90% in 1996–97 and 1997–98 (Table 17, Figure 8). This shift is now reversing, with the winter catch dropping to below 80% taken by the end of August in 2000–01 and to 60% and lower since 2001–02 (Table 17). There have been significant catches in November and December in 2002–03 and 2003–04 since these months were reopened to commercial fishing. In 2003–04, June and July remained important months for catch, especially in Area 910 (Table 18).

Arithmetic CPUE trajectories for 1979–80 through to 2003–04 show strong increasing trends in all Areas beginning in the early 1990s, with all three Areas increasing to similar levels (Table 19, Figure 9). All statistical areas peaked in CPUE in the mid 1990s and have since declined. Area 909 appears to have dropped less to about 0.8 kg/potlift, while Areas 910 and 911 are currently near 0.5–0.6 kg/potlift. Areas 909 and 911 appeared to drop less quickly than Area 910, possibly accounting for the shift in the relative amount of catch coming from Areas 910 and 911 (see Table 18). The overall trend in CPUE for the entire QMA shows a steady increase from the early 1990s to a peak in 1997–98, followed by a decline to a level somewhat higher than the early 1990s (Table 20, Figure 10). The unstandardised and standardised CPUE trends are very similar, except that the standardised analysis estimates a relatively higher peak for 1997–98 (Table 20, Figure 10). This was probably caused by the shift in effort towards winter months causing a reduction in average CPUE in the arithmetic series.

### 3.5 CRA 4

Although there has been a decrease since the 1979–80 fishing year in the number of vessels that report catch from CRA 4, the decline is less than in CRA 1, CRA 2, and CRA 3 (Table 21). The number of vessels fell from about 85 to 90 during the 1980s to 61 to 72 vessels in the late 1990s and early 2000s. The single count of 131 vessels in 1989 is likely an artefact of the changeover from the FSU to CELR systems where vessels were likely double-counted because the vessel codes were not properly transferred between the systems. The relative importance of the five rock lobster statistical areas that make up this QMA has remained relatively constant for the 25 years presented, with Area 914 (South Wairarapa) being the most important (Table 22). Areas 912 (Hawke Bay) and 913 (North Wairarapa) contribute most of the remainder of the catch.

Before 1992–93, most fishing took place in the spring and summer months, although a significant proportion of the catch was also taken in winter (Table 23, Figure 11). Winter fishing predominated by the 1993–94 fishing year and this pattern has been maintained more or less to the present, with little evidence of a return to summer fishing as observed in CRA 1, CRA 2, and CRA 3 (Table 23, Figure 11). However, only about 50% of the catch was taken by the end of August in 2003–04, compared to 60–70% taken in the preceding five or six years. In 2003–04, about half of the catch was taken between June and September in Areas 912, 913, 914, and 915 (Table 24).

Arithmetic CPUE trajectories for 1979–80 to 2003–04 show an increase in all areas beginning in 1992–93 (Table 25, Figure 12). The increase in Area 914 ended by the 1996–97 fishing year, well below the peak catch rates observed in the two more northerly Areas, and then remained relatively constant (Table 25, Figure 12). Areas 912 and 913 increased to much higher levels. The four main statistical areas have since declined to approximately the same mean catch per potlift in both the 2002–03 and 2003–04 fishing years (Table 25). The pattern of increase and the peak year for mean

catch rate in Areas 912 and 913 resembles similar patterns observed in the more northerly statistical areas in CRA 2 and CRA 3 (compare Figure 6 and Figure 9 with Figure 12). Note that the year of peak catch rates in CRA 3 is one or two years earlier than for the peaks observed in Areas 912 and 913. The overall trend in CPUE for the entire QMA is similar to that for CRA 3, with a steady increase from the early 1990s to a peak in 1998–99, which is one year later than in CRA 3 (Table 26, Figure 13). The relative decline since the peak fishing year has been less for CRA 4 than for CRA 3, and shows what appears to be a reversal of the decline in the most recent two fishing years (compare Table 20 with Table 26). The unstandardised and standardised CPUE trends are very similar, except that the standardised analysis estimates a relatively higher peak for 1998–99 (Table 26, Figure 13). This was probably caused by the shift in effort towards winter months, causing a reduction in average CPUE in the unstandardised series.

### 3.6 CRA 5

There has been a decline in the number of vessels fishing in CRA 5 since the 1979–80 fishing year (Table 27). Currently, there are fewer than 40 vessels reporting in this QMA, compared to the 80 to 90 which fished there during the 1980s (Table 27). Six rock lobster statistical areas make up this QMA, but most of the catch is reported from Area 916 (Cape Campbell) and Area 917 (Kaikoura-Motanau) and a lesser amount from Area 932 (Marlborough Sounds; Table 28). The relative proportions between these Areas have changed somewhat, with Area 916 rising in importance in the most three years to over 40% of the catch along with corresponding decreases in the relative importance of Areas 917 and 932.

This fishery remained predominantly a summer fishery for longer than any of the North Island QMAs and did not shift to a winter fishery until 1996–97 (Table 29, Figure 14). Unlike the northern QMAs, the relative proportion of the catch taken in the winter months has continued to increase, with about 80% of the catch taken by the end of September in the most recent fishing year. In 2003–04, 60% of the catch was taken between April and August in Areas 916 and 917 (Table 30). Peak catch months were June and July in Area 916.

Arithmetic CPUE trajectories for 1979–80 to 2003–04 show similar trends up to the mid 1990s. At that time there was an increase in CPUE in all Areas, but at a much greater rate in Area 916 (Table 31, Figure 15). Area 916 increased to catch rates that are much higher than those in the other statistical areas, peaking in 2000–01. Catch rates in this statistical area have since declined, but are still strong, and there is a suggestion of an increase in 2003–04. The overall trend in CPUE for the QMA shows a continuous increase that appears to have not yet peaked (Table 32, Figure 16). The unstandardised and standardised CPUE trends are similar, except that the standardised increasing trend is steeper than that for the unstandardised analysis (Table 32, Figure 16). This difference reflects the shift to a winter fishery where catch rates tend to be relatively lower.

### 3.7 CRA 6

The number of vessels fishing in CRA 6 fluctuated between 39 and 59 during the 1980s and most of the 1990s. In 1999–2000 the number of vessels dropped to 34 and has remained at about that level since (Table 33).

Four rock lobster statistical areas make up the Chatham Islands QMA, with Area 942 (Southeast Chatham Islands) generally having about half of the catch (Table 34). The relative proportions between these Areas have remained reasonably constant, with the two northern statistical areas (940 and 941) accounting for about 40% of the annual catch.

This fishery has been predominantly a spring-summer (October to February) fishery for its entire history, with little tendency to shift to a winter fishery as on the New Zealand mainland (Table 35, Figure 17). In 2003–04, 70% of the catch was taken between September and February in Areas 940, 941, and 942 (Table 36).

Arithmetic CPUE trajectories for 1979–80 to 2003–04 show a decline in mean annual catch rates in the early 1980s for all Areas except Area 941 (Table 37, Figure 18). Area 942 has consistently had the highest mean catch rates since the mid 1980s, which probably explains why this statistical area has the highest catch (see Table 36). Mean catch rates in all four statistical areas, although variable, have tended to stabilise since the mid 1990s. The overall trend in CPUE for the QMA shows a drop in the early 1980s, followed by a period of relative stability (Table 38, Figure 19). The unstandardised and standardised CPUE trends are similar, with the standardised index slightly higher than the unstandardised indices in recent years.

### 3.8 CRA 7

The number of vessels reporting rock lobster in CRA 7 has dropped considerably since the early 1980s (Table 39), as in all other QMAs. There are only two statistical areas in this QMA, with Area 920 accounting for about two-thirds of the catch (Table 40).

The seasonal distribution for this fishery has been relatively consistent over the entire period because this fishery is restricted by regulation to 21 June to 19 November (Table 41, Figure 20). Consequently, the cumulative proportional trajectories for this fishery are similar for all fishing years (Figure 20). In 2003–04, 67% of the catch was taken between June and October in Area 920 (Table 42).

Arithmetic CPUE trajectories for 1979–80 to 2003–04 show a decline in mean annual catch rates in the early 1980s (Table 43, Figure 21). Area 921 has consistently had the higher mean catch rates, but they tend also to be more variable. Both areas had a broadly declining trend in mean CPUE to the end of the 1990s, although this pattern is highly variable and may have reversed, particularly in Area 921 (Figure 21). The overall trend in CPUE for this QMA also reflects this broad downward trend but there are notable increases in mean CPUE in 1986–87, 1991–92, and 1993–94 (Table 44, Figure 22). Mean CPUE has been rising consistently since 1997–98 when the lowest value in the series was recorded (Figure 22). The unstandardised and standardised CPUE trends are very similar (Table 44, Figure 22).

### 3.9 CRA 8

This QMA historically had the greatest number of vessels (Table 45). Nearly 300 vessels reported lobster in the early 1980s, but this total has gradually dropped to near 60 at present. Seven rock lobster statistical areas make up this QMA and about 80% of catch is reported from Areas 926 to 928 (Fiordland; Table 46). Area 926 (Puysegur) appears to have increased in relative importance within the three Fiordland statistical areas, accounting for nearly 50% of the total CRA 8 landings in the two most recent fishing years. Area 924 (Stewart Island) is also an important fishery that has contributed between 12 and 23% of the annual landings, with recent levels near 14–15% (Table 46).

The seasonal distribution of catch for this fishery has been relatively consistent over the entire period, with about 80% of catch taken from August to November (Table 47, Figure 23). In some years, up to 14% of the annual catch is taken in December and up to 11% in January, probably reflecting relatively poor catches earlier in the fishing year (Table 47). The proportion of catch taken in December and January was particularly low in 2003–04, with less than 6% of the catch taken after November (Table 48). This fishery has not developed the predominantly winter fishery seen on the east coasts of the North and South islands.

Arithmetic CPUE trajectories for 1979–80 to 2003–04 show a gradual decline in mean annual catch rates during the 1980s and early 1990s (Table 49, Figure 24). Catch rates were relatively stable up to the early 2000s, with Areas 924 and 926 having the highest mean catch rates amongst the areas with high catches (Table 49). Catch rates are now improving, with strong rises in all statistical areas in 2003–04 (Table 49). The overall trend in CPUE for this QMA shows a drop from the early 1980s to the early 1990s followed by a period of relative stability. There has been a rising trend since 1999–

2000, with a very strong rise in 2003–04 (Table 50, Figure 25). The lowest mean annual CPUE values in this time series were recorded in 1992–93 and 1997–98 (Table 50). The unstandardised and standardised CPUE trends are very similar, with the standardised index rising more steeply (Table 50, Figure 25).

### 3.10 CRA 9

The number of vessels reporting lobster catch in this QMA has halved from about 20 in the early 1980s to about 10 in the three most recent fishing years (Table 51). Some of the statistical areas in this QMA do not have any vessels reporting catch in the more recent fishing years. There are seven rock lobster statistical areas in CRA 9, with Areas 930, 931, 935, and 936 being the most important (Table 52). The relative contribution of these areas to the total CRA 9 catch has fluctuated substantially (Table 52).

The distribution of catch in this fishery has shifted from predominantly summer to late winter in the early 1990s (Table 53, Figure 26). This shift was particularly strong in 2001–02, with over 90% of the catch taken by the end of October (Table 53). Between 60 and 70% of the catch has been taken by the end of September in the four most recent fishing years. In 2003–04, 49% of the catch was taken between July and October in Areas 931, 935, and 936 (Table 54).

Arithmetic CPUE trajectories for 1979–80 to 2003–04 are difficult to interpret because many of the year/statistical area combinations cannot be reported because of confidentiality restrictions (Table 55, Figure 27). However, Area 931 has consistently higher mean annual catch rates (Table 55). CPUE for this QMA has increased strongly in the two most recent fishing years after a long period of relative stability, although the precision on the individual year indices is low (Table 56, Figure 28). The unstandardised and standardised CPUE trends are very similar throughout the series (Table 56, Figure 28).

### 3.11 CRA 3 standardised CPUE indices by period

Standardised indices by season (autumn-winter: April–September; spring-summer: October–March) have been calculated for CRA 3 (Table 57, Figure 29) from the 1979–80 to 2003–04 fishing years. These series were used as input into the 2004 stock assessment for CRA 3.

The total deviance explained by the model is relatively high (about 50%, Table 58), with most of the explanatory power lying with model period. The residual patterns show some deviation from the lognormal assumption at both tails of the residual distribution, but appear to be reasonable in the centre of the distribution. June and July are the peak catching months during the autumn/winter season, as are November and December in the spring/summer season (Figure 30). Area 910 has the lowest relative catchability while Areas 909 and 911 are approximately equal in their relative catchability (Figure 30). The CPUE series by model period shows a long period of stability ending in the lowest observed value for the series in period 95 (autumn/winter 1992; Figure 29). CPUE then rose to a peak in periods 106 (spring/summer 1997) and 108 (spring/summer 1998) and has since declined (Figure 29).

A comparison of the CPUE indices calculated for the 2004 assessment with the equivalent indices used in the 2001 CRA 3 assessment show some differences, particularly in the peak periods of the late 1990s (Figure 31). The high peak observed in period 108 in the 2001 standardised series is still the highest peak of the 2004 series, but is now comparable in the present analysis with the peak in period 106. Periods 106 and 108 both have large error bars (see Figure 29) and relatively few data. The raw uncorrected data are virtually the same in all but three periods for the overlapping periods in the 2001 and 2004 series. Therefore, it seems likely that the differences observed in the two series are attributable to the changes in the methods used to correct the estimated catch with the landed catch. We consider, based on the extensive testing, that the current method is superior to that used in 2001.

### 3.12 CRA 3 standardised pre-recruitment index (PRI)

Standardised indices by season (autumn-winter: April–September; spring-summer: October–March) were calculated for sub-legal lobster in CRA 3 (Table 59, Figure 32) from period 97 (autumn/winter 1993) to period 118 (spring/summer 2003–04). About 38,000 potlifts were available for this analysis, with three periods (102, 104 and 106) excluded due to insufficient potlifts (see Table 60). These series were used as input into the 2004 stock assessment for CRA 3.

The lognormal model shows a reasonable fit to its distributional assumption, but there are some patterns in the residuals. The relative abundance of pre-recruits appears to be increasing in the five most recent periods, while Area 910 has the highest abundance of pre-recruits (Figure 32). The relative abundance by month is lower in the autumn/winter months, and there is a declining trend with increasing depth down to 40 m, at which point there is an increasing trend (Figure 32). There are relatively few data for the deeper depths, which means that the increasing trend estimated for the deeper depths may be spurious. There appears to be no difference in the information based on the data source. The lognormal model explains about 23% of the total deviance, with statistical area followed by month of capture being the most powerful explanatory variables (Table 61).

The binomial model also shows a reasonable fit to its distributional assumption, and there is relatively little pattern in the residuals. There is one large spike in the relative abundance of pre-recruits, with little contrast in the rest of the period coefficients; there is a declining trend in the presence of pre-recruits with depth and a similar declining trend in pre-recruits from north to south (Areas 909 to 911) (Figure 33). The relative abundance by month shows a higher prevalence of pre-recruits in the autumn/winter months and the fishermen who complete logbooks appear to find a few more pre-recruits than is observed in the catch sampled by observers (Figure 33). The binomial model explains about 14% of the total deviance with statistical area and period of capture being the most powerful explanatory variable (Table 61). The combined model is similar to, but more variable than, the lognormal model (Figure 34). None of the three models shows much contrast or trend over the time period examined.

The proportion of pots with zero catch of pre-recruits shows high variability and a possible increasing trend towards the end of the time period analysed (Figure 35). The trend in the proportion of zero sub-legal fish is mirrored by the proportion of pots with no catch of lobster in any size category. However, there is uncertainty whether the proportion of zero pots with respect to sub-legal lobster is correctly determined, given the design of the catch sampling programme. Observers are allowed to count but not measure lobsters in pots if they fall behind in their measurements, but all pots with zero catch are included as part of the sample. Pots with unmeasured lobster may be zero with respect to sub-legal lobster, but this information is not available because of the lack of measurements. The Rock Lobster Fishery Assessment Working Group concluded that the binomial model (Figure 33) may be biased because the true proportion of zeros is not known for sub-legal lobsters and decided that the lognormal index was potentially more reliable. Therefore, the 2004 CRA 3 stock assessment used only the lognormal model as an index series in the assessment model.

## 4. ACKNOWLEDGMENTS

This work was done for Objective 3 of Ministry of Fisheries Research Project CRA2003–01 contracted to the New Zealand Rock Lobster Industry Council Limited.

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**Table 1: Reported commercial catch (t), commercial TACC (t) and total allowable catch (TAC) of *Jasus edwardsii* to the Quota Management System by rock lobster QMA for each fishing year since the species was included in the QMS on 1 April 1990.**

Fishing Year	CRA 1			CRA 2			CRA 3		
	Catch	TACC	TAC	Catch	TACC	TAC	Catch	TACC	TAC
1990-91	131.1	160.1	-	237.6	249.5	-	324.1	437.1	-
1991-92	128.3	146.8	-	229.7	229.4	-	268.8	397.7	-
1992-93	110.5	137.4	-	190.3	214.6	-	191.5	327.5	-
1993-94	127.4	130.5	-	214.9	214.6	-	179.5	163.7	-
1994-95	130.0	130.5	-	212.8	214.6	-	160.7	163.7	-
1995-96	126.7	130.5	-	212.5	214.6	-	156.9	163.7	-
1996-97	129.4	130.5	-	213.2	214.6	-	203.5	204.7	-
1997-98	129.3	130.5	-	234.4	236.1	452.6	223.4	204.9	379.4
1998-99	128.7	131.1	-	232.3	236.1	452.6	325.7	327.0	453.0
1999-00	125.7	131.1	-	235.1	236.1	452.6	326.1	327.0	453.0
2000-01	130.9	131.1	-	235.4	236.1	452.6	328.1	327.0	453.0
2001-02	130.6	131.1	-	225.0	236.1	452.6	289.9	327.0	453.0
2002-03	130.8	131.1	-	205.7	236.1	452.6	291.0	327.0	453.0
2003-04	128.7	131.1	-	195.8	236.1	452.6	215.7	327.0	453.0
2004-05		131.1			236.1	452.6		327.0	453.0

Fishing Year	CRA 4			CRA 5			CRA 6		
	Catch	TACC	TAC	Catch	TACC	TAC	Catch	TACC	TAC
1990-91	523.2	576.3	-	308.6	465.2	-	369.7	518.2	-
1991-92	530.5	529.8	-	287.4	426.8	-	388.3	503.0	-
1992-93	495.7	495.7	-	258.8	336.9	-	329.4	503.0	-
1993-94	492.0	495.7	-	311.0	303.2	-	341.8	530.6	-
1994-95	490.4	495.7	-	293.9	303.2	-	312.5	530.6	-
1995-96	487.2	495.7	-	297.6	303.2	-	315.3	530.6	-
1996-97	493.6	495.7	-	300.3	303.2	-	378.3	530.6	-
1997-98	490.4	495.7	-	299.6	303.2	-	338.7	400.0	480.0
1998-99	493.3	495.7	-	298.2	303.2	-	334.2	360.0	370.0
1999-00	576.5	577.0	-	349.5	350.0	467.0	322.4	360.0	370.0
2000-01	573.8	577.0	771.0	347.4	350.0	467.0	324.7	360.0	370.0
2001-02	574.1	577.0	771.0	349.1	350.0	467.0	328.7	360.0	370.0
2002-03	575.2	577.0	771.0	348.7	350.0	467.0	335.8	360.0	370.0
2003-04	574.5	577.0	771.0	349.9	350.0	467.0	285.8	360.0	370.0
2004-05		577.0	771.0		350.0	467.0		360.0	370.0

Fishing Year	CRA 7			CRA 8		
	Catch	TACC	TAC	Catch	TACC	TAC
1990-91	133.4	179.4	-	834.5	1 152.4	-
1991-92	177.7	164.7	-	962.7	1 054.6	-
1992-93	131.6	153.1	-	876.5	986.8	-
1993-94	138.1	138.7	-	896.1	888.1	-
1994-95	120.3	138.7	-	855.6	888.1	-
1995-96	81.3	138.7	-	825.6	888.1	-
1996-97	62.9	138.7	-	862.4	888.1	-
1997-98	36.0	138.7	-	785.6	888.1	-
1998-99	58.6	138.7	-	808.1	888.1	-
1999-00	56.5	111.0	-	709.8	711.0	-
2000-01	87.2	111.0	131.0	703.4	711.0	798.0
2001-02	76.9	89.0	109.0	572.1	568.0	655.0
2002-03	88.6	89.0	109.0	567.1	568.0	655.0
2003-04	81.4	89.0	109.0	566.8	568.0	655.0
2004-05		94.9	114.9		603.4	690.4

Fishing Year	CRA 9			Total	
	Catch	TACC	TAC	Catch	TACC <sup>1</sup>
1990-91	45.3	54.7	-	2 907.4	3 793.0
1991-92	47.5	50.2	-	3 020.9	3 502.9
1992-93	45.7	47.0	-	2 629.9	3 201.9
1993-94	45.5	47.0	-	2 746.2	2 912.1
1994-95	45.2	47.0	-	2 621.5	2 912.1
1995-96	45.4	47.0	-	2 548.6	2 912.1
1996-97	46.9	47.0	-	2 690.5	2 953.1
1997-98	46.7	47.0	-	2 584.2	2 844.1
1998-99	46.9	47.0	-	2 726.0	2 926.8
1999-00	47.0	47.0	-	2 748.5	2 850.2
2000-01	47.0	47.0	-	2 795.9	2 850.2
2001-02	46.8	47.0	-	2 593.0	2 685.2
2002-03	47.0	47.0	-	2 589.8	2 685.2
2003-04	45.9	47.0	-	2 444.6	2 685.2
2004-05		47.0	-		2 726.5

<sup>1</sup> TACC totals exclude CRA 10 (TACC=0.1 t); catch totals exclude CRA 10 and ET catches (outside EEZ).



**Table 2: Ratio of the sum of landed catch from the bottom portion of the CELR forms relative to the reported QMR/MHR catch for each QMA and fishing year. Landed catches from CELRs include only records where error ratings are less than or equal to 1 and have been adjusted using the B4 algorithm (Bentley et al. in prep a). The landed catch data From CELRs are the data used to calculate all tables and graphs in this report.**

Fishing Year	CRA 1	CRA 2	CRA 3	CRA 4	CRA 5	CRA 6	CRA 7	CRA 8	CRA 9
1990-91	0.96	0.87	1.00	0.99	0.94	0.81	0.89	0.86	1.03
1991-92	1.12	0.92	0.99	0.99	1.00	0.85	0.94	0.93	1.02
1992-93	1.08	0.97	0.99	1.00	0.98	0.83	0.97	0.92	1.04
1993-94	1.06	1.00	1.03	1.00	0.96	0.86	0.98	0.89	1.17
1994-95	0.99	0.95	1.00	1.01	0.96	0.92	0.98	0.90	1.35
1995-96	0.93	0.96	1.02	0.98	0.95	0.94	0.96	0.88	1.24
1996-97	1.01	0.89	0.93	0.94	0.94	0.88	0.92	0.86	1.84
1997-98	0.87	0.89	0.91	0.95	0.95	0.87	0.91	0.84	1.55
1998-99	0.87	0.92	0.87	0.94	0.92	0.82	0.86	0.84	1.45
1999-00	0.98	0.88	0.96	0.94	0.91	0.75	0.58	0.82	1.75
2000-01	0.91	0.95	0.97	0.95	0.83	0.82	0.95	0.87	1.01
2001-02	0.94	0.93	0.94	0.96	0.88	0.85	0.97	0.85	0.93
2002-03	0.89	0.93	0.92	0.97	0.85	0.78	0.95	0.75	0.84
2003-04	0.83	0.93	0.91	0.91	0.96	0.81	0.98	0.78	0.92

**Table 3: Number of vessels reporting rock lobster by statistical area from CRA 1, 1979-80 through to 2003-04. Vessels recorded as catching less than 1 t in a year for the entire QMA have been excluded.**

Fishing year	901	902	903	904	939	All
1979-80	5	9	8	7	10	34
1980-81	3	9	10	11	9	34
1981-82	3	8	10	9	8	33
1982-83	3	10	8	9	9	33
1983-84	5	14	6	8	7	31
1984-85	5	14	4	8	7	30
1985-86	5	10	8	10	8	34
1986-87	5	11	12	9	9	35
1987-88	4	10	13	8	9	30
1988-89	5	6	8	6	8	26
1989-90	7	7	5	8	9	27
1990-91	12	10	7	7	8	27
1991-92	8	16	13	12	8	33
1992-93	3	11	7	10	8	31
1993-94	6	8	6	9	6	27
1994-95	4	6	5	9	4	22
1995-96	4	6	5	9	5	23
1996-97	3	3	8	11	5	26
1997-98	2	3	4	7	6	21
1998-99	2	3	3	6	6	19
1999-00	5	3	3	6	6	20
2000-01	4	3	3	6	5	18
2001-02	4	4	3	5	5	18
2002-03	6	6	3	3	6	17
2003-04	1	6	3	3	6	15

**Table 4: Percentage of annual catch by statistical area from CRA 1, 1979–80 through 2003–04.**

Fishing year	901	902	903	904	939
1979–80	16.9	23.6	19.8	15.3	24.4
1980–81	12.5	31.0	13.4	17.8	25.2
1981–82	11.1	35.4	20.6	12.1	20.8
1982–83	18.3	32.4	12.1	14.1	23.1
1983–84	21.3	31.7	7.9	14.3	24.7
1984–85	16.4	39.6	7.4	14.7	21.9
1985–86	17.4	31.1	8.6	19.2	23.7
1986–87	11.0	25.0	19.5	22.2	22.2
1987–88	18.3	23.9	15.7	18.3	23.8
1988–89	20.1	25.2	12.0	19.6	23.1
1989–90	28.2	20.4	11.3	19.6	20.5
1990–91	27.2	27.8	9.9	14.0	21.0
1991–92	7.9	30.7	16.7	18.4	26.3
1992–93	15.5	28.6	14.0	20.1	21.8
1993–94	27.0	27.9	11.7	16.8	16.6
1994–95	25.2	20.7	13.6	24.4	16.2
1995–96	15.3	16.6	17.0	31.9	19.2
1996–97	16.2	16.2	19.0	30.5	18.1
1997–98	13.8	19.4	15.8	22.9	28.0
1998–99	23.2	18.5	12.0	15.7	30.6
1999–00	45.2	8.3	5.3	10.3	30.9
2000–01	51.5	10.9	8.0	10.2	19.4
2001–02	49.0	9.6	8.5	8.7	24.2
2002–03	35.2	21.0	7.5	6.0	30.3
2003–04	3.8	53.9	7.0	10.9	24.4

**Table 5: Percentage of annual catch by month from CRA 1, 1979–80 through 2003–04.**

Fishing year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1979–80	0.9	0.1	0.1	4.4	9.4	7.3	10.1	16.5	15.8	14.9	16.4	4.2
1980–81	2.1	0.3	0.7	3.7	6.8	4.4	11.9	10.0	19.1	23.9	11.1	5.9
1981–82	1.2	0.1	0.3	2.6	6.4	7.1	11.1	13.4	22.1	22.3	8.9	4.6
1982–83	0.2	0.4	0.4	2.8	6.3	9.6	9.7	16.1	19.6	15.1	12.5	7.2
1983–84	2.0	0.0	0.3	5.5	9.0	7.8	15.8	14.8	14.2	15.1	10.6	4.9
1984–85	1.8	0.7	0.6	4.0	5.1	11.1	13.5	15.4	16.0	14.5	10.1	7.2
1985–86	1.4	0.8	1.1	6.3	8.2	6.6	10.4	13.9	15.0	17.6	12.8	5.7
1986–87	1.7	0.6	1.0	6.1	10.1	10.3	14.5	14.3	13.1	11.4	11.9	5.1
1987–88	1.1	0.4	0.6	3.7	9.1	6.6	14.7	14.2	13.9	17.3	12.0	6.4
1988–89	2.4	1.4	1.0	1.8	7.2	2.4	12.8	18.3	20.7	15.4	9.0	7.6
1989–90	1.1	0.4	0.5	3.9	5.3	8.9	5.9	18.6	20.9	16.9	12.2	5.3
1990–91	0.1	0.2	0.7	4.3	14.9	12.0	14.2	15.0	15.9	11.2	7.1	4.5
1991–92	0.2	0.4	1.1	8.0	9.5	10.3	10.3	9.8	19.7	16.8	9.9	3.9
1992–93	0.1	1.1	1.9	6.3	9.5	8.3	14.0	13.9	14.2	14.9	11.0	4.9
1993–94	0.1	0.3	1.8	7.2	9.2	7.2	18.4	14.7	17.7	12.9	7.9	2.6
1994–95	0.1	0.5	2.4	9.5	15.0	7.6	10.8	17.1	17.2	8.9	7.7	3.1
1995–96	1.2	2.1	2.8	11.9	19.0	18.9	16.8	10.6	6.8	2.4	3.4	4.1
1996–97	1.2	4.9	3.9	18.5	13.8	18.8	15.8	12.3	5.8	2.2	1.7	1.0
1997–98	5.3	6.7	5.4	20.8	20.0	18.5	12.3	4.0	2.2	0.5	0.3	4.0
1998–99	4.8	6.3	7.7	21.1	17.3	20.7	10.9	4.3	3.3	2.9	0.3	0.4
1999–00	3.1	4.4	5.0	19.5	25.7	20.0	13.1	4.7	2.6	0.7	0.2	0.9
2000–01	2.3	2.2	4.9	13.4	23.6	23.3	22.6	4.8	0.9	1.0	0.6	0.5
2001–02	3.3	4.1	5.6	14.4	20.6	26.9	11.5	7.5	3.9	1.3	0.3	0.4
2002–03	4.4	5.4	2.6	16.6	20.4	18.1	17.3	7.2	4.2	3.2	0.2	0.3
2003–04	3.6	0.8	0.6	19.8	15.7	10.1	24.8	7.6	8.6	4.8	2.5	1.1

**Table 6: Percentage of catch from CRA 1 by statistical area and month for 2003-04. A '.' indicates that no fishing took place in that month/statistical area combination.**

Month	901	902	903	904	939
Apr	.	.	.	.	3.6
May	.	.	.	0.0	0.8
Jun	.	0.2	.	0.2	0.2
Jul	1.0	11.6	1.8	1.6	3.7
Aug	1.6	6.8	2.1	2.4	2.8
Sep	1.1	5.2	1.0	1.3	1.4
Oct	0.0	16.3	1.5	1.7	5.2
Nov	.	5.7	0.1	1.1	0.8
Dec	.	4.2	0.4	1.6	2.4
Jan	.	2.7	0.1	0.8	1.2
Feb	.	1.0	0.1	0.1	1.3
Mar	.	0.2	.	.	0.9

**Table 7: Arithmetic CPUE (total kg/total potlifts) for CRA 1 by fishing year and statistical area, 1979-80 through 2003-04. '.', value not available because there were fewer than 3 vessels or there was no fishing in that year/statistical area combination.**

Fishing year	901	902	903	904	939
1979-80	1.905	1.417	0.695	0.516	0.466
1980-81	2.045	1.799	0.705	0.761	0.771
1981-82	2.010	1.778	0.904	0.717	0.776
1982-83	2.866	2.058	0.580	0.724	0.855
1983-84	1.888	1.473	0.602	0.657	1.118
1984-85	1.681	1.373	0.636	0.578	0.771
1985-86	1.160	1.302	0.665	0.622	0.800
1986-87	1.341	0.972	0.740	0.530	0.709
1987-88	1.581	0.939	0.641	0.512	0.636
1988-89	1.621	0.976	0.468	0.679	0.733
1989-90	1.493	1.136	0.504	0.488	0.597
1990-91	1.101	0.680	0.568	0.476	0.600
1991-92	1.451	0.813	0.442	0.412	0.646
1992-93	1.732	0.651	0.470	0.319	0.487
1993-94	1.879	1.033	0.414	0.328	0.499
1994-95	1.764	1.193	0.611	0.471	0.663
1995-96	1.829	1.300	0.898	0.669	1.018
1996-97	2.420	1.036	0.833	0.661	1.266
1997-98	2.118	1.238	0.726	0.520	1.117
1998-99	.	1.177	0.800	0.541	1.081
1999-00	2.845	1.127	0.476	0.340	1.164
2000-01	2.817	1.219	0.715	0.402	0.894
2001-02	2.910	2.766	0.765	0.501	0.860
2002-03	1.982	3.010	0.719	0.339	0.962
2003-04	.	3.301	0.784	0.363	0.803

**Table 8: Annual arithmetic, unstandardised and standardised (with standard error) CPUE indices for CRA 1 (kg/potlift) for 1979–80 through 2003–04. (s.e.=standard error).**

Fishing year	Arithmetic	Unstandardised	Standardised	s.e.
1979–80	0.735	0.794	0.817	0.039
1980–81	1.014	0.924	0.978	0.041
1981–82	1.088	0.931	0.930	0.045
1982–83	1.118	0.975	0.996	0.043
1983–84	1.112	1.016	0.949	0.042
1984–85	0.961	0.954	0.881	0.042
1985–86	0.890	0.852	0.818	0.040
1986–87	0.749	0.815	0.802	0.040
1987–88	0.742	0.764	0.753	0.041
1988–89	0.805	0.704	0.666	0.047
1989–90	0.748	0.755	0.672	0.046
1990–91	0.677	0.656	0.555	0.044
1991–92	0.601	0.660	0.648	0.040
1992–93	0.525	0.545	0.543	0.042
1993–94	0.649	0.630	0.625	0.043
1994–95	0.769	0.805	0.803	0.046
1995–96	0.938	1.088	1.211	0.052
1996–97	0.947	1.013	1.173	0.052
1997–98	0.884	0.989	1.162	0.056
1998–99	1.044	1.191	1.345	0.059
1999–00	1.096	1.075	1.113	0.062
2000–01	1.169	1.122	1.128	0.061
2001–02	1.300	1.284	1.285	0.062
2002–03	1.187	1.203	1.083	0.061
2003–04	1.137	1.082	1.093	0.068

**Table 9: Number of vessels reporting rock lobster by statistical area from CRA 2, 1979–80 through 2003–04. Vessels recorded as catching less than 1 t in a year for the entire QMA have been excluded.**

Fishing year	905	906	907	908	All
1979–80	12	31	14	27	80
1980–81	12	41	17	25	89
1981–82	16	38	15	26	88
1982–83	16	34	13	24	82
1983–84	14	29	15	20	75
1984–85	10	29	14	24	73
1985–86	14	30	15	23	78
1986–87	12	29	13	18	70
1987–88	6	25	15	18	59
1988–89	8	27	16	11	55
1989–90	14	3	1	1	17
1990–91	13	29	16	20	57
1991–92	12	27	15	17	51
1992–93	9	20	7	18	47
1993–94	8	24	11	15	46
1994–95	9	22	9	14	47
1995–96	9	24	8	16	45
1996–97	8	17	7	13	40
1997–98	12	17	8	10	43
1998–99	10	13	5	10	36
1999–00	8	15	7	9	35
2000–01	11	17	7	12	40
2001–02	11	14	7	10	36
2002–03	8	15	10	9	36
2003–04	8	13	7	9	34

**Table 10: Percentage of annual catch by statistical area from CRA 2, 1979-80 through 2003-04.**

Fishing year	905	906	907	908
1979-80	10.6	31.4	25.0	32.9
1980-81	9.8	38.6	24.0	27.6
1981-82	12.0	40.0	18.6	29.4
1982-83	14.0	42.9	18.9	24.3
1983-84	13.8	41.5	18.7	26.0
1984-85	11.0	38.8	18.2	31.9
1985-86	11.2	38.4	25.1	25.3
1986-87	9.8	44.1	19.6	26.5
1987-88	8.2	50.2	17.3	24.3
1988-89	10.5	49.8	18.3	21.4
1989-90	68.1	15.2	5.8	10.9
1990-91	14.9	41.8	17.3	26.1
1991-92	11.1	44.8	19.3	24.9
1992-93	14.6	44.0	11.7	29.8
1993-94	15.2	45.1	14.4	25.3
1994-95	14.8	46.4	17.9	20.9
1995-96	13.5	48.2	14.4	23.9
1996-97	15.7	48.9	14.8	20.6
1997-98	14.6	47.2	20.9	17.3
1998-99	18.6	41.2	21.1	19.1
1999-00	15.3	43.0	24.7	17.0
2000-01	16.0	43.6	22.4	18.0
2001-02	15.9	41.6	21.2	21.2
2002-03	14.3	34.9	21.9	28.8
2003-04	17.4	35.8	24.9	22.0

**Table 11: Percentage of annual catch by month from CRA 2, 1979-80 through 2003-04.**

Fishing year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1979-80	0.6	0.2	0.3	5.8	11.1	11.6	14.0	15.9	14.4	13.0	8.3	4.9
1980-81	1.1	0.8	2.3	9.8	13.6	10.4	17.0	10.1	13.1	12.1	6.6	3.1
1981-82	1.5	0.7	1.3	7.4	10.1	9.7	16.1	15.4	14.9	11.5	6.4	4.8
1982-83	1.7	0.2	1.2	7.8	11.5	11.1	15.2	15.1	14.9	10.3	6.9	4.1
1983-84	1.4	0.2	1.6	9.7	8.7	9.1	16.8	15.9	12.3	12.4	8.2	3.8
1984-85	1.5	0.3	1.0	7.7	8.9	14.6	18.0	13.1	13.9	11.7	6.0	3.2
1985-86	0.6	0.2	0.5	6.4	9.4	9.2	18.1	15.8	14.0	13.4	8.5	4.0
1986-87	1.0	0.2	0.5	6.4	10.2	11.6	17.5	15.5	15.9	11.3	6.1	3.6
1987-88	0.6	0.1	0.6	9.5	10.8	10.3	16.7	16.9	14.3	11.5	6.1	2.6
1988-89	1.2	0.1	0.9	8.2	13.9	13.1	16.5	11.4	13.3	10.1	6.9	4.2
1989-90	2.2	0.7	2.6	24.3	9.3	10.4	8.9	17.7	10.1	11.1	2.3	0.4
1990-91	0.0	0.1	0.5	7.9	16.7	14.7	16.4	14.6	12.4	8.3	5.8	2.6
1991-92	0.5	0.8	1.4	11.5	12.9	12.9	19.0	15.0	10.3	7.7	5.4	2.5
1992-93	0.4	0.5	2.6	9.8	10.3	11.2	16.6	13.3	13.7	9.3	7.2	5.1
1993-94	0.3	0.1	2.7	13.4	15.6	15.4	18.3	10.9	9.4	8.2	3.7	2.0
1994-95	0.3	0.3	5.2	18.6	18.6	16.0	20.5	10.6	5.0	2.6	1.7	0.8
1995-96	0.4	0.9	7.0	22.5	24.6	19.7	17.0	3.4	1.8	0.6	0.9	1.3
1996-97	3.2	5.9	7.0	35.1	19.6	16.0	6.8	1.8	1.1	1.4	1.1	0.9
1997-98	5.1	3.8	9.3	32.2	18.9	20.0	8.9	0.4	0.9	0	0.1	0.3
1998-99	1.7	4.3	8.2	22.4	21.8	29.7	5.5	2.5	0.6	0.1	2.2	1.1
1999-00	2.1	4.5	3.8	21.1	20.3	23.0	19.3	2.0	0.6	1.2	1.0	1.3
2000-01	4.6	1.8	1.2	10.5	18.7	18.8	24.7	7.9	2.8	1.3	3.1	4.5
2001-02	3.8	2.5	1.6	13.8	14.3	16.9	23.6	9.1	3.9	2.6	3.8	4.1
2002-03	2.8	1.2	1.2	10.5	10.6	9.1	22.9	13.2	9.8	6.3	7.0	5.5
2003-04	2.1	0.6	1.1	7.4	10.4	12.6	20.2	12.8	9.5	12.1	6.4	4.8

**Table 12: Percentage of catch from CRA 2 by statistical area and month for 2003-04. A '.' indicates that no fishing took place in that month/statistical area combination.**

Month	905	906	907	908
Apr	0.1	2.0	.	.
May	0.1	0.5	.	.
Jun	0.2	0.3	0.6	.
Jul	1.3	2.6	3.1	0.5
Aug	2.4	3.3	2.4	2.3
Sep	2.8	4.5	3.2	2.1
Oct	4.0	6.4	4.6	5.2
Nov	1.7	3.9	3.2	3.9
Dec	1.8	2.5	1.9	3.3
Jan	1.5	3.7	3.4	3.6
Feb	1.1	2.8	1.5	1.0
Mar	0.4	3.3	1.0	0.1

**Table 13: Arithmetic CPUE (total kg/total potlifts) for CRA 2 by fishing year and statistical area, 1979-80 through 2003-04.**

Fishing year	905	906	907	908
1979-80	0.679	0.396	0.688	0.542
1980-81	0.735	0.554	0.785	0.548
1981-82	0.565	0.526	0.669	0.525
1982-83	0.530	0.434	0.517	0.392
1983-84	0.478	0.354	0.439	0.372
1984-85	0.433	0.325	0.415	0.398
1985-86	0.461	0.390	0.519	0.411
1986-87	0.439	0.356	0.411	0.356
1987-88	0.402	0.351	0.354	0.312
1988-89	0.370	0.369	0.333	0.367
1989-90	0.454	0.258	0.219	0.364
1990-91	0.497	0.463	0.492	0.532
1991-92	0.485	0.429	0.450	0.391
1992-93	0.485	0.393	0.356	0.382
1993-94	0.480	0.452	0.562	0.371
1994-95	0.472	0.552	0.894	0.427
1995-96	0.746	0.723	1.276	0.535
1996-97	0.902	0.770	1.913	0.647
1997-98	0.880	0.845	2.160	0.539
1998-99	0.957	0.877	2.198	0.611
1999-00	0.745	0.712	1.184	0.472
2000-01	0.717	0.684	0.890	0.697
2001-02	0.589	0.472	0.645	0.667
2002-03	0.471	0.357	0.491	0.531
2003-04	0.560	0.362	0.462	0.455

**Table 14: Annual arithmetic, unstandardised and standardised (with standard error) CPUE indices for CRA 2 (kg/potlift). (s.e.=standard error).**

Fishing year	Arithmetic	Unstandardised	Standardised	s.e.
1979-80	0.521	0.529	0.514	0.024
1980-81	0.610	0.619	0.618	0.023
1981-82	0.552	0.521	0.515	0.023
1982-83	0.447	0.434	0.429	0.023
1983-84	0.387	0.357	0.351	0.024
1984-85	0.372	0.344	0.340	0.024
1985-86	0.430	0.402	0.393	0.024
1986-87	0.373	0.365	0.356	0.025
1987-88	0.345	0.317	0.311	0.026
1988-89	0.361	0.348	0.337	0.029
1989-90	0.377	0.354	0.346	0.041
1990-91	0.490	0.485	0.469	0.030
1991-92	0.428	0.440	0.428	0.030
1992-93	0.396	0.419	0.414	0.032
1993-94	0.444	0.440	0.439	0.032
1994-95	0.542	0.522	0.524	0.037
1995-96	0.711	0.782	0.826	0.041
1996-97	0.830	0.812	0.892	0.044
1997-98	0.875	0.986	1.069	0.046
1998-99	0.932	1.081	1.159	0.045
1999-00	0.725	0.814	0.852	0.044
2000-01	0.730	0.774	0.771	0.041
2001-02	0.555	0.532	0.529	0.038
2002-03	0.440	0.428	0.417	0.037
2003-04	0.431	0.436	0.423	0.038

**Table 15: Number of vessels reporting rock lobster by statistical area from CRA 3, 1979-80 through 2003-04. Vessels recorded as catching less than 1 t in a year for the entire QMA have been excluded.**

Fishing year	909	910	911	All
1979-80	8	45	30	70
1980-81	11	46	36	85
1981-82	15	39	28	77
1982-83	16	44	29	85
1983-84	14	47	32	84
1984-85	14	49	33	86
1985-86	14	43	33	83
1986-87	12	38	29	76
1987-88	11	42	25	72
1988-89	11	30	22	58
1989-90	10	46	24	77
1990-91	9	30	23	58
1991-92	8	32	35	65
1992-93	6	24	32	54
1993-94	7	24	20	48
1994-95	7	21	16	41
1995-96	4	18	12	34
1996-97	4	18	11	32
1997-98	6	17	9	30
1998-99	7	16	9	30
1999-00	6	17	10	32
2000-01	5	17	12	33
2001-02	5	16	13	33
2002-03	5	20	14	38
2003-04	5	19	16	39

**Table 16: Percentage of annual catch by statistical area from CRA 3, 1979–80 through 2003–04.**

Fishing year	909	910	911
1979–80	12.3	53.0	34.7
1980–81	16.1	44.8	39.1
1981–82	19.2	48.3	32.5
1982–83	16.8	51.9	31.3
1983–84	11.7	52.9	35.4
1984–85	16.7	41.7	41.7
1985–86	15.4	41.8	42.8
1986–87	13.2	51.1	35.7
1987–88	19.8	47.6	32.6
1988–89	14.9	42.0	43.1
1989–90	11.8	52.8	35.5
1990–91	11.0	49.8	39.2
1991–92	11.8	41.1	47.1
1992–93	12.1	40.1	47.9
1993–94	17.9	46.1	36.0
1994–95	16.8	47.7	35.5
1995–96	13.4	54.4	32.2
1996–97	14.9	55.6	29.4
1997–98	17.2	54.9	27.9
1998–99	17.3	59.3	23.5
1999–00	17.2	54.6	28.2
2000–01	15.0	45.4	39.6
2001–02	15.5	35.5	49.1
2002–03	11.9	36.2	51.8
2003–04	13.8	36.2	50.0

**Table 17: Percentage of annual catch by month from CRA 3, 1979–80 through 2003–04. A '.' Indicates that no fishing took place in the indicated fishing year/month cell.**

Fishing year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1979–80	1.4	0.3	5.3	7.2	3.1	4.8	14.8	26.6	16.7	12.1	4.8	2.9
1980–81	2.4	0.5	3.3	8.1	6.5	4.8	11.6	18.5	18.0	14.7	6.4	5.2
1981–82	2.6	0.3	4.7	9.5	4.4	5.3	8.4	12.3	23.4	16.1	5.7	7.3
1982–83	1.6	0.5	4.7	7.6	7.0	3.8	8.7	24.4	17.7	11.4	6.2	6.4
1983–84	2.4	1.2	9.1	7.4	7.0	5.2	11.2	19.6	13.9	12.2	5.3	5.5
1984–85	1.5	0.4	11.2	6.8	3.7	3.7	17.1	21.5	15.7	11.0	5.7	1.5
1985–86	1.8	0.2	6.1	8.1	4.0	3.4	12.8	20.2	17.5	13.1	8.9	3.8
1986–87	1.4	0.1	4.9	5.3	2.7	3.8	18.1	26.0	20.1	11.5	4.5	1.5
1987–88	1.2	0.9	7.7	4.7	5.2	4.4	22.5	15.6	19.4	10.8	4.7	2.8
1988–89	1.1	0.4	4.4	4.1	2.3	8.3	22.3	17.4	16.9	9.1	5.0	8.7
1989–90	1.9	1.1	3.6	4.0	1.7	6.4	10.1	21.8	23.1	14.9	5.9	5.4
1990–91	2.0	1.1	4.0	7.3	3.8	6.5	19.0	22.3	16.7	8.3	6.2	2.8
1991–92	3.7	0.5	2.4	7.9	5.2	4.2	14.4	21.2	20.6	11.2	5.0	3.7
1992–93	1.6	0.8	6.5	6.3	4.8	1.9	7.1	19.0	22.5	17.8	5.9	5.9
1993–94	3.1	2.8	27.1	23.6	8.4	0.2	0.3	0.4	0.3	0.3	29.5	4.1
1994–95	7.5	.	42.9	24.0	14.9	0.3	0.4	0.2	0.6	0.1	7.7	1.6
1995–96	6.1	0.0	38.2	37.7	13.4	0.2	0.4	0.2	0.1	.	3.3	0.6
1996–97	9.2	.	37.5	35.5	15.2	0.5	0.7	0.1	.	.	0.6	0.7
1997–98	7.2	.	32.3	42.9	16.2	0.8	.	.	.	.	0.1	0.6
1998–99	14.4	.	27.9	24.5	21.8	1.5	0.0	.	0.4	.	8.5	0.9
1999–00	4.7	0.1	32.2	31.6	18.4	1.5	0.1	.	.	.	8.6	3.0
2000–01	8.4	.	24.2	20.0	13.4	10.7	0.0	.	.	0.0	15.5	7.8
2001–02	9.1	0.0	25.7	16.9	11.7	0.1	0.5	.	.	0.0	17.3	18.6
2002–03	2.2	.	24.8	16.9	8.3	5.8	8.0	6.7	3.7	5.9	11.1	6.7
2003–04	1.1	.	28.6	15.8	5.2	5.1	8.0	14.4	7.2	4.4	4.9	5.3



**Table 18: Percentage of catch from CRA 3 by statistical area and month for 2003-04. A '.' Indicates that no fishing took place in the indicated statistical area/month cell.**

Month	909	910	911
Apr	.	0.4	0.7
May	.	.	.
Jun	4.5	16.8	7.3
Jul	3.7	7.1	5.0
Aug	0.6	1.7	2.9
Sep	0.0	0.3	4.8
Oct	0.0	0.5	7.5
Nov	0.7	2.6	11.1
Dec	1.9	2.1	3.2
Jan	1.0	1.2	2.1
Feb	0.6	1.7	2.7
Mar	0.8	1.8	2.7

**Table 19: Arithmetic CPUE (total kg/total potlifts) for CRA 3 by fishing year and statistical area, 1979-80 through 2003-04.**

Fishing year	909	910	911
1979-80	1.006	0.953	0.835
1980-81	1.196	0.841	0.953
1981-82	1.324	0.890	0.836
1982-83	0.957	0.932	1.014
1983-84	0.802	0.817	0.968
1984-85	0.765	0.639	0.915
1985-86	0.660	0.635	0.893
1986-87	0.689	0.649	0.706
1987-88	0.491	0.388	0.497
1988-89	0.467	0.353	0.597
1989-90	0.558	0.430	0.683
1990-91	0.459	0.417	0.496
1991-92	0.317	0.281	0.380
1992-93	0.339	0.265	0.273
1993-94	0.587	0.456	0.461
1994-95	1.039	0.844	0.851
1995-96	1.223	1.572	1.028
1996-97	2.015	1.867	1.497
1997-98	2.617	2.099	2.116
1998-99	1.950	1.569	1.613
1999-00	1.693	1.498	1.610
2000-01	1.448	0.926	1.608
2001-02	1.004	0.706	1.222
2002-03	0.809	0.546	0.928
2003-04	0.879	0.598	0.596

**Table 20: Annual arithmetic, unstandardised and standardised (with standard error) CPUE indices for CRA 3 (kg/potlift). (s.e.=standard error).**

Fishing year	Arithmetic	Unstandardised	Standardised	s.e.
1979-80	0.914	0.852	0.792	0.022
1980-81	0.928	0.928	0.878	0.021
1981-82	0.929	0.913	0.870	0.021
1982-83	0.960	0.979	0.942	0.020
1983-84	0.863	0.882	0.859	0.020
1984-85	0.755	0.726	0.696	0.020
1985-86	0.730	0.696	0.665	0.020
1986-87	0.674	0.611	0.576	0.022
1987-88	0.438	0.427	0.411	0.021
1988-89	0.449	0.447	0.421	0.025
1989-90	0.511	0.465	0.454	0.022
1990-91	0.450	0.433	0.423	0.023
1991-92	0.325	0.307	0.293	0.022
1992-93	0.276	0.259	0.246	0.022
1993-94	0.477	0.449	0.499	0.032
1994-95	0.874	0.889	0.933	0.043
1995-96	1.300	1.375	1.435	0.047
1996-97	1.758	1.797	1.920	0.048
1997-98	2.178	2.501	2.709	0.051
1998-99	1.635	1.873	2.052	0.046
1999-00	1.559	1.762	1.919	0.044
2000-01	1.190	1.266	1.404	0.039
2001-02	0.945	1.004	1.080	0.039
2002-03	0.730	0.730	0.727	0.032
2003-04	0.625	0.599	0.566	0.032

**Table 21: Number of vessels reporting rock lobster by statistical area from CRA 4, 1979-80 through 2003-04. Vessels recorded as catching less than 1 t in a year for the entire QMA have been excluded.**

Fishing year	912	913	914	915	934	All
1979-80	25	32	31	17	0	86
1980-81	26	20	30	19	0	86
1981-82	30	25	27	17	0	88
1982-83	28	22	29	18	0	89
1983-84	26	23	32	17	1	89
1984-85	25	24	32	19	1	90
1985-86	27	21	39	17	1	88
1986-87	25	23	35	17	2	88
1987-88	24	19	35	17	0	85
1988-89	22	24	42	16	0	87
1989-90	33	40	57	19	0	131
1990-91	26	25	32	18	0	85
1991-92	25	33	35	13	1	88
1992-93	31	29	33	11	1	94
1993-94	32	33	38	13	2	100
1994-95	23	29	40	14	4	89
1995-96	19	21	36	14	2	80
1996-97	19	15	35	16	1	74
1997-98	18	15	35	9	.	72
1998-99	22	15	32	11	.	65
1999-00	18	15	33	12	1	70
2000-01	21	13	25	11	1	61
2001-02	22	18	25	13	2	62
2002-03	16	15	25	13	1	64
2003-04	15	16	27	11	.	64

**Table 22: Percentage of annual catch by statistical area from CRA 4, 1979–80 through 2003–04. A**  
 ' . ' indicates that no fishing took place in the indicated statistical area/fishing year cell.

Fishing year	912	913	914	915	934
1979–80	21.4	30.2	38.2	10.1	0.1
1980–81	32.4	21.7	33.5	12.2	0.2
1981–82	35.6	22.6	29.3	12.4	0.0
1982–83	25.7	21.8	37.6	14.8	0.1
1983–84	19.8	27.8	40.0	12.2	0.1
1984–85	25.1	25.7	37.1	11.6	0.5
1985–86	27.0	21.2	36.7	14.7	0.4
1986–87	21.9	29.3	37.4	11.2	0.3
1987–88	19.3	25.0	44.3	11.4	0.0
1988–89	17.6	27.0	45.5	9.9	0.0
1989–90	23.0	35.2	33.8	7.9	0.0
1990–91	28.3	29.5	31.7	10.5	0.1
1991–92	31.6	29.3	30.0	8.8	0.3
1992–93	30.1	26.3	32.6	10.6	0.4
1993–94	23.8	28.8	36.7	9.9	0.9
1994–95	21.9	24.5	41.7	9.7	2.1
1995–96	22.9	23.1	46.8	6.3	0.9
1996–97	24.6	19.6	46.0	9.2	0.6
1997–98	25.5	21.9	45.0	7.5	.
1998–99	31.3	22.0	38.2	8.5	.
1999–00	26.6	22.4	39.7	10.6	0.8
2000–01	26.9	23.6	37.5	11.0	0.9
2001–02	22.2	21.5	42.2	12.8	1.3
2002–03	23.6	26.9	36.3	12.6	0.6
2003–04	19.7	32.6	40.1	7.7	.

**Table 23: Percentage of annual catch by month from CRA 4, 1979–80 through 2003–04.**

Fishing year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1979–80	0.3	0.5	9.4	9.8	4.6	7.1	13.5	23.4	13.1	10.8	5.3	2.1
1980–81	0.8	3.3	8.6	8.3	7.1	8.8	14.3	13.4	12.8	13.5	6.8	2.4
1981–82	1.4	3.2	7.4	9.6	5.8	10.0	11.8	10.0	13.5	14.9	9.0	3.6
1982–83	0.4	5.4	6.6	8.5	8.2	6.9	11.7	13.8	15.3	12.9	8.2	2.3
1983–84	0.4	3.3	13.1	8.4	8.7	5.8	12.5	16.4	11.5	11.8	5.7	2.6
1984–85	0.2	6.3	13.8	7.1	4.3	7.8	15.4	16.1	13.4	9.9	4.6	1.1
1985–86	0.4	1.4	11.4	8.3	5.3	5.3	12.9	14.8	17.5	14.6	6.5	1.6
1986–87	0.3	3.4	10.7	4.9	2.8	6.6	17.8	17.3	17.0	14.0	4.3	1.1
1987–88	0.5	4.4	10.2	3.7	6.4	4.8	22.7	18.2	14.4	9.3	4.0	1.5
1988–89	0.5	5.1	8.9	4.4	3.4	9.3	16.9	21.5	14.4	8.5	4.3	2.6
1989–90	1.4	3.3	8.0	6.7	2.2	9.0	11.5	19.6	15.1	14.5	6.0	2.6
1990–91	0.3	2.7	8.1	6.4	2.7	11.4	19.2	18.3	13.6	8.6	7.0	1.6
1991–92	1.6	4.3	5.7	11.7	4.7	4.7	17.0	17.9	15.2	11.6	3.8	1.7
1992–93	0.9	2.6	17.2	8.7	3.7	4.0	11.5	17.2	16.2	10.7	4.7	2.5
1993–94	1.1	14.2	17.1	9.5	3.7	1.9	15.3	15.3	14.5	4.6	2.1	0.6
1994–95	3.2	17.5	13.3	10.3	6.6	4.3	13.1	17.2	8.2	4.3	0.8	1.2
1995–96	3.9	25.1	12.1	11.9	6.1	11.8	13.2	7.3	3.1	1.6	1.8	2.1
1996–97	9.2	30.2	18.8	11.1	11.2	10.7	4.3	2.1	0.8	0.5	0.0	1.1
1997–98	7.3	30.6	19.3	18.3	10.0	8.4	3.2	0.2	0.5	1.5	0.3	0.5
1998–99	4.3	21.6	13.2	19.4	18.3	14.1	4.6	1.4	0.5	0.8	1.7	0.5
1999–00	2.4	19.8	20.5	19.9	11.5	19.3	2.1	0.6	2.9	0.5	0.3	0.4
2000–01	5.5	23.7	24.6	16.8	6.2	10.9	6.4	2.9	0.7	0.4	0.8	1.1
2001–02	5.9	14.2	25.2	11.9	9.2	17.0	5.3	4.6	2.0	2.4	1.1	1.3
2002–03	5.6	12.0	23.1	13.6	9.3	13.9	2.7	5.5	2.5	5.8	4.3	1.5
2003–04	4.7	9.2	17.6	15.3	6.3	11.0	11.6	7.4	3.0	6.8	2.5	4.6

**Table 24: Percentage of catch from CRA 4 by statistical area and month for 2003-04. A '.' indicates that no fishing took place in the indicated statistical area/month cell.**

Month	912	913	914	915	934
Apr	0.9	1.8	0.8	1.2	.
May	1.5	2.8	4.1	0.7	.
Jun	3.3	5.8	7.2	1.3	.
Jul	2.4	4.8	7.2	1.0	.
Aug	0.4	1.4	4.0	0.5	.
Sep	2.7	2.9	4.5	0.9	.
Oct	3.6	4.1	2.8	1.2	.
Nov	1.6	3.5	2.3	0.0	.
Dec	0.1	2.1	0.6	0.2	.
Jan	1.6	1.7	3.4	0.1	.
Feb	0.4	0.5	1.1	0.4	.
Mar	1.2	1.0	2.2	0.2	.

**Table 25: Arithmetic CPUE (total kg/total potlifts) for CRA 4 by fishing year and statistical area, 1979-80 through 2003-04. A '.' indicates that fewer than 3 vessels took part or that no fishing took place in the indicated statistical area/fishing year cell.**

Fishing year	912	913	914	915	934
1979-80	0.927	0.977	0.898	0.559	.
1980-81	1.054	0.773	0.827	0.581	0.929
1981-82	1.093	0.826	0.735	0.592	.
1982-83	0.897	0.941	1.081	0.656	.
1983-84	0.771	1.018	1.054	0.637	.
1984-85	0.858	0.836	0.777	0.552	.
1985-86	0.793	0.773	0.718	0.602	0.750
1986-87	0.850	0.918	0.878	0.609	.
1987-88	0.652	0.782	0.790	0.585	.
1988-89	0.509	0.631	0.691	0.531	.
1989-90	0.643	0.744	0.512	0.411	.
1990-91	0.750	0.525	0.393	0.391	.
1991-92	0.741	0.536	0.380	0.382	.
1992-93	0.630	0.506	0.474	0.461	0.464
1993-94	0.550	0.649	0.621	0.409	.
1994-95	0.784	0.693	0.761	0.456	0.414
1995-96	0.948	0.823	0.915	0.592	0.368
1996-97	1.209	1.033	1.030	0.738	.
1997-98	1.709	1.495	1.066	0.840	.
1998-99	1.718	2.514	1.021	0.729	.
1999-00	1.379	1.798	1.049	1.235	0.839
2000-01	1.167	1.909	1.137	1.116	0.954
2001-02	0.933	1.170	1.084	1.107	0.808
2002-03	1.081	1.179	1.013	1.210	.
2003-04	1.104	1.362	1.073	0.895	.

**Table 26: Annual arithmetic, unstandardised and standardised (with standard error) CPUE indices for CRA 4 (kg/potlift). (s.e.=standard error).**

Fishing year	Arithmetic	Unstandardised	Standardised	s.e.
1979-80	0.872	0.859	0.819	0.020
1980-81	0.829	0.823	0.798	0.020
1981-82	0.827	0.865	0.849	0.021
1982-83	0.915	0.938	0.917	0.019
1983-84	0.905	0.856	0.835	0.019
1984-85	0.773	0.777	0.759	0.020
1985-86	0.727	0.738	0.724	0.020
1986-87	0.841	0.793	0.768	0.020
1987-88	0.729	0.694	0.669	0.020
1988-89	0.618	0.581	0.563	0.021
1989-90	0.593	0.566	0.542	0.020
1990-91	0.496	0.515	0.497	0.020
1991-92	0.500	0.517	0.497	0.020
1992-93	0.520	0.505	0.480	0.019
1993-94	0.580	0.557	0.534	0.021
1994-95	0.692	0.678	0.677	0.022
1995-96	0.859	0.838	0.854	0.024
1996-97	1.026	1.084	1.172	0.027
1997-98	1.238	1.295	1.384	0.029
1998-99	1.314	1.445	1.559	0.029
1999-00	1.265	1.344	1.457	0.028
2000-01	1.261	1.176	1.254	0.029
2001-02	1.061	1.040	1.099	0.027
2002-03	1.088	1.132	1.182	0.026
2003-04	1.141	1.190	1.211	0.027

**Table 27: Number of vessels reporting rock lobster by statistical area from CRA 5, 1979-80 through 2003-04. Vessels recorded as catching less than 1 t in a year for the entire QMA have been excluded. A '.' indicates that no fishing took place in the statistical area/fishing year cell.**

Fishing year	916	917	918	919	932	933	All
1979-80	21	51	13	3	1	9	88
1980-81	19	50	12	1	1	11	86
1981-82	15	51	12	0	2	11	85
1982-83	19	60	13	3	1	13	93
1983-84	16	59	11	1	.	13	93
1984-85	16	60	10	2	0	14	95
1985-86	13	56	11	2	2	15	92
1986-87	11	55	11	4	5	11	91
1987-88	11	51	10	3	2	12	84
1988-89	7	44	9	3	1	9	71
1989-90	15	44	11	0	0	7	67
1990-91	11	40	11	1	3	11	63
1991-92	11	37	21	1	1	11	68
1992-93	12	31	13	0	.	11	59
1993-94	9	35	12	.	0	13	59
1994-95	9	27	8	.	0	11	51
1995-96	12	25	6	1	2	12	49
1996-97	10	22	9	2	1	12	47
1997-98	9	21	7	1	1	12	46
1998-99	6	18	5	.	1	13	41
1999-00	7	21	7	1	1	12	40
2000-01	8	18	6	.	.	10	36
2001-02	10	18	2	.	0	8	35
2002-03	10	17	2	.	.	9	35
2003-04	12	15	2	.	.	11	35

**Table 28: Percentage of annual catch by statistical area from CRA 5, 1979-80 through 2003-04.**

Fishing year	916	917	918	919	932	933
1979-80	26.7	47.9	12.8	1.1	1.0	10.4
1980-81	29.3	50.2	6.3	0.4	0.3	13.5
1981-82	23.0	52.0	7.3	0.1	1.5	16.1
1982-83	19.9	57.3	4.0	0.7	0.1	18.0
1983-84	19.2	57.5	5.6	0.3	.	17.4
1984-85	19.5	61.4	4.7	0.7	0.1	13.6
1985-86	19.4	62.1	6.7	0.7	0.3	10.8
1986-87	15.9	65.3	7.3	1.9	1.6	8.0
1987-88	22.4	58.0	6.3	3.2	0.7	9.4
1988-89	19.3	58.6	8.2	3.2	0.7	10.0
1989-90	28.4	55.8	10.1	0.1	0.0	5.5
1990-91	28.3	57.4	5.3	0.0	0.6	8.4
1991-92	29.9	46.1	10.9	0.0	0.1	13.0
1992-93	24.9	58.4	7.0	0.2	.	9.6
1993-94	23.5	54.3	8.1	.	0.1	14.1
1994-95	28.0	50.5	4.3	.	0.0	17.2
1995-96	26.9	43.2	3.2	0.0	1.3	25.3
1996-97	24.4	45.0	4.8	0.0	2.1	23.7
1997-98	24.3	42.2	4.4	0.0	2.4	26.8
1998-99	23.2	41.9	5.8	.	3.4	25.6
1999-00	29.3	42.0	4.0	0.0	0.0	24.6
2000-01	29.9	40.1	2.9	.	.	27.1
2001-02	42.6	39.4	1.5	.	0.1	16.3
2002-03	46.2	36.6	1.0	.	.	16.2
2003-04	46.8	33.8	0.9	.	.	18.4

**Table 29: Percentage of annual catch by month from CRA 5, 1979-80 through 2003-04.**

Fishing year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1979-80	0.7	7.0	6.4	6.2	4.6	7.5	11.6	17.9	13.5	15.6	7.6	1.5
1980-81	1.2	9.0	2.6	3.2	4.5	6.6	13.2	20.4	14.6	16.1	7.6	1.1
1981-82	0.9	6.2	2.6	3.4	2.4	4.8	12.1	18.7	21.2	16.4	8.2	3.1
1982-83	1.3	6.7	3.1	2.9	4.3	5.0	10.5	20.1	20.3	16.0	7.7	2.1
1983-84	1.2	4.8	5.0	4.3	5.5	5.4	8.5	8.8	17.1	23.6	11.8	4.0
1984-85	1.9	8.2	6.0	4.3	2.7	3.8	8.5	19.9	20.0	16.5	6.1	2.0
1985-86	2.7	4.7	2.1	2.8	3.6	4.4	12.4	14.8	21.0	20.8	8.0	2.7
1986-87	3.1	7.7	3.6	2.4	2.0	4.6	9.8	22.3	21.4	16.9	5.2	0.9
1987-88	2.3	4.4	5.1	2.8	4.7	4.2	13.6	18.6	22.2	15.7	4.9	1.3
1988-89	1.5	4.9	3.5	2.7	3.6	6.4	7.9	20.6	20.6	21.6	4.6	2.1
1989-90	2.1	5.1	2.4	2.3	2.3	4.1	7.0	15.8	20.8	25.1	10.4	2.5
1990-91	2.7	3.7	1.6	2.8	2.2	3.9	13.5	24.7	22.7	14.7	6.2	1.3
1991-92	0.4	3.4	1.9	3.8	3.6	4.0	10.8	19.9	19.1	22.1	8.9	2.1
1992-93	0.9	2.5	5.7	3.5	3.7	2.3	7.9	12.0	21.1	25.0	12.2	3.1
1993-94	0.7	6.7	7.3	7.6	5.6	3.8	10.0	13.0	19.9	15.3	7.7	2.2
1994-95	1.8	9.9	4.6	5.2	5.7	5.1	7.0	19.0	17.0	13.3	7.9	3.6
1995-96	1.8	10.9	5.1	5.5	5.0	5.9	10.9	14.3	15.3	10.6	8.2	6.5
1996-97	8.3	20.9	7.4	5.9	7.7	9.0	10.8	8.8	10.2	6.1	3.2	1.6
1997-98	15.2	24.0	10.8	7.8	7.3	7.4	7.6	5.6	5.1	4.6	3.2	1.3
1998-99	7.7	18.0	14.1	11.8	12.9	12.3	9.3	4.0	3.6	2.0	2.2	2.2
1999-00	11.0	19.4	11.7	13.2	12.1	11.6	8.2	2.8	3.1	2.7	2.1	2.1
2000-01	6.7	22.5	17.4	14.2	11.1	11.1	9.4	2.3	1.5	2.6	0.2	1.1
2001-02	9.0	21.2	13.0	17.1	17.4	12.4	4.6	2.4	0.5	0.6	0.9	0.9
2002-03	9.2	21.9	16.1	14.2	16.2	10.3	2.4	1.5	1.1	2.7	2.2	2.3
2003-04	1.5	14.4	20.3	18.9	12.5	13.7	7.7	2.0	2.0	3.9	1.8	1.4

**Table 30: Percentage of catch from CRA 5 by statistical area and month for 2003-04. A '.' indicates that no fishing took place in the statistical area/month cell.**

Month	916	917	918	919	932	933
Apr	0.4	1.0	.	0.0	.	.
May	7.1	5.5	.	1.8	.	.
Jun	10.5	7.6	0.0	2.2	.	.
Jul	10.7	6.2	0.2	1.7	.	.
Aug	6.0	5.0	0.4	1.2	.	.
Sep	5.8	4.4	0.3	3.1	.	.
Oct	1.0	1.3	.	5.4	.	.
Nov	0.6	0.7	.	0.8	.	.
Dec	1.0	0.5	.	0.6	.	.
Jan	2.0	0.9	.	1.0	.	.
Feb	0.8	0.5	.	0.5	.	.
Mar	1.0	0.4	.	0.1	.	.

**Table 31: Arithmetic CPUE (total kg/total potlifts) for CRA 5 by fishing year and statistical area, 1979-80 through 2003-04. A '.' indicates that no fishing took place in the statistical area/fishing year cell or that fewer than 3 vessels fished.**

Fishing year	916	917	918	919	932	933
1979-80	0.833	0.676	1.097	0.946	.	0.734
1980-81	0.996	0.870	0.853	1.221	.	0.896
1981-82	0.640	0.855	0.815	.	.	0.810
1982-83	0.667	0.939	0.613	0.671	.	0.898
1983-84	0.636	0.801	0.727	0.404	.	0.744
1984-85	0.751	0.810	0.702	0.427	.	0.647
1985-86	0.773	0.701	0.750	0.442	0.452	0.486
1986-87	0.614	0.673	0.799	0.588	0.836	0.361
1987-88	0.591	0.447	0.710	0.571	.	0.337
1988-89	0.482	0.371	0.712	0.318	.	0.301
1989-90	0.562	0.380	0.626	.	.	0.285
1990-91	0.443	0.419	0.513	.	0.550	0.410
1991-92	0.440	0.309	0.550	.	0.238	0.371
1992-93	0.370	0.344	0.454	.	.	0.310
1993-94	0.429	0.363	0.492	.	.	0.390
1994-95	0.558	0.350	0.373	.	.	0.513
1995-96	0.637	0.385	0.413	.	.	0.633
1996-97	0.686	0.464	0.648	.	.	0.658
1997-98	1.064	0.654	0.611	.	.	0.950
1998-99	1.118	0.756	0.880	.	.	1.036
1999-00	2.126	0.773	0.872	.	.	0.909
2000-01	3.573	0.825	1.403	.	.	0.970
2001-02	2.845	0.838	1.641	.	.	1.055
2002-03	2.245	0.954	1.311	.	.	0.848
2003-04	2.372	1.179	1.379	.	.	0.878

**Table 32: Annual arithmetic, unstandardised and standardised (with standard error) CPUE indices for CRA 5 (kg/potlift). (s.e.=standard error).**

Fishing year	Arithmetic	Unstandardised	Standardised	s.e.
1979-80	0.755	0.683	0.658	0.024
1980-81	0.903	0.815	0.798	0.026
1981-82	0.791	0.739	0.711	0.027
1982-83	0.840	0.789	0.779	0.025
1983-84	0.748	0.704	0.696	0.026
1984-85	0.761	0.712	0.704	0.026
1985-86	0.680	0.586	0.578	0.026
1986-87	0.627	0.517	0.511	0.027
1987-88	0.472	0.433	0.429	0.027
1988-89	0.394	0.378	0.376	0.029
1989-90	0.427	0.426	0.408	0.031
1990-91	0.430	0.414	0.393	0.029
1991-92	0.367	0.338	0.322	0.027
1992-93	0.353	0.325	0.313	0.028
1993-94	0.389	0.387	0.377	0.030
1994-95	0.417	0.400	0.395	0.032
1995-96	0.489	0.476	0.468	0.033
1996-97	0.559	0.615	0.629	0.035
1997-98	0.787	0.865	0.891	0.038
1998-99	0.891	1.074	1.140	0.041
1999-00	1.001	1.137	1.180	0.041
2000-01	1.150	1.272	1.359	0.046
2001-02	1.274	1.474	1.607	0.051
2002-03	1.269	1.551	1.661	0.050
2003-04	1.427	1.843	1.924	0.049

**Table 33: Number of vessels reporting rock lobster by statistical area from CRA 6, 1979-80 through 2003-04. Vessels recorded as catching less than 1 t in a year for the entire QMA have been excluded.**

Fishing year	940	941	942	943	All
1979-80	11	13	17	8	39
1980-81	13	12	15	11	42
1981-82	11	16	21	19	45
1982-83	18	17	27	15	54
1983-84	12	16	24	9	50
1984-85	18	18	26	9	53
1985-86	14	19	26	17	57
1986-87	20	14	22	12	48
1987-88	15	17	24	12	47
1988-89	12	13	18	8	42
1989-90	18	18	20	9	55
1990-91	15	14	20	5	40
1991-92	15	19	28	6	46
1992-93	14	20	25	6	50
1993-94	16	19	28	10	54
1994-95	19	15	31	15	59
1995-96	17	15	24	12	51
1996-97	21	14	23	10	50
1997-98	20	11	23	8	50
1998-99	16	11	17	8	42
1999-00	12	9	16	4	34
2000-01	14	8	17	5	33
2001-02	11	10	14	6	32
2002-03	11	8	15	5	32
2003-04	11	12	14	6	34



**Table 34: Percentage of annual catch by statistical area from CRA 6, 1979–80 through 2003–04.**

Fishing year	940	941	942	943
1979–80	21.5	24.6	38.4	15.5
1980–81	28.5	21.3	31.2	19.0
1981–82	19.6	29.0	34.8	16.6
1982–83	24.6	19.1	40.1	16.1
1983–84	21.8	24.2	38.9	15.1
1984–85	25.6	25.1	36.7	12.6
1985–86	28.4	22.1	33.1	16.5
1986–87	29.0	15.6	37.1	18.3
1987–88	24.0	19.2	41.1	15.7
1988–89	20.4	13.9	50.0	15.6
1989–90	30.0	21.8	38.8	9.4
1990–91	23.4	19.2	50.5	6.9
1991–92	20.9	21.7	51.8	5.6
1992–93	23.0	21.4	47.1	8.5
1993–94	24.7	20.4	45.0	9.9
1994–95	22.5	19.5	49.4	8.7
1995–96	27.9	14.1	46.8	11.2
1996–97	27.0	18.3	42.9	11.7
1997–98	29.2	19.9	43.5	7.4
1998–99	29.2	18.8	43.8	8.2
1999–00	24.1	21.7	47.1	7.2
2000–01	24.1	17.6	51.8	6.6
2001–02	24.2	18.6	48.1	9.0
2002–03	17.8	25.1	43.4	13.7
2003–04	23.4	21.7	45.0	9.8

**Table 35: Percentage of annual catch by month from CRA 6, 1979–80 through 2003–04. A ‘.’ indicates that no fishing took place in the month/fishing year cell.**

Fishing year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1979–80	.	7.2	8.1	6.1	3.5	3.5	12.1	14.5	15.1	18.5	11.3	.
1980–81	.	2.2	8.5	9.2	2.1	1.7	8.2	14.1	16.8	25.6	11.7	.
1981–82	.	4.8	6.6	4.8	2.9	3.5	18.4	14.6	14.2	15.2	14.8	.
1982–83	.	2.5	10.3	9.1	3.9	3.1	7.6	10.9	11.8	23.1	17.8	.
1983–84	.	1.4	7.0	7.9	6.5	2.6	7.0	17.6	15.9	18.7	15.4	.
1984–85	.	4.1	6.0	5.0	3.2	2.0	12.3	13.7	19.1	20.8	13.8	0.1
1985–86	.	4.1	5.9	3.4	1.8	6.3	12.2	13.0	19.1	14.8	19.2	.
1986–87	.	2.1	4.0	3.3	3.1	2.9	10.7	16.9	20.4	19.9	16.8	.
1987–88	.	1.1	4.6	4.4	4.8	1.3	9.7	15.6	21.3	18.1	15.7	3.3
1988–89	.	3.1	7.2	4.7	2.8	1.4	8.7	14.4	16.9	22.3	18.5	.
1989–90	.	3.6	5.4	5.7	3.3	1.6	9.9	10.4	19.2	21.4	19.5	0.1
1990–91	.	1.9	5.5	3.4	1.6	1.5	16.0	15.0	16.7	17.0	21.3	0.0
1991–92	.	1.4	5.8	3.9	1.8	2.1	10.7	9.4	17.3	30.8	13.8	3.0
1992–93	.	1.3	8.1	7.2	6.0	3.5	2.5	10.2	16.1	20.9	17.6	6.6
1993–94	.	1.6	8.6	8.1	4.7	3.3	8.7	15.9	13.0	14.1	22.0	.
1994–95	0.0	4.4	6.2	5.1	4.4	2.6	8.6	16.1	14.8	20.9	17.0	.
1995–96	.	4.2	6.8	3.8	5.9	6.7	23.7	11.9	10.0	12.2	14.6	0.3
1996–97	.	5.3	8.3	5.7	5.1	8.7	20.3	11.1	12.9	12.5	10.1	0.0
1997–98	0.0	8.0	9.4	8.2	5.4	6.4	11.3	12.1	14.8	11.7	12.8	0.0
1998–99	.	6.4	6.6	5.6	5.2	6.6	16.7	18.8	12.0	9.5	12.7	.
1999–00	.	6.6	7.2	6.1	5.6	8.4	17.6	12.9	11.3	12.0	12.1	0.1
2000–01	.	5.2	6.7	6.6	4.8	9.7	17.8	16.0	10.2	10.9	11.9	0.2
2001–02	.	2.9	7.9	6.3	4.1	4.3	15.1	14.3	13.1	17.0	14.8	0.3
2002–03	.	2.3	6.6	10.0	6.2	6.0	6.9	14.8	11.3	18.5	17.3	0.1
2003–04	.	0.8	5.6	6.9	8.7	6.0	16.1	12.6	12.8	19.5	10.9	0.1

**Table 36: Percentage of catch from CRA 6 by statistical area and month for 2003-04. A '.' indicates that no fishing took place in the month/statistical area cell.**

Month	940	941	942	943
Apr	.	.	.	.
May	0.3	0.4	0.1	0.1
Jun	1.1	1.7	2.3	0.5
Jul	1.8	1.7	2.8	0.5
Aug	1.9	1.6	4.7	0.5
Sep	1.2	1.2	3.1	0.6
Oct	3.4	3.1	7.9	1.7
Nov	4.5	1.6	5.1	1.3
Dec	2.7	2.9	5.9	1.3
Jan	3.3	4.3	10.0	1.9
Feb	3.0	3.2	3.2	1.5
Mar	.	0.1	.	.

**Table 37: Arithmetic CPUE (total kg/total potlifts) for CRA 6 by fishing year and statistical area, 1979-80 through 2003-04.**

Fishing year	940	941	942	943
1979-80	2.039	1.430	3.671	3.224
1980-81	2.586	1.381	2.444	2.823
1981-82	2.710	1.403	3.102	2.522
1982-83	2.167	0.965	2.232	2.275
1983-84	2.340	1.278	1.803	1.881
1984-85	1.538	1.072	1.418	1.513
1985-86	1.711	1.135	1.419	1.424
1986-87	1.519	1.319	1.996	1.676
1987-88	1.517	1.088	1.783	1.445
1988-89	1.223	1.093	1.618	1.407
1989-90	1.466	1.088	1.498	1.148
1990-91	1.361	0.924	1.866	0.939
1991-92	1.237	0.863	1.784	1.038
1992-93	0.944	0.808	1.717	0.942
1993-94	0.968	0.898	1.383	0.845
1994-95	1.089	0.736	1.461	0.698
1995-96	1.004	0.772	1.443	0.818
1996-97	0.879	0.841	1.293	0.952
1997-98	0.728	0.765	1.088	0.944
1998-99	0.909	1.038	1.532	1.240
1999-00	0.972	0.938	1.707	0.825
2000-01	0.923	0.921	1.538	0.836
2001-02	0.978	0.865	1.466	1.153
2002-03	1.066	0.987	1.278	1.184
2003-04	1.137	0.752	1.372	0.987

**Table 38: Annual arithmetic, unstandardised and standardised (with standard error) CPUE indices for CRA 6 (kg/potlift). (s.e.=standard error).**

Fishing year	Arithmetic	Unstandardised	Standardised	s.e.
1979-80	2.325	2.131	2.199	0.037
1980-81	2.177	2.061	2.030	0.038
1981-82	2.188	2.310	2.308	0.035
1982-83	1.778	1.640	1.666	0.032
1983-84	1.728	1.652	1.634	0.032
1984-85	1.347	1.316	1.305	0.032
1985-86	1.410	1.390	1.379	0.032
1986-87	1.655	1.535	1.515	0.034
1987-88	1.484	1.363	1.315	0.034
1988-89	1.399	1.296	1.274	0.037
1989-90	1.341	1.220	1.159	0.036
1990-91	1.381	1.212	1.185	0.036
1991-92	1.308	1.284	1.242	0.033
1992-93	1.146	1.250	1.211	0.031
1993-94	1.081	1.078	1.080	0.030
1994-95	1.072	1.052	1.045	0.030
1995-96	1.085	1.041	1.065	0.029
1996-97	1.020	1.112	1.133	0.030
1997-98	0.878	1.045	1.066	0.031
1998-99	1.170	1.265	1.309	0.036
1999-00	1.188	1.314	1.360	0.039
2000-01	1.153	1.211	1.229	0.038
2001-02	1.150	1.195	1.217	0.039
2002-03	1.141	1.255	1.287	0.040
2003-04	1.084	1.180	1.197	0.040

**Table 39: Number of vessels reporting rock lobster by statistical area from CRA 7, 1979-80 through 2003-04. Vessels recorded as catching less than 1 t in a year for the entire QMA have been excluded.**

Fishing year	920	921	All
1979-80	64	35	90
1980-81	58	35	86
1981-82	50	35	79
1982-83	24	22	42
1983-84	23	22	40
1984-85	39	24	59
1985-86	47	26	66
1986-87	40	25	58
1987-88	41	16	51
1988-89	28	15	38
1989-90	12	7	17
1990-91	28	12	37
1991-92	34	15	46
1992-93	29	11	35
1993-94	32	10	37
1994-95	26	8	32
1995-96	22	16	27
1996-97	16	8	22
1997-98	7	4	7
1998-99	13	9	18
1999-00	13	6	17
2000-01	18	12	25
2001-02	17	9	22
2002-03	18	6	20
2003-04	15	3	16

**Table 40: Percentage of annual catch by statistical area from CRA 7, 1979–80 through 2003–04.**

Fishing year	920	921
1979–80	61.3	38.7
1980–81	62.0	38.0
1981–82	60.5	39.5
1982–83	53.6	46.4
1983–84	52.3	47.7
1984–85	63.5	36.5
1985–86	74.5	25.5
1986–87	72.6	27.4
1987–88	78.5	21.5
1988–89	70.1	29.9
1989–90	63.9	36.1
1990–91	66.5	33.5
1991–92	71.9	28.1
1992–93	69.9	30.1
1993–94	67.4	32.6
1994–95	64.9	35.1
1995–96	57.2	42.8
1996–97	62.9	37.1
1997–98	51.9	48.1
1998–99	48.3	51.7
1999–00	74.0	26.0
2000–01	50.7	49.3
2001–02	72.8	27.2
2002–03	76.5	23.5
2003–04	69.9	30.1

**Table 41: Percentage of annual catch by month from CRA 7, 1979–80 through 2003–04. A '.' indicates that fishing did not take place in that fishing year/month cell.**

Fishing year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1979–80	1.7	0.0	5.7	18.1	26.8	22.6	13.4	6.5	3.4	1.1	0.6	0.3
1980–81	0.0	0.2	8.6	19.9	33.4	15.4	12.3	5.4	2.1	1.2	0.9	0.6
1981–82	0.1	0.0	8.5	27.5	25.0	19.9	9.3	5.5	1.9	1.6	0.7	0.0
1982–83	0.1	0.0	5.7	25.8	24.3	15.3	11.6	10.0	5.0	1.8	0.3	0.0
1983–84	.	.	5.8	19.0	24.9	19.9	15.4	6.6	5.3	2.0	0.8	0.2
1984–85	0.0	0.0	15.8	30.5	16.6	12.6	11.7	7.6	3.1	1.5	0.5	0.1
1985–86	0.0	0.0	10.9	28.1	25.5	12.9	10.6	5.4	3.8	1.5	1.1	0.1
1986–87	.	0.0	5.6	17.5	19.9	24.9	14.3	8.9	5.7	2.2	0.9	0.1
1987–88	0.0	0.0	7.1	24.7	27.4	16.0	12.0	7.0	2.8	1.6	0.9	0.5
1988–89	0.0	.	4.3	18.6	28.1	14.8	18.3	11.5	1.8	1.5	1.0	0.0
1989–90	.	0.1	2.6	6.0	18.0	27.2	16.5	11.7	8.6	6.5	2.7	0.2
1990–91	0.0	.	7.0	25.0	20.0	19.6	9.1	5.9	6.8	4.2	1.9	0.2
1991–92	0.0	0.0	21.9	34.6	32.7	9.6	0.9	0.2	0.1	.	0.0	.
1992–93	.	.	5.9	18.7	19.9	24.1	17.9	7.8	5.0	0.4	0.3	0.1
1993–94	0.0	.	15.7	40.1	24.4	11.6	8.0	0.1	0.0	0.0	.	.
1994–95	.	0.0	9.4	28.7	33.5	19.6	7.4	1.2	.	.	0.2	.
1995–96	.	0.0	5.9	39.0	26.1	19.9	8.1	1.0	.	.	.	.
1996–97	.	.	4.8	19.4	32.1	19.1	19.2	5.4	.	.	.	.
1997–98	.	.	2.4	17.9	23.1	21.6	13.6	21.4	.	.	.	.
1998–99	.	.	6.0	30.1	21.0	9.1	12.5	20.2	1.0	.	.	.
1999–00	.	.	7.3	20.4	27.5	17.4	13.9	13.5	.	.	.	.
2000–01	.	.	6.5	22.2	28.7	15.6	17.7	9.2	.	0.1	.	.
2001–02	.	.	9.0	27.2	25.7	18.6	12.6	6.9	.	.	0.0	.
2002–03	.	0.0	10.2	21.2	30.5	20.6	15.8	1.8	.	.	.	.
2003–04	.	0.0	6.7	28.8	25.3	15.5	18.8	4.9	.	.	.	.

**Table 42: Percentage of catch from CRA 7 by statistical area and month for 2003-04. A '.' indicates that fishing did not take place in that statistical area/month cell.**

Month	920	921
Apr	.	.
May	0	.
Jun	6.3	0.4
Jul	22.0	6.8
Aug	17.0	8.3
Sep	9.0	6.5
Oct	12.8	6.0
Nov	2.8	2.1
Dec	.	.
Jan	.	.
Feb	.	.
Mar	.	.

**Table 43: Arithmetic CPUE (total kg/total potlifts) for CRA 7 by fishing year and statistical area, 1979-80 through 2003-04. A '.' indicates that fishing did not take place in that statistical area/month cell or that fewer than 3 vessels fished.**

Fishing year	920	921
1979-80	0.912	1.386
1980-81	0.752	1.274
1981-82	0.662	1.104
1982-83	0.400	0.719
1983-84	0.332	0.530
1984-85	0.523	0.756
1985-86	0.723	0.853
1986-87	0.738	1.075
1987-88	0.698	0.842
1988-89	0.401	0.606
1989-90	0.284	0.683
1990-91	0.338	0.739
1991-92	0.770	1.017
1992-93	0.332	0.760
1993-94	0.514	1.170
1994-95	0.373	1.062
1995-96	0.243	0.494
1996-97	0.204	0.439
1997-98	0.177	0.357
1998-99	0.245	0.382
1999-00	0.203	0.314
2000-01	0.270	0.492
2001-02	0.446	0.503
2002-03	0.447	1.069
2003-04	0.451	1.876

**Table 44: Annual arithmetic, unstandardised and standardised (with standard error) CPUE indices for CRA 7 (kg/potlift). (s.e.=standard error).**

Fishing year	Arithmetic	Unstandardised	Standardised	s.e.
1979-80	1.052	1.011	1.004	0.031
1980-81	0.891	0.881	0.882	0.033
1981-82	0.786	0.756	0.751	0.033
1982-83	0.504	0.496	0.484	0.037
1983-84	0.404	0.425	0.419	0.038
1984-85	0.590	0.564	0.561	0.037
1985-86	0.752	0.747	0.748	0.036
1986-87	0.808	0.849	0.854	0.038
1987-88	0.725	0.704	0.721	0.040
1988-89	0.446	0.427	0.424	0.046
1989-90	0.360	0.334	0.352	0.044
1990-91	0.413	0.424	0.443	0.041
1991-92	0.827	0.981	0.967	0.053
1992-93	0.400	0.406	0.421	0.045
1993-94	0.629	0.623	0.620	0.056
1994-95	0.483	0.463	0.475	0.052
1995-96	0.311	0.285	0.279	0.051
1996-97	0.254	0.239	0.240	0.056
1997-98	0.234	0.179	0.174	0.061
1998-99	0.301	0.281	0.268	0.061
1999-00	0.224	0.277	0.278	0.064
2000-01	0.347	0.374	0.356	0.057
2001-02	0.460	0.478	0.459	0.062
2002-03	0.518	0.628	0.637	0.068
2003-04	0.585	0.591	0.627	0.077

**Table 45: Number of vessels reporting rock lobster by statistical area from CRA 8, 1979-80 through 2003-04. Vessels recorded as catching less than 1 t in a year for the entire QMA have been excluded.**

Fishing year	922	923	924	925	926	927	928	All
1979-80	6	48	76	5	67	69	67	271
1980-81	6	50	85	4	63	59	50	253
1981-82	8	39	76	5	68	40	34	221
1982-83	6	32	67	6	71	46	33	214
1983-84	6	41	56	7	73	47	34	208
1984-85	8	33	59	7	70	57	36	212
1985-86	3	38	54	5	63	58	40	208
1986-87	3	28	51	5	56	42	36	187
1987-88	5	24	53	1	57	38	28	173
1988-89	4	29	38	5	43	23	22	135
1989-90	7	35	40	11	78	42	27	178
1990-91	3	15	35	14	65	38	25	134
1991-92	5	19	34	4	71	43	34	143
1992-93	4	16	32	7	52	33	37	144
1993-94	3	18	33	8	51	34	34	143
1994-95	2	10	32	16	42	29	34	122
1995-96	3	10	18	10	36	27	30	112
1996-97	3	11	21	9	36	25	31	111
1997-98	2	12	18	8	36	23	35	107
1998-99	1	11	17	9	34	20	37	104
1999-00	2	13	16	7	29	21	21	91
2000-01	1	8	14	4	32	24	18	87
2001-02	2	6	13	3	34	15	18	74
2002-03	1	2	12	2	33	12	15	69
2003-04	1	5	11	4	26	11	12	61

**Table 46: Percentage of estimated annual catch by statistical area from CRA 8, 1979–80 through 2003–04.**

Fishing year	922	923	924	925	926	927	928
1979–80	1.9	12.7	25.6	0.4	22.4	19.5	17.6
1980–81	1.2	11.3	30.5	1.3	24.1	17.1	14.5
1981–82	1.5	11.9	27.5	1.9	32.4	13.8	11.0
1982–83	1.4	9.9	24.9	1.0	33.2	18.8	10.8
1983–84	1.1	10.2	22.3	1.5	35.8	17.2	11.9
1984–85	1.3	9.4	22.0	0.8	30.5	24.9	11.2
1985–86	0.7	10.5	21.3	1.0	29.5	24.2	12.9
1986–87	1.1	9.9	27.8	0.4	30.2	16.2	14.3
1987–88	1.3	12.5	27.8	0.1	32.0	15.5	10.8
1988–89	1.7	16.2	23.8	1.0	32.8	11.5	12.9
1989–90	1.1	9.7	22.7	0.5	36.2	19.1	10.6
1990–91	0.9	6.7	23.1	1.4	37.9	18.9	11.2
1991–92	1.0	6.0	19.6	1.3	32.3	23.1	16.6
1992–93	0.8	5.6	19.5	1.4	33.0	18.4	21.2
1993–94	1.5	6.4	22.9	1.7	30.2	17.4	19.8
1994–95	1.0	3.9	24.3	4.0	27.8	18.7	20.3
1995–96	0.8	5.0	17.1	3.6	30.4	21.1	21.9
1996–97	0.8	5.5	16.1	2.7	33.3	21.7	20.0
1997–98	0.3	4.4	16.7	1.2	32.5	19.3	25.6
1998–99	0.4	6.0	11.6	1.3	35.2	20.1	25.5
1999–00	0.5	6.6	13.7	3.1	35.6	23.2	17.3
2000–01	0.5	3.6	15.6	2.1	40.7	25.3	12.2
2001–02	0.8	3.3	14.8	0.3	42.8	22.9	15.0
2002–03	1.0	1.2	15.4	1.1	48.2	18.5	14.7
2003–04	0.6	4.2	13.9	0.3	50.1	17.2	13.7

**Table 47: Percentage of estimated annual catch by month from CRA 8, 1979–80 through 2003–04.**

Fishing year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1979–80	0.2	0.3	2.2	4.0	8.4	16.5	25.0	18.9	9.3	8.9	5.0	1.2
1980–81	0.2	0.3	2.4	5.4	7.0	14.4	25.3	21.2	12.6	7.4	3.1	0.8
1981–82	0.1	0.3	1.9	2.7	10.7	22.2	26.0	18.6	9.1	5.2	2.1	1.1
1982–83	0.3	0.2	3.4	3.3	7.2	20.3	29.2	10.5	10.5	8.3	5.5	1.2
1983–84	0.4	0.2	2.1	3.3	5.3	13.2	18.8	22.4	15.5	11.7	5.8	1.4
1984–85	0.2	0.3	1.3	2.4	9.6	24.8	24.8	14.8	10.6	5.6	3.5	2.0
1985–86	0.3	0.7	3.1	3.6	18.5	21.2	21.1	14.3	8.7	4.2	2.9	1.5
1986–87	0.6	0.6	1.4	2.1	9.5	19.1	20.1	20.1	11.7	7.8	4.5	2.6
1987–88	0.4	0.2	0.7	2.2	8.9	19.7	20.2	19.0	12.7	8.0	6.0	1.9
1988–89	0.7	0.7	2.9	3.2	5.7	12.1	17.0	17.9	14.0	16.0	7.3	2.6
1989–90	0.6	0.3	0.8	1.6	11.2	23.0	14.2	19.0	12.2	9.0	6.1	1.9
1990–91	0.3	0.1	0.9	2.5	8.3	17.6	17.1	19.7	10.5	11.9	7.0	4.2
1991–92	0.3	0.4	2.9	3.5	7.1	14.7	18.2	16.0	14.7	13.0	7.2	2.1
1992–93	0.5	0.2	2.2	4.0	8.3	17.4	15.5	15.8	15.1	8.6	8.5	3.9
1993–94	0.1	0.2	1.0	4.5	19.2	27.6	19.8	11.9	7.0	3.4	2.9	2.4
1994–95	0.1	0.4	3.5	5.2	11.2	25.6	18.6	11.4	10.4	9.0	3.3	1.3
1995–96	0.2	0.2	3.0	4.2	11.9	20.4	19.8	18.9	8.3	7.1	4.3	1.9
1996–97	0.2	0.3	2.2	4.0	10.0	19.1	22.4	19.1	11.1	8.2	2.5	0.9
1997–98	0.2	0.3	3.0	4.7	8.1	21.1	21.7	15.9	11.0	9.6	3.6	0.9
1998–99	0.1	0.3	1.5	2.4	7.7	17.5	16.2	22.4	13.2	10.5	6.4	1.8
1999–00	0.0	0.1	0.6	2.1	16.1	24.9	22.5	13.7	8.7	7.9	2.1	1.2
2000–01	0.1	0.0	0.4	2.6	15.0	37.6	15.3	13.0	6.5	4.9	3.7	1.0
2001–02	0.2	0.6	1.2	5.8	14.3	33.2	21.5	14.5	3.6	3.8	1.1	0.2
2002–03	0.8	0.8	0.8	5.6	21.7	33.1	17.0	8.0	3.6	4.8	1.0	2.8
2003–04	0.5	0.8	1.5	10.5	28.1	39.2	11.0	2.3	0.3	3.9	1.2	0.5

**Table 48: Percentage of estimated catch from CRA 8 by statistical area and month for 2003–04. A' indicates that fishing did not take place in that statistical area/month cell.**

Month	922	923	924	925	926	927	928
Apr	.	.	.	.	0.5	.	0
May	.	.	.	.	0.4	0.5	.
Jun	.	.	.	.	0.6	0.7	0.2
Jul	.	0.0	.	.	6.0	2.6	1.9
Aug	.	0.3	2.2	0.1	17.8	4.1	3.6
Sep	0.6	3.3	7.1	0.2	17.2	7.2	3.4
Oct	.	0.5	2.2	.	4.4	1.7	2.1
Nov	.	.	1.1	.	0.4	0.1	0.7
Dec	.	.	0.1	.	0.0	.	0.2
Jan	.	0.0	1.1	.	1.9	.	0.9
Feb	.	.	.	.	0.9	.	0.3
Mar	.	.	.	.	.	0.2	0.4

**Table 49: Arithmetic CPUE (total kg/total potlifts) for CRA 8 by fishing year and statistical area, 1979–80 through 2003–04. A' indicates that fishing did not take place in that statistical area/month cell or that fewer than 3 vessels fished.**

Fishing year	922	923	924	925	926	927	928
1979–80	1.993	2.229	1.891	5.009	1.840	1.520	1.634
1980–81	1.321	1.898	2.002	7.953	1.959	1.328	1.371
1981–82	1.518	1.806	1.897	10.431	2.144	1.447	1.223
1982–83	1.103	1.815	1.732	4.438	1.987	1.219	1.074
1983–84	0.805	1.183	1.234	4.459	1.527	0.987	1.088
1984–85	0.859	1.246	1.331	3.674	1.300	1.192	0.956
1985–86	0.941	1.489	1.656	13.460	1.514	1.141	1.036
1986–87	1.098	1.169	1.688	2.110	1.234	0.788	0.906
1987–88	1.009	1.450	1.722	.	1.353	0.823	0.907
1988–89	0.540	1.067	1.071	1.577	1.036	0.700	0.685
1989–90	0.806	0.968	1.270	0.603	0.905	0.723	0.709
1990–91	0.605	0.930	1.231	1.377	0.943	0.719	0.567
1991–92	0.420	0.860	1.122	2.016	0.836	0.740	0.677
1992–93	0.471	0.787	1.065	0.927	0.705	0.537	0.57
1993–94	1.205	1.340	1.643	1.775	0.942	0.706	0.651
1994–95	0.730	0.892	1.224	1.294	0.899	0.749	0.704
1995–96	0.922	0.764	1.098	1.243	1.076	0.855	0.689
1996–97	0.795	0.753	0.959	1.205	1.007	0.827	0.719
1997–98	0.639	0.662	0.901	0.944	0.777	0.687	0.623
1998–99	.	0.732	0.709	0.883	1.010	0.861	0.609
1999–00	.	0.753	0.877	0.824	1.134	0.886	0.517
2000–01	.	1.203	1.273	1.555	1.274	0.827	0.557
2001–02	.	1.435	1.329	0.609	1.037	0.789	0.643
2002–03	.	.	1.323	.	1.284	0.906	0.751
2003–04	.	2.745	2.342	1.572	1.944	1.638	0.903



**Table 50: Annual arithmetic, unstandardised and standardised (with standard error) CPUE indices for CRA 8 (kg/potlift). (s.e.=standard error).**

Fishing year	Arithmetic	Unstandardised	Standardised	s.e.
1979-80	1.786	2.079	2.116	0.020
1980-81	1.723	1.841	1.838	0.021
1981-82	1.788	1.831	1.763	0.023
1982-83	1.574	1.525	1.506	0.022
1983-84	1.247	1.164	1.135	0.021
1984-85	1.222	1.123	1.099	0.021
1985-86	1.355	1.293	1.302	0.022
1986-87	1.149	1.149	1.155	0.022
1987-88	1.243	1.220	1.212	0.023
1988-89	0.924	0.934	0.907	0.027
1989-90	0.897	0.898	0.842	0.024
1990-91	0.873	0.886	0.842	0.026
1991-92	0.820	0.809	0.805	0.024
1992-93	0.680	0.712	0.727	0.024
1993-94	0.925	0.949	0.975	0.027
1994-95	0.882	0.872	0.882	0.027
1995-96	0.903	0.905	0.907	0.029
1996-97	0.874	0.843	0.852	0.029
1997-98	0.725	0.708	0.731	0.027
1998-99	0.790	0.744	0.752	0.028
1999-00	0.835	0.772	0.767	0.033
2000-01	0.986	0.928	0.931	0.036
2001-02	0.924	0.962	0.989	0.040
2002-03	1.090	1.191	1.249	0.045
2003-04	1.686	1.796	1.869	0.051

**Table 51: Number of vessels reporting rock lobster by statistical area from CRA 9, 1979-80 through 2003-04. Vessels recorded as catching less than 1 t in a year for the entire QMA have been excluded. A '.' indicates that no fishing took place in the statistical area/fishing year cell. A '0' indicates that fishing took place but none of the qualified vessels fished.**

Fishing year	929	930	931	935	936	937	938	All
1979-80	4	6	6	3	6	3	.	23
1980-81	2	4	5	4	8	5	1	23
1981-82	1	3	7	3	4	4	.	20
1982-83	2	3	7	2	4	4	.	19
1983-84	1	3	7	3	6	6	.	22
1984-85	0	3	6	3	6	5	.	21
1985-86	0	2	7	7	6	6	.	20
1986-87	0	2	6	5	6	6	.	20
1987-88	0	2	5	5	6	5	.	19
1988-89	.	1	1	4	5	2	0	10
1989-90	1	4	4	7	3	1	.	18
1990-91	0	1	5	5	2	1	1	12
1991-92	.	1	5	6	0	1	0	13
1992-93	.	3	4	5	0	1	0	12
1993-94	0	3	3	6	0	0	.	12
1994-95	1	6	3	5	0	1	.	16
1995-96	1	4	1	6	1	1	.	14
1996-97	1	6	5	6	1	2	.	18
1997-98	1	6	5	7	4	1	.	19
1998-99	1	5	5	5	1	1	1	16
1999-00	1	7	6	4	0	1	.	17
2000-01	0	3	2	3	3	2	0	9
2001-02	0	2	2	4	2	3	0	11
2002-03	0	1	2	4	2	2	.	10
2003-04	.	1	3	3	2	1	.	9

**Table 52: Percentage of estimated annual catch by statistical area from CRA 9, 1979–80 through 2003–04. A '.' indicates that no fishing took place in the statistical area/fishing year cell.**

Fishing year	929	930	931	935	936	937	938
1979–80	14.7	14.7	28.8	13.1	13.4	15.3	.
1980–81	3.3	10.9	16.9	14.4	29.2	25.0	0.3
1981–82	4.3	8.9	32.5	10.2	20.0	24.1	.
1982–83	7.2	9.0	42.3	16.0	8.5	17.1	.
1983–84	2.0	6.3	50.1	8.2	12.6	20.7	.
1984–85	0.7	12.2	42.1	16.5	12.4	16.1	.
1985–86	0.1	7.0	38.6	18.8	16.3	19.2	.
1986–87	1.0	6.3	34.6	23.2	23.4	11.5	.
1987–88	0.0	2.8	33.5	36.3	16.1	11.2	.
1988–89	.	5.5	19.6	46.9	19.5	8.0	0.4
1989–90	2.0	19.3	23.9	44.0	6.4	4.3	.
1990–91	0.1	3.8	40.3	46.4	5.4	1.8	2.1
1991–92	.	2.6	49.8	40.2	1.3	5.1	0.9
1992–93	.	12.5	41.7	40.2	0.1	3.9	1.6
1993–94	1.4	23.0	26.3	47.5	0.1	1.6	.
1994–95	5.6	31.9	13.2	46.1	0.4	2.8	.
1995–96	5.7	27.6	5.8	43.3	8.8	8.8	.
1996–97	4.8	19.0	22.7	45.5	3.2	4.7	.
1997–98	5.7	16.5	19.7	45.4	9.9	2.9	.
1998–99	4.7	31.1	19.2	35.2	4.5	4.7	0.7
1999–00	2.6	34.9	28.3	28.6	0.6	5.0	.
2000–01	1.2	6.5	34.1	35.6	10.4	12.0	0.0
2001–02	0.1	10.0	24.0	41.7	12.2	11.5	0.6
2002–03	0.4	5.0	20.2	49.4	13.8	11.3	.
2003–04	.	6.3	36.5	30.7	17.6	8.8	.

**Table 53: Percentage of estimated annual catch by month from CRA 9, 1979–80 through 2003–04. A '.' indicates that no fishing took place in the month/fishing year cell.**

Fishing year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1979–80	3.4	0.1	0.6	3.6	2.9	2.0	15.0	26.0	11.6	17.5	11.0	6.3
1980–81	0.8	0.1	0.2	2.7	2.7	2.4	13.4	5.7	21.1	32.0	15.0	3.8
1981–82	0.6	0.2	1.4	2.4	3.0	1.2	9.0	19.9	20.7	19.7	14.7	7.3
1982–83	4.0	0.7	2.4	4.6	8.1	3.1	8.2	8.0	16.0	14.8	20.8	9.3
1983–84	2.6	0.9	2.8	11.2	5.2	0.9	5.5	11.6	11.6	21.1	18.4	8.2
1984–85	0.8	2.3	2.3	5.1	5.3	8.3	7.9	16.4	13.4	15.6	14.4	8.2
1985–86	4.4	1.6	0.3	2.9	6.5	10.4	10.4	14.6	17.3	12.8	11.6	7.3
1986–87	2.0	0.6	0.6	4.8	4.3	5.1	9.5	16.2	20.8	15.3	10.6	10.2
1987–88	2.7	0.1	1.7	3.0	5.9	4.8	15.9	18.0	13.6	15.2	11.4	7.8
1988–89	4.4	.	0.5	4.9	3.0	8.3	3.7	13.6	18.6	21.3	12.9	8.8
1989–90	1.3	0.0	0.0	3.9	7.7	16.2	7.7	10.9	12.4	15.7	18.4	5.9
1990–91	0.4	.	.	2.3	5.1	11.9	21.4	12.2	6.4	13.1	11.1	16.2
1991–92	1.1	0.0	2.0	17.1	6.1	8.9	9.8	17.4	12.5	10.1	7.4	7.4
1992–93	0.5	0.8	11.7	11.9	3.4	13.6	11.6	11.1	10.4	9.1	11.7	4.3
1993–94	1.0	0.5	1.0	24.3	9.3	12.7	16.3	7.1	11.0	5.7	8.7	2.5
1994–95	0.3	0.0	4.4	12.0	11.6	13.7	22.4	8.9	13.8	9.4	2.0	1.4
1995–96	0.0	0.5	2.4	7.4	16.5	24.2	24.0	13.2	4.8	3.7	0.5	2.8
1996–97	0.4	0.5	4.6	16.2	17.2	22.3	17.0	8.2	7.3	4.6	0.7	1.0
1997–98	0.2	0.2	12.5	21.0	15.0	17.0	12.0	7.3	7.0	3.6	3.9	0.2
1998–99	1.1	1.2	2.6	8.2	12.7	17.9	12.6	18.4	10.8	8.3	3.7	2.6
1999–00	0.8	1.6	6.4	9.4	15.9	27.2	18.1	12.5	5.6	2.5	0.1	0.0
2000–01	3.2	2.3	6.0	20.6	18.7	12.8	14.0	12.7	6.8	2.5	0.0	0.3
2001–02	4.2	2.7	8.8	25.3	13.5	23.3	13.9	3.8	2.8	0.6	0.6	0.3
2002–03	12.5	5.6	2.1	20.0	15.6	15.8	5.7	4.6	3.5	3.6	9.2	1.7
2003–04	8.0	0.7	1.1	16.1	28.8	9.0	8.7	5.8	9.5	10.7	.	1.6

**Table 54: Percentage of estimated catch from CRA 9 by statistical area and month for 2003-04. A '.' indicates that no fishing took place in the statistical area/month cell.**

Month	929	930	931	935	936	937	938
Apr	.	.	.	8.0	.	0.0	.
May	.	.	.	0.4	.	0.3	.
Jun	.	.	1.1	.	.	.	.
Jul	.	.	5.9	5.8	4.3	.	.
Aug	.	1.9	8.2	12.0	4.7	1.9	.
Sep	.	0.5	3.0	4.2	.	1.4	.
Oct	.	0.7	6.7	.	.	1.2	.
Nov	.	1.0	4.6	.	.	0.1	.
Dec	.	1.5	6.9	0.3	.	0.9	.
Jan	.	0.7	0.0	.	8.6	1.4	.
Feb	.	.	.	.	.	.	.
Mar	.	.	.	.	.	1.6	.

**Table 55: Arithmetic CPUE (total kg/total potlifts) for CRA 9 by fishing year and statistical area, 1979-80 through 2003-04. A '.' indicates that fishing did not take place in that statistical area/month cell or that fewer than 3 vessels fished.**

Fishing year	929	930	931	935	936	937	938
1979-80	1.206	1.032	2.506	0.632	0.679	1.299	.
1980-81	0.650	1.047	2.280	0.819	0.880	1.804	.
1981-82	0.731	0.829	2.346	0.494	0.630	1.283	.
1982-83	0.818	0.481	1.582	0.693	0.461	0.834	.
1983-84	.	0.702	1.809	0.631	0.435	0.888	.
1984-85	.	0.610	1.783	0.749	0.510	0.765	.
1985-86	.	0.527	1.069	0.672	0.538	0.719	.
1986-87	.	0.636	1.143	0.899	0.788	0.630	.
1987-88	.	.	0.891	1.199	0.610	0.611	.
1988-89	.	0.415	.	1.293	0.523	0.660	.
1989-90	0.461	0.610	1.437	1.059	0.421	0.467	.
1990-91	.	.	1.369	0.864	1.170	.	0.699
1991-92	.	.	1.355	0.810	.	.	.
1992-93	.	0.632	1.429	0.777	.	.	.
1993-94	.	1.203	1.488	1.276	.	.	.
1994-95	.	0.655	1.329	1.233	.	.	.
1995-96	0.499	0.692	.	1.269	.	.	.
1996-97	.	0.695	0.863	1.251	.	.	.
1997-98	0.833	0.549	0.622	1.017	1.056	.	.
1998-99	0.627	0.740	1.217	0.976	.	.	.
1999-00	.	0.741	0.990	1.006	.	.	.
2000-01	0.720	0.741	.	0.743	0.474	.	.
2001-02	.	0.542	1.812	0.658	.	0.926	.
2002-03	.	.	.	1.212	.	.	.
2003-04	.	.	1.790	2.208	.	.	.

**Table 56: Annual arithmetic, unstandardised and standardised (with standard error) CPUE indices for CRA 9 (kg/potlift). (s.e.=standard error).**

Fishing year	Arithmetic	Unstandardised	Standardised	s.e.
1979-80	1.110	1.066	1.169	0.049
1980-81	1.138	1.117	1.264	0.048
1981-82	0.983	0.918	0.963	0.056
1982-83	0.861	0.798	0.807	0.056
1983-84	0.945	0.871	0.838	0.057
1984-85	0.886	0.809	0.797	0.055
1985-86	0.742	0.701	0.704	0.056
1986-87	0.866	0.829	0.816	0.057
1987-88	0.846	0.871	0.835	0.060
1988-89	0.806	0.760	0.818	0.074
1989-90	0.842	0.719	0.741	0.063
1990-91	0.982	0.906	0.827	0.080
1991-92	0.932	0.981	0.849	0.078
1992-93	0.883	1.036	0.943	0.081
1993-94	1.302	1.178	1.110	0.081
1994-95	0.926	0.829	0.884	0.071
1995-96	0.979	0.977	1.069	0.081
1996-97	0.981	0.951	0.956	0.071
1997-98	0.793	0.812	0.828	0.069
1998-99	0.922	1.037	1.087	0.072
1999-00	0.875	0.907	0.906	0.074
2000-01	0.933	1.035	1.051	0.087
2001-02	0.820	1.021	1.011	0.091
2002-03	1.064	1.198	1.191	0.093
2003-04	1.627	1.899	1.706	0.111

**Table 57: Standardised indices for each period with associated standard error and the corresponding arithmetic (unstandardised) CPUE (kg/potlift) for CRA 3 from period 69 (autumn-winter 1979-80) through period 118 (spring-summer 2003-04). [s.e.=standard error]**

Period	Standardised	s.e.	Arithmetic	Period	Standardised	s.e.	Arithmetic
69	0.647	0.038	0.754	94	0.346	0.031	0.368
70	0.894	0.029	0.973	95	0.167	0.035	0.185
71	0.751	0.036	0.848	96	0.320	0.032	0.320
72	0.964	0.028	0.960	97	0.345	0.039	0.419
73	0.718	0.036	0.835	98	0.867	0.067	0.645
74	0.971	0.029	0.969	99	0.742	0.048	0.875
75	0.823	0.034	0.868	100	1.037	0.111	0.863
76	1.010	0.029	0.996	101	1.162	0.052	1.305
77	0.744	0.033	0.794	102	1.367	0.137	1.205
78	0.923	0.028	0.900	103	1.507	0.052	1.761
79	0.563	0.032	0.651	104	2.364	0.177	1.664
80	0.786	0.028	0.803	105	2.142	0.054	2.180
81	0.501	0.033	0.581	106	3.027	0.217	1.988
82	0.793	0.029	0.792	107	1.557	0.051	1.602
83	0.428	0.037	0.471	108	3.062	0.126	2.019
84	0.688	0.030	0.745	109	1.526	0.051	1.596
85	0.332	0.034	0.357	110	2.155	0.101	1.331
86	0.463	0.031	0.472	111	1.084	0.047	1.169
87	0.319	0.041	0.343	112	1.763	0.084	1.267
88	0.497	0.033	0.487	113	0.830	0.050	0.909
89	0.315	0.038	0.343	114	1.318	0.068	1.016
90	0.564	0.030	0.576	115	0.597	0.046	0.733
91	0.334	0.037	0.326	116	0.801	0.047	0.726
92	0.485	0.032	0.513	117	0.528	0.047	0.712
93	0.222	0.036	0.238	118	0.552	0.047	0.541

**Table 58: Proportion of the total deviance explained by each variable in the standardised CPUE model used in the CRA 3 stock assessment.**

Variable	Iteration		
	1	2	3
Period	0.4269		
Month	0.0707	0.4766	
Area	0.0145	0.4470	0.4974
Additional deviance explained	0.0000	0.0497	0.0208

**Table 59: Standardised index and standard error (s.e.) by period for the CRA 3 pre-recruitment index (PRI) for the lognormal and binomial models.**

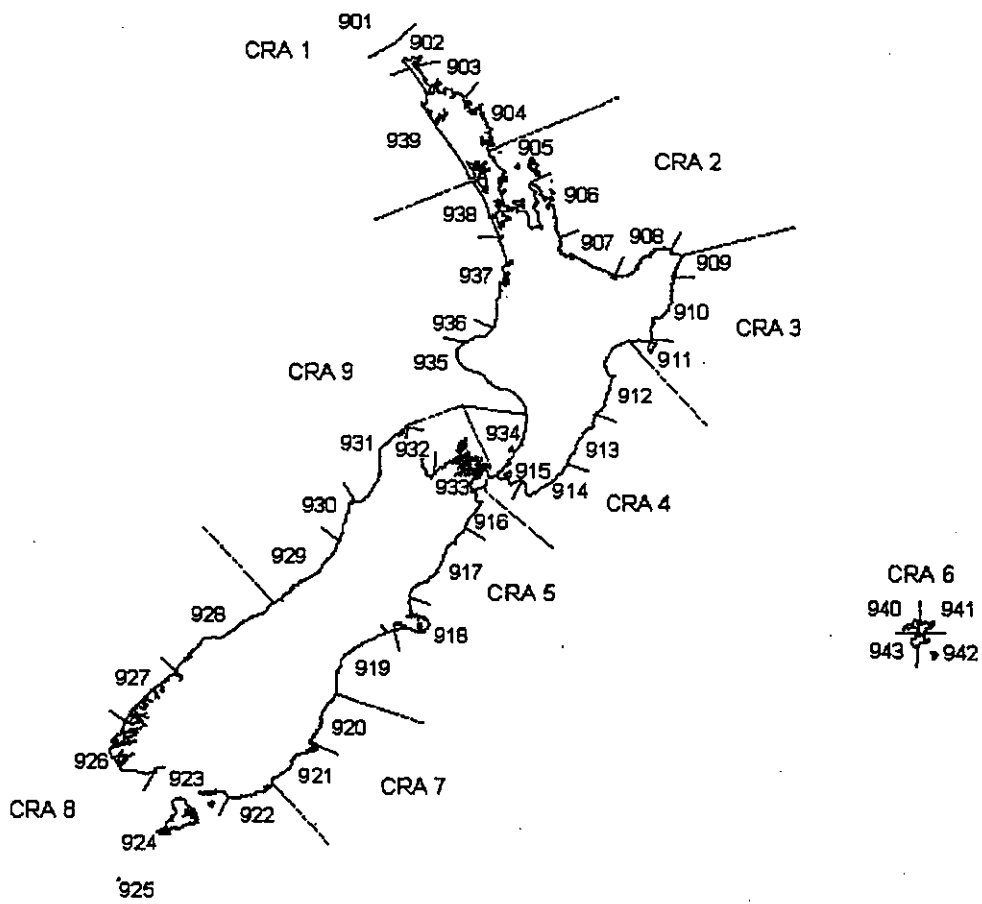
Period	Lognormal		Binomial	
	Index	s.e.	Index	s.e.
97	1.011	0.052	0.574	0.098
98	1.039	0.066	1.921	0.121
99	0.973	0.048	0.666	0.090
100	1.320	0.070	3.961	0.137
101	1.005	0.050	0.525	0.094
103	1.106	0.051	0.731	0.098
105	0.994	0.056	0.321	0.101
107	0.787	0.053	0.289	0.099
108	1.050	0.077	18.966	0.295
109	0.845	0.056	0.274	0.104
110	1.097	0.078	8.700	0.247
111	0.685	0.054	0.350	0.104
112	1.250	0.077	22.815	0.342
113	0.763	0.066	0.122	0.115
114	0.905	0.075	0.633	0.134
115	0.979	0.054	0.533	0.107
116	0.964	0.072	1.809	0.133
117	1.187	0.055	0.490	0.107
118	1.322	0.068	0.734	0.117

**Table 60: Number of potlift records in the dataset, by period and statistical area, used to calculate the CRA 3 PRI time series. Periods shaded with grey with less than 200 potlifts were dropped from the analysis. AW: autumn/winter; SS: spring/summer.**

Fishing year	Season	Period	Statistical Area			Total
			909	910	911	
1993	AW	97	259	2 103	850	3 212
1993	SS	98	660	1 614	1 193	3 467
1994	AW	99	736	3 152	1 687	5 575
1994	SS	100	0	834	645	1 479
1995	AW	101	1 137	1 560	1 154	3 851
1995	SS	102	0	39	0	39
1996	AW	103	975	675	1 055	2 705
1996	SS	104	0	0	0	0
1997	AW	105	412	305	760	1 477
1997	SS	106	0	52	0	52
1998	AW	107	844	876	843	2 563
1998	SS	108	0	600	0	600
1999	AW	109	646	559	469	1 674
1999	SS	110	0	558	7	565
2000	AW	111	663	584	588	1 835
2000	SS	112	0	516	0	516
2001	AW	113	81	499	226	806
2001	SS	114	0	1 270	0	1 270
2002	AW	115	367	983	508	1 858
2002	SS	116	0	1 041	475	1 516
2003	AW	117	231	958	684	1 873
2003	SS	118	0	614	779	1 393
		Total	7 011	19 392	11 923	38 326

**Table 61: Proportion of the total deviance explained by each variable in the CRA 3 lognormal and binomial standardised PRI model.**

Variable	Lognormal Model				
	1	2	3	4	Iteration 5
Period	0.0579				
Area	0.1597	0.1968			
Month	0.0813	0.1021	0.2191		
Depth interval	0.0062	0.0703	0.2102	0.2305	
Data source	0.0003	0.0579	0.1970	0.2191	0.2305
Additional deviance explained	0.0000	0.1390	0.0223	0.0114	0.0000
Variable	Binomial Model				
	1	2	3	4	Iteration 5
Depth interval	0.0245	0.0824	0.1303		
Month	0.0263	0.0623	0.1147	0.1378	
Data source	0.0010	0.0545	0.1078	0.1313	0.1383
Additional deviance explained	0.0000	0.0547	0.0235	0.0075	0.0005



**Figure 1: Map of rock lobster statistical areas and quota management areas.**

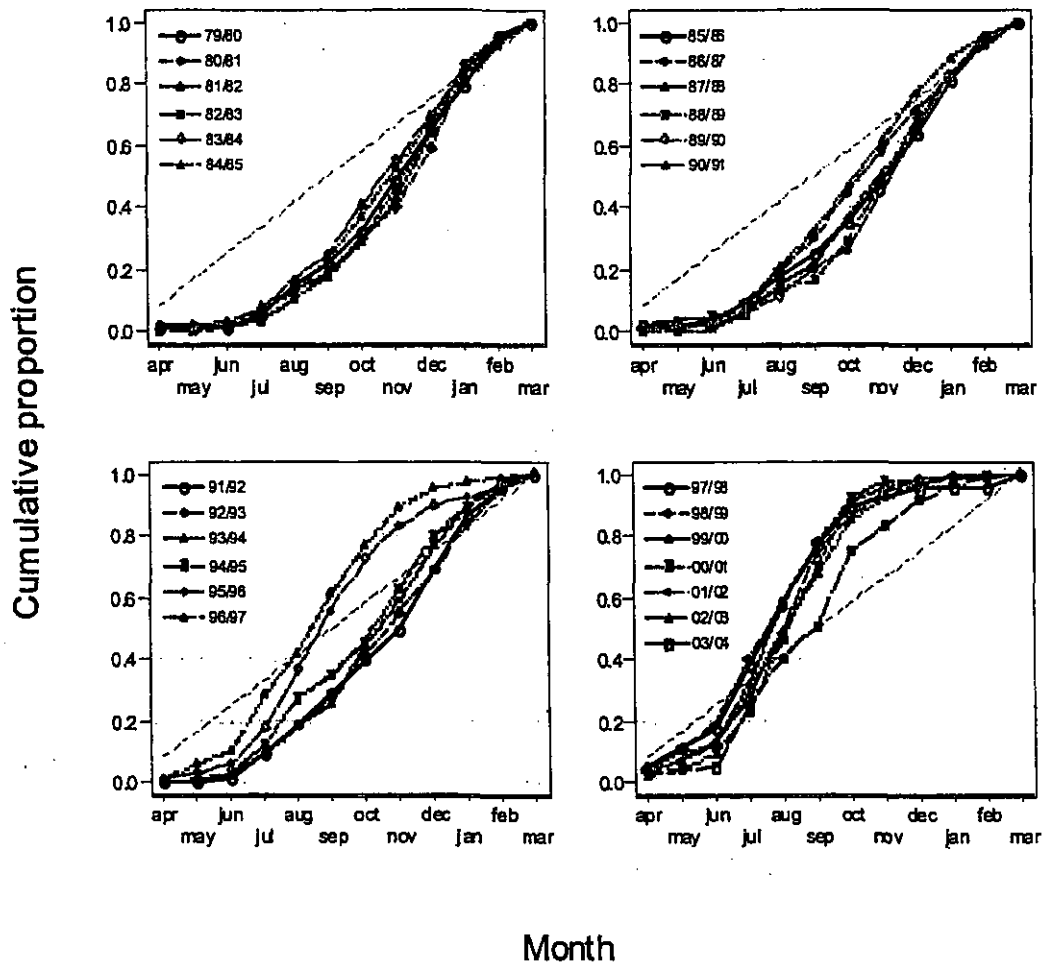


Figure 2: Cumulative catch percentages by fishing month for CRA 1, 1979–80 through 2003–04. Dotted line provides a reference equivalent to an equal distribution of catch across all months.



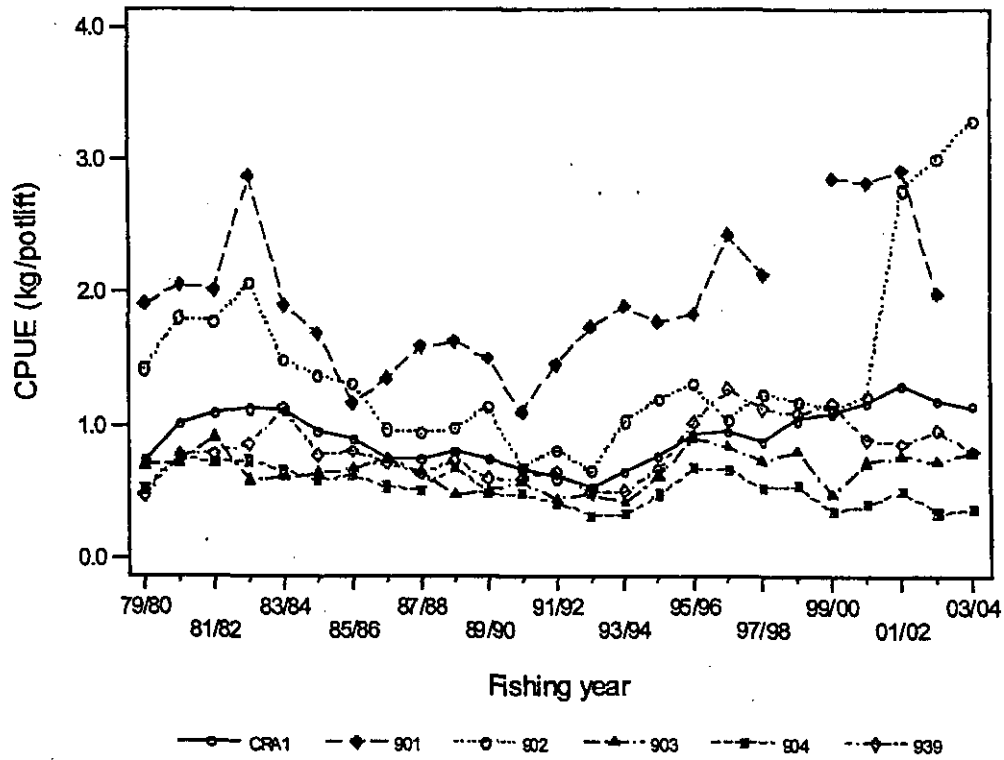


Figure 3: Arithmetic CPUE (total kg/total potlifts) for CRA 1 by fishing year and statistical area from 1979-80 through 2003-04.

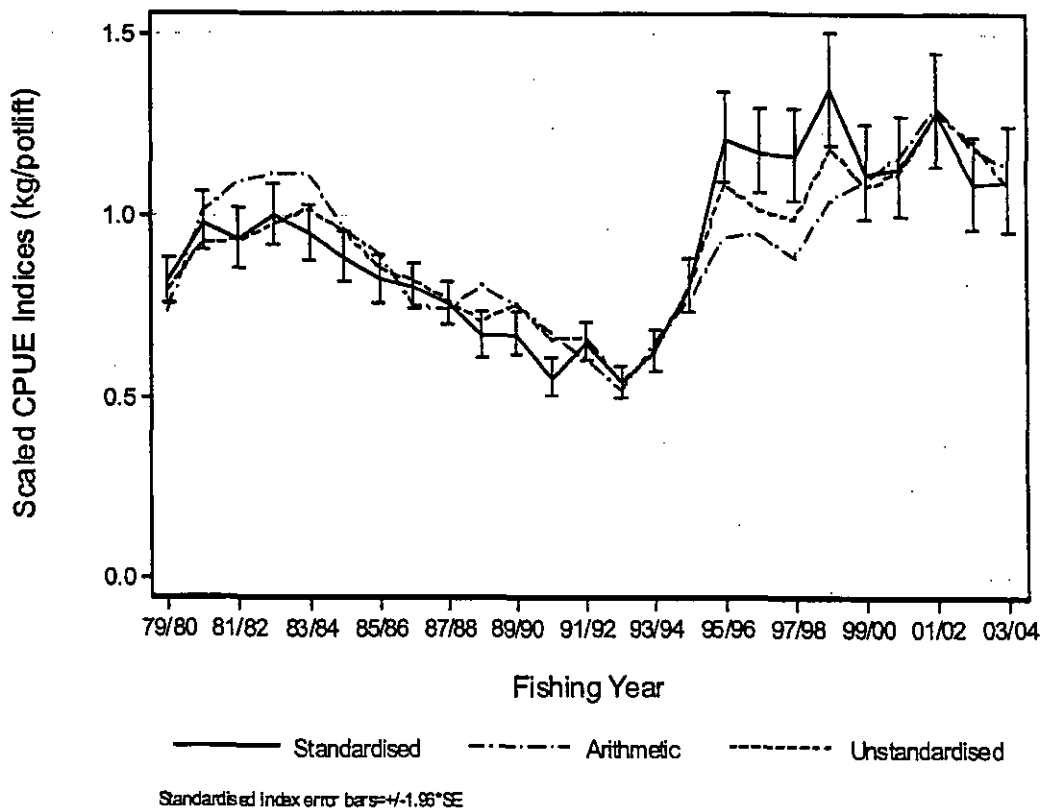


Figure 4: Annual CPUE indices for CRA 1: arithmetic (dashed line), unstandardised (dotted line), and standardised (bold line)  $\pm 2$  s.e. from 1979-80 through 2003-04.

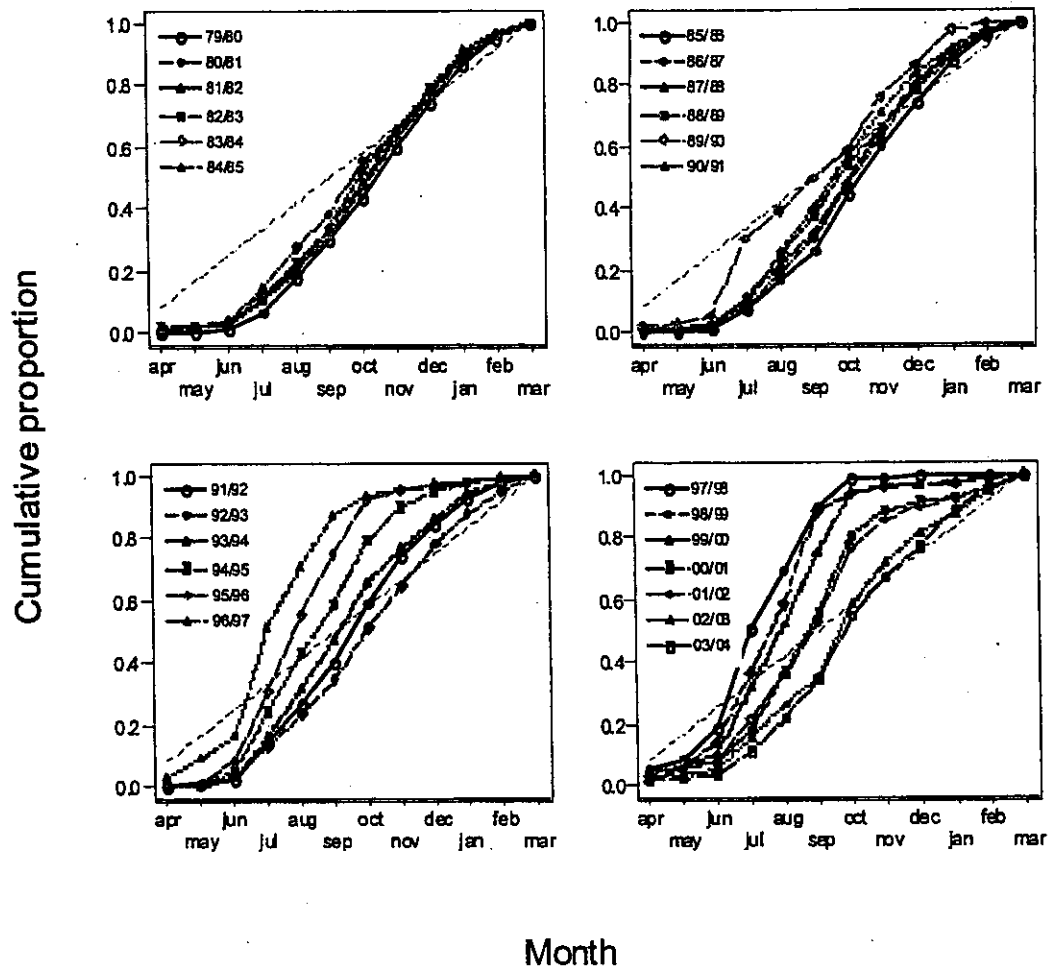


Figure 5: Cumulative catch percentages by fishing month for CRA 2, 1979–80 through 2003–04. Dotted line provides a reference equivalent to an equal distribution of catch across all months.

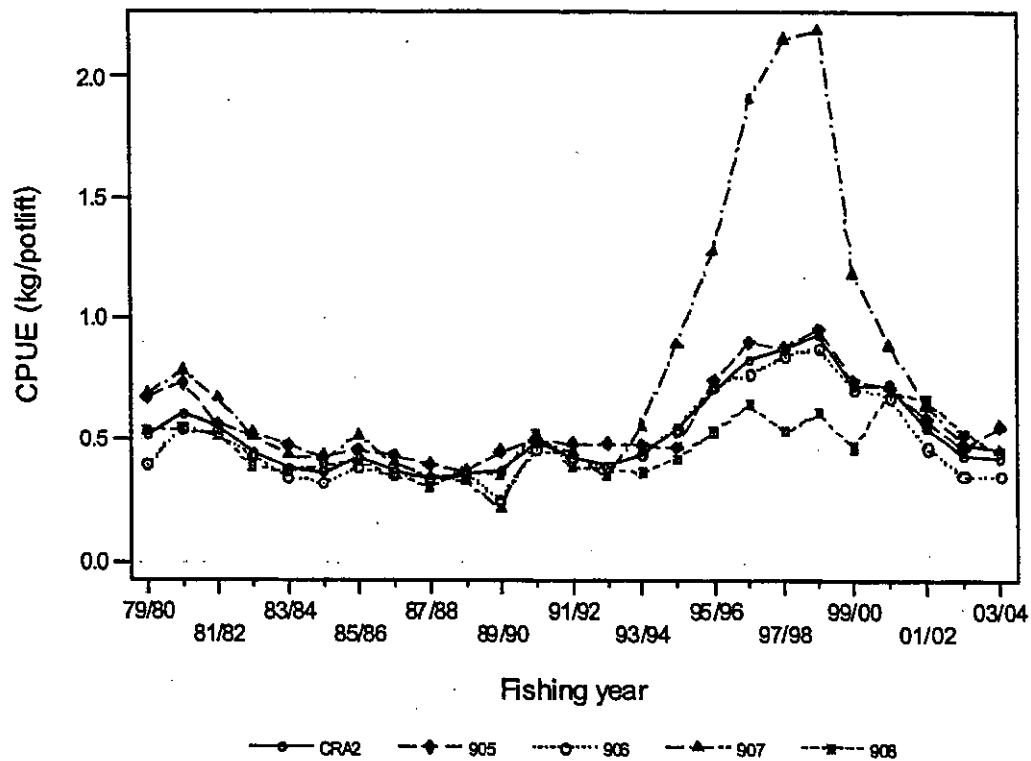


Figure 6: Arithmetic CPUE (total kg/total potlifts) for CRA 2 by fishing year and statistical area from 1979-80 through 2003-04.

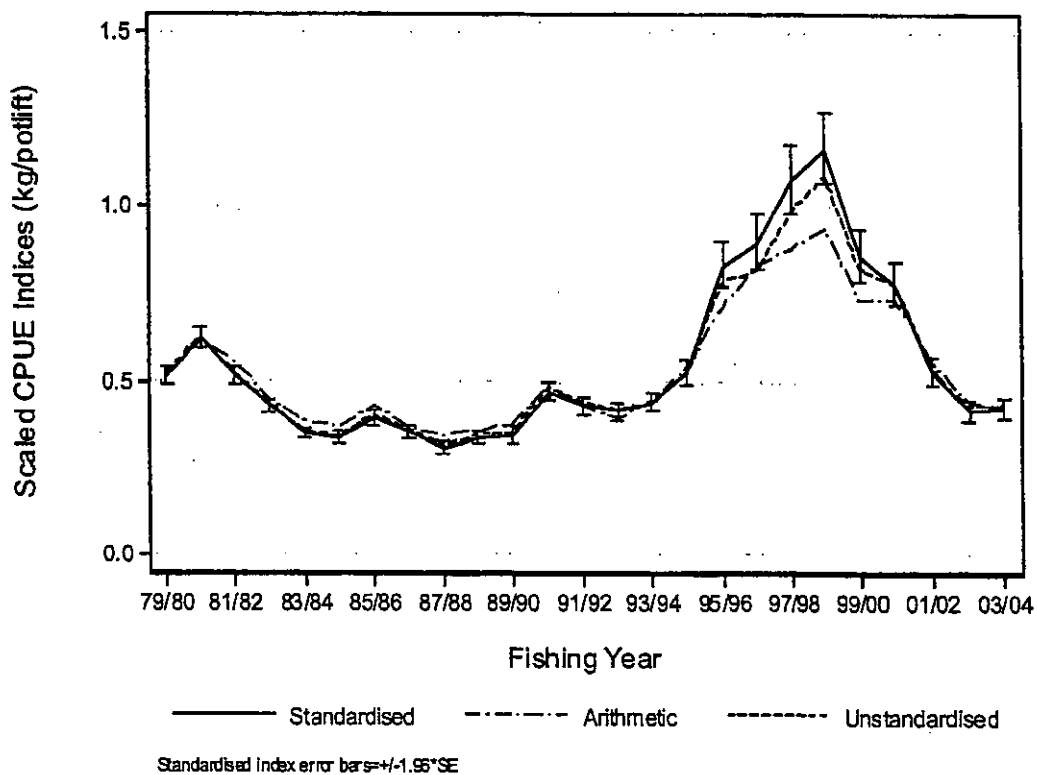


Figure 7: Annual CPUE indices for CRA 2: arithmetic (dashed line), unstandardised (dotted line), and standardised (bold line)  $\pm 2$  s.e. from 1979-80 through 2003-04.

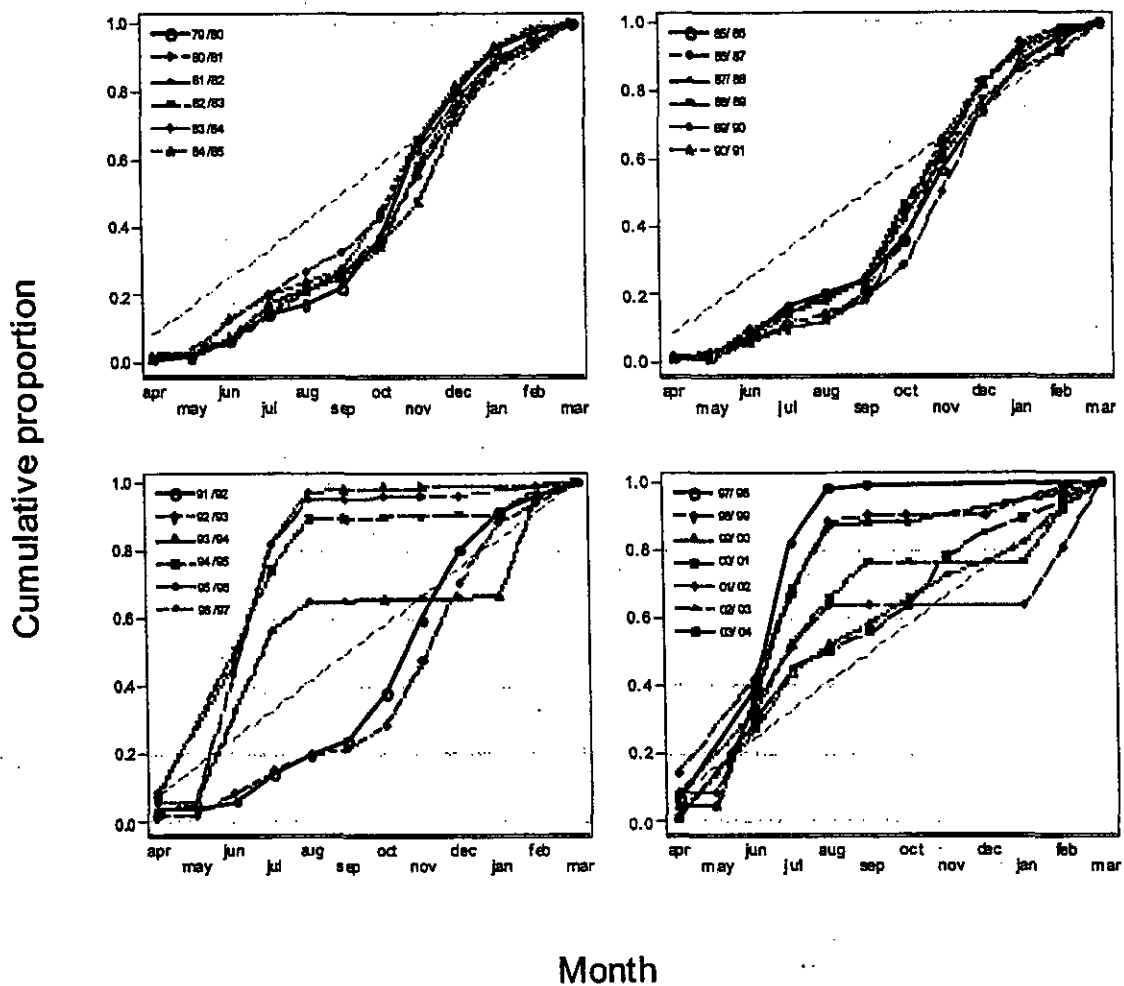


Figure 8: Cumulative catch percentages by fishing month for CRA 3, 1979–80 through 2003–04. Dotted line provides a reference equivalent to an equal distribution of catch across all months.

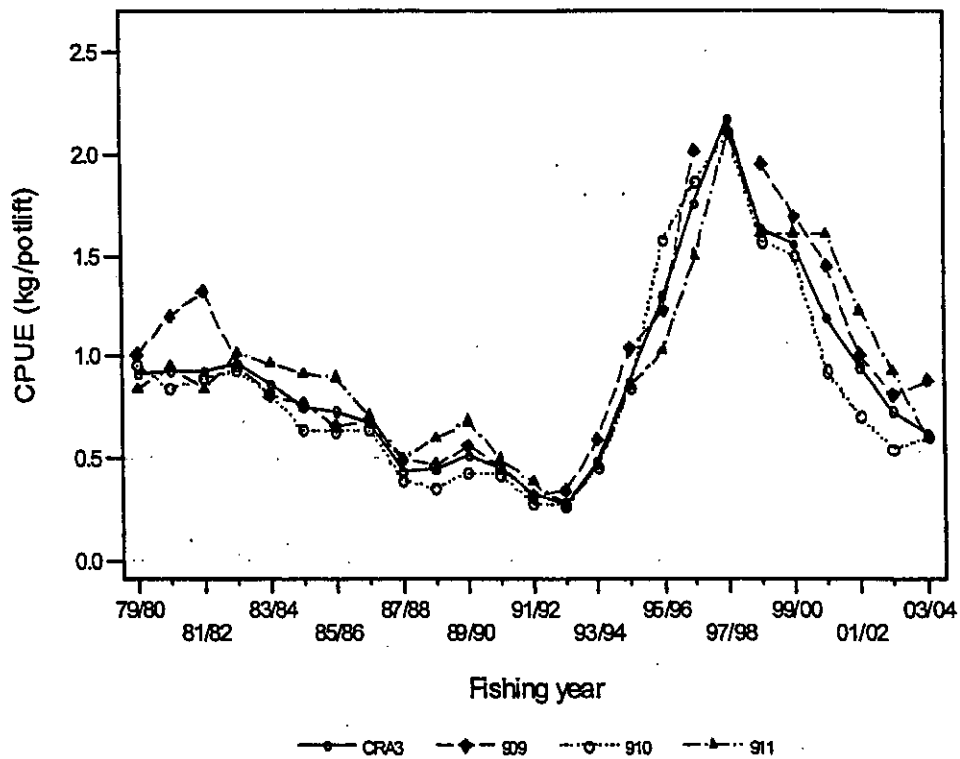


Figure 9: Arithmetic CPUE (total kg/total potlifts) for CRA 3 by fishing year and statistical area from 1979-80 through 2003-04.

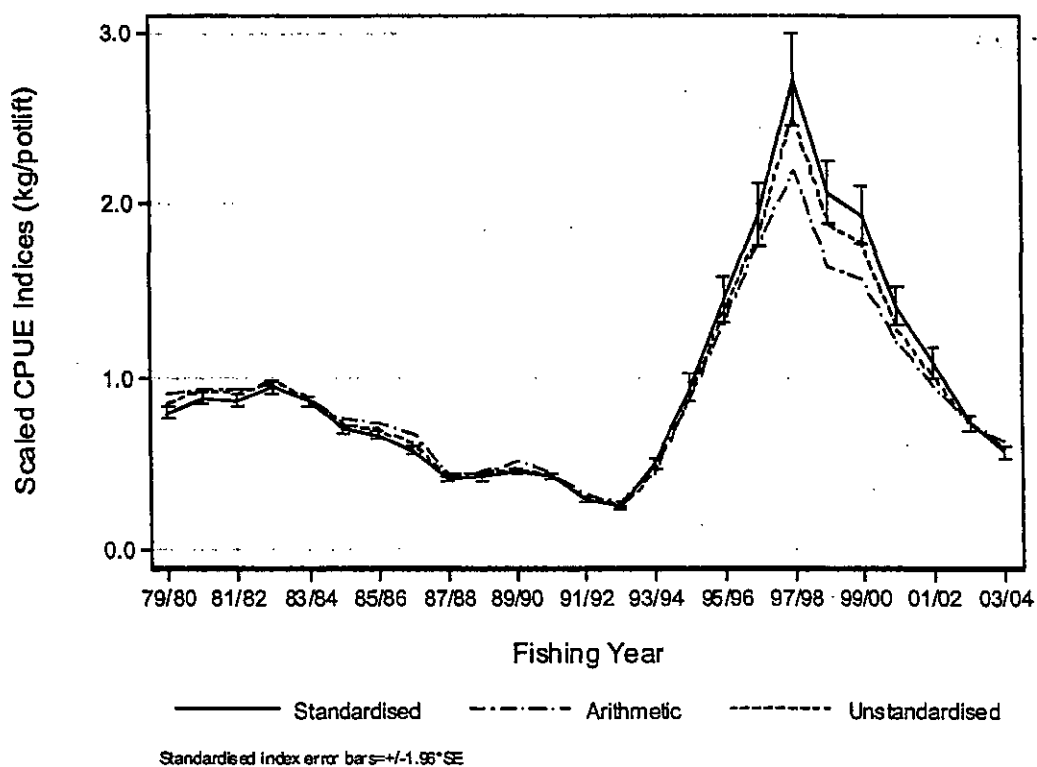


Figure 10: Annual CPUE indices for CRA 3: arithmetic (dashed line), unstandardised (dotted line), and standardised (bold line)  $\pm 2$  s.e.

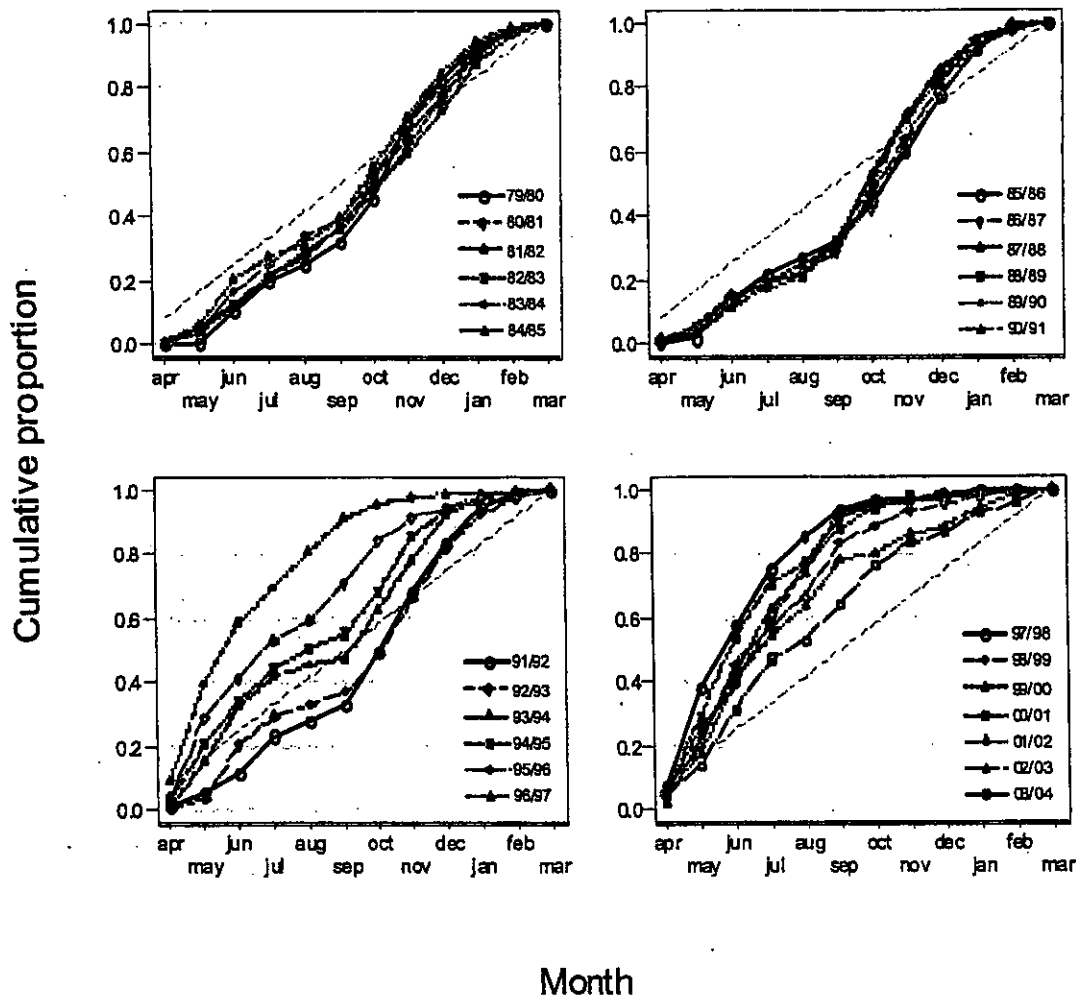


Figure 11: Cumulative catch percentages by fishing month for CRA 4, 1979–80 through 2003–04. Dotted line provides a reference equivalent to an equal distribution of catch across all months.

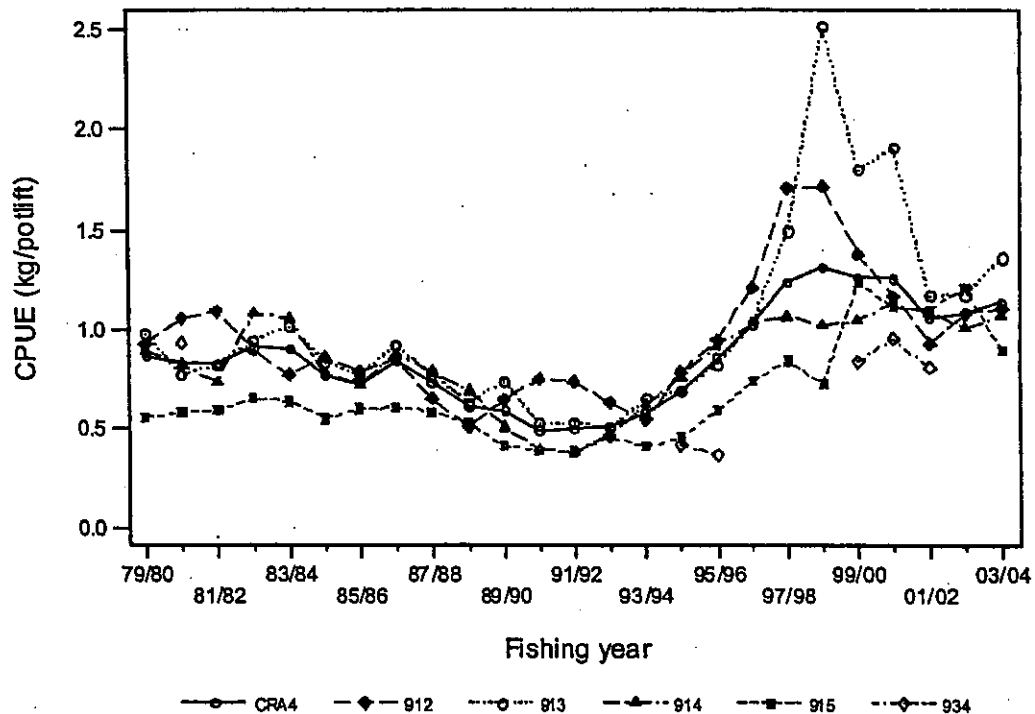


Figure 12: Arithmetic CPUE (total kg/total potlifts) for CRA 4 by fishing year and statistical area from 1979-80 through 2003-04.

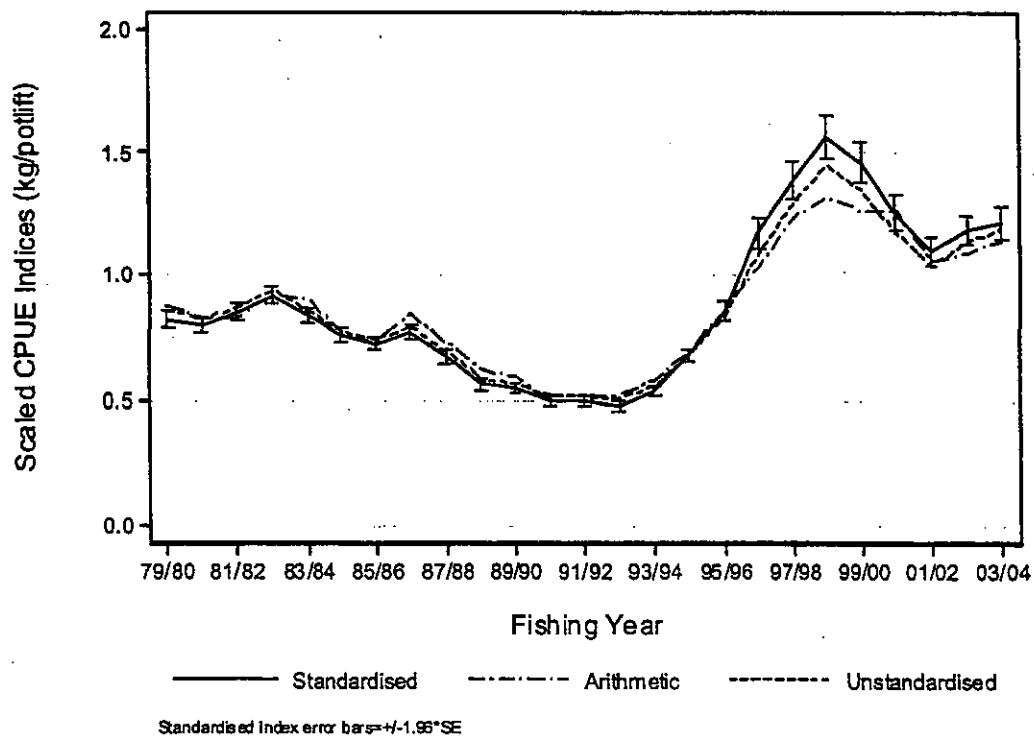


Figure 13: Annual CPUE indices for CRA 4: arithmetic (dashed line), unstandardised (dotted line), and standardised (bold line)  $\pm 2$  s.e. from 1979-80 through 2003-04.

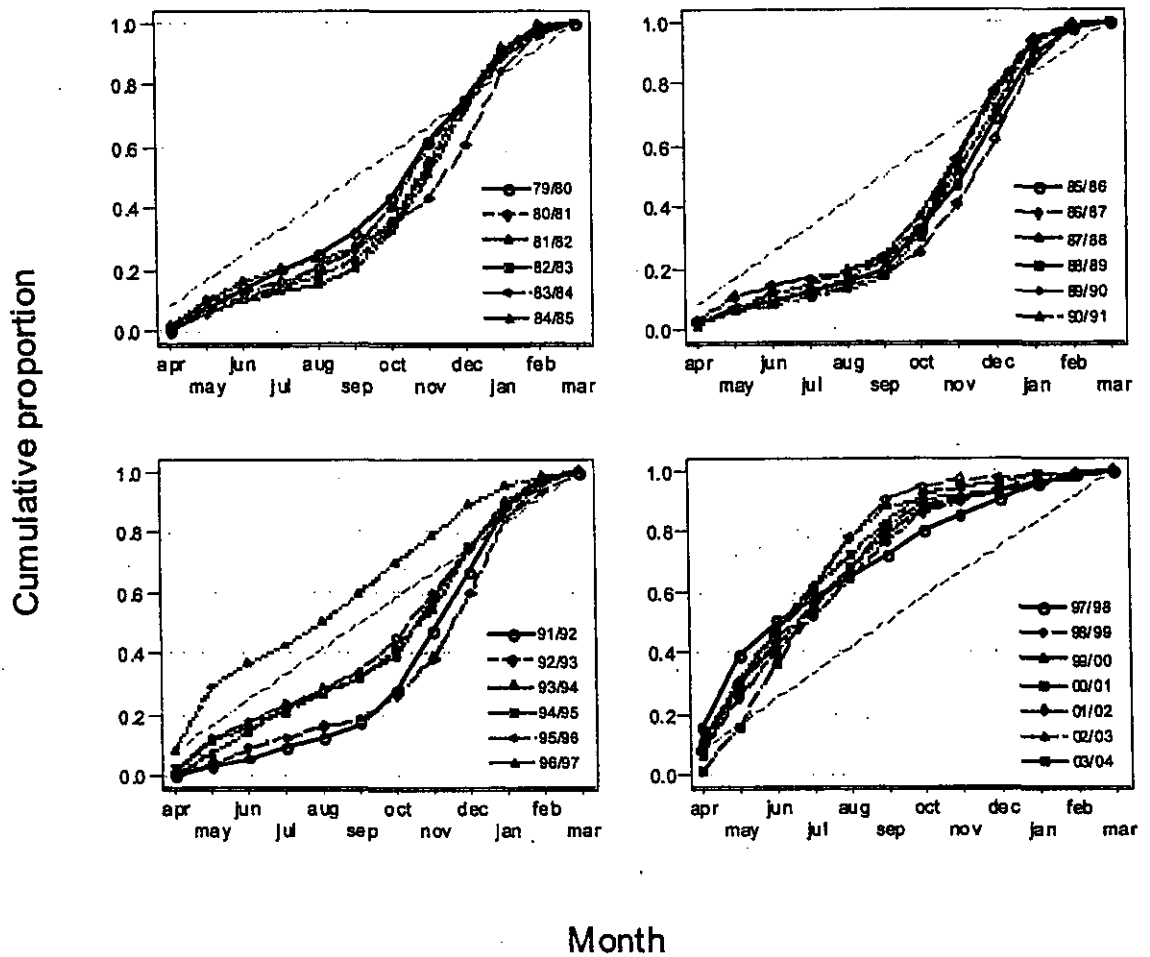


Figure 14: Cumulative catch percentages by fishing month for CRA 5, 1979–80 through 2003–04. Dotted line provides a reference equivalent to an equal distribution of catch across all months.



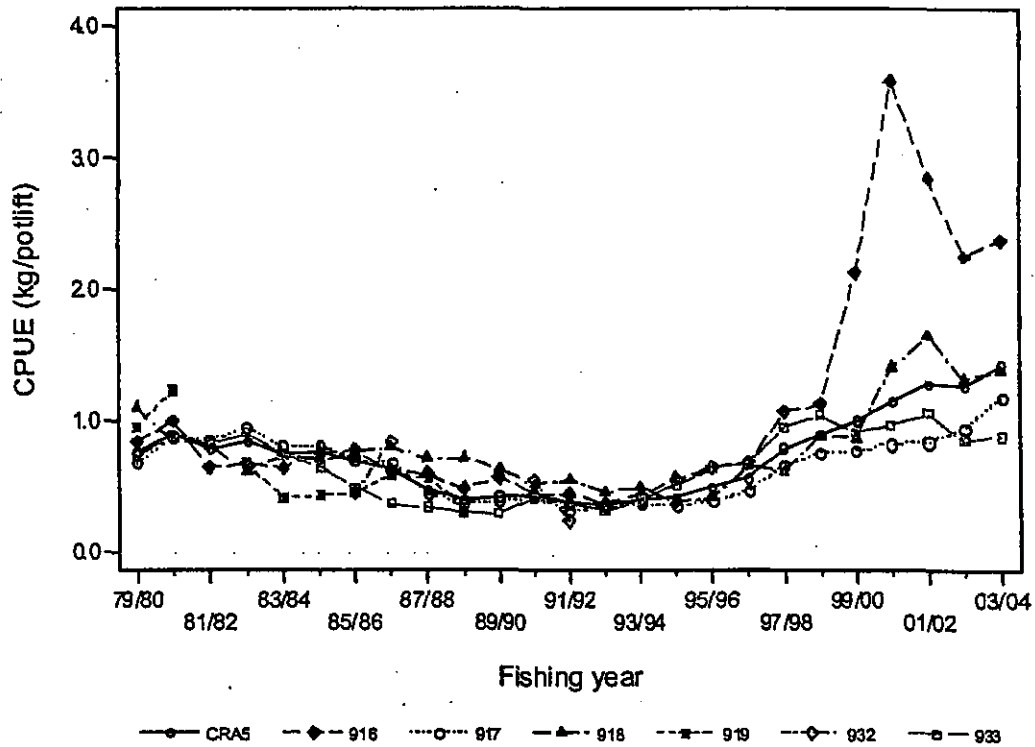


Figure 15: Arithmetic CPUE (total kg/total potlifts) for CRA 5 by fishing year and statistical area from 1979-80 through 2003-04.

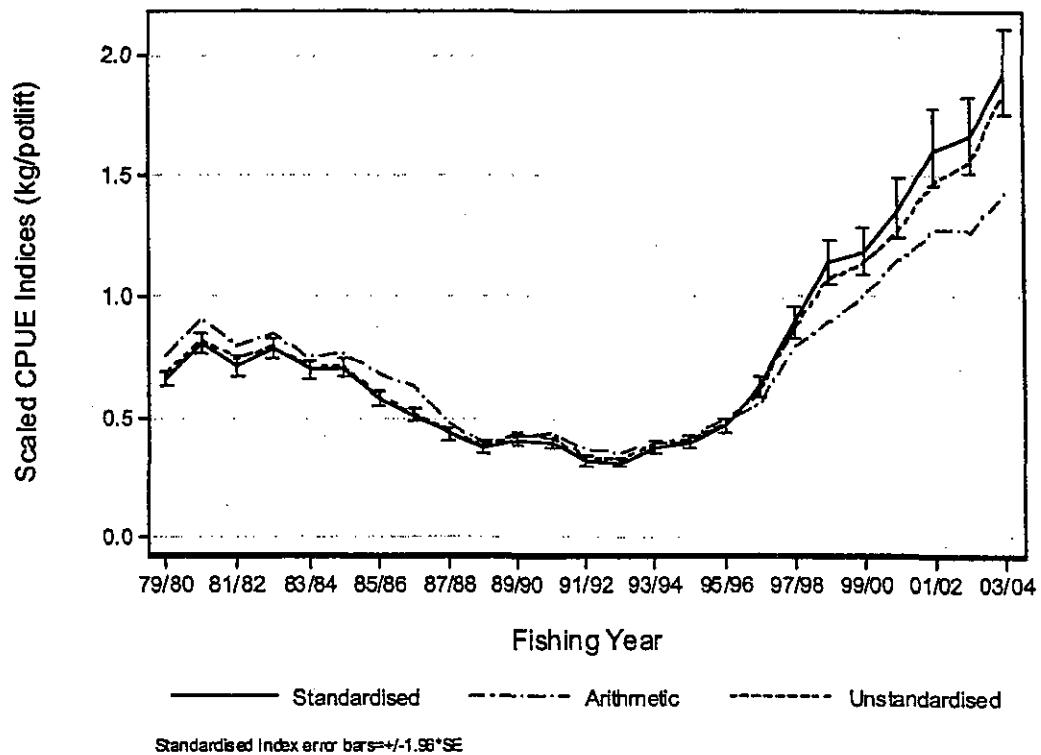


Figure 16: Annual CPUE indices for CRA 5: arithmetic (dashed line), unstandardised (dotted line), and standardised (bold line)  $\pm 2$  s.e. from 1979-80 through 2003-04.

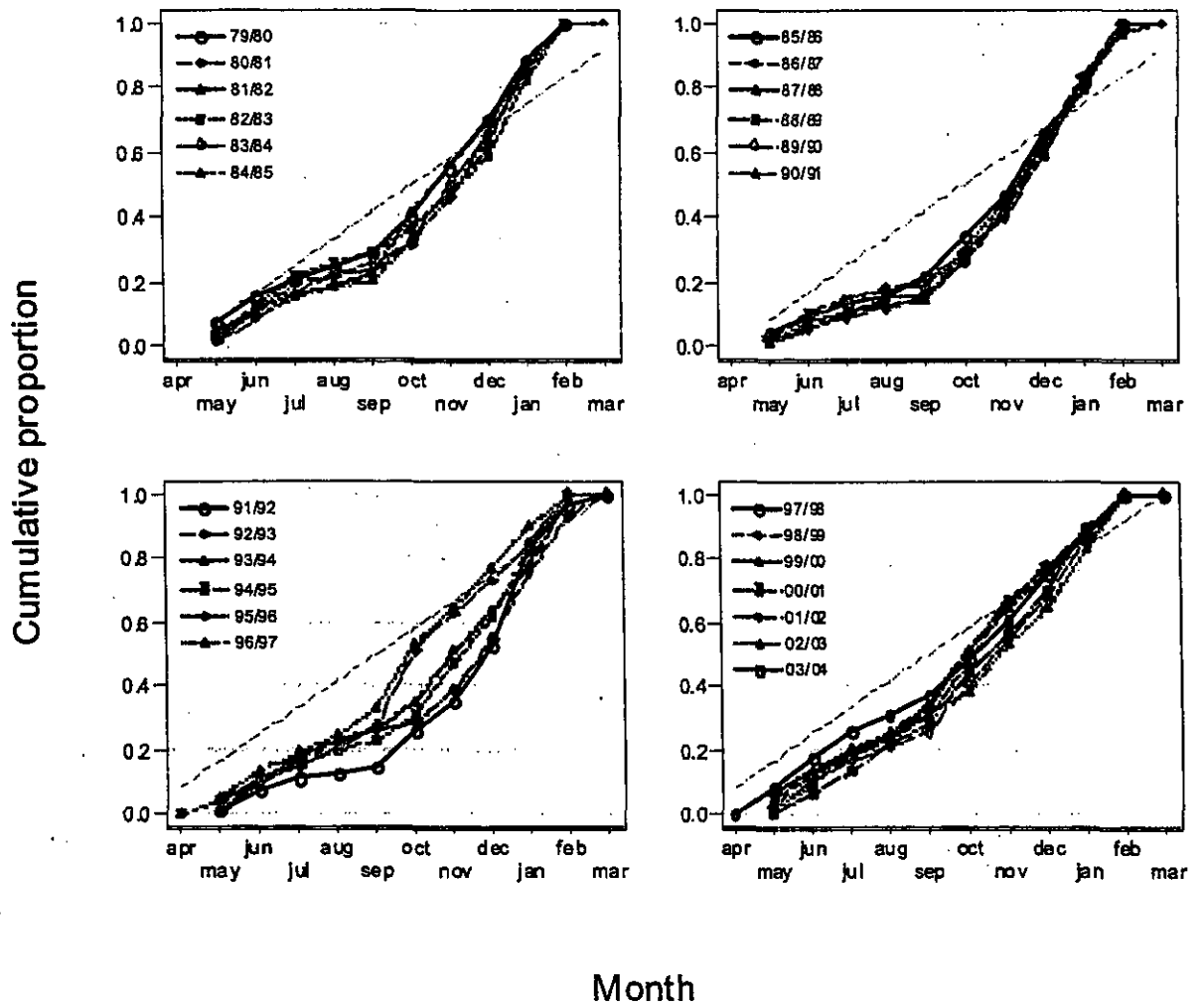


Figure 17: Cumulative catch percentages by fishing month for CRA 6, 1979–80 through 2003–04. Dotted line provides a reference equivalent to an equal distribution of catch across all months.

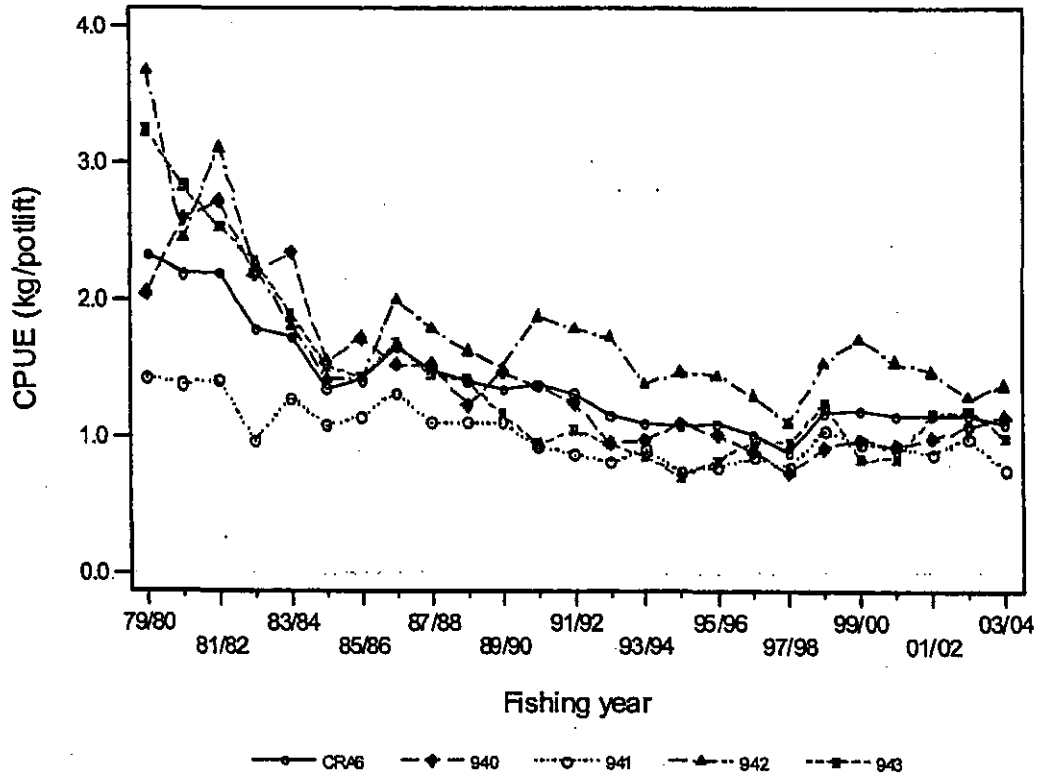


Figure 18: Arithmetic CPUE (total kg/total potlifts) for CRA 6 by fishing year and statistical area from 1979-80 through 2003-04.

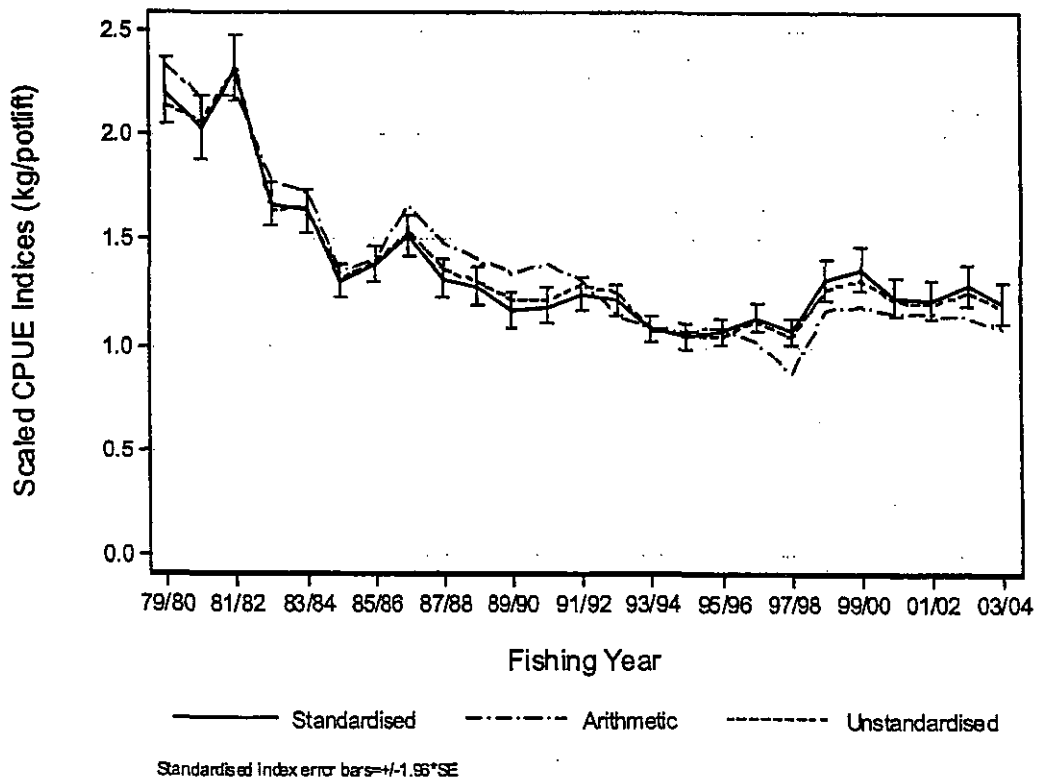


Figure 19: Annual CPUE indices for CRA 6: arithmetic (dashed line), unstandardised (dotted line), and standardised (bold line)  $\pm 2$  s.e. from 1979-80 through 2003-04.

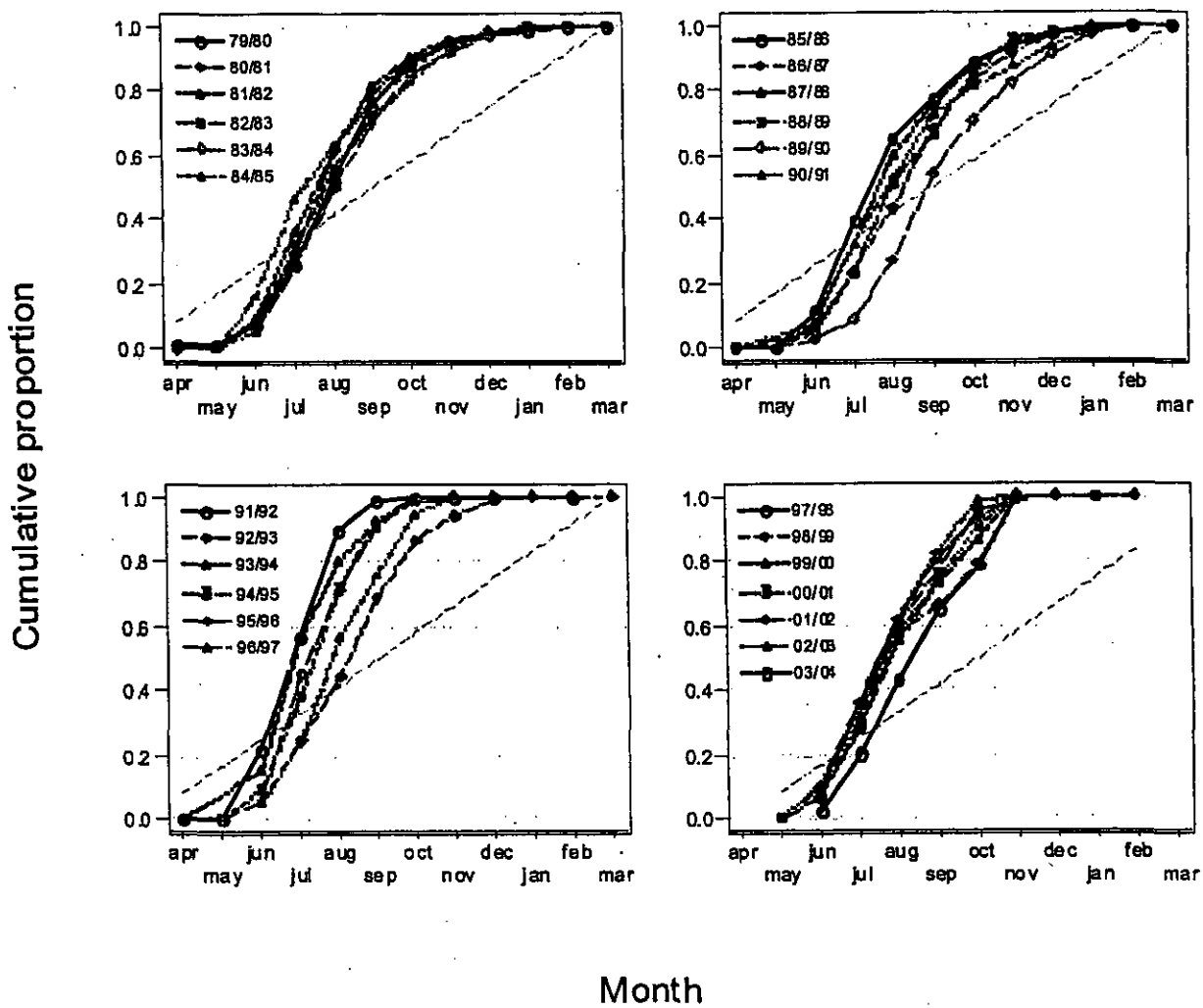


Figure 20: Cumulative catch percentages by fishing month for CRA 7, 1979–80 through 2003–04. Dotted line provides a reference equivalent to an equal distribution of catch across all months.

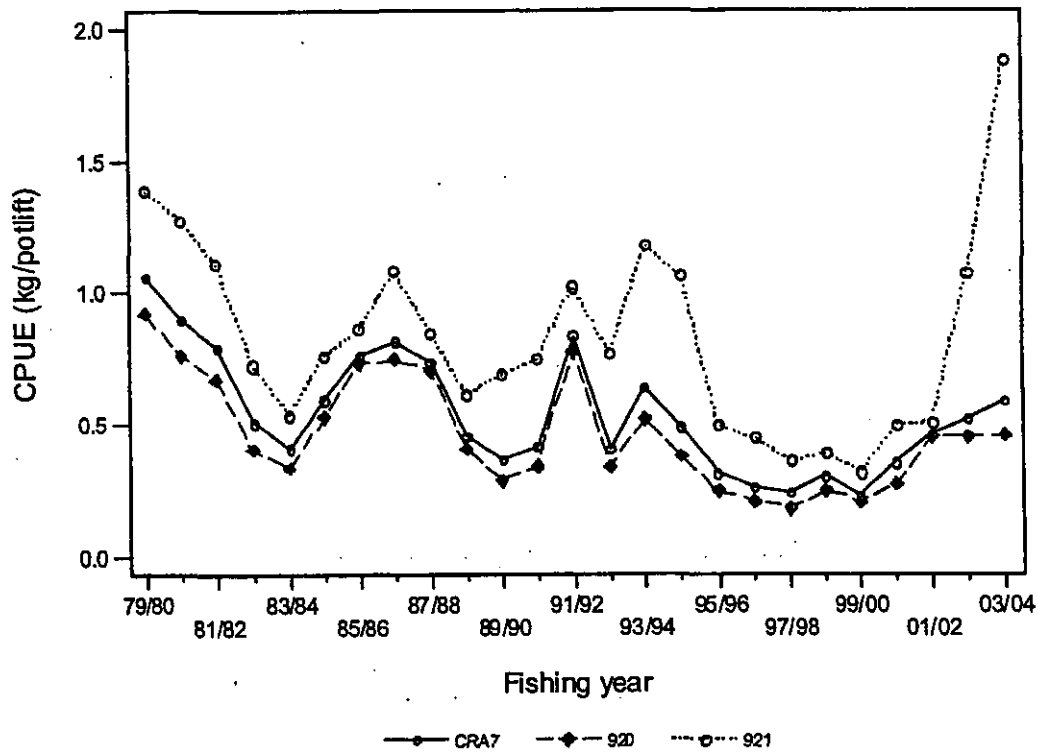


Figure 21: Arithmetic CPUE (total kg/total potlift) for CRA 7 by fishing year and statistical area from 1979-80 through 2003-04.

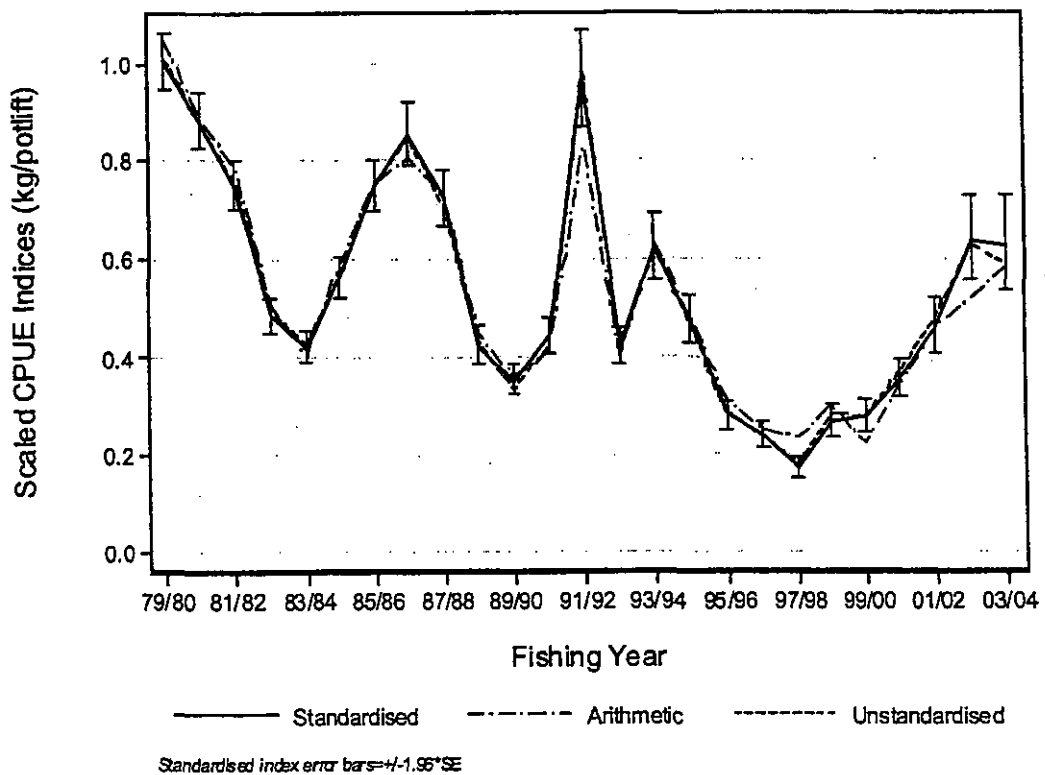
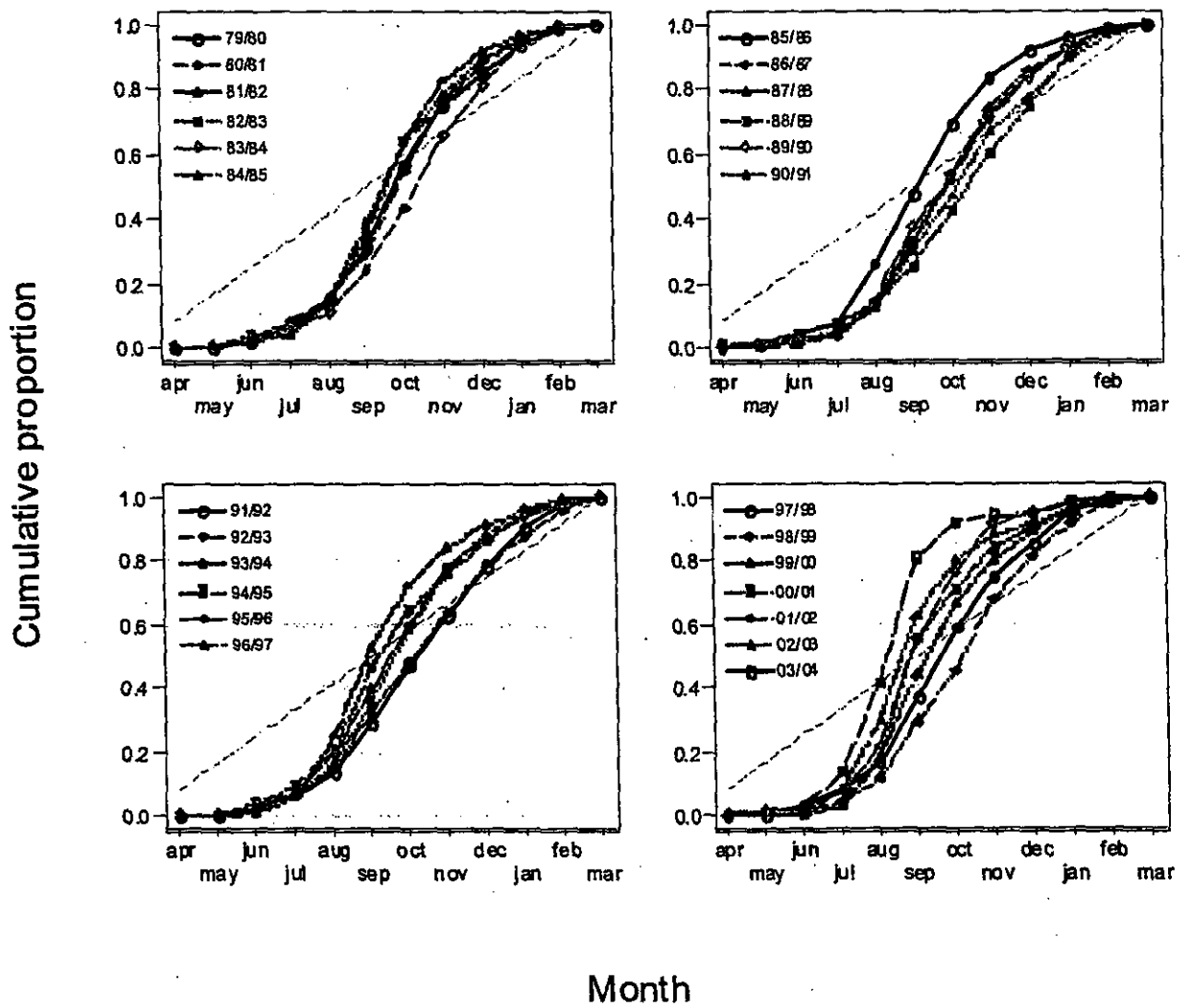


Figure 22: Annual CPUE indices for CRA 7: arithmetic (dashed line), unstandardised (dotted line), and standardised (bold line)  $\pm 2$  s.e. from 1979-80 through 2003-04.



**Figure 23: Cumulative catch percentages by fishing month for CRA 8, 1979–80 through 2003–04. Dotted line provides a reference equivalent to an equal distribution of catch across all months.**

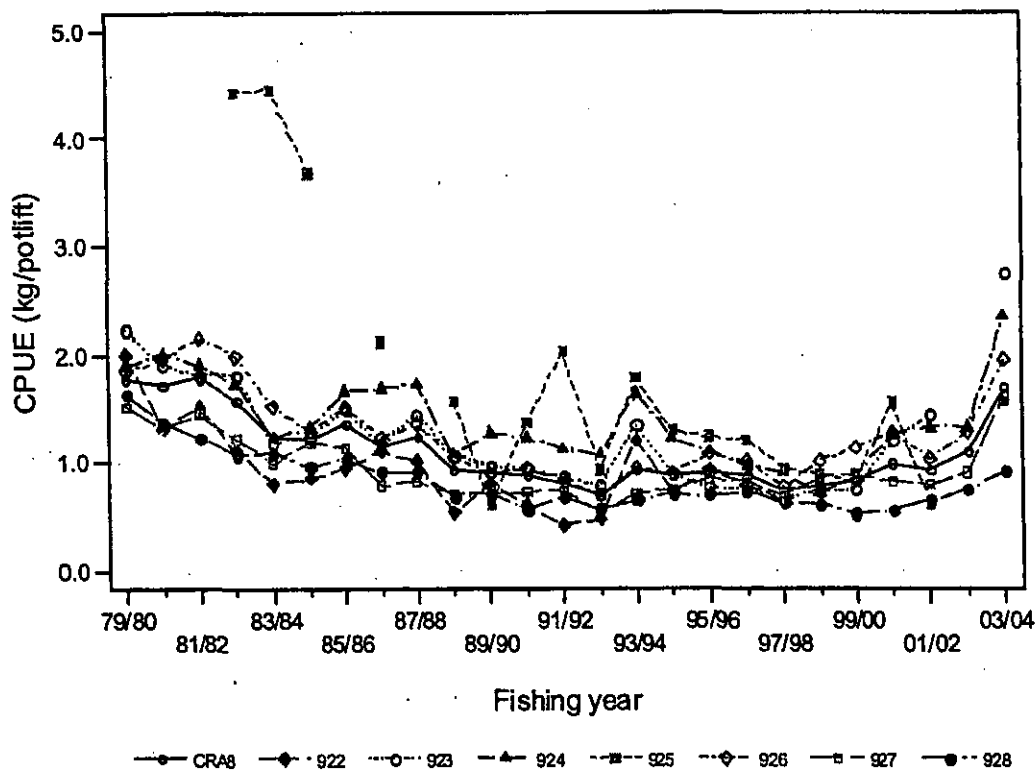


Figure 24: Arithmetic CPUE (total kg/total potlifts) for CRA 8 by fishing year and statistical area from 1979-80 through 2003-04.

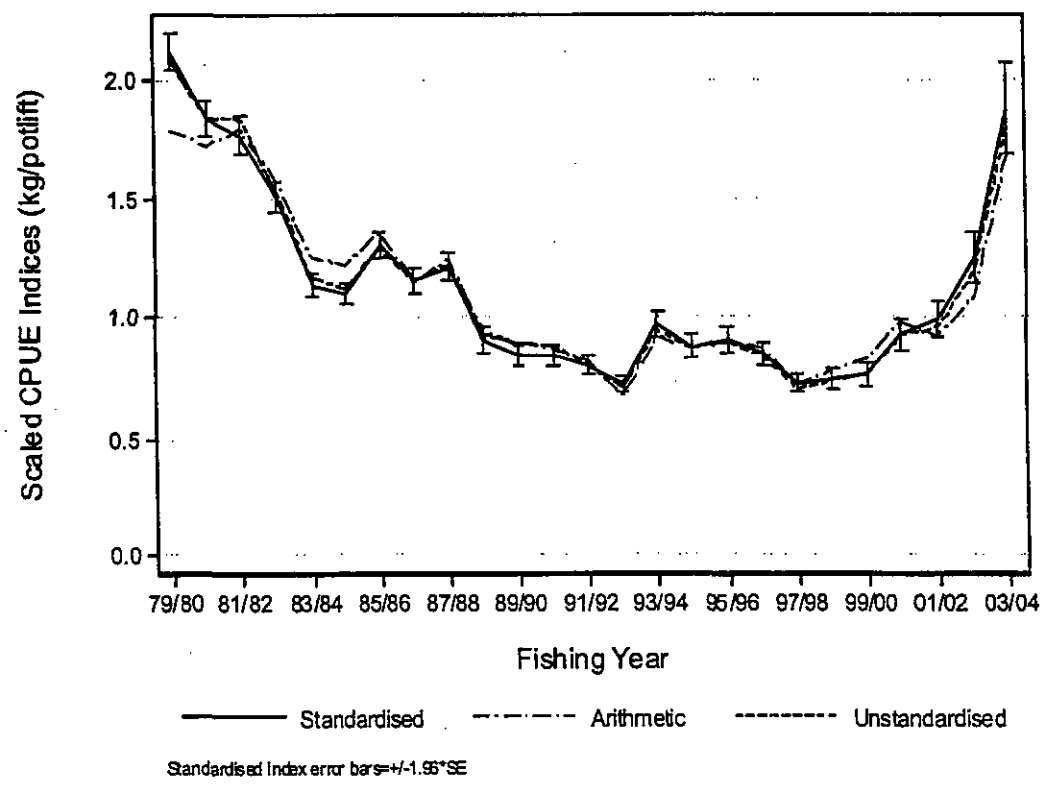


Figure 25: Annual CPUE indices for CRA 8: arithmetic (dashed line), unstandardised (dotted line), and standardised (bold line)  $\pm 2$  s.e. 1979-80 through 2003-04.

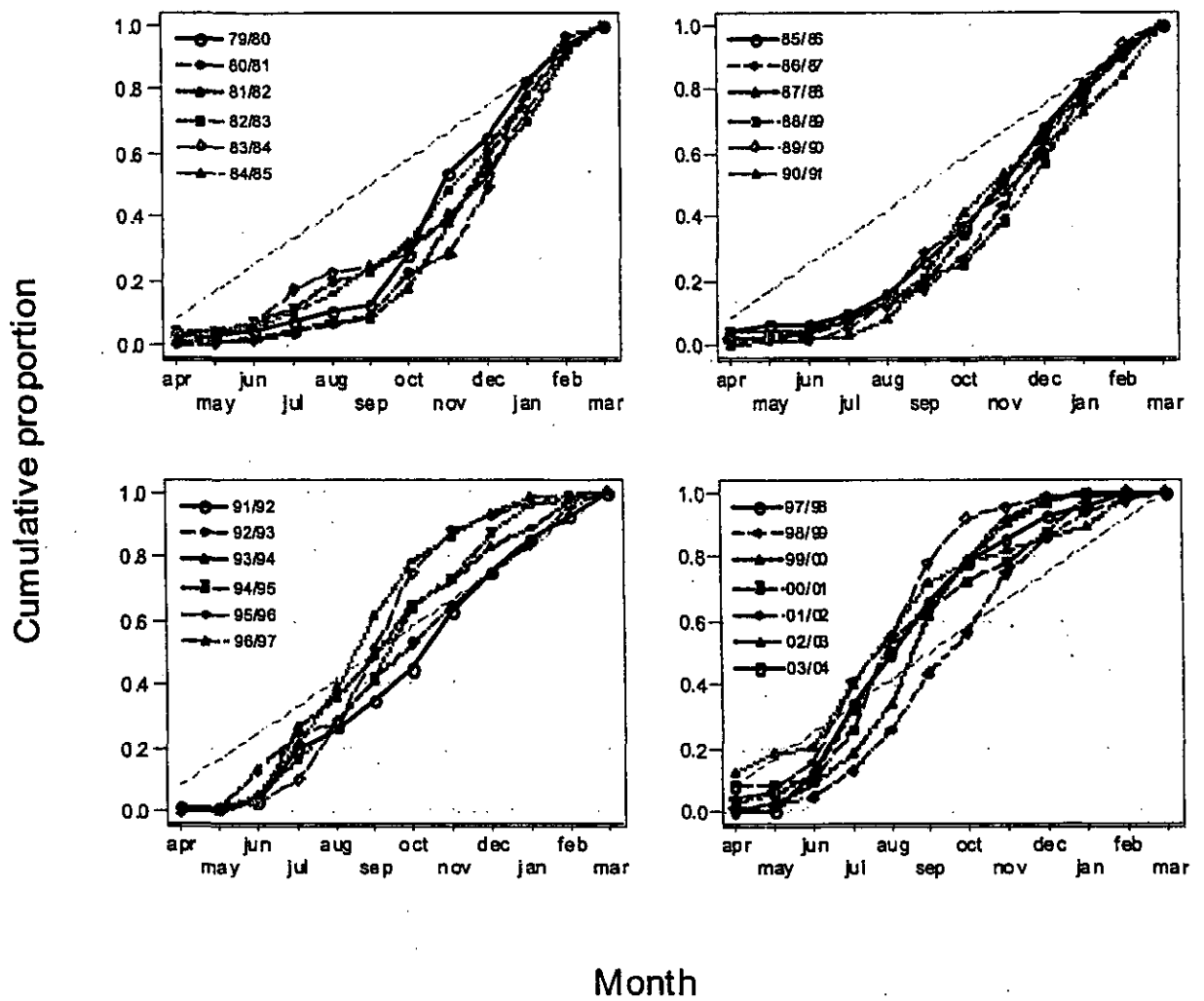


Figure 26: Cumulative catch percentages by fishing month for CRA 9, 1979–80 through 2003–04. Dotted line provides a reference equivalent to an equal distribution of catch across all months.



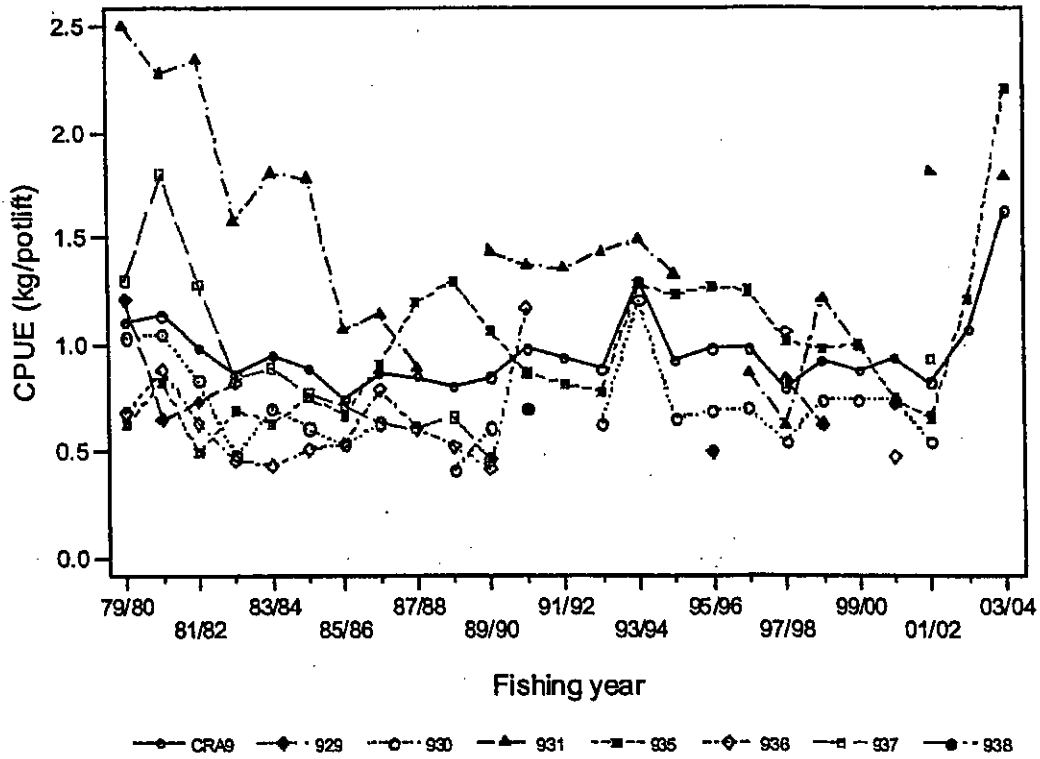


Figure 27: Arithmetic CPUE (total kg/total potlifts) for CRA 9 by fishing year and statistical area from 1979-80 through 2003-04.

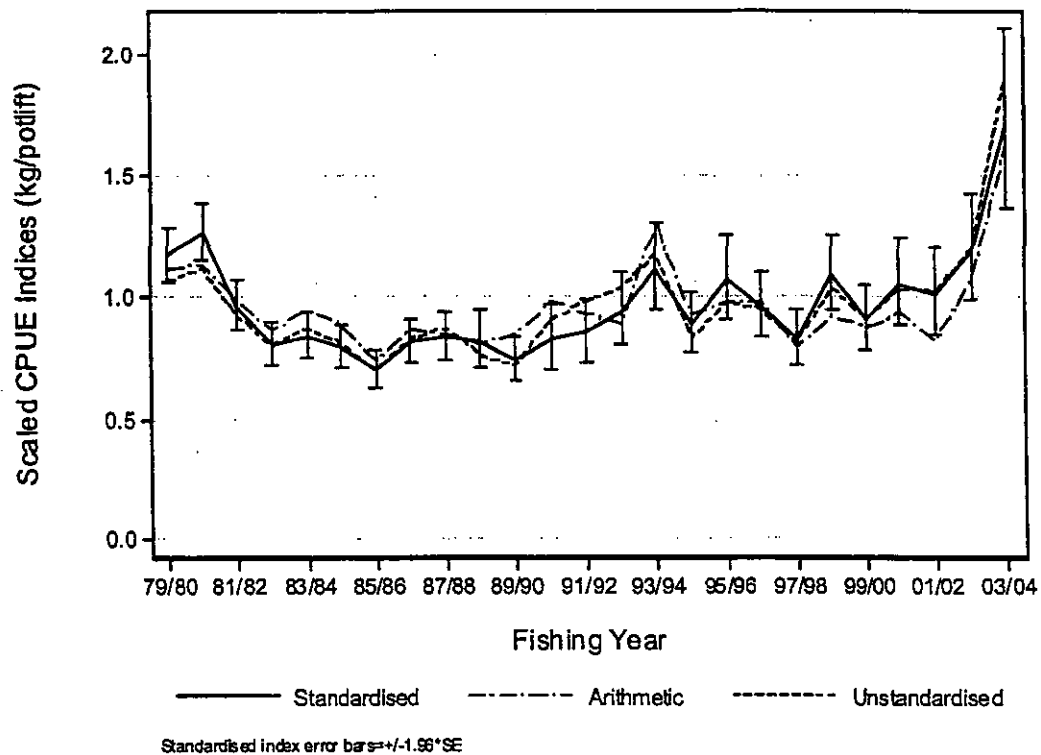


Figure 28: Annual CPUE indices for CRA 9: arithmetic (dashed line), unstandardised (dotted line), and standardised (bold line)  $\pm 2$  s.e. from 1979-80 through 2003-04.

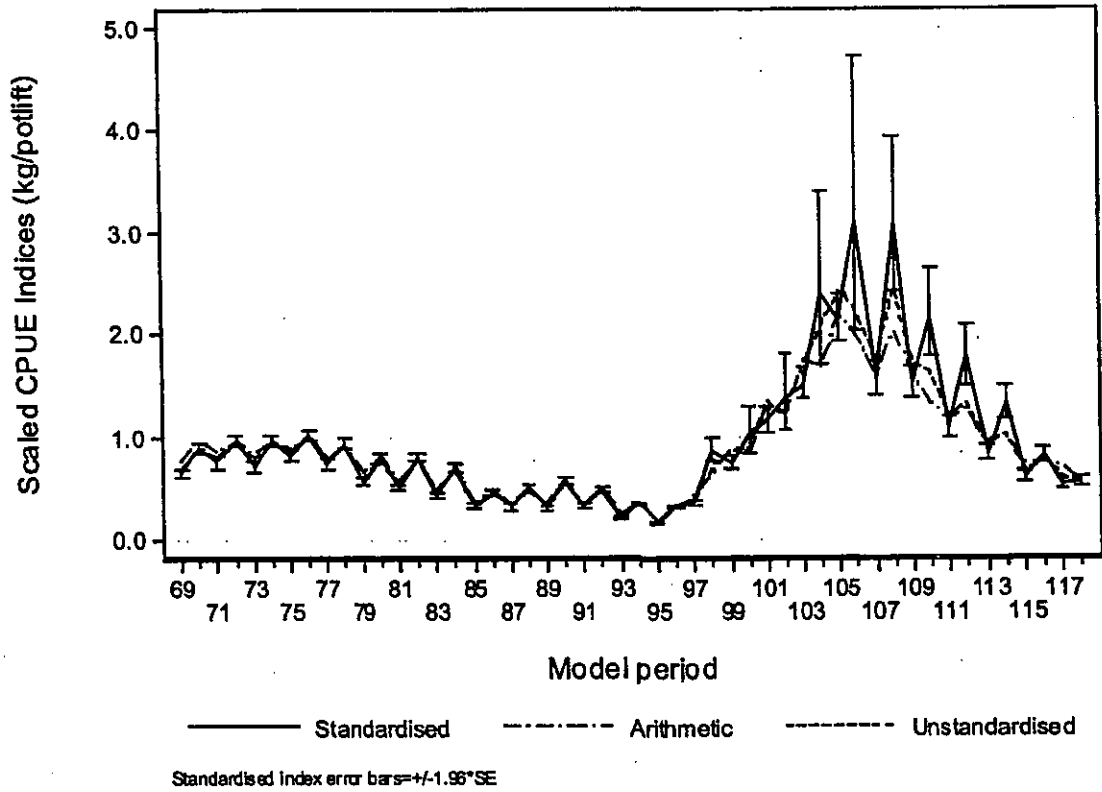


Figure 29: Standardised (solid line), unstandardised (dotted line), and arithmetic (dashed line) CPUE indices (kg/potlift) by period for the CRA 3 from period 69 (autumn/winter 1979–80) to period 118 (spring/summer 2003–04). Vertical bars are 95% confidence intervals.

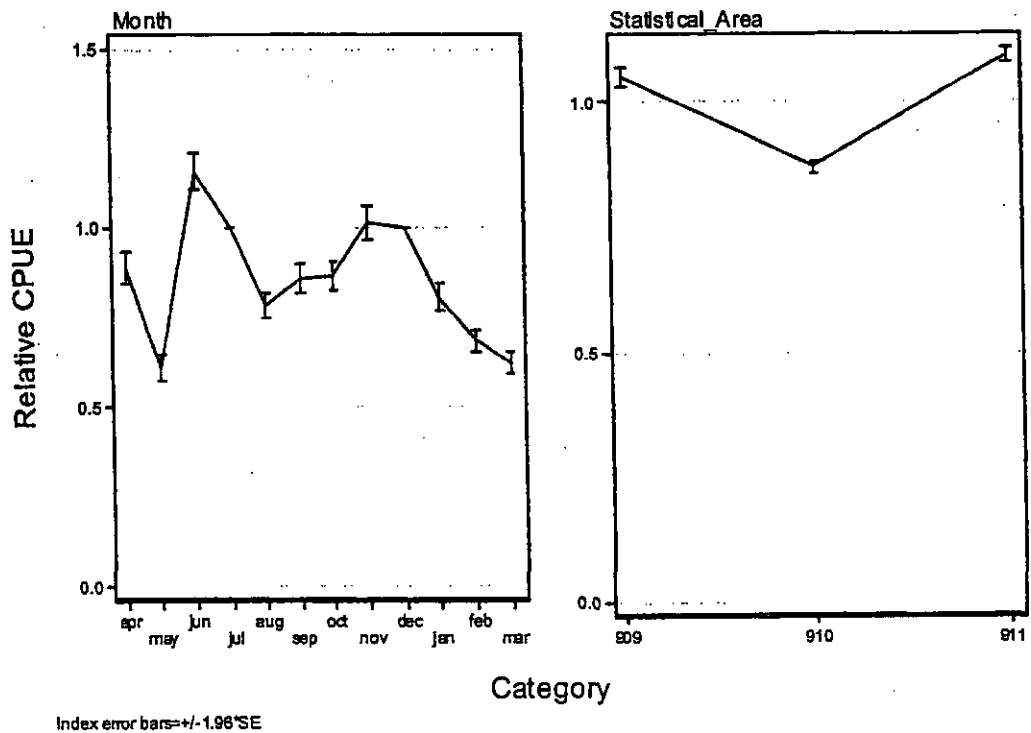


Figure 30: Coefficients for month and statistical area from the CRA 3 CPUE standardisation. The statistical area coefficients are in canonical form (Francis 1999). The reference month (July and December) coefficients equal 1.0 with s.e. of zero.

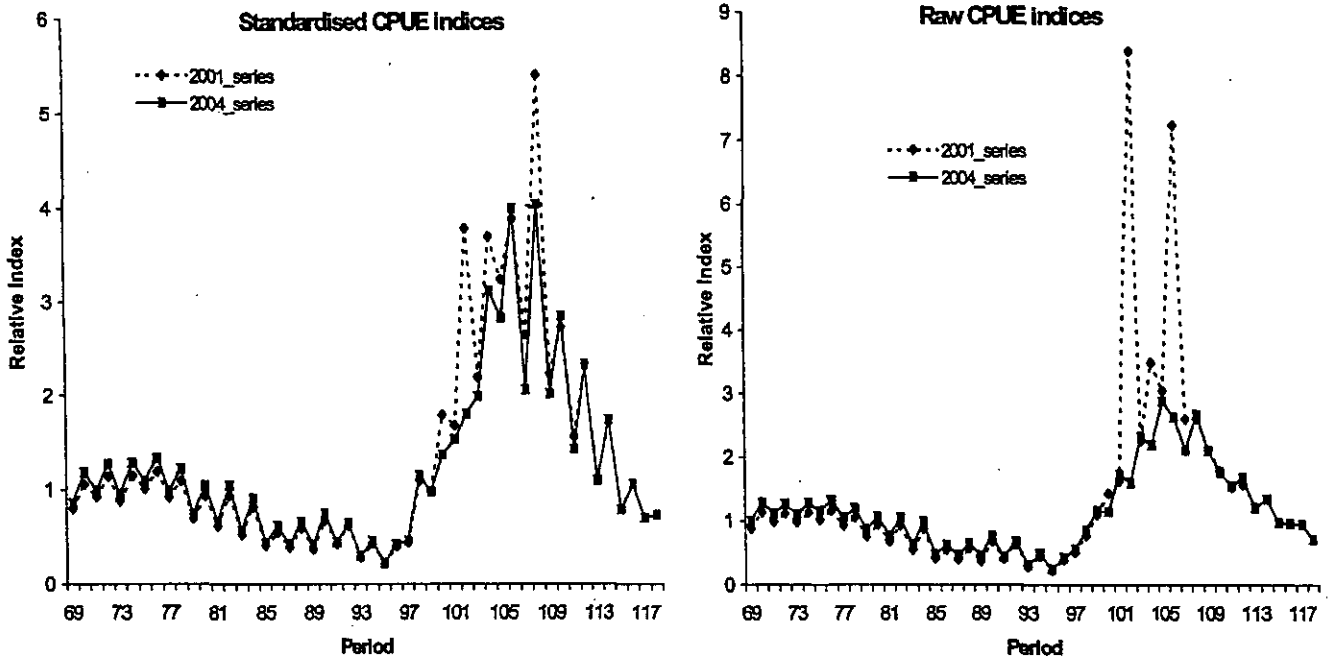


Figure 31: Comparison of the 2001 and 2004 standardised CPUE indices [left panel] and arithmetic CPUE indices for CRA 3. The geometric mean of each series equals one.

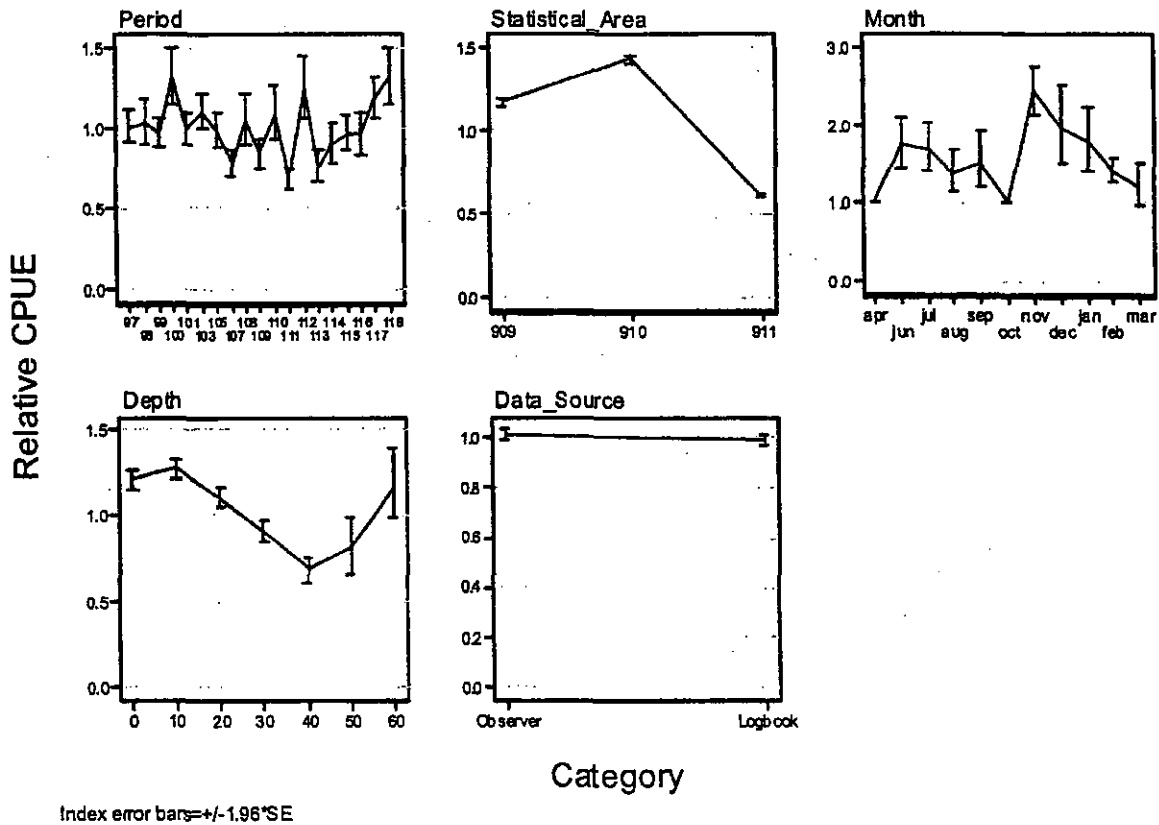


Figure 32: Coefficients for the explanatory variables from the lognormal CRA 3 PRI standardisation. All coefficients are in canonical form (Francis 1999) except the month coefficients where the reference months (April and October) have a coefficient of 1.0 and s.e. of zero. Period 97=autumn-winter 1993-94; period 118=spring-summer 2003-04. Depths are in metres.

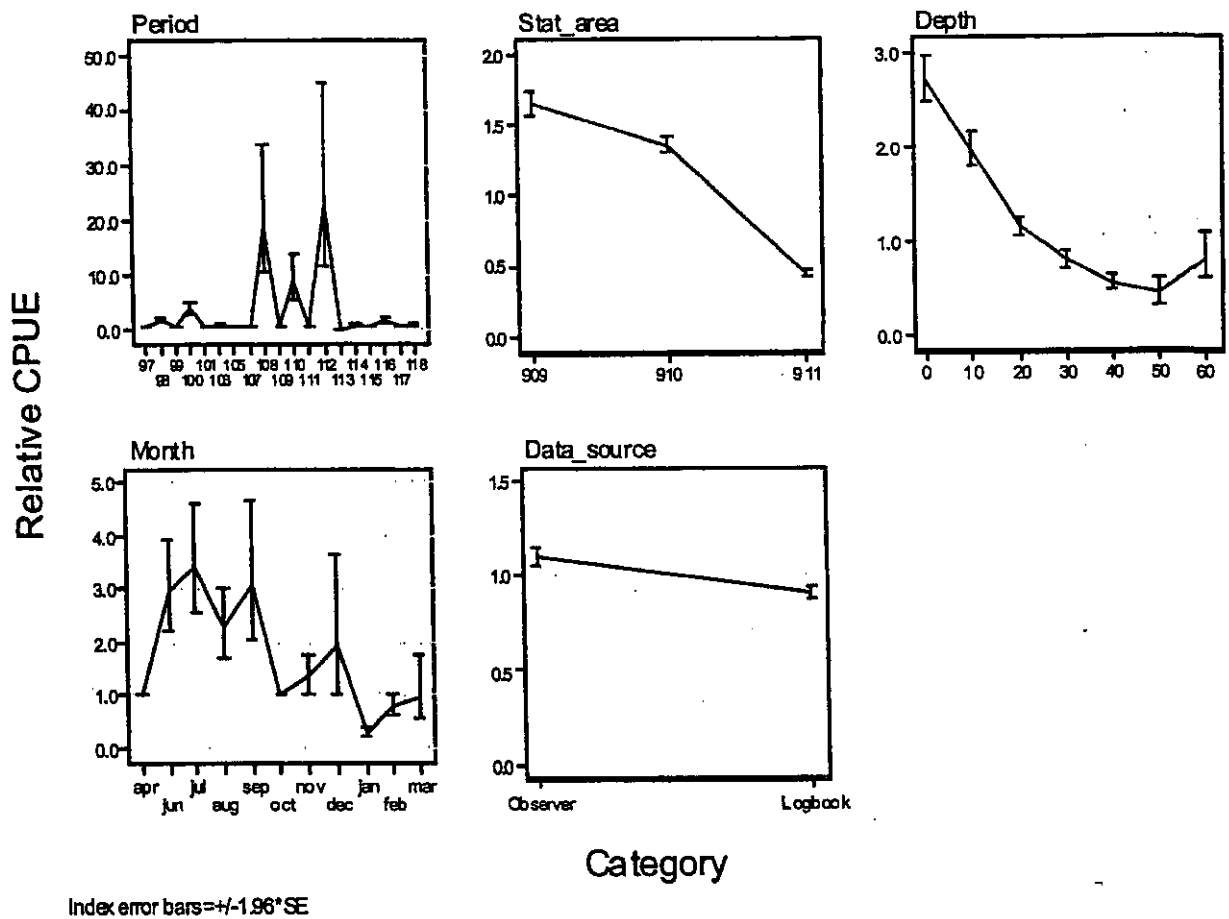


Figure 33: Coefficients for the explanatory variables from the binomial CRA 3 PRI standardisation. All coefficients are in canonical form (Francis 1999) except the month coefficients where the reference months (April and October) have a coefficient of 1.0 and s.e. of zero. Period 97=autumn-winter 1993-94; period 118=spring-summer 2003-04. Depths are in metres.

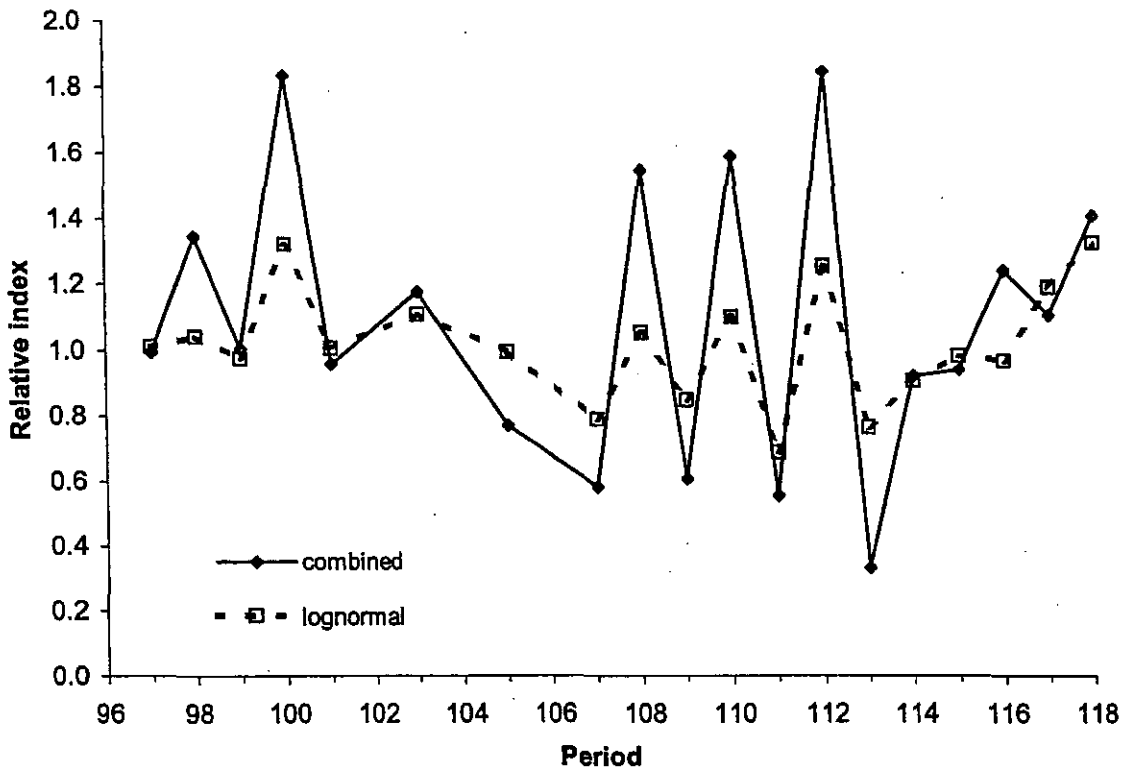


Figure 34: Combined binomial plus lognormal PRI index by period for CRA 3 compared with the lognormal index. Period 97=autumn-winter 1993-94; period 118=spring-summer 2003-04.

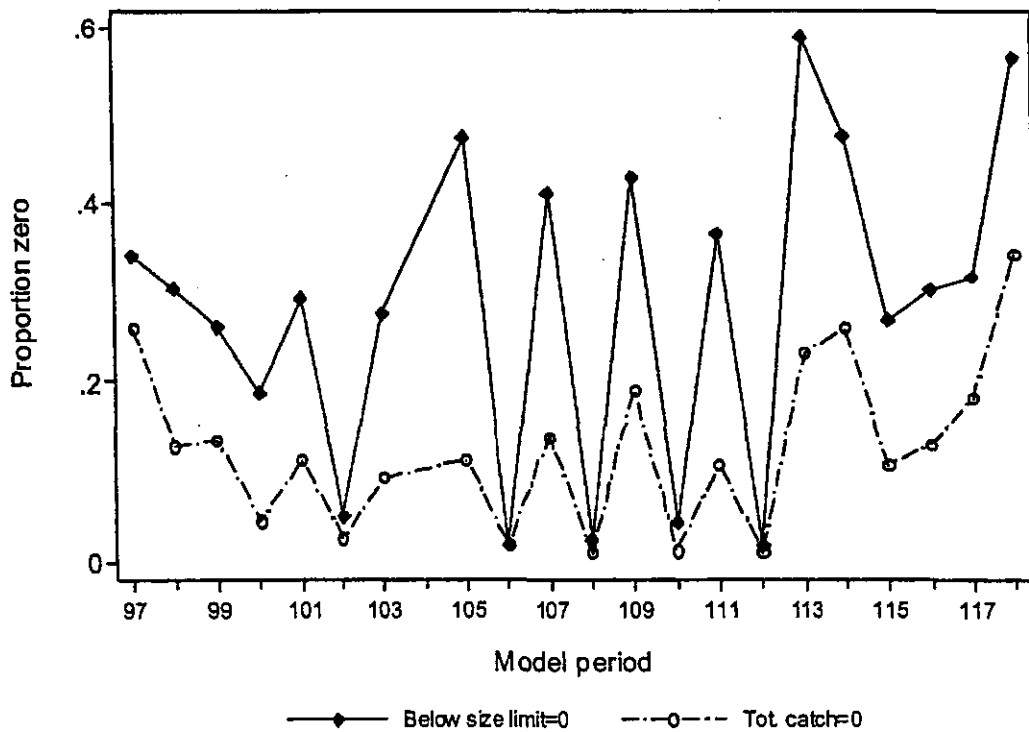


Figure 35: Proportion of potlifts in CRA 3 by model period with no catch of lobster and with no catch of undersized lobster. Period 97=autumn-winter 1993-94; period 118=spring-summer 2003-04.