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Te Tautiaki i nga tini a Tangaroa

**Summary of catch and effort data from the SQU 1J, SQU 1T,
and SQU 6T fisheries for 1989-90 to 1999-2000**

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EXECUTIVE SUMMARY

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Recent trends in the fleet composition and the distribution of catch and fishing effort are described for the SQU 1J, SQU 1T, and SQU 6T fisheries. For each of the fisheries, annual trends in squid catch, fishing effort, and catch rate are compared with longer-term trends from the fishery.

During 1990–91 to 1999–2000, the number of jig vessels participating in the SQU 1J fishery reached a peak of 113 in 1996–97 with the entrance of a large number of Chinese vessels. In subsequent years, the jig fleet declined and only three vessels were present in the SQU 1J fishery in 1999–2000. Since 1994–95, the total SQU 1J catch declined from about 30 000 t to 1500 t, representing only 7% of the total 1999–2000 squid catch.

The SQU 1J fishery comprises two separate fisheries; the mainland north fishery and the southern fishery. Most of the catch from the southern squid jig fishery was taken off the eastern and southern coast of the South Island (statistical areas 020, 022, 024, 028, and 030). However, the distribution of catch between these areas varied between years. The mainland north fishery supported large catches in 1991–92 and 1994–95, with most of the catch taken from North Taranaki Bight and off the northwestern coast of the South Island (statistical areas 041 and 035 and 036), although the annual distribution of catch was variable.

Large catches were taken from the mainland north SQU 1J fishery in 1991–92 and 1994–95, although annual catches were small for the remainder of the 1990–91 to 1999–2000 period. The variability in the level of annual catch from the fishery between 1989–90 and 1999–2000 is consistent with longer-term trends in the fishery. The fishery also yielded high catches in the 1980–81 to 1982–83 and 1987–88 fishing years, with relatively low catches during the intervening years.

For the southern fishery, the annual SQU 1J catch was low between 1990–91 and 1993–94. The fishery yielded high annual catches during the following three years, initially supported by high catch rates and sustained by the increase in fishing effort associated with the entrance of the Chinese and Taiwanese vessels into the fishery. Since 1996–97, catch rates from the southern fishery remained at a low level, while the number of days fished and, consequently, the total annual catch from the fishery declined substantially.

Between 1989–90 and 1999–2000, the SQU 1T fishery was dominated by large Russian, Korean, and Ukrainian vessels and small domestic vessels. During 1990–91 to 1994–95, the number of vessels operating in the fishery remained relatively stable at about 40 per year. However, the size of the fleet declined between 1994–95 and 1997–98 due to a reduction in the number of Russian vessels in the fishery. The decline in the fleet was somewhat countered by an increase in the number of Korean vessels operating in the fishery during the same period.

The total catch from the SQU 1T target fishery increased from about 10 000 t in 1989–90 to over 30 000 t in 1991–92 and was maintained around this level from 1991–92 to 1994–95. The total SQU 1T catch dropped markedly in 1995–96, but increased steadily during the two subsequent years. Fishing effort in the SQU 1T fishery, expressed as the number of target trawls, remained relatively stable during 1991–92 to 1998–99, but declined in 1999–2000.

The SQU 6T fleet comprised the same vessels as the SQU 1T fishery, with the exception that the small domestic vessels did not participate in the SQU 6T fishery. However, the proportion of the fishing effort and annual catch taken by each of the main nationalities varied between the two fisheries.

Annual catches from the SQU 6T fishery were highly variable between 1985–86 and 1999–2000, and considerably more variable than the SQU 1T fishery during the same period. Following relatively stable catches between 1980–81 and 1985–86, the SQU 6T fishery was characterised by episodic periods of low and high catches. The fishery yielded relatively small catches in 1986–87 to 1987–88, 1990–91 to 1992–93, and 1997–98 to 1999–2000 and high catches in 1988–89 and 1993–94 to 1994–95. In the 1995–96, 1996–97, 1997–98, and 1999–2000 fishing years, the duration of the SQU 6T fishing season was constrained by the closure of the fishery following the maximum allowable limit of fishing related mortality (MALFIRM) for New Zealand sealions being reached.

1. INTRODUCTION

The New Zealand EEZ supports a number of important squid fisheries which are currently managed as three separate area and method fisheries under the Quota Management System. Catches from the squid jig method fishery are reported as a single fishstock (SQU 1J) encompassing the entire EEZ with a TACC of 50 212 tonnes (Figure 1). The SQU 6T fishery includes the trawl fishery operating around the Sub-Antarctic Auckland Islands and Campbell Island, and SQU 1T encompasses the trawl fishery operating in the remainder of the EEZ, with the exception of the Kermadec Fishery Management Area (SQU 10T) (Figure 1). The TACCs for the SQU 6T and SQU 1T fisheries are currently 32 369 t and 44 740 t, while the SQU 10T fishery has a nominal TACC of 10 t (Annala et al. 2000).

The New Zealand squid fishery is based on two commercially important species of arrow squid (Gibson 1995). The two species are geographically separated by the Subtropical Convergence Zone. Catches from north of the Convergence Zone, principally from off the west coast of New Zealand north of 44° S, are almost exclusively *Nototodarus gouldi* (Gould's arrow squid). Arrow squid catches from the east coast South Island and Sub-Antarctic fishery are principally the southern arrow squid, *Nototodarus sloanii* (Smith 1985). The biology of the two species was described by Gibson (1995).

Trends in catch and effort from the New Zealand squid fishery between 1979–1993 were summarised by Gibson (1995). In 2000, the Squid Management Company (SMC), the stakeholder group representing the main quota owners in the New Zealand squid fisheries, commissioned the New Zealand Seafood Industry Council to summarise recent trends in catch and effort from the squid fisheries. This report documents the results of the analysis, providing a general summary of catch and effort data from SQU 1T, 6T, and 1J fisheries for the 1989–90 to 1999–2000 period.

2. DATA PROVISION

Squid catch and effort data were provided by the Information Management Group of the Ministry of Fisheries (Report Nos: 2548, 2856, and 3399). Data from the squid fisheries are collected and stored in three different formats based on the form type completed by the fisher; Trawl, Catch, Effort, Processing Return (TCEPR), Catch Effort Landing Return (CELR), and Squid Jigging Catch, Effort Return (SJ CER). The data set included all TCEPR data and CELR data from 1989–90 to 1999–2000 and all SJ CER data from 1990–91 to 1999–2000. Before 1990–91, squid jig data were collected under the FSU system and were not readily available from Ministry of Fisheries.

The data set included the catch of squid and associated species (top five species caught) from all records where SQU was targeted or recorded amongst the top five species caught. The variables included in each data set are presented in Table 1.

2.1 Data checking

Error checking of the three catch and effort data sets was limited to the main variables included in the summary analysis; squid catch weight, fishing date, and statistical area. For each of the main variables, obvious outliers in the data set were identified and, where possible, corrected based on the adjacent catch and effort records for the individual fishing trip. Records with unresolvable errors were excluded from the subsequent analysis of the data. Details of the error checking criteria applied to the three data formats were described by Langley (1999).

For the three squid fishstocks, the total squid catch included in the catch and effort data set was compared to the annual catches reported from the Quota Management Returns (QMRs). From 1990–91 to 1999–2000, the total annual catch of SQU 1J included in the catch and effort data set was generally 5–10% less than reported to the QMR system, although in 1991–92 and 1996–97 the level of under-reporting in the data set was about 12%, while in 1992–93 the data set included 17% more catch than the QMR system (Table 2). In 1992–93, the catch reported in the Catch Effort system exceeded the QMR catch by about 250 t.

From 1989–90 to 1999–2000, the annual SQU 1T squid catch reported to the Catch Effort system was consistently 2–7% less than the total landed catch (Table 3), while the discrepancy in the level of SQU 6T catch was generally +/- 3% (Table 4).

3. DATA ANALYSIS

3.1 Jig fishery

3.1.1 Fleet composition

Between 1990–91 and 1999–2000, the New Zealand squid jig fleet was dominated by Japanese, Korean, Chinese, and Taiwanese vessels (Table 5). In addition, a small number of Russian and New Zealand domestic vessels participated in the fishery over the same period. Vessels belonging to the last two nationalities have been considered collectively under the "Other" category in Table 5 along with vessels for which nationality was not specified.

Most of the vessels operating in the SQU 1J fishery were within the 40–70 m length range (overall length), with the exception of the domestic fleet which mainly comprised vessels less than 40 m in length.

The number and nationality of vessels operating in the SQU 1J has varied considerably over the 1990–91 to 1999–2000 period. In 1990–91, the fleet comprised 47 vessels, dominated by the Japanese and Korean jiggers (Table 5). However, in the following three years the fleet contracted to about 20 vessels per year. Between 1993–94 and 1996–97, the fleet increased over successive fishing seasons, reaching a peak in 1996–97 largely due to an influx of Chinese and Taiwanese vessels (Table 5). From a peak of 113 vessels in 1996–97, the number of vessels in the fleet declined over the two subsequent years to 24 in the 1998–99 fishing season (Table 5). Only three vessels, all Japanese registered, participated in the fishery in 1999–2000.

Overall, between 1990–91 and 1997–98 there was a steady decline in the number of Korean vessels operating in the fishery and the fleet became increasingly dominated by Chinese and Taiwanese vessels (Table 5). The number of Japanese vessels followed the overall trend of the entire fleet, with a decline in the number of vessels during the early 1990s followed by an increase from 1993–94 to 1995–96 (Table 5). The Japanese fleet declined over the subsequent years and only three vessels persisted in the fishery in 1999–2000.

The general trends observed in the composition of the fleet are also apparent in the distribution of SQU 1J catch and fishing effort with respect to vessel nationality (Table 6 and Table 7). However, in most years the Japanese and Taiwanese vessels have caught a higher percentage of the total SQU 1J catch than the proportion of the total days fished by vessels of these nationalities. In contrast, for the 1996–97 to 1998–99 fishing years, the Chinese fleet's proportion of the total catch was considerably less than the proportion of the days fished by this sector of the fleet (Table 6 and Table 7).

3.1.2 Areal distribution

The squid jig fishery comprises two discrete fisheries as defined by Gibson (1995).

1. The mainland north fishery off the northern west coast of the South Island and the North and South Taranaki Bights. The catch from this fishery is almost exclusively *N. gouldi* (Gibson 1995).
2. The southern fishery which operates along the east coast of the South Island south of Pegasus Bay and along the Snares shelf. The catch from this fishery is almost exclusively *N. sloanii* (Gibson 1995).

From 1990–91 to 1999–2000, most of the SQU 1J catch from the mainland north fishery was taken from statistical areas 034–037, 040, and 041 (Table 8). The catch from this fishery was highly variable during the study period. In 1990–91, the mainland north fishery yielded 4800 t of arrow squid, representing 45% of the total SQU 1J catch. During the following year, virtually the entire squid jig catch of 11 300 t was taken from the mainland north fishery (Table 8).

In 1992–93 and 1993–94, the annual catch from SQU 1J was 5500–6500 t, most of which was taken from the southern fishery. In 1994–95, the mainland north fishery yielded a large catch, accounting for almost half of the total SQU 1J catch of 32 000 t (Table 8). Catches from the mainland north fishery declined in subsequent years, with annual catches being low in 1996–97 and 1997–98 and negligible in 1998–99 and 1999–2000. From 1995–96 to 1999–2000, this fishery has accounted for only 1–17% of the total annual SQU 1J catch.

Catches from the SQU 1J southern fishery increased steadily from a negligible catch in 1991–92 to 27 600 t in the 1995–96 fishing year. Catches steadily declined between 1996–97 and 1999–2000, although the southern fishery still continued to account for most of the total SQU 1J catch taken during this period (Table 8).

The proportional distribution of days fished by the squid jig fleet between the two fisheries is broadly consistent with the observed trends in the annual distribution of catch (Table 9). However, since 1994–95 the proportion of catch taken in the mainland north fishery was considerably less than the proportion of the total days fished in this area.

The main areas fished in the southern squid jig fishery are within statistical areas 020, 022, 024, 026, and 030 (Table 8). However, the distribution of catch between these statistical areas was variable between 1990–91 and 1999–2000 (Figure 2 and Figure 3). Statistical area 030 yielded a large SQU 1J catch in 1990–91, but catches were negligible during the remainder of the period. Large catches of squid were taken from the southern fishery in 1994–95, 1995–96, and 1996–97, with most of the catch taken from statistical area 022 and, to a lesser extent statistical area 026 (Figure 2). In the years of lower catches from the southern fishery (1991–92 to 1993–94 and 1997–98 to 1999–2000), a higher proportion of the annual SQU 1J catch was taken from statistical areas 020 and 024.

In years when large catches were taken from the mainland north fishery (1991–92 and 1994–95), most of the catch was taken from statistical areas 035, 036, and 041 (Figure 4). However, in the other years between 1990–91 and 1999–2000, the distribution of the total catch between the statistical areas of the mainland north fishery has been highly variable (Figure 5). In the more recent years, when catches have been smaller, an increasing proportion of the catch was taken from statistical area 041 at the expense of statistical area 035.

3.1.3 Seasonal distribution

The squid jig season begins in late December and lasts until May, with peak catches taken during the January–March period (Tables 10, 11, and 12). However, for a given fishing year, the seasonal distribution of catch within each of the two fishing grounds is influenced by the availability of squid on the grounds and the relative performance of fishing on either ground throughout the season (Figure 6).

For example, in 1994–95 the fishing season began on the mainland north ground and this fishery accounted for most of the catch taken in January. However, as the daily catch rates of the vessels improved on the southern grounds during February more vessels were attracted to this fishery (Table 10) and the southern fishery accounted for most of the catch taken in February and March. Catch rates declined in the southern fishery over this period and by April effort was diverted back to the mainland north fishery, resulting in an increase in the catch taken from this fishery during April (Figure 6).

Similar trends in the distribution in catch and relative catch rate between the two fishing grounds were also evident for the 1990–91 and 1995–96 fishing years, although to a lesser extent. The trend appears to occur in those fishing years when moderate to high catches are taken from both fisheries (Figure 6).

For the years when catches and catch rates were low in mainland north ground (1992–93, 1993–94, 1996–97, and 1997–98), most of the catch from the fishery was taken on the shoulder of the main fishing season, i.e., during December–January and/or March–April (see Table 10).

During these years, most of the SQU 1J catch taken during February–March was from the southern fishing ground. In 1998–99 and 1999–2000, catches from the mainland north ground were negligible throughout the season (Figure 6).

3.1.4 Summary

Annual catches from the SQU 1J fishery were highly variable during the 1990–91 to 1999–2000 period. For the mainland north fishery, catches peaked in 1991–92 and 1994–95 with an annual catch in excess of 10 000 t. However, during the remainder of the 1990–91 to 1999–2000 period, this fishery has yielded relatively small catches (Figure 7).

The episodic periods of high annual catches have been evident over the entire catch history of the mainland north jig fishery. Large catches from the fishery were also taken during the 1980–81 to 1982–83 and 1987–88 fishing years (Figure 8). These high catches were taken with a level of fishing effort (number of days fished) considerably greater than was present in the fishery since 1990–91.

In recent years, there has been a general decline in the level of fishing effort in the mainland north fishery. The number of days fished by the jig fleet declined from about 2200 fishing days in 1990–91 to 264 days in 1993–94, recovered to about 1800 days in 1994–95 and steadily declined over the subsequent years to a low level in 1998–99 to 1999–2000 (see Figure 7). For the 1991–92, 1993–94, and 1994–95 fishing years, annual catch rates (kilogrammes per day fished) from the fishery were the highest recorded from the 1979–1980 to 1999–2000 period (Figure 8). The high catch rates achieved in 1991–92 and 1994–95 corresponded to years of relatively high catch from the fishery. However, the total catch taken in 1993–94 was modest. Since 1995–96, catch rates from the fishery have been low.

In the mainland north fishery, there were high average catch rates in the 1985–86 and 1987–88 fishing years (Figure 8). A large catch was taken from the fishery in 1987–88, but the fishery yielded only an average catch in 1985–86. Despite the large annual catches taken from the fishery between 1980–81 and 1982–83, average catch rates for the fleet were quite low during this period (Figure 8).

In the southern fishing ground, the total annual catch increased from 1991–92 to 1995–96, with the fishery accounting for an increasing proportion of the total annual SQU 1J catch during this period (see Figure 7). The increase in catch was driven by an increase in the average daily catch rate of the jig vessels from 1991–92 to 1994–95 followed by a large increase in the number of days fished between 1993–94 and 1996–97. The large number of vessels present in the fishery during 1995–96 and 1996–97 enabled a high annual catch to be maintained despite a decline in the average catch rate (kg per day fished).

The southern SQU 1J fishery also yielded large annual catches in the 1983–84, 1984–85, and 1988–89 fishing years (Figure 9). Fishing effort, in the number of days fished, was high during these years, while catch rates achieved by the vessels were average. High catch rates were achieved from 1993–94 to 1995–96, although total fishing effort (days fished) was low in the fishery during 1993–94 and 1994–95 (Figure 9). Since 1996–97, catch rates from the southern fishery have remained relatively constant at a low level, while the number of days fished and, consequently, the total annual catch has declined substantially.

3.2 Trawl fishery

3.2.1 Target species

The SQU 1T fishery is dominated by the target squid trawl fishery which has accounted for about 90–95% of the total SQU 1T catch taken in each fishing year from 1989–90 to 1999–2000 (Table 13). Relatively small quantities of squid are also caught as a bycatch from the other main trawl fisheries operating along the outer edge of the continental shelf, most notably the target barracouta and red cod fisheries. These fisheries each accounted for about 2% of the total SQU 1T catch between 1989–90 and 1999–2000 period.

Over 99% of the annual SQU 6T catch is taken by the target fishery operating around the Auckland Islands.

3.2.2 Fleet composition

Trends in the composition of the SQU 1T trawl fleet were examined for 1989–90 to 1999–2000 with respect to vessel nationality and vessel size class. The fleet was subdivided into three size classes based on vessel length; less than 43 m, 43 to 75 m, and over 75 m overall length.

Between 1989–90 and 1999–2000, the fleet has been dominated numerically by Russian, New Zealand, Korean, and Ukrainian vessels (Table 14). A number of vessels from other nations also operated in the fishery during this period, including Japan, Norway, Belize, and Panama.

Most of the large vessels (over 75 m) operating in the SQU 1T fishery were either Russian or Ukrainian registered. During 1990–91 to 1994–95, about 30 of these vessels operated in the fishery each year. However, there was a significant reduction in the number of large vessels from 1994–95 to 1999–2000 due to a decline in the size of the Russian fleet. This decline in capacity was countered, to some extent, by an increase in the number of Korean registered vessels during the same period and the presence of a fleet of smaller (43–75 m) Russian

vessels during 1995–96 and 1996–97, although most of the latter group did not participate in the fishery in subsequent years (Table 14).

Between 1989–90 and 1999–2000, most of the Korean vessels operating in the SQU 1T fishery were within the 43–75 m length class and Korean registered vessels dominated this sector of the fleet (Table 14).

Almost all the vessels in the SQU 1T fishery less than 43 m in overall length were New Zealand domestic vessels. Most of these vessels were smaller inshore vessels and targeted squid along the east coast of the South Island. While numerically important in the squid trawl fleet, many of these vessels may conduct only a few trawls targeting squid in a given fishing year. In most fishing years, this sector of the fleet accounted for a small proportion of the total SQU 1T fishing effort and catch (Tables 15 and 16).

For the remainder of the fleet, annual trends in the SQU 1T fishing effort and catch are consistent with the trends in the number of vessels operating in the fishery described above. In recent years, catch and effort by Korean vessels increased at the expense of the Russian fleet, while the level of catch and effort by the Ukrainian vessels remained relatively constant between 1992–93 and 1999–2000 (Tables 15 and 16). Between 1989–90 and 1993–94, the proportion of the SQU 1T catch harvested collectively by the “Other” nations increased and accounted for 22–29% of the annual catch from 1993–94 to 1997–98. The proportion of the catch taken by this sector of the fleet further increased in 1998–99 and 1999–2000 to 33% and 36%, respectively.

From 1989–90 to 1999–2000 period, the SQU 6T fleet was almost exclusively composed of vessels over 43 m in length (Table 17). The small domestic vessels operating in the SQU 1T fishery were absent from the SQU 6T fleet. With the exception of these vessels, the number of vessels of each nationality and length class in the SQU 6T fishery was comparable to the composition of the SQU 1T fleet (see Tables 14 and 17) indicating that the same group of vessels operated in both fisheries in each year. Nevertheless, in some years not all vessels operating in the SQU 1T fishery moved south to the SQU 6T fishery. This was evident in 1992–93 and 1996–97 when fewer of the Russian vessels operating in the SQU 1T fishery were present in the SQU 6T fishery.

As with the SQU 1T fishery, the SQU 6T fishery was dominated by Russian, Korean, and Ukrainian vessels in both catch and fishing effort (Tables 18 and 19). However, the proportion of the fishing effort and annual catch taken by each of the main nationalities varied between the two fisheries. Between 1989–90 and 1993–94, the Russian fleet was dominant in the SQU 6T fishery, accounting for an average of 66% of the annual SQU 6T squid catch, while catching about 50% of the SQU 1T catch during the same period. In contrast, the Korean fleet had a greater presence in SQU 1T than in the SQU 6T fishery. From 1989–90 to 1993–94, Korean vessels accounted for 27% of the average annual SQU 1T catch, while accounting for only 14% of the catch from SQU 6T.

Since 1994–95, the number of large (over 75 m) Russian vessels in the SQU 6T fleet has declined, with a corresponding decline in the proportion of the total SQU 6T catch taken by the entire Russian fleet. During the same period, an increasing proportion of the total SQU 6T catch was taken by Korean and Ukrainian registered vessels and vessels collectively included in the Other category (see Tables 18 and 19).

3.2.3 Areal distribution

From 1989–90 to 1999–2000, target trawling for squid in the mainland north fishery was negligible and virtually the entire SQU 1T catch was taken from the southern fishery. Most

(94–99%) of the annual SQU 1T target trawl catch was taken along the southwestern edge of the Stewart–Snares shelf (Statistical Areas 026, 027, 028, and 504) and Canterbury Bight (Statistical Area 022) (Tables 20 and 21).

Between 1989–90 and 1992–93, statistical area 028 accounted for the largest proportion of the total annual catch from the target SQU 1T trawl fishery (Figure 10 and Figure 11). However, the relative proportion of the catch taken from this area declined during 1993–94 to 1995–96, while the actual catch and the proportion of the total catch increased in statistical areas 022 and 026 and to a lesser extent in area 504 (Figure 11).

During the period studied, the proportion of the catch taken from statistical area 026 was highest in 1995–96, while the level of catch from 028 was at the lowest in the same year. In the three subsequent years, catches from 028 increased to about 65% of the total catch, countered by the decline in catches from both 022 and 026 (Figure 11). The proportion of the catch taken from 028 declined in 1999–2000, with a corresponding increase in catch from 022 and 023.

Between 1989–90 and 1999–2000, the catch from the target SQU 6T fishery was almost exclusively taken around the Auckland Islands, within statistical area 602. Catches around Campbell Island were negligible.

The areal distribution of catch within the SQU 1T fishery is likely to be strongly influenced by the relative performance of the SQU 1T and SQU 6T fisheries. To some extent, this will determine the amount of fishing conducted along the Snares shelf (statistical areas 028 and 504) and the proportion of the total SQU 1T catch taken from this area.

3.2.4 Seasonal distribution

The SQU 1T fishery operates from December to June although most of the annual catch from the SQU 1T target fishery is taken from January to March (Table 22). However, there is considerable variability in the seasonal distribution of catch between fishing years. In the 1990–91 to 1992–93, 1994–95, and 1995–96, the SQU 1T fishery occurred during a similar period, with most of the catch taken during February and March (Figure 12 and Figure 13). In contrast, the seasonal distribution of catch during the remaining years of the study period was highly variable. In 1989–90, most of the catch was taken in January, but in 1993–94 the catch was broadly distributed from February to May (Figure 12).

In the 1996–97 fishing year, there was an initial peak in catch in January, with a large peak in March followed by declining monthly catches from March to June. The 1997–98 and 1998–99 fishing seasons began in December, peaked in January–February, and continued over the next three months with declining monthly catches (Figure 13). In contrast, the 1999–2000 SQU 1T season began in January, with monthly catches steadily increasing to reach a peak during May and a negligible catch taken during June.

In general, the SQU 6T fishing season is less protracted than that in SQU 1T. Most of the annual SQU 6T catch is taken in a two-month period between February and April, although the proportion of the catch taken in each month varied considerably between years (Figure 14 and Figure 15). However, the timing of the main fishing season is variable between years. In the 1989–90, 1997–98, and 1999–2000 fishing years, the SQU 6T season began early with peak catches in February. In contrast, in 1992–93 and 1995–96 the highest monthly SQU 6T catch was in April.

In recent years, the duration of the SQU 6T fishery has been influenced by management measures introduced to protect the New Zealand sea lion (*Phocarctus hookeri*). In 1992–93, a

maximum allowable limit of fishing related mortality (MALFIRM) was introduced for sea lions caught in association with the SQU 6T fishery. The introduction of this resulted in the closure of the SQU 6T fishery when the MALFIRM was exceeded in 1995–96, 1996–97, 1997–98, and 1999–2000 (Table 23). In 1995–96, the fishery was closed late in the season (4 May 1996) and in the subsequent year the closure occurred on 28 March 1997. The closure of the fishery on 27 March 1998 accounts for the absence of SQU 6T catch in the subsequent months, and the closure on 8 March 2000 accounts for the large decline in catch between February and March during 1999–2000 (Figure 15). The SQU 6T fishery remained open throughout 1998–99, although the level of fishing effort and catch was low.

To determine the factors influencing the seasonal distribution in catch in SQU 1T and SQU 6T it is important to consider the interaction between the two fisheries. For the 1989–90 and 1997–98 fishing years, both the SQU 1T and SQU 6T fisheries were characterised by an early start in the fishing season with most of the catch taken during February. However, for other fishing years the seasonal distribution of fishing effort and catch was influenced by the relative performance of the two fisheries. The closure of the SQU 6T fishery in 1995–96, 1996–97, 1997–98, and 1999–2000 also resulted in the diversion of fishing effort to the SQU 1T fishery in these years.

For the 1990–91 fishing year, average monthly catch rates in the SQU 1T fishery were higher than achieved in the SQU 6T fishery during December–February, and most of the total squid trawl catch was taken from the SQU 1T fishery during this period (Figure 16). However, catch rates in the SQU 6T fishery increased steadily between February and April to exceed those in the SQU 1T fishery. There was an increase in the level of the SQU 6T catch taken during the corresponding period as catch rates in the area increased (Figure 16).

A similar trend in the seasonal distribution of catch is also evident for the 1993–94 fishing year. The SQU 1T fishing season began in December, and small catches were taken through December and January. However, catch rates were higher from the SQU 6T fishery when fishing began in this area in February, and during February and March this area accounted for most of the total squid trawl catch. Catch rates in the SQU 6T fishery gradually declined over this period and dropped below the average monthly catch rates from SQU 1T in April. Fishing effort shifted to the SQU 1T fishery which accounted for most of the catch taken during April and May (Figure 16).

Similar trends in the distribution of catch and fishing effort were also apparent in the 1994–95, 1995–96, and 1996–97 fishing years. The interaction between the two fisheries was most evident when the level of catch from both the SQU 1T and SQU 6T fisheries was comparable, including 1993–94 and 1994–95 (high catch), 1990–91 and 1999–2000 (low catch), and 1995–96 and 1996–97 (moderate catch). However, there was no apparent shift in fishing effort between SQU 1T and SQU 6T in years when there was a large difference in the catch taken between the two areas, specifically the 1991–92, 1992–93, 1997–98, and 1998–99 fishing years when large catches were taken from the SQU 1T fishery while catches from SQU 6T were small (Figure 17 and Figure 18).

3.2.5 Summary

The total annual catch from the SQU 1T fishery increased steadily from a few hundred tonnes in 1980–81 to about 20 000 t in 1988–89 before declining the next year (Figure 17). Between 1980–81 and 1986–87, the level of fishing effort (number of trawls) increased in conjunction with the increase in catch, while catch rate (tonnes per trawl) remained relatively stable. During 1986–87 to 1989–90, the level of fishing effort declined, although catch rates steadily increased to reach a peak in 1988–89 (Figure 17).

The total catch from the SQU 1T target fishery increased from about 10 000 t in 1989–90 to over 30 000 t in 1991–92 (Figure 17). Annual catches were maintained at about 30 000 t from 1991–92 to 1994–95 before declining to about 14 000 t in 1995–96. The total annual catch increased steadily over the following two years to reach 24 000 t in 1997–98 before declining to about 10 000 t in 1999–2000 (Figure 17). Fishing effort, in terms of the number of target trawls, increased from 3100 in 1989–90 to 8200 in 1990–91 and remained relatively stable at 6000–7000 trawls per annum between 1991–92 and 1998–99 and then declined to about 4000 trawls in 1999–2000 (Figure 17).

In general terms, trends in fishing effort in the SQU 6T fishery during the 1980s and early 1990s were the inverse of those described for the SQU 1T fishery. While the number of trawls in the SQU 1T fishery increased between 1980–81 and 1986–87, there was a less marked decline in the fishing effort in SQU 6T followed by a large decline in fishing effort in the subsequent year (Figure 18). However, between 1987–88 and 1989–90 the level of fishing effort in the SQU 6T fishery increased, while effort in SQU 1T declined.

During the early 1990s, there was a further large decline in fishing effort in SQU 6T and annual catches declined. In 1993–94, fishing effort and SQU 6T catch greatly increased and, despite declining catches, fishing effort was maintained at about 4000 trawls per annum between 1993–94 and 1996–97 (Figure 18). Fishing effort declined substantially in 1997–98 and remained low in subsequent years.

Annual catches from the SQU 6T fishery were highly variable between 1985–86 and 1999–2000; considerably more variable than catches from the SQU 1T fishery during the same period. Following a period of relatively stable catches between 1980–81 and 1985–86, the SQU 6T fishery has been characterised by episodes of low and high catches. The fishery yielded relatively small catches in 1986–87 to 1987–88, 1990–91 to 1992–93, and 1997–98 to 1999–2000 and high catches in 1988–89 and 1993–94 to 1994–95 (Figure 18).

4. CONCLUSIONS

1. From 1989–90 to 1999–2000, there was considerable change in the size and composition of the fleet operating in the SQU 1J fishery, most notably the presence of a large number of Chinese and, to a lesser extent, Taiwanese, vessels entering the fishery in 1994–95 to 1996–97. The SQU 1J fleet steadily declined over the subsequent years and was virtually absent in 1999–2000. The SQU 1T and SQU 6T fleet was more static during the 1989–90 to 1999–2000 period, although there was a general decline in the number of larger vessels (greater than 75 m in length) in the two fisheries between 1994–95 and 1999–2000.
2. The mainland north SQU 1J fishery has been characterised by episodes of high and low catches. In general, peak catches are taken in years when high catch rates are maintained in the fishery. High annual catches were taken in 1980–81 to 1982–83, 1987–88, and 1994–95 with small catches in the intervening years. Total annual catch and catch rates remained low from the mainland north fishery between 1994–95 and 1999–2000. Total fishing effort in the mainland north fishery was high in the early 1980s, but remained low throughout the 1990s.
3. Annual catch rates from the southern SQU 1J fishery were generally less variable than from the mainland north fishery. However, annual catches from the fishery were highly variable from 1979–80 to 1999–2000, largely due to the large variation in the level of fishing effort in the fishery. The exception was the 1995–96 fishing year when very high catch rates yielded a high annual catch from the fishery.
4. For the SQU 1J and SQU 1T fisheries, total annual catches have remained below the level of the TACCs which were established at an historically high level to account for high inter-annual variation in the abundance of arrow squid. The annual catch from the SQU 6T fishery approximated the level of the current TACC in 1988–89, 1993–94, and 1994–

- 95, but was considerably less than the TACC during the remainder of the 1986–87 to 1999–2000 period.
5. Between 1980–81 and 1991–92, there was a steady increase in catch from the SQU 1T fishery corresponding to a general increase in fishing effort. Fishing effort remained relatively constant between 1991–92 and 1998–99, although total annual catch declined. Fishing effort dropped markedly in 1999–2000 with a corresponding decline in level of annual catch.
 6. Annual catch rates and catch in the SQU 6T fishery are more highly variable than in the SQU 1T fishery. Many vessels operate in both fisheries and maximise their seasonal catch by moving between the fishing grounds depending on the relative abundance of squid. Consequently, high annual catches in the SQU 6T fishery generally correspond to years of high fishing effort. Annual catches from the SQU 6T fishery were low between 1997–98 and 1999–2000. In the 1995–96, 1996–97, 1997–98, and 1999–2000 fishing years, the SQU 6T fishing season was closed after the MALFIRM for New Zealand sea lions was reached.
 7. The variability in catch and effort observed in the SQU 1T, SQU 6T, and SQU 1J fisheries is dependent on the interaction between the annual abundance of squid on each fishing ground (mainland north, southern, and SQU 6T) and number of vessels participating in the fishery each year. More efficient use of the squid resource would be achieved by improving the balance between the level of fishing effort and the abundance of squid. This would require the ability to reliably forecast the abundance of squid well in advance of the fishing season. Future research in this area may investigate the relationship between the relative year class strength of squid and oceanographic conditions during critical phases of the squid life history.

5. ACKNOWLEDGMENTS

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Table 1: Summary of variables and number of squid catch and effort records included in each of the three data formats.

Variable	Data format		
	TCEPR	CELR	SJCER
Unique vessel key	✓	✓	✓
Registered nationality of vessel	✓	✓	✓
Year vessel built	✓	✓	✓
Gross tonnage of vessel	✓	✓	✓
Overall length of vessel	✓	✓	✓
Start date of fishing	✓	✓	✓
End date of fishing	✓		✓
Start time of fishing	✓		✓
End time of fishing	✓		✓
Start latitude	✓		✓
Start longitude	✓		✓
Statistical area	✓	✓	✓
Squid quota area	✓	✓	
Bottom depth	✓		✓
Depth of groundrope of trawl	✓		
Gear code	✓	✓	
Headline height	✓		
Trawl speed	✓		
Target species	✓	✓	
Total catch weight	✓	✓	
Fishing duration		✓	
Effort number		✓	
Number of single jig reels used			✓
Number of double jig reels used			✓
Depth of deepest lure			✓
Sea surface temperature			✓
Wind speed and direction			✓
Number of effort records	136 695	17 674	28 751
Number of catch records (all species)	370 297	88 775	28 042

Table 2: Comparison of annual catch (tonnes) in SQU 1J reported to the QMR system and from the Catch and Effort database for the 1990-91 to 1999-2000 period (a small amount of SQU 1J catch reported in the CELR format is included). The percentage difference is the difference between the two sets of catch statistics. The annual TACC for the period is also reported.

Fishing year	QMR catch (t)	Database catch (t)	Percent difference	TACC
1990-91	11 562	10 547	-8.8	46 087
1991-92	12 985	11 348	-12.6	45 766
1992-93	4 865	5 693	17.0	49 891
1993-94	6 524	6 353	-2.6	49 891
1994-95	33 615	31 968	-4.9	49 891
1995-96	30 805	30 891	0.3	49 891
1996-97	20 792	18 346	-11.8	50 212
1997-98	9 329	8 757	-6.1	50 212
1998-99	3 240	3 051	-5.8	50 212
1999-2000	1 457	1 465	0.5	50 212

Table 3: Comparison of annual catch (tonnes) in SQU 1T reported to the QMR system and from the Catch and Effort database for the 1989-90 to 1999-2000 period (a small amount of SQU 1T catch reported in the CELR format is included). The percentage difference is the difference between the two sets of catch statistics. The annual TACC for the period is also reported.

Fishing year	QMR catch (t)	Database catch (t)	Percent difference	TACC
1989-90	13 161	12 248	-6.9	47 986
1990-91	18 680	17 833	-4.6	42 284
1991-92	36 653	35 627	-2.8	42 284
1992-93	30 862	28 949	-6.2	42 615
1993-94	32 434	31 613	-2.5	42 615
1994-95	35 017	34 350	-1.9	42 741
1995-96	17 823	16 526	-7.3	42 741
1996-97	24 769	23 350	-5.7	42 741
1997-98	28 686	26 727	-6.8	44 741
1998-99	23 362	21 855	-6.5	44 741
1999-2000	13 049	12 326	-5.5	44 741

Table 4: Comparison of annual catch (tonnes) in SQU 6T reported to the QMR system and from the Catch and Effort database for the 1989-90 to 1999-2000 period. The percentage difference is the difference between the two sets of catch statistics. The annual TACC for the period is also reported.

Fishing year	QMR catch (t)	Database catch (t)	Percent difference	TACC
1989-90	19 859	20 723	4.3	42 118
1990-91	10 658	10 556	-1.0	30 190
1991-92	10 861	10 529	-3.1	30 190
1992-93	1 551	1 459	-5.9	30 369
1993-94	34 534	32 457	-5.7	30 369
1994-95	30 683	30 275	-1.3	30 369
1995-96	14 041	14 526	3.5	30 369
1996-97	19 843	19 513	-1.7	30 369
1997-98	7 344	7 118	-3.1	32 369
1998-99	950	924	-2.7	32 369
1999-2000	6 241	6 055	-3.0	32 369

Table 5: Number of jig vessels operating in the SQU 1J fishery by nationality of vessel and fishing year.

Vessel nation	Fishing year									
	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000
China	0	0	2	0	0	6	53	12	6	0
Japan	24	8	10	5	18	20	18	8	10	3
Korea	13	8	6	5	7	1	4	0	0	0
Taiwan	0	0	0	0	12	26	17	8	5	0
Other	10	4	4	8	13	20	21	5	3	0
Total	47	20	22	18	50	73	113	33	24	3

Table 6: Percentage distribution of days fished by the squid jig fleet by nationality of vessel and fishing year.

Vessel nation	Fishing year									
	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000
China	0.0	0.0	0.1	0.0	0.0	1.6	51.6	33.5	28.4	0.0
Japan	57.3	42.8	52.8	48.3	46.3	30.8	15.7	28.4	43.7	100.0
Korea	27.0	40.0	26.5	26.6	20.2	1.7	0.9	0.0	0.0	0.0
Taiwan	0.0	0.0	0.0	0.0	28.1	42.7	18.9	31.8	21.9	0.0
Other	15.8	17.2	20.5	25.1	5.4	23.1	12.9	6.2	6.0	0.0
Total days	3 257	1 446	1 399	901	3 522	5 477	8 386	2 535	1 512	308

Table 7: Percentage distribution of SQU 1J catch by nationality of vessel and fishing year.

Vessel nation	Fishing year									
	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000
China	0.0	0.0	0.0	0.0	0.0	0.8	36.3	21.4	20.5	0.0
Japan	63.6	38.6	59.2	55.8	51.1	38.7	22.7	36.3	54.9	100.0
Korea	20.6	44.9	20.7	31.3	19.6	1.6	0.7	0.0	0.0	0.0
Taiwan	0.0	0.0	0.0	0.0	27.4	44.7	28.8	37.0	19.4	0.0
Other	15.7	16.5	20.0	12.9	1.9	14.2	11.6	5.2	5.3	0.0
Total catch (t)	10 547	11 348	5 693	6 353	31 844	30 733	18 335	8 739	3 051	1 465

Table 8: Percentage distribution of SQU 1J catch by statistical area and fishing year for the two main squid jig fisheries, 1990-91 to 1999-2000.

Fishery	Stat area	Fishing year									
		1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000
North	033	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	034	12.7	1.3	2.5	0.4	4.7	5.5	3.2	0.1	0.0	0.0
	035	11.5	31.2	7.6	14.5	17.0	1.4	0.2	0.1	0.1	0.0
	036	3.0	32.0	1.5	0.4	2.4	0.2	0.0	0.4	0.1	0.0
	037	3.3	8.0	0.9	10.3	2.5	0.1	0.3	6.1	0.0	0.6
	038	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	039	0.0	0.8	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.3
	040	8.2	5.2	0.0	0.0	1.6	0.0	0.4	1.7	0.0	0.0
	041	6.6	20.2	7.3	5.4	17.2	3.0	1.1	8.1	0.9	7.7
	703	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	704	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	705	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	801	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total		45.4	98.7	20.0	32.3	45.5	10.2	5.2	16.5	1.1
South	018	0.1	0.0	0.1	0.5	0.2	0.0	2.6	0.0	0.0	0.0
	019	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	020	0.1	0.5	25.6	13.2	1.6	1.6	12.2	0.1	11.2	53.3
	021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	022	0.2	0.4	53.3	39.3	35.4	35.9	53.4	47.6	36.9	36.1
	023	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0
	024	0.0	0.4	0.0	14.7	3.1	15.7	1.9	33.3	28.8	1.9
	025	0.0	0.0	0.0	0.0	0.1	0.0	2.7	0.0	0.3	0.0
	026	0.1	0.0	0.1	0.0	13.7	35.4	19.3	2.2	20.9	0.1
	027	0.0	0.0	0.8	0.0	0.2	0.0	0.6	0.0	0.4	0.0
	028	5.6	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
	029	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	030	46.1	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0
	031	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	301	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	302	0.3	0.0	0.0	0.0	0.0	0.7	0.2	0.0	0.1	0.0
	303	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
	407	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0
	408	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	502	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	503	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
504	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
602	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.0	
603	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
610	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	
Total		54.5	1.3	79.9	67.8	54.4	89.8	94.2	83.4	98.9	91.4
Total catch (t)	North	4 796	11 201	1 142	2 045	14 506	3 134	957	1 445	44	126
	South	5 752	147	4 551	4 305	17 315	27 596	17 280	7 291	3 017	1 339
	Other	0	0	0	2	23	3	97	3	0	0

Table 9: Percentage distribution of days fished by SQU 1J vessels by statistical area and fishing year for the two main squid jig fisheries, 1990-91 to 1999-2000.

Fishery	Stat area	Fishing year									
		1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000
North	033	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0
	034	10.1	1.7	2.1	0.8	3.6	4.1	3.3	0.3	0.2	0.3
	035	16.7	24.0	14.4	12.7	10.1	2.3	0.5	0.8	0.2	0.3
	036	4.7	22.3	4.9	0.7	2.4	0.8	0.2	1.3	0.3	0.3
	037	7.6	15.6	3.0	7.8	3.9	0.9	1.3	8.2	0.1	3.9
	038	0.0	0.0	0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.0
	039	0.1	1.2	0.1	1.4	0.1	0.0	0.1	0.0	0.1	1.3
	040	13.8	7.1	0.3	0.1	1.4	0.5	1.6	3.4	0.4	0.0
	041	15.5	23.7	6.9	5.9	28.6	10.9	3.2	17.4	2.9	12.7
	703	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	704	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	705	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	801	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total		68.6	95.6	32.2	29.3	50.3	19.7	10.3	31.5	4.1
South	018	0.2	0.0	0.4	1.4	0.3	0.1	5.2	0.1	0.3	0.0
	019	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	020	1.1	1.1	18.3	10.0	1.8	1.4	11.6	1.1	13.4	27.6
	021	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	022	1.4	1.9	47.0	39.8	26.8	38.4	47.4	40.5	34.1	42.2
	023	0.2	0.0	0.1	0.1	0.2	0.3	0.2	0.0	0.1	0.0
	024	0.4	1.2	0.4	17.9	5.9	14.8	3.1	21.0	23.0	7.8
	025	0.0	0.0	0.1	0.0	0.1	0.1	2.1	0.0	0.3	0.0
	026	0.5	0.1	0.4	0.1	14.0	23.9	16.2	4.9	23.3	2.6
	027	0.4	0.0	0.3	0.0	0.3	0.2	0.6	0.1	0.9	0.0
	028	4.8	0.1	0.1	0.0	0.0	0.2	0.2	0.1	0.1	0.0
	029	1.8	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	030	20.1	0.0	0.4	0.3	0.1	0.1	0.4	0.1	0.0	0.6
	031	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	301	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0
	302	0.0	0.0	0.0	0.1	0.1	0.5	0.3	0.2	0.2	0.3
	303	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	407	0.1	0.1	0.0	0.6	0.1	0.2	0.0	0.0	0.0	0.0
	408	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	502	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	503	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	504	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	602	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.0
603	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
610	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	
Total		31.3	4.4	67.7	70.4	49.6	80.1	87.9	68.2	95.8	81.2
Total days fished	North	2 234	1 382	451	264	1 771	1 079	867	799	62	275
	South	1 019	64	949	634	1 749	4 386	7 377	1 729	1 448	1 190
	Other	4	0	1	3	4	12	146	7	2	0

Table 10: Percentage distribution of SQU 1J catch from the mainland north fishery by month and fishing year, 1990-91 to 1999-2000.

Month	Fishing year									
	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000
Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dec	3.3	7.7	16.3	13.9	0.7	6.4	50.9	2.7	0.2	0.1
Jan	23.2	28.1	45.7	58.8	41.1	62.4	14.1	1.4	0.0	10.2
Feb	16.3	28.8	1.1	9.8	18.5	0.3	0.2	9.5	6.8	0.0
Mar	41.3	18.3	0.5	5.4	10.1	1.0	22.0	29.0	37.0	0.0
Apr	15.2	14.7	33.4	11.5	27.2	29.9	12.9	57.2	56.0	81.8
May	0.6	2.4	3.0	0.6	2.3	0.1	0.0	0.2	0.0	7.9
Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sep	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 11: Percentage distribution of SQU 1J catch from the southern fishery by month and fishing year, 1990-91 to 1999-2000.

Month	Fishing year									
	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000
Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dec	0.6	0.0	0.0	0.2	0.1	0.1	0.0	0.1	0.2	0.2
Jan	42.5	0.3	8.6	3.2	0.2	12.0	27.4	31.1	35.6	5.9
Feb	55.8	97.0	59.3	19.2	50.2	49.6	39.9	31.1	26.1	27.1
Mar	1.0	2.3	20.0	27.6	43.2	34.8	25.6	37.3	32.9	51.9
Apr	0.1	0.5	12.1	33.9	6.0	3.5	7.2	0.3	5.1	14.9
May	0.0	0.0	0.0	15.7	0.3	0.0	0.0	0.0	0.0	0.0
Jun	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sep	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 12: Percentage distribution of days fished by SQU 1J vessels by month and fishing year for the two main squid jig fisheries, 1990-91 to 1999-2000.

Fishery	Month	Fishing year									
		1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000
North	Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nov	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	Dec	1.4	4.2	3.1	4.7	0.8	0.7	2.9	1.1	0.4	0.6
	Jan	9.9	18.4	20.8	14.9	11.5	6.8	1.3	1.3	0.1	5.2
	Feb	6.8	23.7	0.5	3.0	6.8	0.1	0.0	2.3	0.1	0.0
	Mar	33.9	27.6	0.7	3.2	4.9	0.2	3.6	5.5	1.7	0.0
	Apr	16.0	17.7	5.1	3.1	22.0	11.9	2.7	21.4	1.7	11.7
	May	0.5	3.9	1.9	0.6	4.3	0.0	0.0	0.0	0.0	1.3
	Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sep	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	68.7	95.6	32.2	29.6	50.3	19.7	10.5	31.6	4.1	18.8
South	Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nov	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	Dec	0.5	0.0	0.0	0.4	0.2	0.1	0.0	0.5	0.6	3.2
	Jan	8.7	0.1	4.9	5.7	0.7	6.0	22.8	16.0	22.0	12.0
	Feb	19.4	3.5	28.4	15.9	18.4	29.9	31.3	26.7	33.5	27.6
	Mar	2.2	0.6	22.1	20.9	23.5	33.6	25.9	23.9	33.6	26.3
	Apr	0.7	0.2	12.4	17.2	5.7	10.6	9.5	1.3	6.2	12.0
	May	0.0	0.0	0.0	9.5	1.2	0.2	0.0	0.0	0.0	0.0
	Jun	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
	Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sep	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	31.3	4.4	67.8	70.4	49.7	80.3	89.5	68.4	95.9	81.2

Table 13: Percentage of the total SQU 1T catch taken by the trawl method by target species, 1989-90 to 1999-2000.

Target species	Fishing year											Total
	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/2000	
Squid	94.1	95.4	93.2	94.8	95.0	89.9	84.7	92.1	91.5	95.1	94.1	92.8
Barracouta	3.0	1.2	2.1	1.7	1.4	4.5	3.8	2.2	1.6	1.7	1.1	2.2
Red cod	0.2	0.2	1.4	1.7	1.1	1.2	4.5	2.3	3.7	1.8	2.6	1.9
Jack mackerel	0.5	0.9	0.9	0.1	0.3	1.3	4.1	0.9	1.1	0.7	0.5	0.9
Hoki	0.5	0.6	1.0	0.5	0.7	1.5	1.0	0.9	0.9	0.3	0.8	0.8
Silver warehou	0.7	1.3	0.6	0.9	1.0	0.9	1.2	1.0	0.5	0.1	0.3	0.8
Ling	0.6	0.2	0.3	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1
Other	0.5	0.2	0.5	0.3	0.5	0.7	0.7	0.5	0.7	0.2	0.6	0.5

Table 14: The number of fishing vessels operating in the target SQU 1T fishery by vessel nationality (RUS, Russian; NZL, New Zealand; KOR, Korean; UKR, Ukrainian) vessel length class, and fishing year, 1989-90 to 1999-2000. Nations included in the "Other" category are Panama, Belize, Japan, Norway, Poland, and unspecified. The boxes represent nation/length categories used to group data in the subsequent tables to ensure the confidentiality of individual vessel data.

Vessel nation	Vessel class	Fishing year										
		89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/2000
RUS	< 43 m	0	0	0	0	0	0	0	0	0	0	0
	43-75 m	1	2	1	0	0	1	6	6	1	2	0
	75+m	25	30	29	26	21	23	19	10	9	9	6
	Total	26	32	30	26	21	24	25	16	10	11	6
NZL	< 43 m	9	7	12	11	17	18	13	10	12	22	14
	43-75 m	4	3	2	0	1	1	1	1	2	1	1
	75+m	2	2	3	2	2	3	1	2	0	1	1
	Total	15	12	17	13	20	22	15	13	14	24	16
KOR	< 43 m	0	0	0	0	0	0	0	0	0	0	0
	43-75 m	10	9	6	7	7	7	10	12	11	8	7
	75+m	0	2	0	0	0	0	0	0	0	0	0
	Total	10	11	6	7	7	7	10	12	11	8	7
UKR	< 43 m	0	0	0	0	0	0	0	0	0	0	0
	43-75 m	0	0	0	0	0	0	0	0	0	0	0
	75+m	0	1	2	4	4	4	4	5	5	4	4
	Total	0	1	2	4	4	4	4	5	5	4	4
Other	< 43 m	0	0	0	0	1	0	0	1	1	3	
	43-75 m	2	2	4	3	2	4	3	4	6	8	3
	75+m	5	3	7	7	7	8	7	9	5	8	6
	Total	7	5	11	10	10	12	10	14	12	19	9
Total	< 43 m	9	7	12	11	18	18	13	11	13	25	14
	43-75 m	17	16	13	10	10	13	20	23	20	19	11
	75+m	32	38	41	39	34	38	31	26	19	22	17
	Total	58	61	66	60	62	69	64	60	52	66	42

Table 15: The proportion of the total target SQU 1T trawls conducted by vessel nationality (RUS, Russian; NZL, New Zealand; KOR, Korean; UKR, Ukrainian), vessel length class, and fishing year, 1989-90 to 1999-2000. Nations included in the "Other" category are Panama, Belize, Japan, Norway, Poland, and unspecified. To ensure the confidentiality of individual vessel data, data were combined across adjacent vessel length classes where less than three vessels were in a particular nation/length category in a fishing year. The combined table cells are included within the boxes.

Vessel nation	Vessel class	Fishing year										
		89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/2000
RUS	< 43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m				0.0	0.0		3.6	4.8			0.0
	75+m	33.5	65.4	53.1	56.2	25.2	41.9	25.9	13.1	19.8	22.9	12.7
	Total	33.5	65.4	53.1	56.2	25.2	41.9	29.5	17.8	19.8	22.9	12.7
NZL	< 43 m	3.9	0.6	1.8		12.5	4.9		4.8	6.8		
	43-75 m										7.1	16.1
	75+m	6.5	2.1	7.9	7.2	5.2	4.9	5.1	3.4	0.0		
	Total	10.4	2.6	9.7	7.2	17.7	9.8	5.1	8.2	6.8	7.1	16.1
KOR	< 43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m	52.7	24.3	20.2	13.6	23.6	20.8	37.0	39.6	39.0	30.9	34.5
	75+m	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	52.7	24.3	20.2	13.6	23.6	20.8	37.0	39.6	39.0	30.9	34.5
UKR	< 43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	75+m	0.0	3.5	6.0	7.8	9.6	6.0	8.6	10.9	9.1	8.0	8.7
	Total	0.0	3.5	6.0	7.8	9.6	6.0	8.6	10.9	9.1	8.0	8.7
Other	< 43 m	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.1
	43-75 m			3.0	3.5	6.0	6.0	7.0	5.7	10.0	8.3	10.4
	75+m	3.4	4.2	8.0	11.7	17.9	15.5	12.8	17.8	15.4	21.1	16.4
	Total	3.4	4.2	11.0	15.2	23.9	21.5	19.9	23.5	25.4	29.4	26.9
Total	< 43 m	3.9	0.6	1.8	1.7	12.5	4.9	5.0	4.9	6.0	5.3	15.1
	43-75 m	56.9	23.7	27.8	17.2	29.7	28.8	47.7	51.0	52.3	47.0	47.4
	75+m	39.2	75.7	70.3	81.2	57.7	66.4	47.4	44.1	41.7	47.7	37.5
Total Trawls	3 094	8 165	6 114	7 619	5 541	6 982	5 810	6 649	6 625	7 202	4 234	

Table 16: The proportion of the total target SQU 1T catch taken by vessel nationality (RUS, Russian; NZL, New Zealand; KOR, Korean; UKR, Ukrainian), vessel length class, and fishing year, 1989-90 to 1999-2000. Nations included in the "Other" category are Panama, Belize, Japan, Norway, Poland, and unspecified. To ensure the confidentiality of individual vessel data, data were combined across adjacent vessel length classes where less than three vessels were in a particular nation/length category in a fishing year. The combined table cells are included within the boxes.

Vessel nation	Vessel class	Fishing year										
		89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/2000
RUS	<43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m				0.0	0.0		2.0	4.4			0.0
	75+m	43.0	62.7	61.1	51.8	29.3	45.1	15.5	11.8	21.6	21.6	7.4
	Total	43.0	62.7	61.1	51.8	29.3	45.1	17.5	16.3	21.6	21.6	7.4
NZL	<43 m	0.1	0.1	0.3		4.0	1.6		1.8	3.2		
	43-75 m										3.0	4.8
	75+m	4.9	2.4	6.3	6.4	5.4	3.5	1.8	0.8	0.0		
	Total	5.0	2.5	6.7	6.4	9.4	5.1	1.8	2.6	3.2	3.0	4.8
KOR	<43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m	50.7	28.1	16.8	15.9	23.9	19.6	48.5	40.5	38.1	34.3	45.4
	75+m	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	50.7	28.1	16.8	15.9	23.9	19.6	48.5	40.5	38.1	34.3	45.4
UKR	<43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	75+m	0.0	2.8	5.1	10.4	9.3	7.9	7.0	11.3	10.3	8.5	6.8
	Total	0.0	2.8	5.1	10.4	9.3	7.9	7.0	11.3	10.3	8.5	6.8
Other	<43 m	0.0	0.0	0.0	0.0		0.0	0.0			0.1	0.0
	43-75 m			2.8	4.5	6.3	6.8	8.6	8.3	10.4	10.9	14.3
	75+m	1.3	3.8	7.6	11.1	21.8	15.5	16.6	21.1	16.4	21.7	21.3
	Total	1.3	3.8	10.4	15.5	28.1	22.3	25.2	29.4	26.9	32.6	35.6
Total	<43 m	0.1	0.1	0.3	0.4	4.1	1.6	1.7	1.8	3.1	1.9	4.7
	43-75 m	54.1	26.8	23.6	20.3	30.1	27.4	59.1	53.5	50.8	47.8	59.7
	75+m	45.8	73.1	76.0	79.3	65.8	71.0	39.1	44.7	46.1	50.3	35.5
Total catch (t)		11 520	17 010	33 208	27 441	30 015	30 867	14 002	21 507	24 438	20 746	11 260

Table 17: The number of fishing vessels operating in the target SQU 6T fishery by vessel nationality (RUS, Russian; NZL, New Zealand; KOR, Korean; UKR, Ukrainian), vessel length class, and fishing year, 1989-90 to 1999-2000. Nations included in the "Other" category are Panama, Belize, Japan, Norway, Poland, and unspecified. The boxes represent nation/length categories used to group data in the subsequent tables to ensure the confidentiality of individual vessel data.

Vessel nation	Vessel class	Fishing year										
		89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/2000
RUS	< 43 m	0	0	0	0	0	0	0	0	0	0	0
	43-75 m	1	2	1	0	0	1	6	5	1	3	0
	75+m	26	31	29	19	22	23	19	7	9	8	6
	Total	27	33	30	19	22	24	25	12	10	11	6
NZL	< 43 m	3	0	0	1	0	1	1	0	0	0	0
	43-75 m	2	3	2	0	1	1	0	1	2	0	0
	75+m	2	2	2	1	2	3	1	2	0	1	0
	Total	7	5	4	2	3	5	2	3	2	1	0
KOR	< 43 m	0	0	0	0	0	0	0	0	0	0	0
	43-75 m	10	9	6	7	6	6	10	10	11	8	7
	75+m	0	2	0	0	0	0	0	0	0	0	0
	Total	10	11	6	7	6	6	10	10	11	8	7
UKR	< 43 m	0	0	0	0	0	0	0	0	0	0	0
	43-75 m	0	0	0	0	0	0	0	0	0	0	0
	75+m	1	1	2	3	4	4	4	5	5	4	4
	Total	1	1	2	3	4	4	4	5	5	4	4
Other	< 43 m	0	0	0	0	0	0	0	0	0	0	0
	43-75 m	2	0	3	3	2	3	4	3	3	5	3
	75+m	4	3	4	4	7	8	7	9	5	7	7
	Total	6	3	7	7	9	11	11	12	8	12	10
Total	< 43 m	3	0	0	1	0	1	1	0	0	0	0
	43-75 m	15	14	12	10	9	11	20	19	17	16	10
	75+m	33	39	37	27	35	38	31	23	19	20	17
	Total	51	53	49	38	44	50	52	42	36	36	27

Table 18: The proportion of the total target SQU 6T trawls conducted by vessel nationality (RUS, Russian; NZL, New Zealand; KOR, Korean; UKR, Ukrainian), vessel length class, and fishing year, 1989-90 to 1999-2000. Nations included in the "Other" category are Panama, Belize, Japan, Norway, Poland, and unspecified. To ensure the confidentiality of individual vessel data, data were combined across adjacent vessel length classes where less than three vessels were in a particular nation/length category in a fishing year. The combined table cells are included within the boxes.

Vessel nation	Vessel class	Fishing year										
		89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/2000
RUS	< 43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m	79.3	64.9	79.1	0.0	0.0	48.1	15.8	11.2	43.9	7.8	0.0
	75+m				61.6	52.7		46.7	18.5		40.6	23.8
	Total	79.3	64.9	79.1	61.6	52.7	48.1	62.5	29.7	43.9	48.3	23.8
NZL	< 43 m	0.8	0.0	0.0		0.0			0.0		0.0	0.0
	43-75 m	4.4	3.2	1.9	2.1	4.3	8.7	0.3	6.8	1.0	0.0	0.0
	75+m									0.0	0.3	0.0
	Total	5.1	3.2	1.9	2.1	4.3	8.7	0.3	6.8	1.0	0.3	0.0
KOR	< 43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m	10.4	27.5	5.7	4.3	10.5	10.3	6.7	20.9	13.2	15.5	23.7
	75+m	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	10.4	27.5	5.7	4.3	10.5	10.3	6.7	20.9	13.2	15.5	23.7
UKR	< 43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	75+m	3.5	2.4	3.2	14.7	11.6	10.8	10.0	13.9	22.5	8.8	15.9
	Total	3.5	2.4	3.2	14.7	11.6	10.8	10.0	13.9	22.5	8.8	15.9
Other	< 43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m	1.7	0.0	5.1	3.6	20.9	5.2	3.6	4.8	7.2	3.1	5.1
	75+m		2.0	5.0	13.7		16.9	16.9	24.0	12.2	24.0	31.5
	Total	1.7	2.0	10.1	17.3	20.9	22.1	20.6	28.8	19.4	27.1	36.7
Total	< 43 m	0.8	0.0	0.0	0.6	0.0	0.1	0.1	0.0	0.0	0.0	0.0
	43-75 m	15.8	27.5	12.1	7.9	14.3	19.1	26.1	38.7	26.7	26.4	28.8
	75+m	83.5	72.5	87.9	91.5	85.7	80.8	73.8	61.3	73.3	73.6	71.2
Total Trawls		5 286	3 318	2 159	658	4 703	4 026	4 473	3 721	1 443	387	1 208

Table 19: The proportion of the total target SQU 6T catch taken by vessel nationality (RUS, Russian; NZL, New Zealand; KOR, Korean; UKR, Ukranian), vessel length class, and fishing year for the period 1989-90 to 1999-2000. Nations included in the "Other" category are Panama, Belize, Japan, Norway, Poland, and unspecified. To ensure the confidentiality of individual vessel data, data were combined across adjacent vessel length classes where less than three vessels were in a particular nation/length category in a fishing year. The combined table cells are included within the boxes.

Vessel nation	Vessel class	Fishing year										
		89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/2000
RUS	< 43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m	77.8	54.4	77.0	0.0	0.0	45.0	17.2	10.0	34.1	4.4	0.0
	75+m				66.1	56.8		39.2	20.2		36.4	16.2
	Total	77.8	54.4	77.0	66.1	56.8	45.0	56.4	30.1	34.1	40.8	16.2
NZL	< 43 m	0.2	0.0	0.0		0.0			0.0		0.0	0.0
	43-75 m	3.5	3.9	1.3	0.5	3.5	6.1	0.1	3.6	0.0	0.0	0.0
	75+m									0.0	0.0	0.0
	Total	3.7	3.9	1.3	0.5	3.5	6.1	0.1	3.6	0.0	0.0	0.0
KOR	< 43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m	14.0	36.7	8.2	3.6	6.8	11.5	9.7	23.5	22.5	23.8	27.7
	75+m	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	14.0	36.7	8.2	3.6	6.8	11.5	9.7	23.5	22.5	23.8	27.7
UKR	< 43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	75+m	2.7	2.2	2.6	13.3	12.7	12.5	11.0	15.1	25.2	7.7	18.1
	Total	2.7	2.2	2.6	13.3	12.7	12.5	11.0	15.1	25.2	7.7	18.1
Other	< 43 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43-75 m	1.7	0.0	5.5	10.7	20.1	6.4	4.2	4.2	4.7	1.1	5.4
	75+m		2.8	5.5	5.8		18.4	18.6	23.4	13.5	26.6	32.7
	Total	1.7	2.8	11.0	16.5	20.1	24.8	22.8	27.6	18.2	27.7	38.0
Total	< 43 m	0.2	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	43-75 m	18.1	34.6	14.9	14.3	11.1	20.7	31.1	38.4	30.7	29.3	33.0
	75+m	81.6	65.4	85.1	85.5	88.9	79.1	68.9	61.6	69.3	70.7	67.0
Total catch (t)		20 724	10 556	10 530	1 459	32 457	30 276	14 526	19 513	7 118	919	6 041

Table 20: Percentage distribution of SQU 1T catch (t) for the squid target fishery by statistical area and fishing year for the mainland north and southern squid fisheries, 1989-90 to 1999-2000.

Fishery	Stat area	Fishing year											
		89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	
North	033	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	034	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	035	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
	036	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	037	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	038	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	039	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	040	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	041	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	703	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	704	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	705	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
	801	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Total	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.0	0.0	0.1	0.2
South	018	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	019	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	020	3.6	0.3	2.6	0.3	0.5	0.9	1.6	1.2	1.2	1.2	4.5	
	021	0.0	0.1	0.1	0.0	0.1	0.4	0.3	0.2	0.4	0.1	0.4	
	022	22.1	5.2	16.0	10.2	53.9	22.1	33.5	16.7	11.6	12.5	32.9	
	023	0.2	0.1	0.1	0.0	0.0	0.2	0.0	0.1	0.0	0.0	12.5	
	024	0.0	0.0	0.0	0.0	1.0	0.5	0.3	0.2	1.1	0.4	0.6	
	025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	
	026	0.1	0.1	0.1	1.7	0.7	1.3	34.1	13.7	9.9	4.1	1.8	
	027	0.5	0.3	0.1	2.1	1.6	2.2	3.0	6.3	5.9	3.6	2.5	
	028	70.8	81.3	75.7	75.9	33.7	46.2	16.8	43.0	47.1	63.5	28.7	
	029	0.2	0.1	0.7	0.2	0.0	0.1	0.0	0.1	0.2	0.0	0.0	
	030	0.4	0.0	1.5	0.7	0.2	0.7	0.4	3.3	0.2	0.2	0.6	
	031	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	301	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	302	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	
	303	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	407	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	
	408	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	
	502	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	503	0.0	0.1	0.3	0.2	0.0	0.1	0.2	0.1	0.1	0.0	0.1	
	504	1.5	12.1	2.6	8.6	8.2	25.0	9.1	14.3	21.9	14.1	6.0	
	602	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.5	
603	0.0	0.1	0.1	0.0	0.0	0.2	0.1	0.2	0.0	0.0	0.0		
610	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	Total	99.9	99.9	100.0	100.0	99.9	100.0	99.6	99.4	99.7	99.9	99.5	
Total catch (t)	North	0	8	4	1	41	11	42	0	2	16	20	
	South	11 510	16 995	33 203	27 430	29 971	30 854	13 950	21 387	24 373	20 722	11 199	
	Other	10	7	1	10	3	2	10	119	63	13	42	

Table 21: Percentage distribution of trawls targeting squid by statistical area and fishing year for the mainland north and southern squid fisheries, 1989-90 to 1999-2000.

Fishery	Stat area	Fishing year											
		89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	
North	033	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	034	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	035	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	036	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	037	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.5	5.6
	038	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	039	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.5	1.3
	040	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
	041	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	703	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	704	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	705	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	801	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
		Total	0.0	0.3	0.2	0.1	0.4	0.2	0.0	0.1	0.0	1.1	7.5
South	018	0.0	0.0	0.0	0.3	0.0	0.1	0.1	0.0	0.0	0.5	0.0	
	019	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	020	4.8	0.5	3.8	0.7	1.3	1.8	2.5	2.7	2.0	3.4	5.6	
	021	0.0	0.4	0.2	0.2	0.8	1.6	1.5	0.4	1.0	0.4	0.6	
	022	30.5	6.5	18.6	11.3	51.1	25.4	30.3	20.3	16.7	14.2	29.7	
	023	0.3	0.1	0.3	0.0	0.0	0.3	0.0	0.1	0.0	0.0	4.1	
	024	0.2	0.0	0.1	0.0	2.2	1.4	0.8	0.7	1.6	1.5	1.8	
	025	0.0	0.2	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.1	0.3	
	026	0.7	0.5	0.4	1.8	1.6	1.7	20.9	13.4	11.8	6.4	3.6	
	027	1.3	1.3	0.3	2.4	3.1	2.9	3.4	6.4	6.3	4.9	4.1	
	028	56.3	79.4	69.0	73.7	31.4	40.7	28.7	40.0	42.4	54.7	28.9	
	029	0.5	0.5	0.9	0.9	0.0	0.2	0.1	0.1	0.4	0.0	0.4	
	030	0.8	0.0	1.8	1.3	0.2	0.7	0.6	1.8	0.6	0.6	1.3	
	031	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	301	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	302	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	
	303	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	407	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.1	3.8	
	408	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	502	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	503	0.0	0.1	0.3	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	
	504	2.5	9.5	3.6	6.8	7.3	22.7	9.8	11.9	15.5	11.9	6.9	
	602	0.2	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	
603	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0		
610	1.3	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0		
	Total	99.6	99.5	99.5	99.7	99.3	99.7	99.3	98.2	98.8	98.7	91.3	
Total number of trawls	North	0	27	15	9	23	14	2	6	3	78	324	
	South	3 083	8 125	6 074	7 590	5 485	6 953	5 766	6 529	6 545	7 287	3 956	
	Other	11	13	17	11	15	8	41	114	77	19	52	

Table 22: Percentage distribution of SQU 1T catch taken by the squid target fishery by month and fishing year, 1989-90 to 1999-2000.

Month	Fishing year										
	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00
Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.0	0.0	0.0
Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Dec	3.4	1.3	0.0	0.0	0.1	0.1	0.0	1.6	6.6	8.5	0.1
Jan	53.2	13.7	0.1	0.0	0.3	0.3	3.7	18.9	31.1	28.0	12.9
Feb	14.1	34.2	43.4	57.4	20.9	49.1	40.3	4.3	28.9	34.8	18.1
Mar	20.2	37.7	33.4	26.7	16.1	30.7	34.6	36.5	16.3	20.7	19.7
Apr	1.6	7.1	10.9	10.6	29.6	9.2	9.5	22.8	8.3	4.5	21.1
May	5.2	2.7	7.7	4.2	29.0	7.1	10.4	12.3	7.6	3.0	26.8
Jun	2.1	2.6	4.2	0.9	3.7	3.0	0.9	3.4	1.1	0.5	1.1
Jul	0.0	0.6	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Aug	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sep	0.1	0.0	0.0	0.0	0.1	0.4	0.1	0.0	0.0	0.0	0.0

Table 23: Date of closure of the SQU 6T fishery when the maximum allowable limit of fishing mortality (MALFIRM) on New Zealand sea lions was reached by fishing year. The MALFIRM was first introduced for the 1992-93 fishing year.

Fishing year	Date of closure
1992-93	No closure
1993-94	No closure
1994-95	No closure
1995-96	4 May 1996
1996-97	28 March 1997
1997-98	27 March 1998
1998-99	No closure
1999-2000	8 March 2000

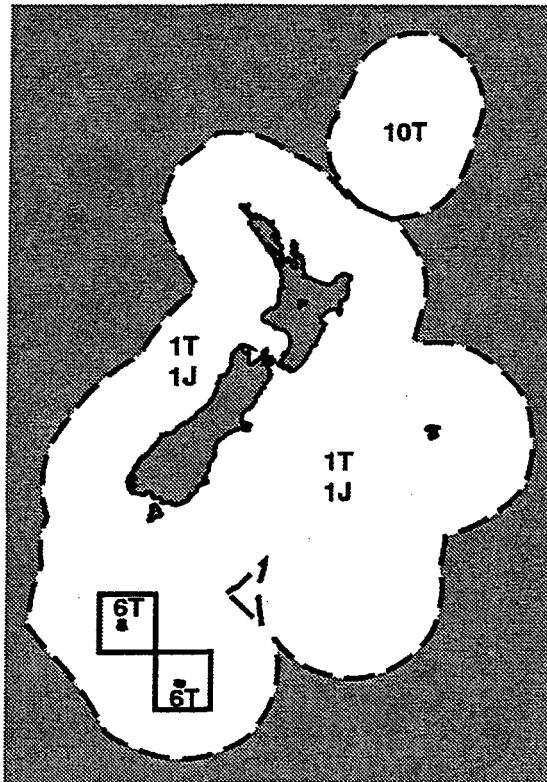


Figure 1: Location of the SQU 1J, SQU 1T, and SQU 6T fishstock areas (from Annala et al. 2000).

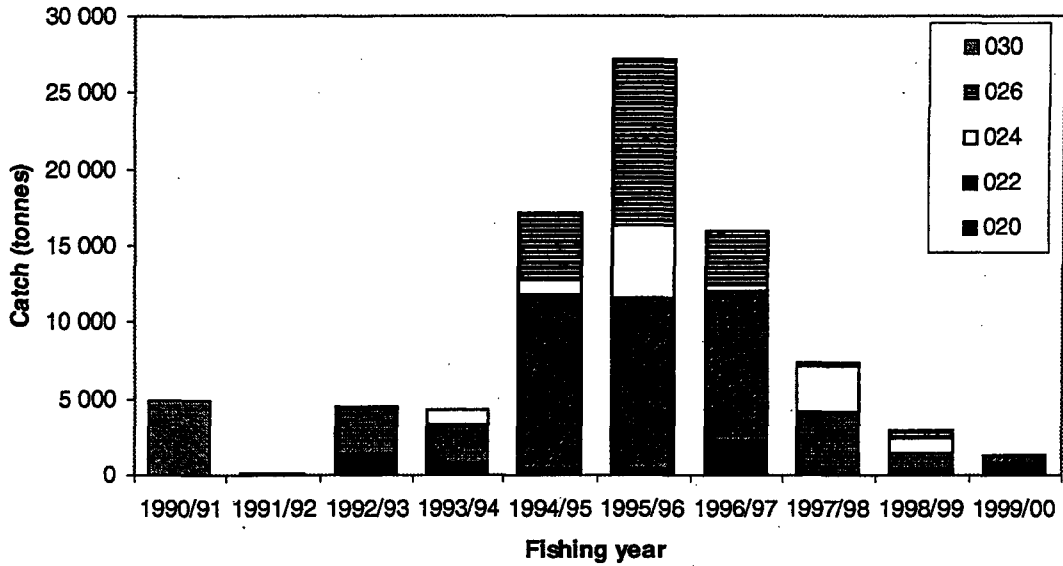


Figure 2: Distribution of SQU 1J catch by statistical area and fishing year for the statistical areas accounting for most of the catch taken from the southern squid jig fishery, 1990-91 to 1999-2000.

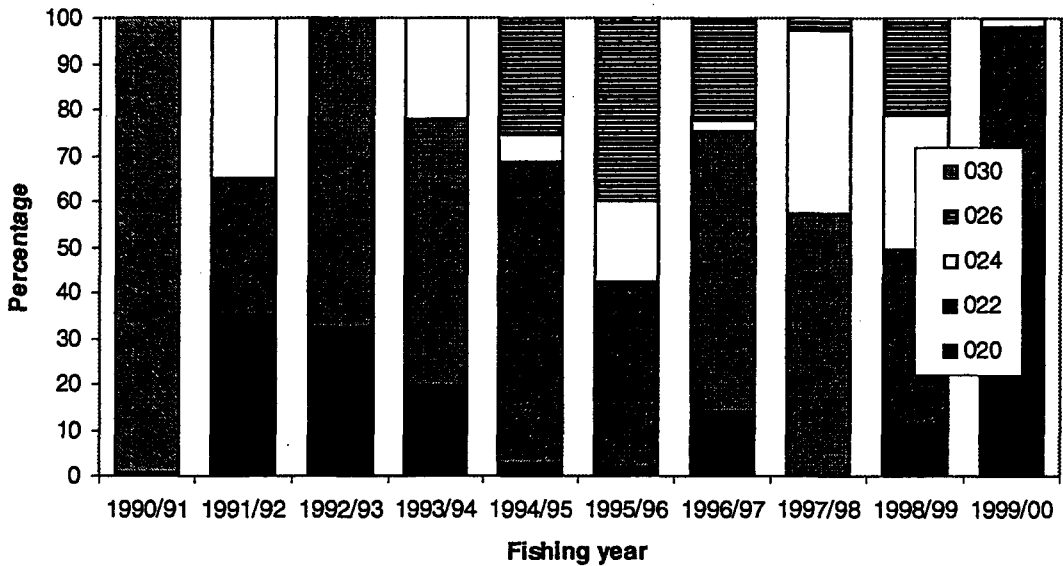


Figure 3: Percentage distribution of total catch from the southern squid jig fishery by statistical area and fishing year, 1990-91 to 1999-2000.

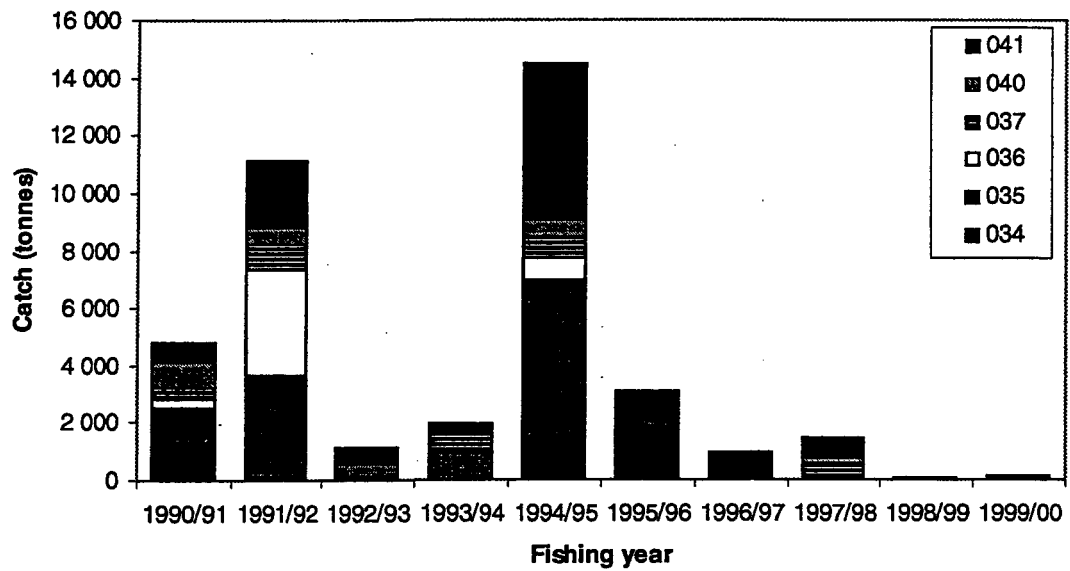


Figure 4: Distribution of SQU 1J catch by statistical area and fishing year for the statistical areas accounting for most of the catch taken from the mainland north squid jig fishery, 1990-91 to 1999-2000.

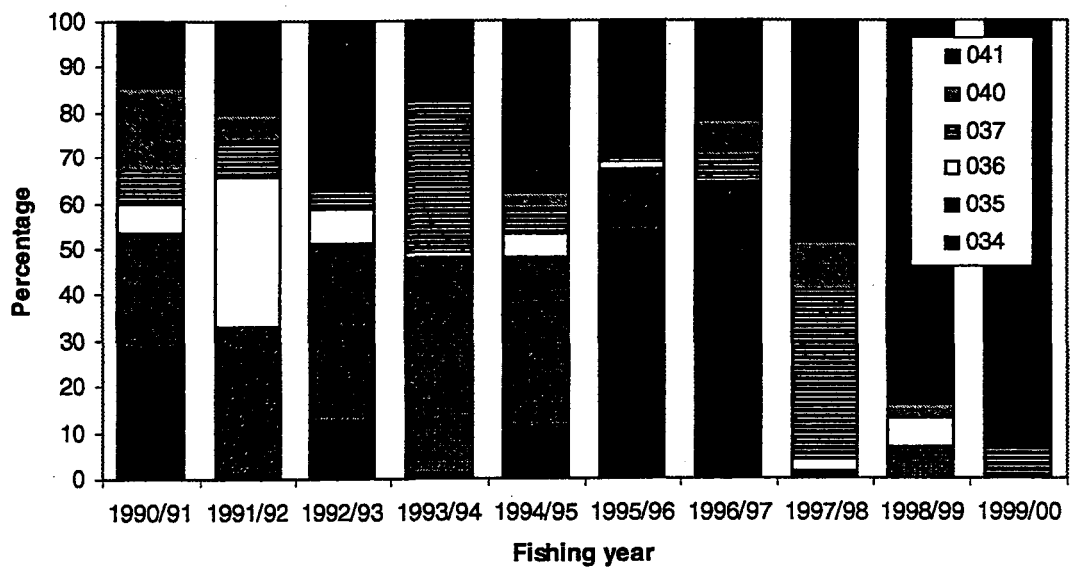


Figure 5: Percentage distribution of total SQU 1J catch from the mainland north squid jig fishery by statistical area and fishing year, 1990-91 to 1999-2000.

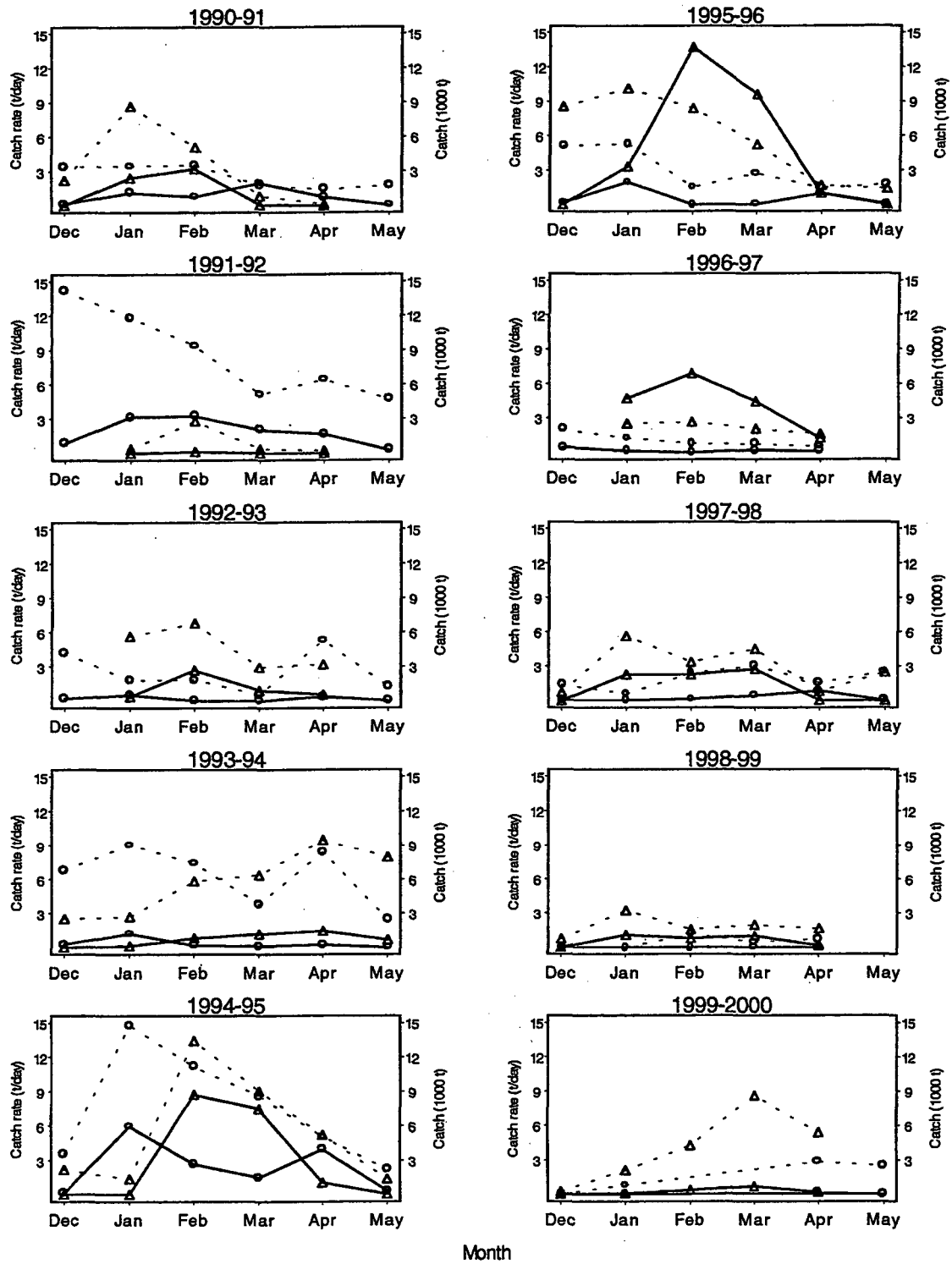


Figure 6: Seasonal trends in SQU 1J catch (solid line) and average catch rate (tonnes per day) (dashed line) by month for the mainland north (circles) and southern (triangles) fishing grounds by fishing year for 1990-91 to 1999-2000.

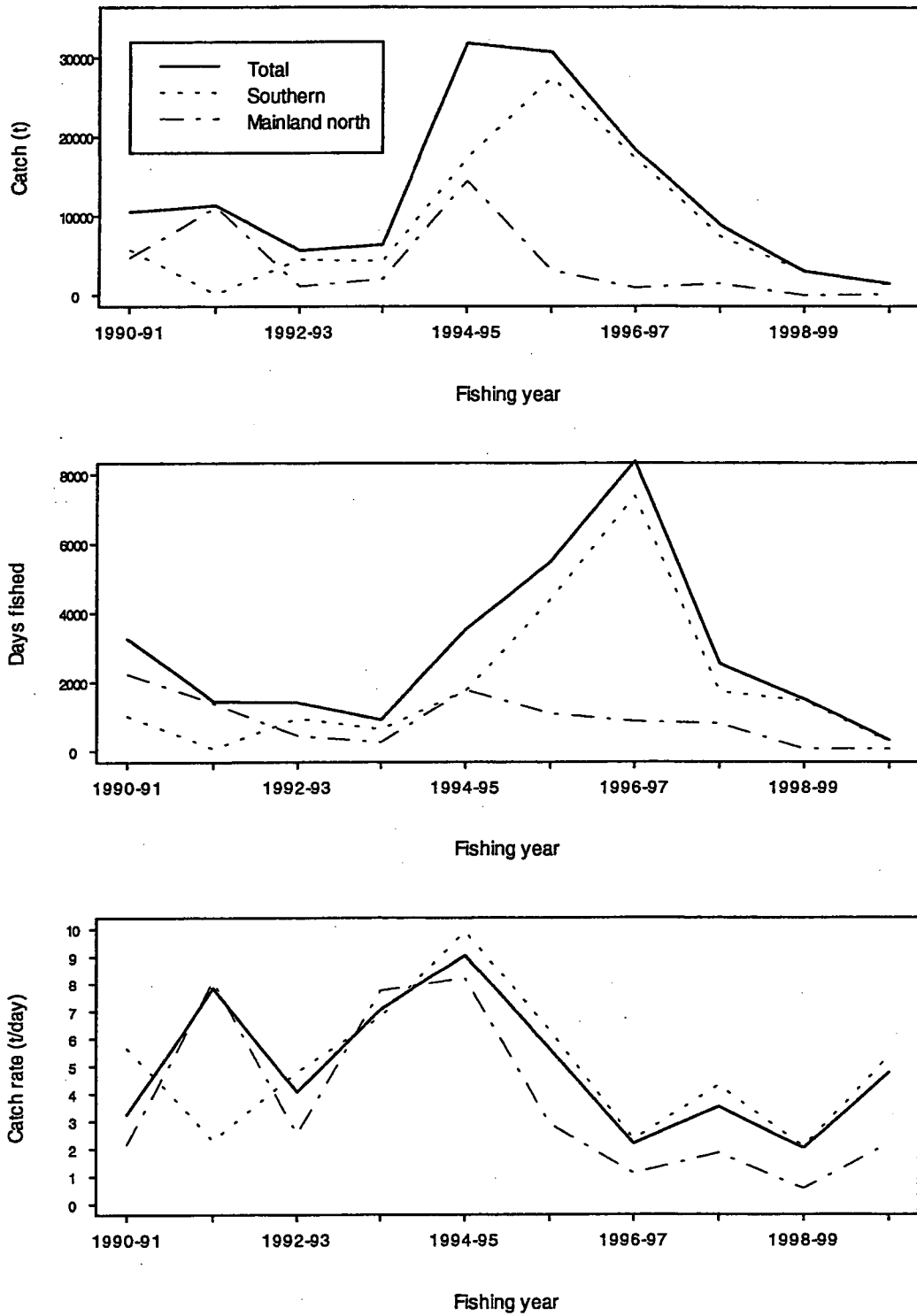


Figure 7: Summary of total SQU 1J catch (top), total number of days fished by the jig fleet (middle), and average catch rate (t/day fished) (bottom) achieved by the fleet by fishing year for the mainland north, southern, and total combined squid jig fishery, 1990-91 to 1999-2000.

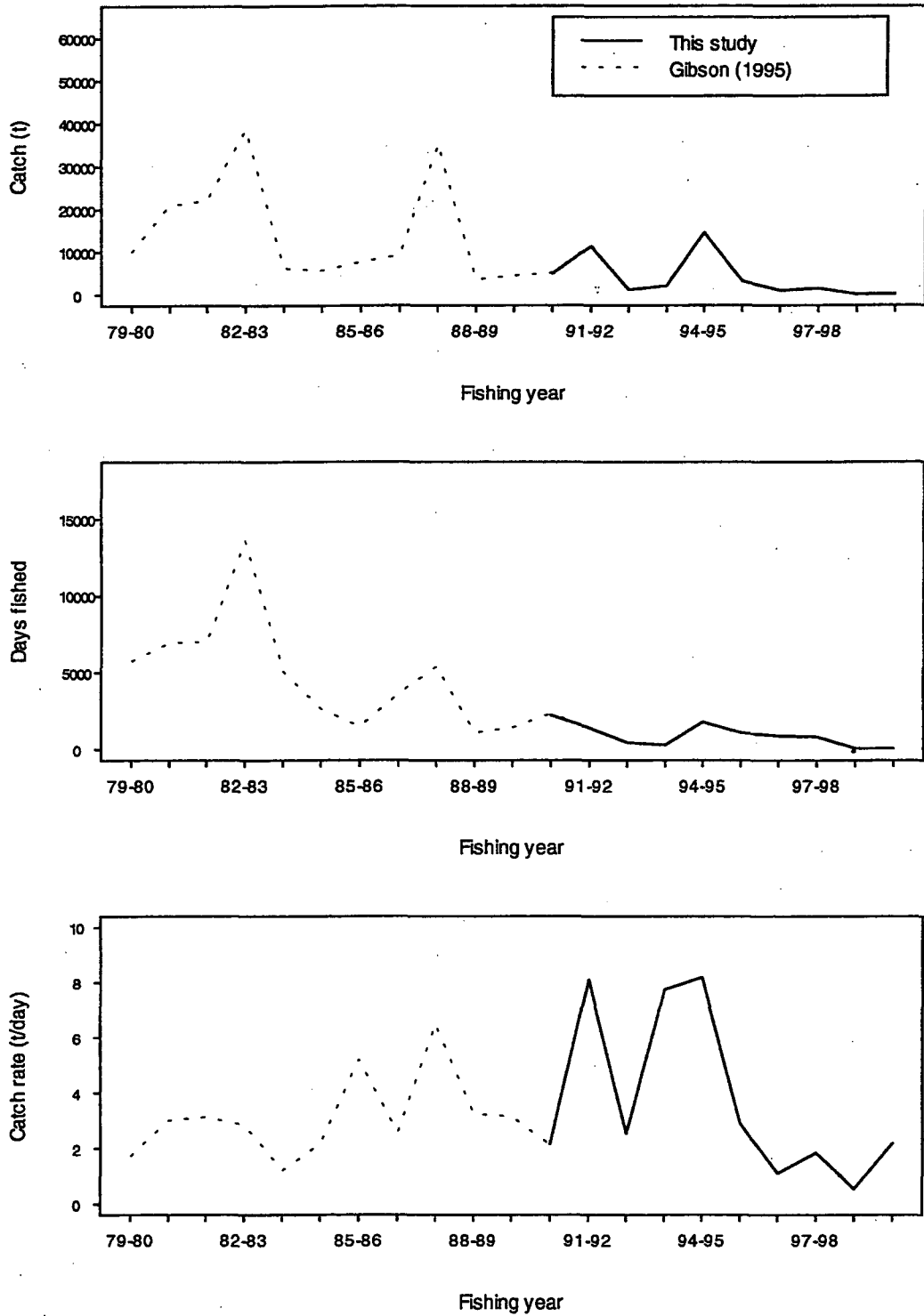


Figure 8: Summary of annual SQU 1J catch (top), total days fished by the jig fleet (middle), and average daily catch rate (tonne/vessel day) (bottom) for the mainland north fishing grounds, 1979-80 to 1999-2000. Data for 1979-80 to 1992-93 are from Gibson (1995).

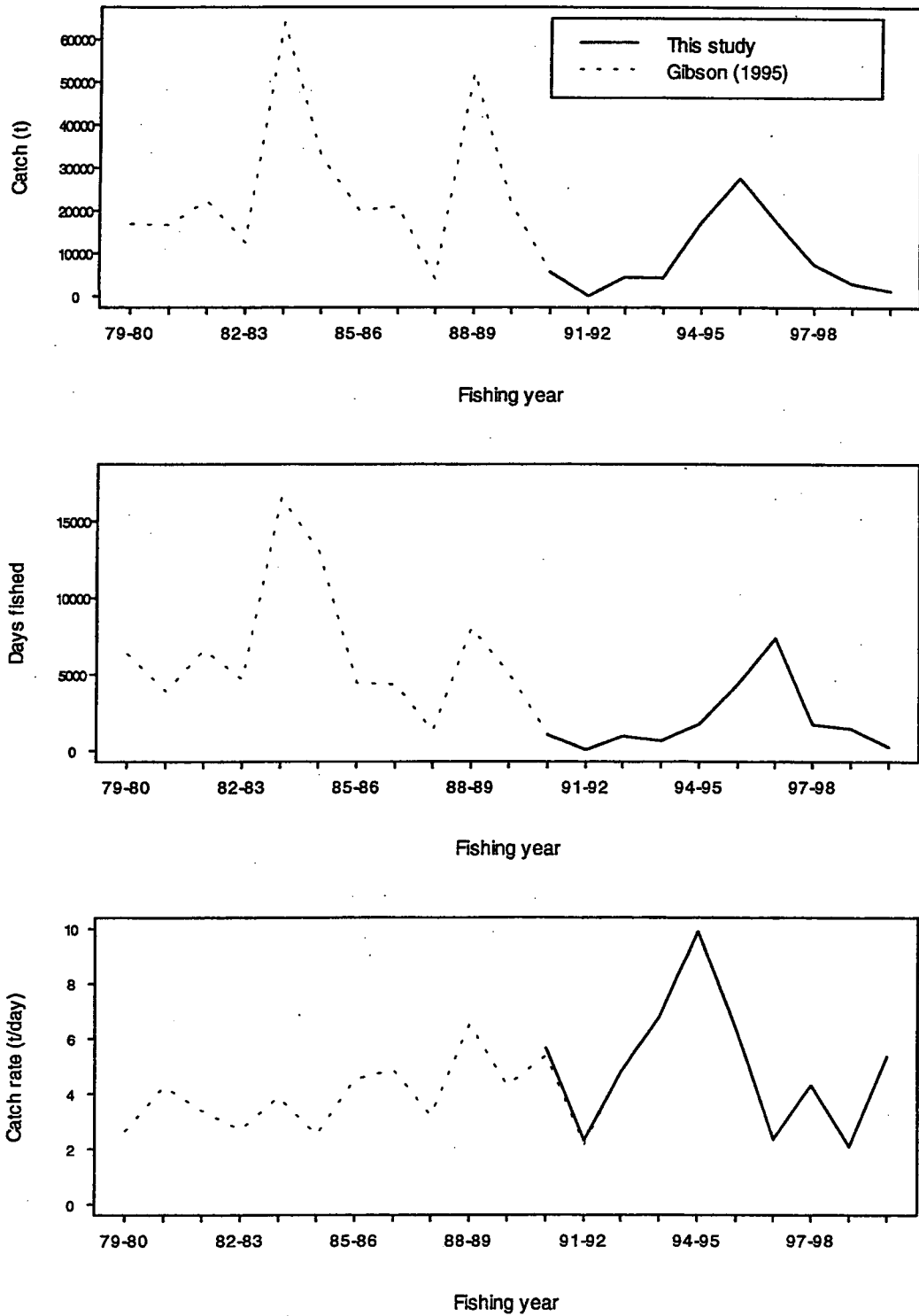


Figure 9: Summary of annual SQU 1J catch (top), total days fished by the jig fleet (middle), and average daily catch rate (tonne/vessel day) (bottom) for the southern fishing ground, 1979–80 to 1999–2000. Data for 1979–80 to 1992–93 are from Gibson (1995).

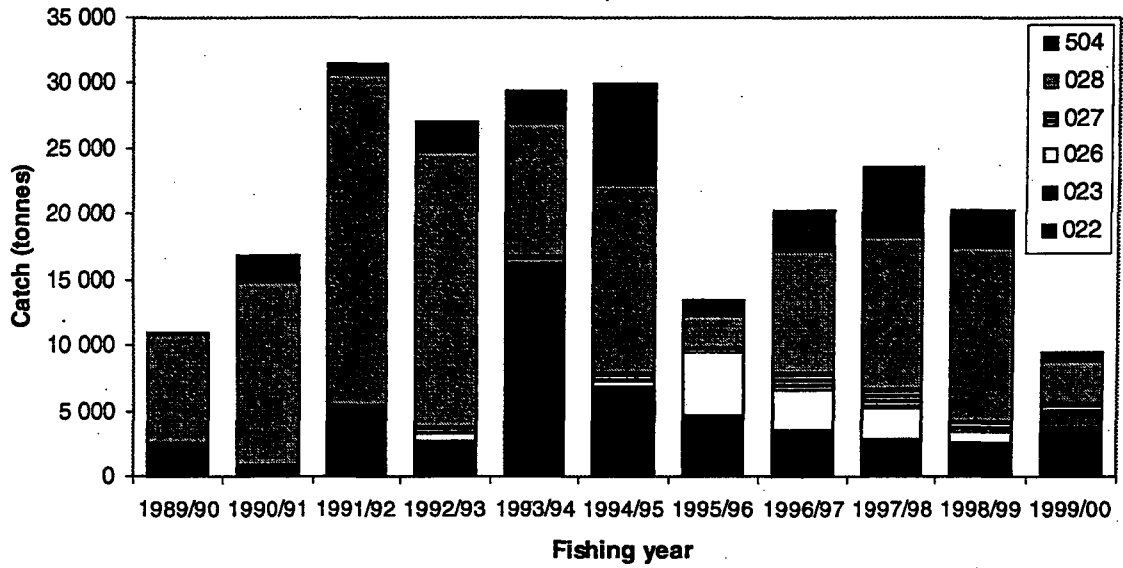


Figure 10: Distribution of SQU 1T catch (tonnes) by statistical area and fishing year for the five main statistical areas comprising the southern 1T trawl fishery, 1989-90 to 1999-2000.

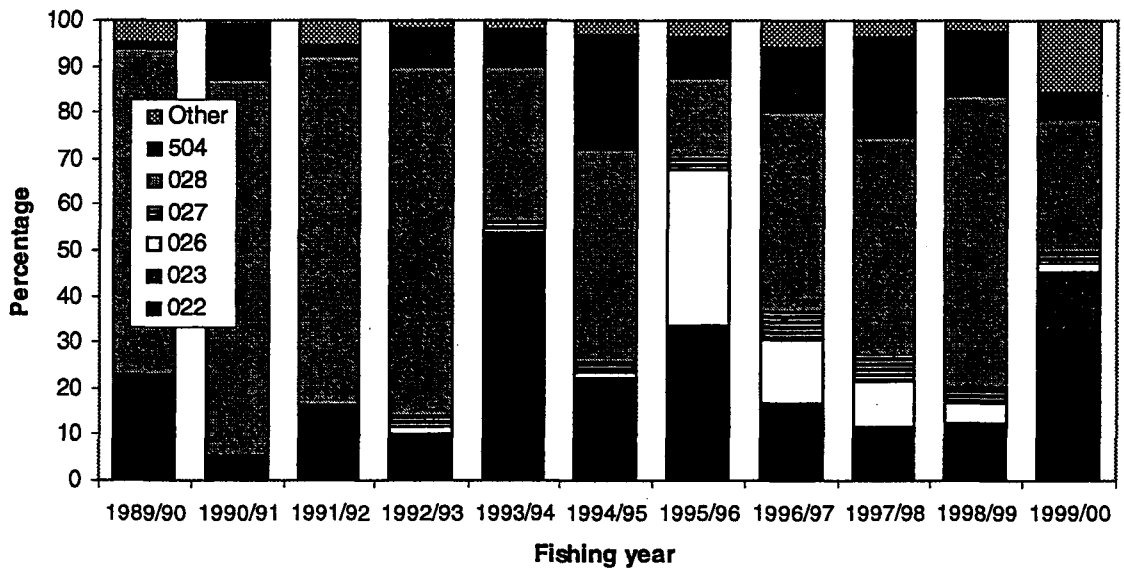


Figure 11: Percentage distribution of SQU 1T catch by statistical area and fishing year for the five main statistical areas comprising the southern 1T trawl fishery, 1989-90 to 1999-2000.

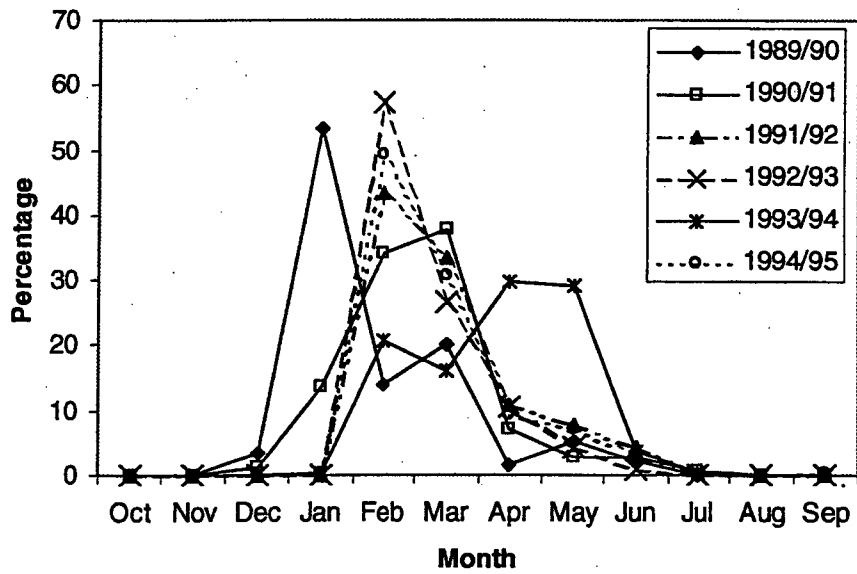


Figure 12: Percentage distribution of SQU 1T target trawl catch by month and fishing year, 1989-90 to 1994-95.

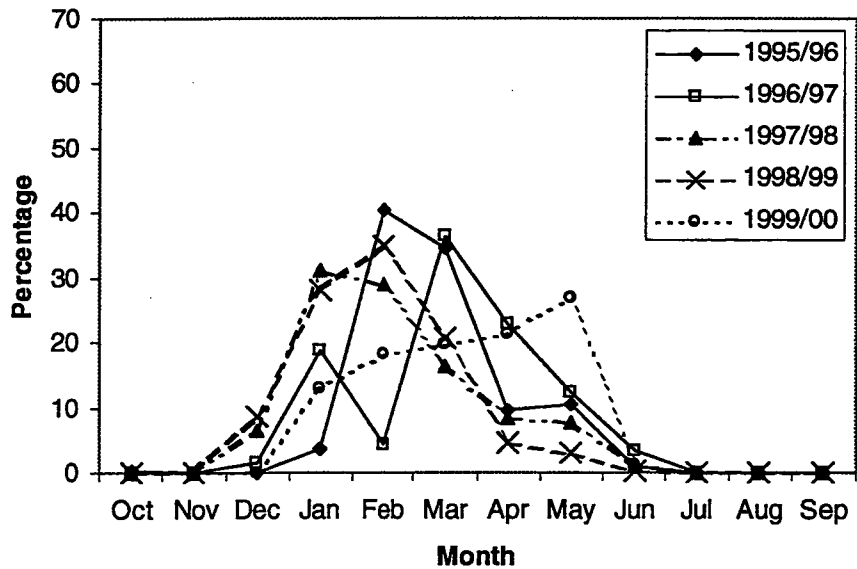


Figure 13: Percentage distribution of SQU 1T target trawl catch by month and fishing year, 1995-96 to 1999-2000.

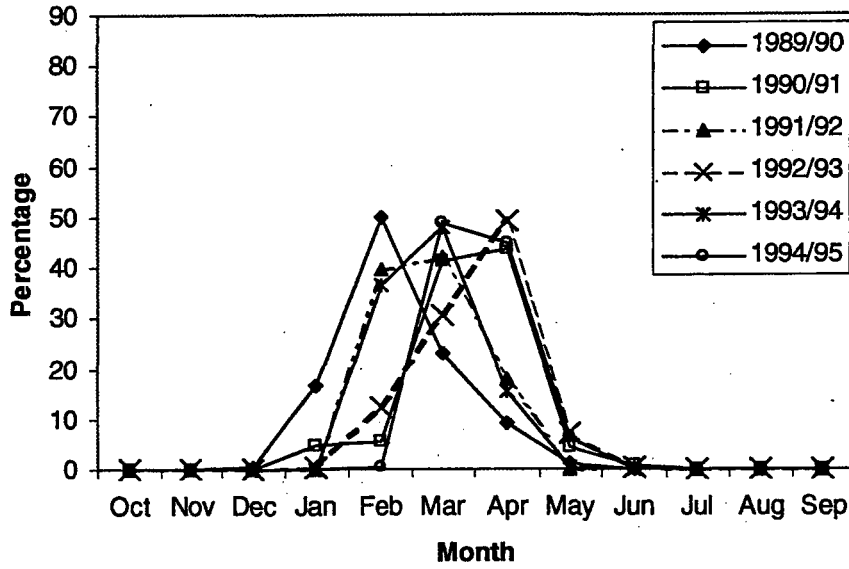


Figure 14: Percentage distribution of SQU 6T target trawl catch by month and fishing year, 1989-90 to 1994-95.

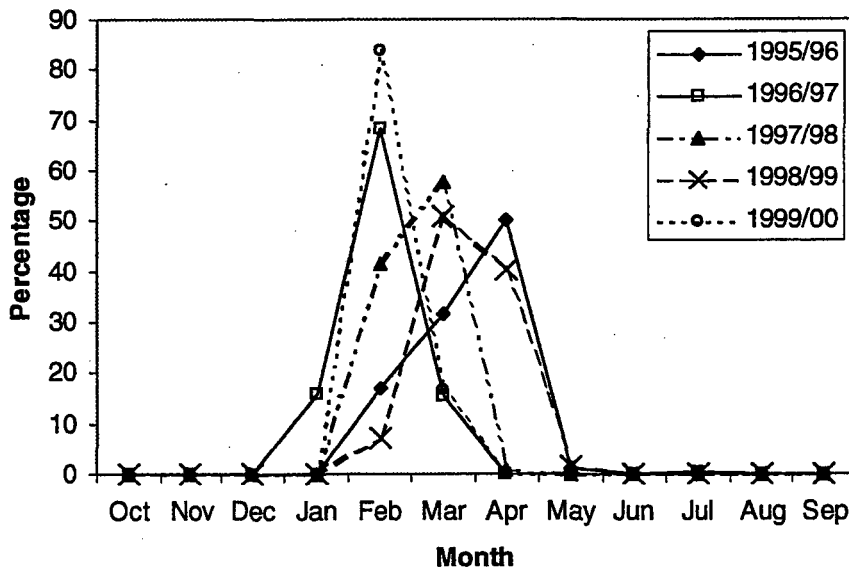


Figure 15: Percentage distribution of SQU 6T target trawl catch by month and fishing year, 1995-96 to 1999-2000.

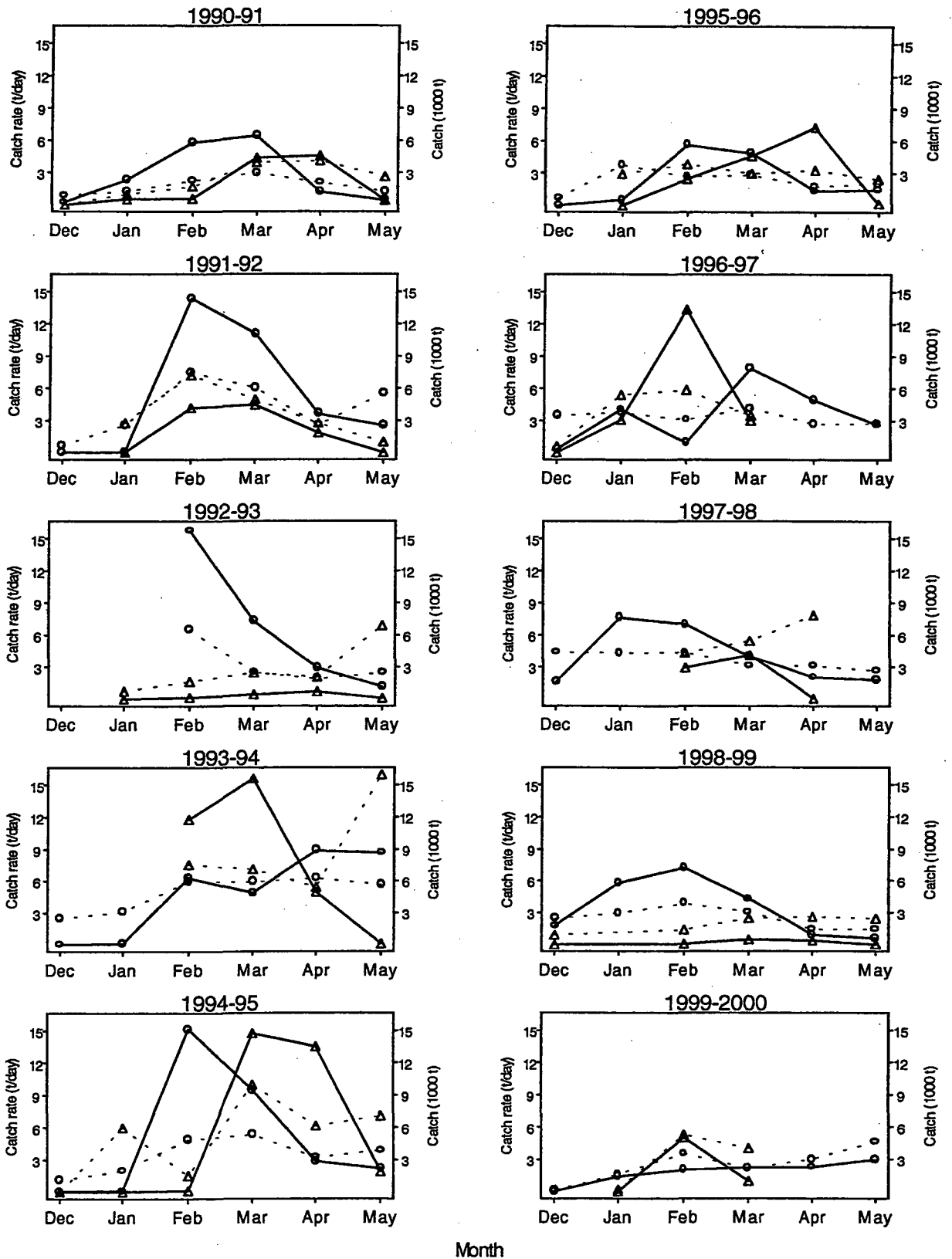


Figure 16: Monthly trends in SQU 1T and 6T catch (solid line) and average catch (tonnes per trawl) (dashed line) for the target trawl fishery in 1T (circles) and 6T (triangles) by fishing year, 1990-91 to 1999-2000.

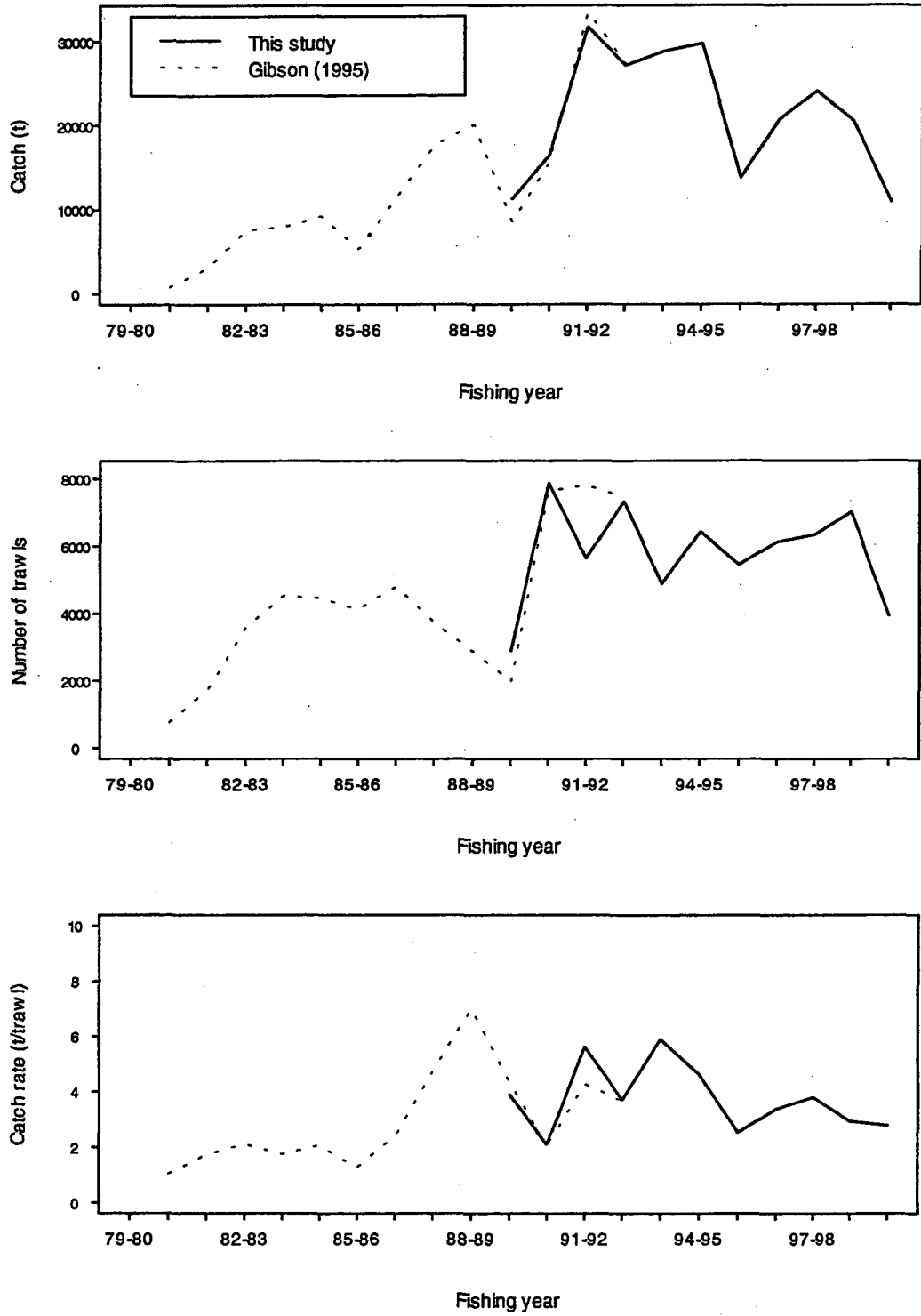


Figure 17: Summary of annual SQU 1T catch (top), total number of trawls (middle), and average catch rate (tonne/trawl) (bottom) for the SQU 1T target trawl fishery, 1980–81 to 1999–2000. Data for 1980–81 to 1992–93 are from Gibson (1995).

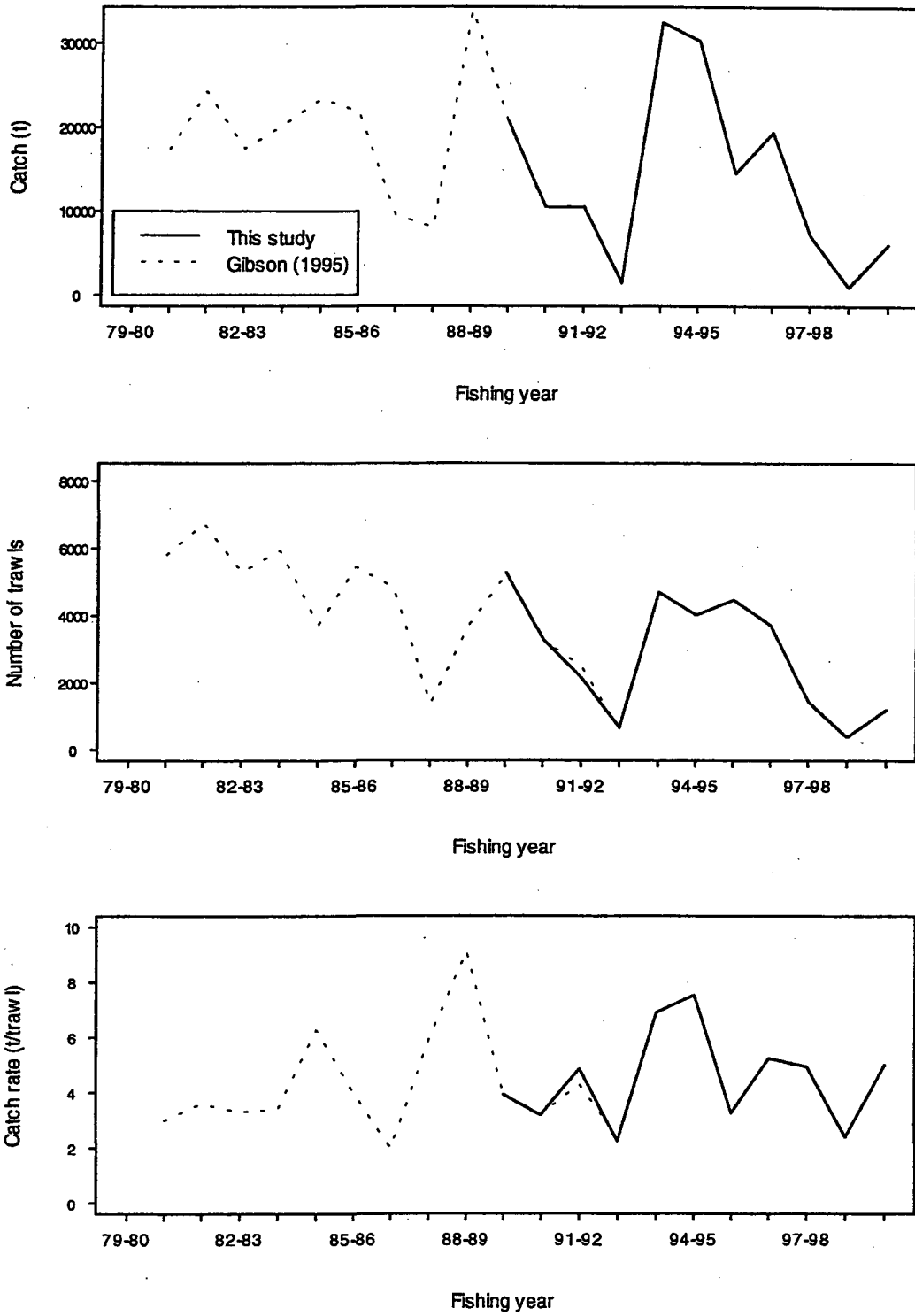


Figure 18: Summary of annual SQU 6T catch (top), total number of trawls (middle), and average catch rate (tonne/trawl) (bottom) for the SQU 6T target trawl fishery, 1980-81 to 1999-2000. Data for 1980-81 to 1992-93 are from Gibson (1995).

Appendix A: Map of the general statistical areas referred to in the text.

