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***New Zealand Fisheries Assessment Research Document 99/8***

**A summary of biology and commercial landings, and a stock assessment of trumpeter, *Latris lineata* (Bloch and Schneider 1801) (Latrididae), in New Zealand waters**

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**This series documents the scientific basis for stock assessments and fisheries management advice in New Zealand. It addresses the issues of the day in the current legislative context and in the time frames required. The documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.**

**A summary of biology and commercial landings, and a stock assessment of trumpeter, *Latris lineata* (Bloch and Schneider 1801) (Latrididae) in New Zealand waters**

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**N.Z. Fisheries Assessment Research Document 99/8. 20 p.**

**1. EXECUTIVE SUMMARY**

Published information on the trumpeter, *Latris lineata*, is limited to brief descriptions, locality listings, habitat preference, and (in Australia) aquaculture trials.

Trumpeter are widespread in cool Southern Hemisphere waters but apparently nowhere common. In New Zealand they mainly occur south of East Cape, and appear restricted to reefs from 20 m to at least 150 and probably 200 m.

Trumpeter have been caught commercially since last century, but are recorded in catch statistics only from 1936. Apart from a few years when landings exceeded 10 t, reported annual landings have been less than 10 t until the early 1980s, when they increased steadily to reach 120 t in 1995. Historical under-reporting is likely.

Trumpeter have a localised distribution pattern near mid- to outer-shelf reefs. When encountered by fishers they may be targeted, but most landings would be taken as bycatch in coastal line-fisheries. A varying but generally small proportion of the catch has been trawl-caught, and from the 1970s taken by setnet.

Most commercial landings are from east coast grounds between the eastern Bay of Plenty and Southland. The main areas have varied with time. Since 1990 a greater proportion of the catch has come from QMAs 3 and 4, probably the Mernoo Bank region, possibly the Chatham Islands.

There are seasonal peaks in landings, often in summer or autumn, but the pattern is irregular, and presumably related to fishing activity for other target species.

There is no information on customary or current Maori fisheries, although trumpeter would be a small component of the catch. Although trumpeter are not common in the recreational fishery (central and southern New Zealand) they are highly regarded when caught. Estimates of the recreational catch (26 and 38 t) may be low because of limited information; however, this catch would have been higher than the commercial catch until the late 1980s.

In QMAs 3–6 trumpeter is prohibited as a target species for commercial fishers. There are no quotas, but netting and other general fishing regulations apply. In QMA 5 there is a recreational bag limit of 15 fish.

Trumpeter reach a maximum size of at least 100 cm and 25 kg. Mean length and weight, and a length-weight relationship, are not available. There is no information on growth rate or longevity. Limited information suggests a winter/early spring spawning season. Feeding appears to be opportunistic on a variety of invertebrates and fish.

There are no suitable data for a CPUE analysis, or a biomass estimate.

It will be difficult to obtain a biomass estimate on such a large, mobile, reef-associated fish with a discontinuous distribution.

It is doubtful that existing data on landings are adequate for an MCY estimate. CAY cannot be determined. The long history of reported landings averaging less than 10 t, with only brief periods of greater than 20 t, cannot be used to justify the recent annual catches of about 120 t. Anecdotal information suggests that, in the past at least, newly discovered grounds yield good catches for only a short period.

Some modification of the standard QMAs is recommended for establishing Fishstocks.

## **2. INTRODUCTION**

### **2.1 Overview**

This document presents the currently available biological information on the trumpeter, *Latris lineata* (Bloch & Schneider 1801), and on its fisheries, and discusses the sustainable yield. Its species code in research and fisheries statistics databases is TRU.

### **2.2 Description of the Fishery**

Trumpeter occur around central and southern New Zealand. They have a discontinuous distribution, being restricted to rocky, usually mid-shelf reefs. They are known to Maori as kohikohi and in early times would have been line-caught, though probably only in small numbers. They have undoubtedly been taken by the commercial fishery since its inception, although records of landings exist only from 1936. There is currently a small seasonal bycatch in the coastal line and setnet fishery in a few central and southern New Zealand localities, but reported landings have increased steadily from only a few tonnes in the 1970s to over 100 t in the mid 1990s. They are also a popular component of recreational line-fishing in southeastern and southern New Zealand.

### **2.3 Literature Review**

Trumpeter were originally described as *Cichla lineata*, sometimes listed as *Latris hecateia* between 1872 and 1920, or as *Latridopsis lineata* by Whitley (1956, 1968) and Graham (1956). However, the name *Latris lineata* is used in most accounts. Related “trumpeters” (Family Latrididae) in New Zealand waters include the blue moki, *Latridopsis ciliaris*, copper moki, *L. forsteri*, and telescope fish, *Mendesoma lineatum*.

There are numerous mentions of trumpeter in the early literature on New Zealand fishes, but most are only listings or brief notes. The earliest accounts often give more information on the species in Australian (Tasmanian) waters. Griffin (1928) provided an illustrated description, and noted that trumpeter “do not appear to be so plentiful in our warmer northern waters” as in the south. Graham (1956) reviewed many of the brief early accounts, and described the trumpeter’s presence in the Otago region based on his observations from the Portobello Marine Biological Station in the early 1930s.

Flesh characteristics and chemical composition have been investigated by Johnson (1920, 1921) and Nichols *et al.* (1994).

Accounts of the suitability of trumpeter for aquaculture in Tasmania have been given by Ruwald *et al.* (1991), Ruwald (1992), and Ritar (1995).

### 3. REVIEW OF THE FISHERY

#### 3.1 The Commercial Fishery

##### 3.1.1 Catches and landings

Trumpeter have undoubtedly been taken commercially since the very earliest days of commercial fishing, although catch records exist only from 1936 (Figure 1(a), Table 1). Their presence in the Otago fish market in the late 1800s and early 1900s was recorded by Hector (1872), Sherrin (1886), and Graham (1956).

There is no published information on the characteristics of the fishery for trumpeter, but this species is almost certainly predominantly a bycatch in several coastal fisheries. The most probable of these would be the southern line fisheries for groper, ling, and blue cod, and (from the mid 1970s) mid-shelf setnet fisheries for tarakihi, moki, groper, and rig. More recently there may have been some targeting in the Mernoo Bank region.

In 1937 and 1938 a high proportion of the total annual New Zealand catch of 30–40 t was landed at Kaikoura. In the late 1940s 10–15 t was landed at Banks Peninsula. In most other years until the early 1980s the total reported landings have been less than 10 t. (The true value would have been higher, with many small catches of this prime species being unreported for a variety of reasons — private sale, retention for personal use, etc.). In the early 1980s total reported landings were 10–20 t, and then increased steadily to reach 120 t by the mid 1990s (Figure 1(a), Table 2).

Since 1936 most trumpeter have been taken by line (Figure 1(b)). There are some irregularities in the data on catch by method, which may result from errors or misinterpretations. In 1939 over half the catch was reported as taken by net, although this method did not become important until the setnet fishery developed in the late 1970s. In the mid to late 1940s much of the catch was reported as trawl-caught. From 1950, when the trawl catch was low again, the proportion of the catch taken by this method increased once more, and from 1967 again became relatively important, together with setnetting. However, the sudden changes in reported catch by method (*see* Figure 1(b)) are difficult to explain and the proportions may be unreliable. Unfortunately, more recent records are incomplete.

The geographical distribution of catches is shown in Figure 2, and landings at the main ports (to 1973) are listed in Table 3. Most of the pre-1990 catch was taken from coastal grounds along the east coast of both islands, from the eastern Bay of Plenty to the Southland coast. Highest catches during this time were centred on Hawke Bay, Cook Strait, and Foveaux Strait. Catches by QMA (Table 4) show a similar pattern for the period 1982–83 to 1988–89, when 86% of the catch can be identified to QMA. Over these 7 years 53% of this identified catch came from QMA 2, 24% from QMA 3, 13% from QMA 5, and the remaining 10% from QMAs 7, 1, and 4. From 1989–90 to 1995–96 only about 60% of the catch can be identified to QMA; of this, 35% came from QMA 3, 30% from QMA 4, and 19% from QMA 2. The greatest change occurred in QMA 3 and QMA 4 from 1991–92 onwards, where the increase suggests a greater catch off the

Canterbury coast and on the Chatham Rise, perhaps the Mernoo Bank region, possibly the Chatham Islands.

The probability that trumpeter has been under-reported is suggested by its irregular reporting at several of the ports where it is landed (*see* Table 3). Although annual landings are generally low, sequences of “no reported catch” may be the result of small catches being included in the category “mixed species” or “other finfish”. This certainly occurred from 1974 to 1982, as King (1985) listed New Zealand totals but no port landings. For most earlier years (values *in* Annual Reports on Fisheries) the annual port totals equal the New Zealand totals, and small landings could be missing from both.

The high landings at Kaikoura in 1937 and 1938, and at Banks Peninsula ports from 1944 to 1948, seem anomalous in view of the overall catch history at these ports. One possible explanation is that profitable grounds (perhaps the Mernoo Bank) were located and fished for a few years, either being worked out or the vessels moving on to other fisheries. Another explanation is the mis-recording of another species, possibly elephant fish (listed as silver trumpeter by Archey (1927)).

Although there are annual or biannual peaks in monthly landings, these are not consistent from year to year (Figure 3). Because trumpeter are mainly a bycatch in several fisheries, these peaks probably reflect seasonal changes in effort within these other fisheries. The CELR data can be subdivided by QMA (Figure 4), and although there is a tendency for the peaks in QMA 3 and QMA 4 (the two main regions after 1990) to occur in summer or autumn, these regional data represent only 60% of landings and could be misleading.

### **3.1.2 Effort**

Because trumpeter are taken almost exclusively as a bycatch there is no useful information on fishing effort.

### **3.1.3 Management**

No commercial quotas exist for trumpeter, but in the southern QMAs (3–6) it is listed as a “totally prohibited targeted species”, and can be taken only as a bycatch. However, no quotas apply. The setnet fishery is subject to general netting controls on mesh size, net length, and prohibited fishing areas.

There is a control on the recreational catch of trumpeter in QMA 5. The general controls on setnetting apply, and there is a daily bag limit of 15 trumpeter. There is no size limit.

## **3.2 Customary Maori Fisheries**

There is no available information.

## **3.3 Recreational Fishery**

Trumpeter readily take a bait, fight strongly, and are a popular though uncommon catch around southern New Zealand. They have been recorded in recreational fishing surveys (Table 5). Approximations derived by summing regional surveys give a total of 26 000 fish taken annually

by recreational fishers, while a single nationwide survey suggests 38 000 fish. Few reliable weight data are available, and no length-weight relationship exists. In 1996 a sample of 58 trumpeter measured at South Island boat ramps were 28 to 48 (mean 36) cm in length. From length-weight relationships for moki and trevally, the mean weight is about 1 kg. If this is used, the two survey estimates give a recreational catch of 26 and 38 t. These fish are smaller than the average size of 50 cm (c. 2.5 kg) usually mentioned, so the recreational catch weight would be proportionately higher. In either case it would be less than the commercial catch of recent years, but greater than the reported commercial catch until the late 1980s. .

## 4. RESEARCH

### 4.1 Distribution

*Latris lineata* occurs widely at several localities around the cool temperate Southern Hemisphere, including south Indian Ocean islands (Penrith 1967, Beurois 1975), southern Australia (Gomon *et al.* 1994), and South America (Furlani & Last 1993).

Trumpeter are present around central and southern New Zealand, from the Poor Knights Islands and Cape Egmont southwards (Francis 1996a, 1996b). They occur only occasionally from the Bay of Plenty north (Griffin 1928, Ayling & Cox 1982). They are more common in the south, and are present at the Snares Islands (Fenwick 1978) and adults (25–40 cm) were recorded on 20 m deep reefs at the Auckland Islands (Kingsford *et al.* 1989).

In Australia, as Tasmanian or stripey trumpeter, they are restricted to the cool southeastern coast, from southern New South Wales to eastern South Australia, and to Tasmania (Gomon *et al.* 1994). They are recorded there to a depth of 300 m, with juveniles in shallower coastal water (Kuitert 1993).

Graham (1938) noted that trumpeter were taken over or near rock bottom, never sand, generally in 50–135 fathoms [90–145 m], but sometimes as shallow as 23 fathoms [42 m]. Ayling & Cox (1982) summarised their distribution pattern as near rock reefs in the depth range 20–200 m.

### 4.2 Changes in Apparent Abundance

Thomson & Anderton (1921) stated that the species was not as common “in the [Otago] harbour as it used to be”; it previously occurred near rocks in the main harbour channels, but now mainly occurred in coastal waters, where “large fish” could still be taken in depths of 90–100 fathoms (165–180 m). Graham (1938) also noted that in 1932–33 trumpeter in the Otago region were “much less abundant than formerly; not seen in the harbour now,” and (1956) suggested that because trumpeter had a localised distribution pattern, being restricted to a small number of isolated reefs, this reduction was probably due to fishing. The same conclusion has been drawn elsewhere; Gomon *et al.* (1994) commented that “because of heavy inshore fishing it now occurs mainly in deep water” (at least 300 m) in southern Australia, and Furlani & Last (1993) recorded the trumpeter’s susceptibility to overfishing by both commercial and recreational fishers.

Shuntov *et al.* (1980) compared trends in commercial landings of several New Zealand fish species with climatic cycles in an ambitious attempt to demonstrate that there was a correlation. They noted that trumpeter was a coldwater species with two main peaks in landings, the mid

1940s and mid 1960s, when temperatures were cool. However, catch and climate trends after the early 1970s, the limit of their analysis, do not support their conclusions for trumpeter, although there is occasional agreement (Figure 5). After 1980, reported landings of trumpeter increased fairly steadily to a new high in the mid 1990s, despite temperature also generally rising between 1980 and 1990. The extended El Niño and lower temperatures of 1991 to 1994 do not appear to have influenced the continued rise in catches. Consequently, there is no overall correlation between mean annual temperature and landings (Figure 5(c)). It is difficult to see how such a direct relationship would exist, unless cold temperatures somehow brought the trumpeter population within easier range of fishers, which is unlikely given the preferred reef habitat of the species. Generally in fisheries the temperature/catch relationship is lagged, implying climatically-driven recruitment variation, but there is also no evidence for this in trumpeter.

#### **4.2 Stock Structure**

There is no information on whether biologically distinct stocks occur. The species is widespread in cool temperate Southern Hemisphere waters, suggesting some dispersal ability, but there is also anecdotal evidence for a quite localised distribution pattern, perhaps resulting from a strong association with a rocky reef habitat.

#### **4.3 Fish Size**

Graham (1938) recorded a maximum size of 42 inches TL (estimated at c. 100 cm FL from illustrations), and a maximum weight of 60 pounds [27 kg]. In Australia they attain 120 cm TL (Kuitert 1993) [c. 105+ cm FL] and 25 kg (Furlani & Last 1993).

#### **4.4 Length-weight relationships**

No information is available.

#### **4.5 Age and Growth**

No information is available.

#### **4.6 Reproduction**

Graham (1939b) recorded ripe roes in July, and a decline in fish condition “after spawning”, and implied that there was a movement “to deeper water” for spawning. Ruwald *et al.* (1991) noted natural spawning of hatchery broodstock fish during September in Tasmania, and Furlani & Last (1993) summarised the Australian spawning period as “late winter to early spring”.

#### **4.7 Sex Ratios**

No information is available.

#### **4.8 Feeding**

Graham (1939a) recorded trumpeter in the Otago region feeding on small fishes (pilchard, sprat, pipefish, seahorse), octopus, squid, and “whalefeed” crustaceans. Fenwick (1978) found

euphausiids, mainly *NICTYPHANES AUSTRALIS*, to be common in the stomachs of trumpeter at the Snares Islands.

#### 4.9 Movement and Behaviour

Ayling & Cox (1982) recorded that trumpeter often gather in loose schools, sometimes in association with blue moki and copper moki. They suggest a movement into "deeper water on the outer continental shelf" for winter spawning, probably repeating the comment by Graham (1956) that, based on fishermen's beliefs, "they migrate to deeper water in the winter and back to shallow water in the summer".

### 5. STOCK ASSESSMENT

This is the first attempt at a stock assessment for trumpeter.

#### 5.1 Biomass Estimates

No biomass estimates have been attempted. For a large, but mobile, reef-associated species it will probably not be possible to obtain any estimate.

#### 5.2 Estimation of Maximum Constant Yield (MCY)

It is not feasible to estimate a realistic MCY from present knowledge and data. The only potential procedure, Method 4 in Annala & Sullivan (1997), i.e.  $MCY = cY_{av}$ , could be applied to the pre-1982 catch history, but would yield a value of 8 t for  $Y_{av}$  alone.

#### 5.3 Estimation of Current Annual Yield (CAY)

No estimates of current biomass are available for any stock and it is not possible to estimate CAY.

#### 5.4 Factors Modifying Yield Estimates

There is a strong likelihood that the landings of trumpeter have been under-reported throughout the whole history of the fishery, or at least until the early 1980s. Although the species is included in published catch statistics, small individual catches may well have been incorporated within the "mixed-species" category. The MCY determined from  $cY_{av}$  (actual catch) would therefore have been greater than 8 t, but it would still be much less than the landings of c. 100 t reported in the mid 1990s.

Landings of c. 100 t have not been achieved (or at least reported) previously, and there have been periods of only a few years when reported landings exceeded 20 t. If the recent increase in reported trumpeter landings has been largely dependent on catches from newly exploited grounds, it is unlikely that landings in the order of 100 t will be sustainable.



## 6. MANAGEMENT IMPLICATIONS

There is no reason to doubt the anecdotal statements that trumpeter have localised distributions and are quickly fished out from newly discovered grounds, which are usually relatively small reefs on the continental shelf. For such species, it is accepted practice to recommend regional, rather than total New Zealand, yields. Although there is no evidence for regional stocks, such a subdivision of yield helps minimise the risk of local overfishing.

However, regional yields will convert into very small units of quota for trumpeter, which may prove difficult to manage.

With catches being taken along the whole east coast from East Cape to Southland, and extending into Cook Strait and Foveaux Strait (*see* Figure 2), it is not easy to recommend practical boundaries for Fishstocks. There is no natural break in catches between East Cape and Banks Peninsula. Because it would be desirable to retain the Cook Strait (including Kaikoura) area as one unit, consideration should be given to establishing the region: East Cape + Cook Strait (to D'Urville Island) + Banks Peninsula as the main Fishstock. A southern Fishstock could extend from Banks Peninsula to Awarua Point. The western part of QMA 7 (to D'Urville Island) would be an appropriate Fishstock, and the north and west of the North Island (D'Urville Island to North Cape to East Cape, essentially QMAs 8 + 9 + 1) would be a large Fishstock in which only small catches are made.

## 7. ACKNOWLEDGMENTS

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Table 1: Reported landings (t) of trumpeter, 1936 to 1974. New Zealand total, and port landings grouped into QMAs. Source: Annual Reports on Fisheries (1936–74). Values for 1936 to 1944 are for April-March years, listed as the April year. “Other” is the nominal difference between the port subtotals and the New Zealand total, and represents incomplete recording of the former; most values are converted from cwt and rounded, and differences of less than 5 t are shown as –. QMA landings less than 50 kg (including zero) are listed as 0

Year	QMA 1	QMA 2	QMA 3	QMA 5	QMA 7	“Other”	New Zealand Total	Year
1936	0	0	4.8	0	0	15.3	20.1	1936
1937	0	3.5	29.3	0.3	0	8.4	41.4	1937
1938	0	1.6	21.8	0.4	0.1	6.5	30.3	1938
1939	0	0.9	4.8	0.2	0	30.6	36.5	1939
1940	0	3.0	7.9	0.4	0.1	5.6	17.0	1940
1941	0	1.2	3.5	0.9	0	–	10.8	1941
1942	0	0.3	4.4	0.1	0.1	–	4.8	1942
1943	0	0.5	3.9	0	1.3	–	4.5	1943
1944	0.1	0.2	10.4	0	0	–	10.6	1944
1945	0	0.1	10.4	0	0.1	–	10.6	1945
1946	0	0.3	15.3	0.2	0.1	–	15.7	1946
1947	0	0.2	12.3	0.1	0.1	–	12.6	1947
1948	0	0.3	19.0	0.1	0	–	19.4	1948
1949	0	0.3	0.9	5.0	0.1	–	6.2	1949
1950	0	0.8	3.1	2.0	0.1	–	5.9	1950
1951	0	0.3	7.8	2.2	0.7	–	10.7	1951
1952	0	0	5.0	0.6	7.0	–	10.8	1952
1953	0	0.3	3.2	1.3	1.2	–	4.8	1953
1954	0.1	0.2	2.5	1.4	1.0	–	4.8	1954
1955	0	0.9	3.1	1.9	0.7	–	5.9	1955
1956	0	0.5	1.6	2.3	0.4	–	4.6	1956
1957	0	1.0	1.7	1.4	0.2	–	4.7	1957
1958	0	0.7	0.8	1.2	0.8	–	3.4	1958
1959	0.1	0.7	1.2	0.7	0.3	–	2.8	1959
1960	0.3	1.1	1.6	0.1	0.2	–	3.3	1960
1961	0.1	1.0	1.6	0.1	0.5	–	2.8	1961
1962	0	2.8	1.0	0.3	0.1	–	4.2	1962
1963	0	1.6	0.7	0.3	0.2	–	2.6	1963
1964	0.1	1.8	1.5	0.2	0.1	–	3.6	1964
1965	0.1	2.4	1.0	0	0.2	–	3.6	1965
1966	0.2	2.8	1.5	0	0.5	–	4.9	1966
1967	0.1	1.2	1.6	0	6.6	–	9.4	1967
1968	0.1	2.4	1.1	0	2.8	–	6.7	1968
1969	0.1	2.8	1.0	0	0.3	–	4.5	1969
1970	0.2	5.6	0.7	0.1	0.3	–	6.7	1970
1971	0.1	8.3	0.6	0	0.8	–	9.8	1971
1972	0.6	2.7	0.3	0.1	0.5	–	4.1	1972
1973	0.3	3.0	1.2	0.3	0.5	–	5.0	1973
1974	0	3.0	1.0	1.0	1.0	–	5.0	1974

Table 2: Reported landings (t) of trumpeter (species code TRU) by fishing year, from various sources. FSU, Fisheries Statistics Unit; CELR, catch, effort and landing return; TCEPR, trawl, catch, effort and processing return; CLR, catch landing return; LFRR, licensed fish receiver return. Fishing years are from 1 October to 30 September. This table follows the standard format for documentation of proposed new QMS species. A dash (–) indicates no relevant data, an asterisk (\*) data not obtained. The “best estimate” was taken as the FSU total from 1982–83 to 1986–87, and the LFRR total from 1987–88 onwards

Year	FSU Inshore	FSU Deep- water	FSU Total	CELR Estimated	CELR Landed	TCEPR Estimated	TCEPR Processed	CLR	LFRR	Best Estimate
1982–83	11	–	11	–	–	–	–	–	–	11
1983–84	24	–	24	–	–	–	–	–	–	24
1984–85	24	–	24	–	–	–	–	–	–	24
1985–86	14	–	14	–	–	–	–	–	–	14
1986–87	20	–	20	–	–	–	–	–	27	20
1987–88	14	–	14	–	–	–	–	–	33	33
1988–89	12	–	12	2	1	–	–	–	55	55
1989–90	–	–	–	17	17	–	–	–	35	35
1990–91	–	–	–	26	29	–	–	–	48	48
1991–92	–	–	–	62	49	–	–	–	68	68
1992–93	–	–	–	40	35	–	–	–	57	57
1993–94	–	–	–	58	58	–	–	–	82	82
1994–95	–	–	–	103	101	–	–	–	119	119
1995–96	–	–	–	116	137	–	–	–	120	120
1996–97	–	–	–	*	*	–	–	–	135	135
1997–98	–	–	–	*	*	–	–	–	75	75

Table 3: Reported landings (t) of trumpeter by port, 1936 to 1974. Source: Annual Reports on Fisheries (1936–74). Values for 1936 to 1944 are for April-March years, listed here as the April year. Values converted from original values in hundredweight. The values for 1974 are reported only in whole tonnes; assumed values between zero and 1 t are shown as -. Trumpeter catch values for 1975 to 1984 (King 1985, 1986, King *et al.* 1987) are not listed by port

	Ports											
	Tau	Gis	Nap	Wtn	Sds	Nls	Kai	BPn	SCa	Dun	Sth	Wst
1936	0	0	0	0	0	0	0	4.78	0	0	0	0
1937	0	0.10	0	3.35	0	0	28.91	0.41	0	0	0.25	0
1938	0	0	0.66	0.91	0	0	21.44	0.36	0.05	0	0.36	0
1939	0	0	0	0.86	0	0	4.72	0	0	0.10	0.20	0
1940	0	0	0	3.00	0	0	7.77	0	0.05	0.10	0.41	0
1941	0	0	0	1.22	0	0	3.45	0.05	0	0	0.86	0
1942	0	0	0	0.25	0	0	3.66	0.46	0.05	0.20	0.05	0
1943	0	0	0	0.51	0	0	0.25	2.03	1.32	0.25	0	0
1944	0.05	0	0	0.15	0	0	0.91	8.69	0	0.76	0	0
1945	0	0	0	0.10	0	0	0.51	9.65	0.10	0.15	0	0
1946	0	0	0	0.25	0	0	1.57	13.67	0.05	0.05	0.15	0
1947	0	0.05	0	0.15	0	0	0.66	11.53	0.05	0.10	0.05	0
1948	0	0.05	0	0.25	0	0	0.41	18.54	0	0.05	0.05	0
1949	0	0	0	0.30	0	0	0.15	0.61	0.05	0.10	4.98	0
1950	0	0	0	0.81	0	0	0.05	2.74	0.10	0.15	2.03	0
1951	0	0	0	0.25	0.46	0	0.05	7.26	0.25	0.20	2.18	0
1952	0	0	0	0	5.28	0	0.46	2.54	1.68	0.36	0.62	0
1953	0	0	0	0.25	0.10	0	0.97	0.20	1.07	0.91	1.32	0
1954	0.05	0	0	0.20	0.56	0	0.61	0.66	0.46	0.76	1.42	0
1955	0	0	0	0.91	0.05	0	0.30	0.91	0.61	1.22	1.93	0
1956	0	0	0	0.51	0.15	0	0.20	1.02	0.20	0.15	2.29	0.10
1957	0	0	0.05	0.91	0.10	0	0.41	1.12	0.05	0.10	1.37	0.56
1958	0	0	0.05	0.66	0.71	0	0.05	0.41	0.10	0.25	1.17	0
1959	0.05	0	0.05	0.61	0.10	0	0.20	0.86	0.15	0	0.71	0
1960	0.30	0	0.41	0.71	0.15	0	0.66	0.81	0.05	0.05	0.10	0
1961	0.05	0.10	0.41	0.51	0	0	0.10	0.87	0.46	0.20	0.10	0
1962	0	0	2.24	0.61	0	0	0.15	0.46	0.10	0.30	0.30	0
1963	0	0.05	0.91	0.66	0	0	0.20	0.20	0.15	0.10	0.30	0
1964	0.05	0.10	0.97	0.76	0	0	0.76	0.51	0.10	0.10	0.15	0
1965	0.05	0.81	1.17	0.46	0.10	0	0.61	0.30	0.05	0.05	0	0
1966	0.15	0.51	1.83	0.46	0.46	0	0.91	0.30	0.05	0.20	0	0.05
1967	0.10	0.15	0.56	0.46	0.05	6.50	1.47	0.15	0	0	0	0
1968	0.05	0	1.22	1.17	0	2.84	1.02	0.05	0	0	0	0.36
1969	0.10	0.15	0.97	1.68	0.25	0	0.41	0.51	0.05	0	0	0
1970	0.16	0.46	1.52	3.61	0.15	0.10	0.46	0.20	0	0	0.05	0
1971	0.10	0.25	3.51	4.52	0.20	0.56	0.31	0.25	0.05	0	0	0
1972	0.61	0.36	0.61	1.73	0.41	0.05	0	0.10	0.05	0.10	0.05	0
1973	0.25	0.25	1.52	1.17	0.15	0.30	0.51	0.25	0	0.41	0.30	0
1974	-	1	1	1	-	-	-	-	1	1	-	-

Ports:

Tau, Tauranga; Gis, Gisborne; Nap, Napier; Wtn, Wellington; Sds, Marlborough Sounds; Nls, Nelson; Kai, Kaikoura; BPn, Banks Peninsula (Lyttelton, Akaroa); SCa, South Canterbury (Timaru, Oamaru, Moeraki); Dun, Dunedin (Karitane, Port Chalmers); Sth, Southland (Nuggets, Bluff, Riverton); Wst, Westland (Greymouth, Westport).

Table 4: Reported landings (t) of trumpeter, 1975 to 1995–96. New Zealand total, and statistical fishing areas grouped into the standard finfish QMAs. Source: King 1985 (1975–82), King 1986 (1983), King *et al.* 1987 (1984), FSU data (1982–83 to 1988–89), QMS: CELR<sub>estimated</sub> data 1989–90 to 1995–96; LFRR data 1996–97 and 1997–98. Values for 1975 to 1982 are for calendar years, from 1982–83 for October–September fishing years. –, no data

Year	QMA Unknown	QMA 1	QMA 2	QMA 3	QMA 4		Year
1975	–	–	–	–	–		1975
1976	–	–	–	–	–		1976
1977	–	–	–	–	–		1977
1978	–	–	–	–	–		1978
1979	–	–	–	–	–		1979
1980	–	–	–	–	–		1980
1981	–	–	–	–	–		1981
1982	–	–	–	–	–		1982
1982–83	1.3	0.5	5.3	3.0	0.1		1982–83
1983–84	1.5	1.0	17.0	2.4	0.6		1983–84
1984–85	1.8	0	14.5	3.1	0		1984–85
1985–86	1.3	0.2	3.8	6.4	0		1985–86
1986–87	3.4	0.2	3.9	5.2	0		1986–87
1987–88	4.3	0.5	4.0	3.9	0		1987–88
1988–89	2.3	0.2	6.6	1.0	0.2		1988–89
1989–90	0.6	0.3	8.0	4.9	0.4		1989–90
1990–91	1.2	1.8	7.7	9.4	1.6		1990–91
1991–92	31.5	0.4	7.1	17.6	2.7		1991–92
1992–93	6.3	1.8	11.6	12.5	3.6		1992–93
1993–94	6.5	2.0	6.5	21.0	17.6		1993–94
1994–95	32.3	1.7	9.1	24.2	29.4		1994–95
1995–96	19.8	6.1	11.1	24.1	41.6		1995–96
1996–97	0.3	1.7	16.0	35.5	32.6		1996–97
1997–98	1.3	1.4	10.7	28.4	23.4		1997–98

Year	QMA 5	QMA 7	QMA 8	QMA 9	“Other”	New Zealand Total	Year
1975	–	–	–	–	–	4	1975
1976	–	–	–	–	–	3	1976
1977	–	–	–	–	–	3	1977
1978	–	–	–	–	–	6	1978
1979	–	–	–	–	–	17	1979
1980	–	–	–	–	–	10	1980
1981	–	–	–	–	–	12	1981
1982	–	–	–	–	–	37	1982
1982–83	0.5	0.1	0	0	0	11	1982–83
1983–84	1.4	0.1	0	0	1	24	1983–84
1984–85	4.3	0.4	0.1	0	0	24	1984–85
1985–86	1.1	0.5	0.4	0	0	14	1985–86
1986–87	5.2	2.4	0	0	0	20	1986–87
1987–88	0.4	0.8	0	0.4	0	33	1987–88
1988–89	0.7	1.0	0	0	0	55	1988–89
1989–90	0.7	0.9	1.2	0	17	35	1989–90
1990–91	0.6	3.8	0.2	0	22	48	1990–91
1991–92	0.1	2.3	0	0.1	6	68	1991–92
1992–93	1.2	1.1	1.8	0	17	57	1992–93
1993–94	1.6	2.8	0.2	0	24	82	1993–94
1994–95	4.1	1.7	0.4	0	16	119	1994–95
1995–96	11.1	1.9	0.3	0.2	4	120	1995–96
1996–97	43.0	3.0	0.4	0	2	135	1996–97
1997–98	6.7	2.5	0.3	0	1	75	1997–98

Table 5(a): Estimated number of trumpeter taken by recreational fishers by QMA and survey, and the corresponding QMA (potential Fishstock) harvest. The latter is given only as fish numbers; mean fish weights are not yet available from which to calculate a tonnage. Surveys were carried out in different years in the Ministry of Fisheries regions: South in 1991–92, Central in 1992–93, and North in 1993–94. The estimated harvest by QMA is indicative only, and was made by combining estimates from the different years

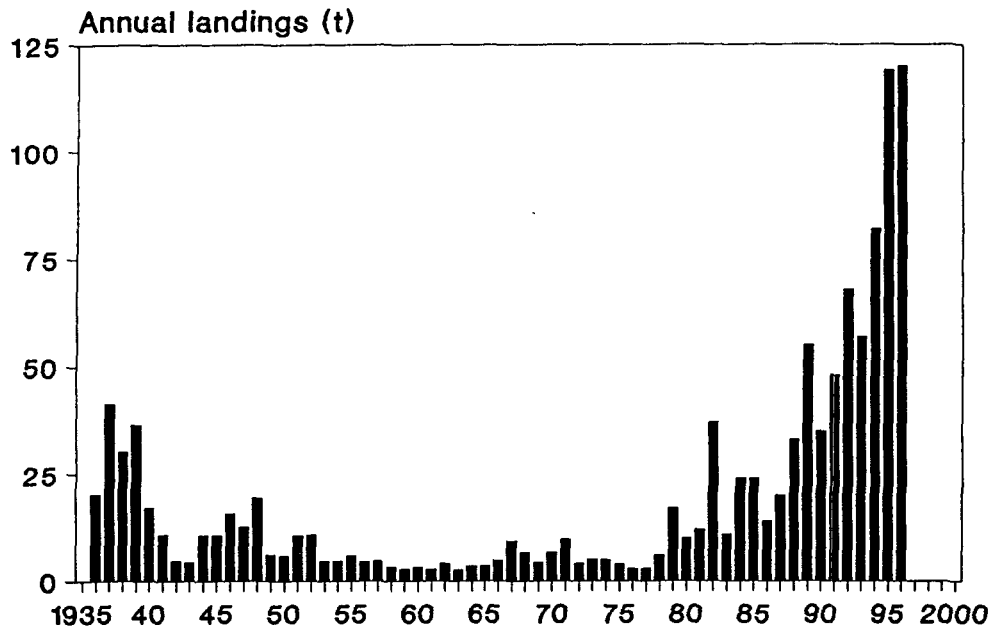
QMA	Survey	Number caught	QMA harvest
QMA 1 + 9	North	0	0
QMA 2	North	1 000	
QMA 2	Central	1 000	2 000
QMA 8	North	0	
QMA 8	Central	0	0
QMA 7	Central	0	
QMA 7	South	8 000	8 000
QMA 3	Central	3 000	
QMA 3	South	6 000	9 000
QMA 5	Central	1 000	
QMA 5	South	6 000	7000
Total		26 000	26 000

Table 5(b): Estimated number of trumpeter taken by recreational fishers by QMA, provisional values from a Ministry of Fisheries telephone survey and diary scheme in 1996 (Source: Bradford 1998)

QMA	Number caught	<i>c.v.</i>
1	< 500	
2	1 000	
7	3 000	
3	13 000	19
5	21 000	19
Total	38 000	



### (a) Trumpeter landings



### (b) Trumpeter landings by method

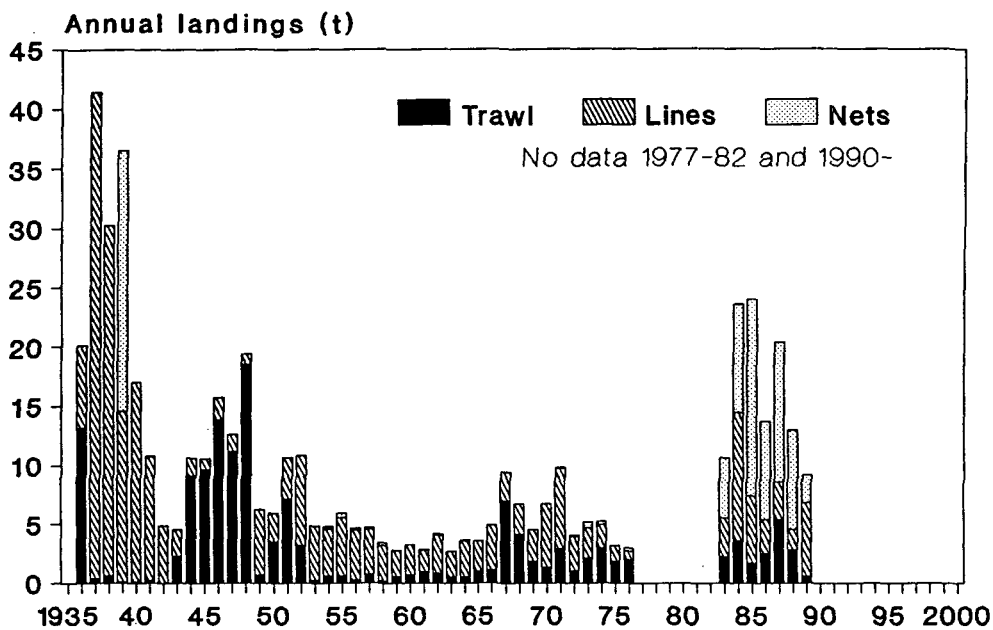


Figure 1: (a) Reported total landings of trumpeter for New Zealand, 1936 to 1995–96. Values for 1936–73 from Annual Reports on Fisheries (Marine Department, later Ministry of Agriculture and Fisheries), for 1974–82 from King (1985), for 1983 from King (1986), for 1984 from King *et al.* (1987), for 1985 to 1995–96 (shown as 1996) from unpublished FSU or QMS data (see Table 2). Values for 1936 to 1944 are for April–March years, listed as the April year. Values for 1945 to 1984 are for calendar years. Values from 1985 onwards are for October to September years, listed against the September year. (b) Reported landings of trumpeter by fishing method, 1936 to 1989, some years missing. Data to 1976 from Annual Reports on Fisheries, from 1983 to 1989 from unpublished FSU data.

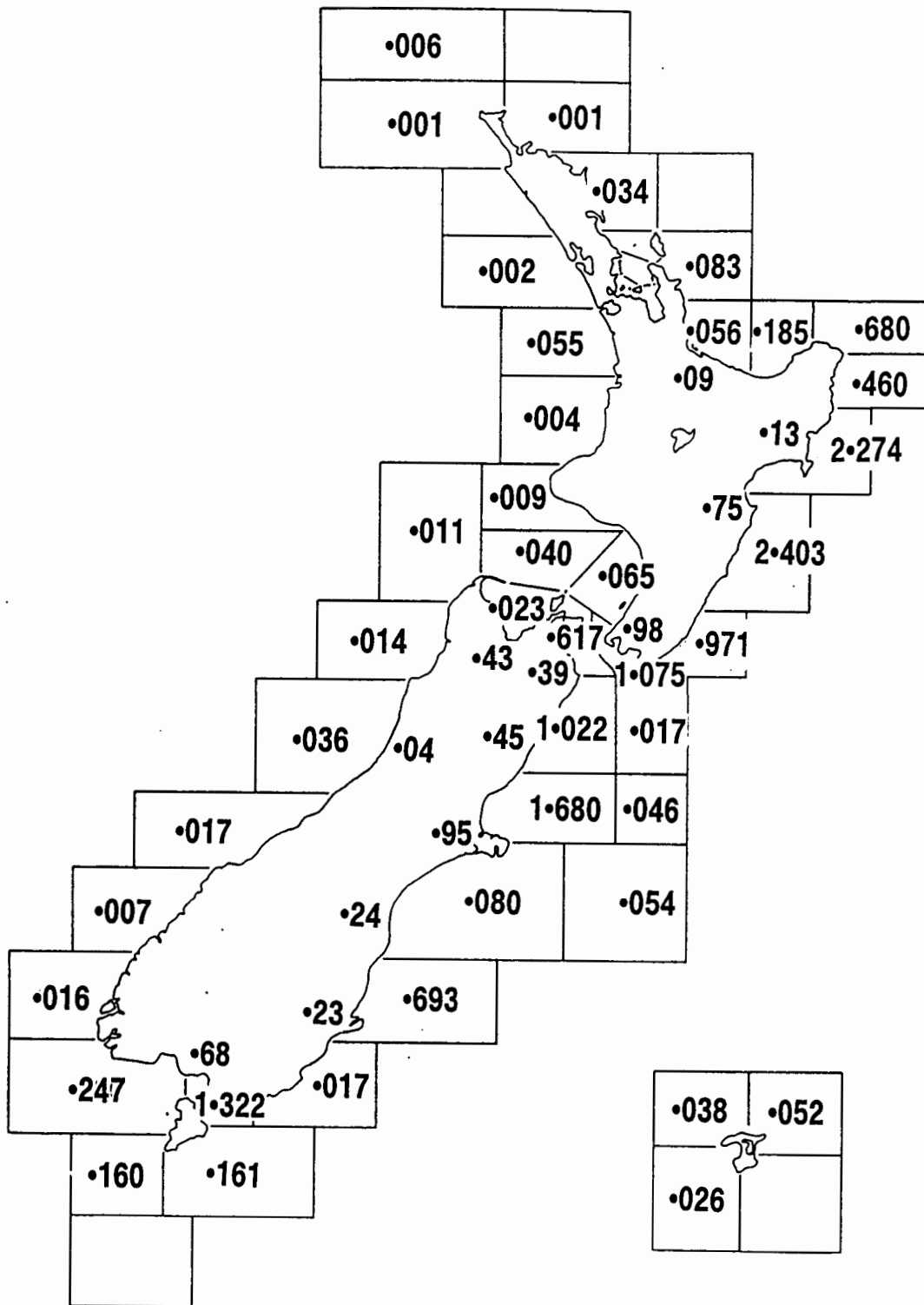


Figure 2: Geographical distribution of trumpeter catches around New Zealand. Catch by fishing return statistical area: mean annual catch for the fishing years 1982–83 to 1988–89. Catch at ports (shown inside coastline, for list *see* Table 3): mean annual catch (t) for the years 1950 to 1973.

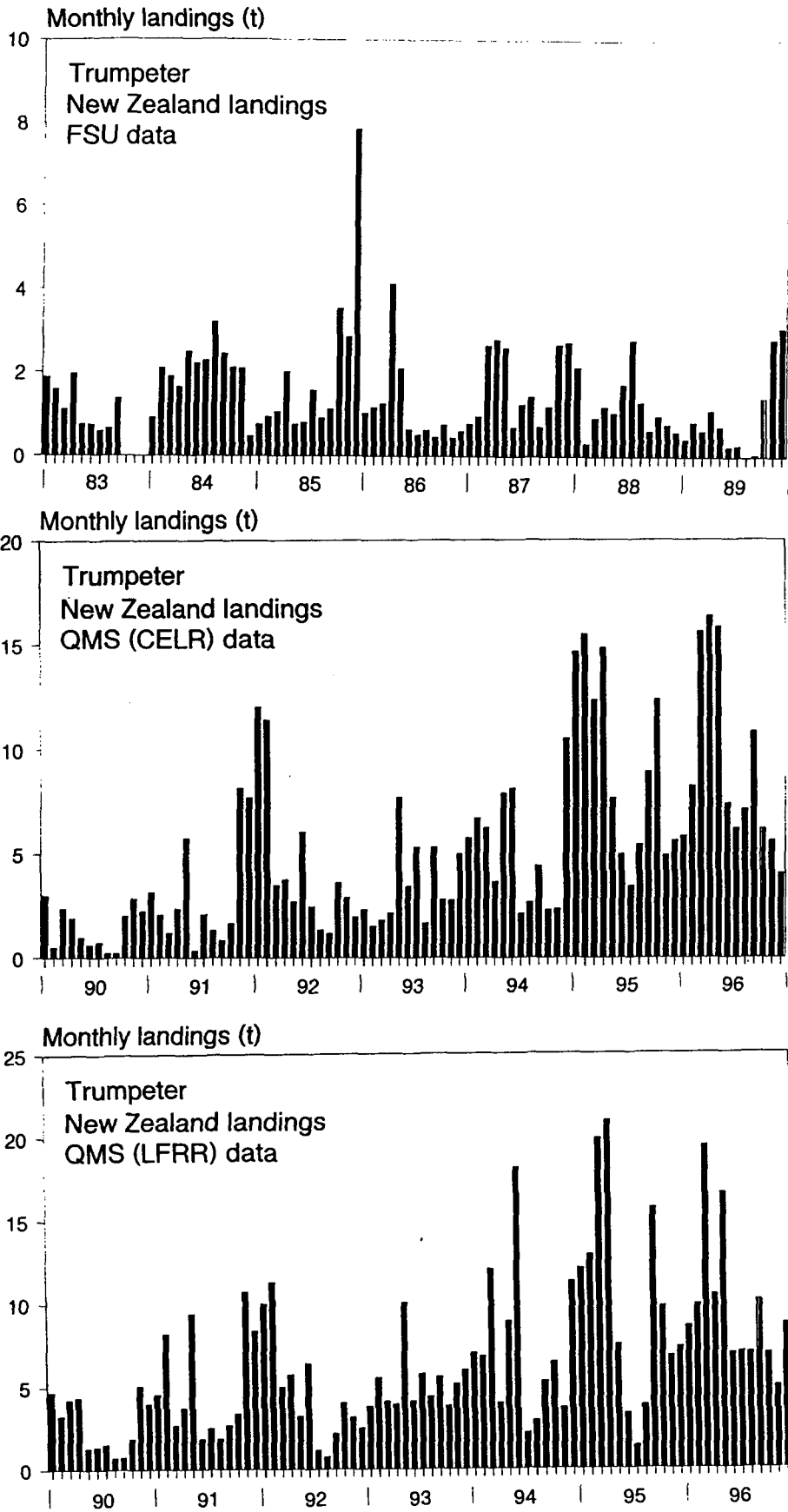


Figure 3: Reported monthly landings (t) of trumpeter for New Zealand, 1983 to 1996. (Top) FSU data, 1983 to 1989. (Centre) QMS CELR estimated data, from coastal vessels, 1990 to 1996. (Bottom) QMS LFRR data, from licensed fish receivers (wholesalers), 1990 to 1996.

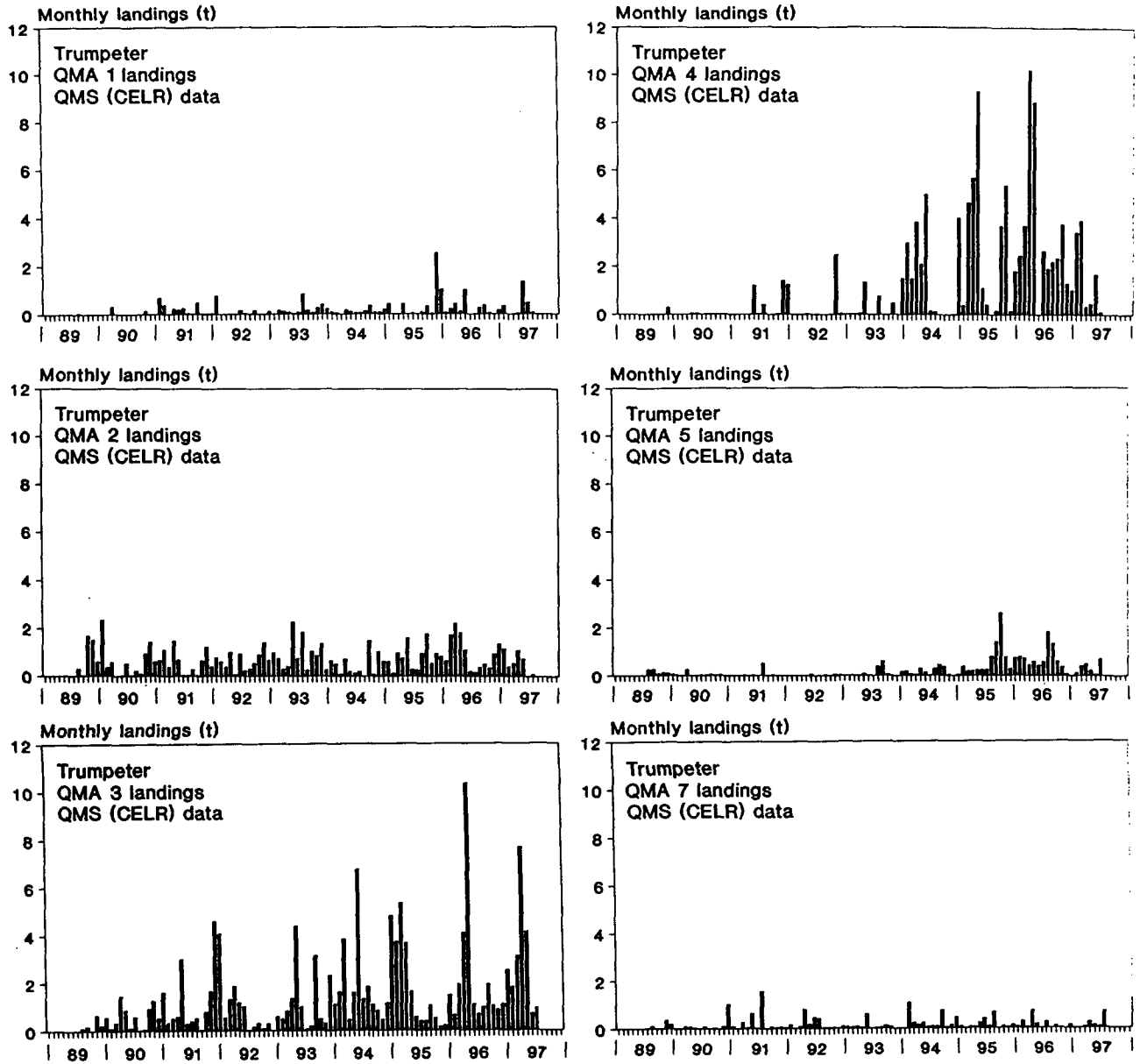
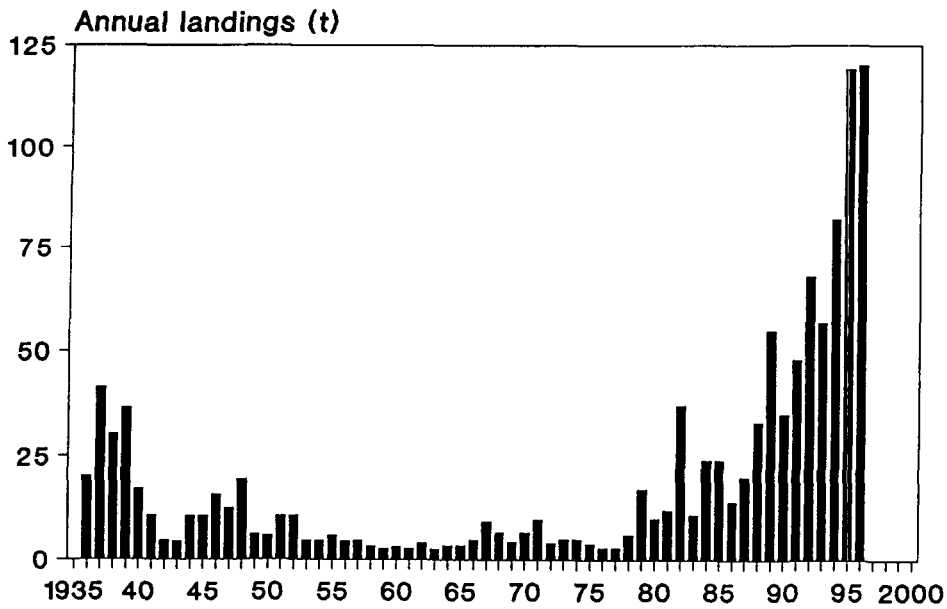
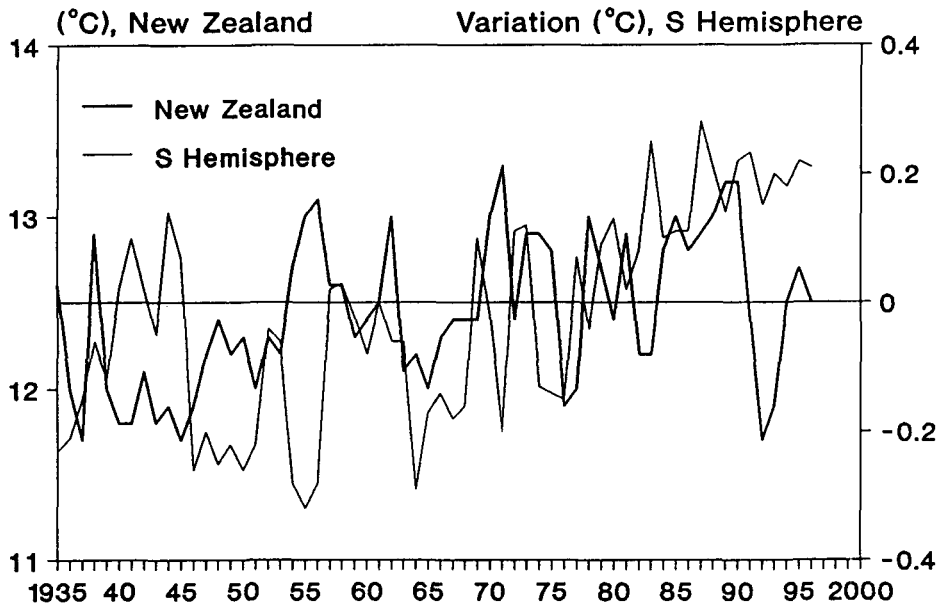


Figure 4: Reported total monthly landings (t) of trumpeter by standard finfish QMA, 1989 to 1996. QMS (CELR) data, from coastal vessels.

(a) Trumpeter landings



(b) Air temperature



(c) Landings/temperature relationship

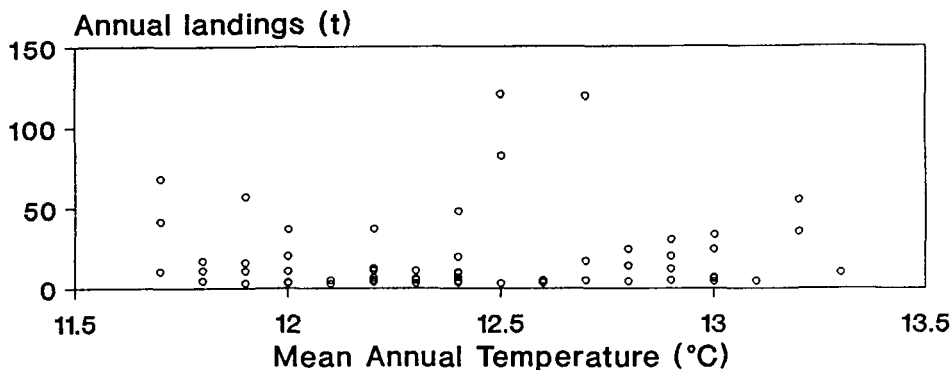


Figure 5: Comparison of trumpeter landings with climate. (a) Reported total landings of trumpeter for New Zealand, 1936 to 1995–96, from Figure 1. (b) Air temperatures (°C) 1935 to 1996, for New Zealand (from Salinger 1980 and NIWA unpublished data), and the Southern Hemisphere (Jones 1997). (c) Relationship between annual New Zealand landings of trumpeter and mean annual New Zealand temperature.