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New Zealand Fisheries Assessment Research Document 88/10

Blue moki

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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.

BLUE MOKI
(*Latridopsis ciliaris*)

I. Introduction

A. Overview

Blue moki supports a seasonal set net fishery. The biology of the main stock is reasonably understood. CPUE analysis has been used to estimate relative abundance, and these data indicate that the population may have stabilised at current fishing levels.

B. Description of the fishery

The blue moki fishery is based primarily on a single stock on the east coast of New Zealand. The fish make an annual spawning migration, swimming north from Kaikoura in May-June, reaching Gisborne to spawn in August-September, then swimming south to reach Kaikoura again in October (Francis, 1981). Moki are fished at various times along their migratory path by vessels from Gisborne, Napier and Wellington, and since 1970, from Kaikoura and Castlepoint. Moki were caught almost exclusively by trawl until the early 1970's when the set net fishery developed. Trawling accounted for only about 10% of the catch in 1986.

Moki is currently managed in 5 Quota Management Areas (QMA), with TACs as follows:

FMA	QMA No.	1987/88 TAC (t)
Auckland + Central + Challenger	1,2,7,8	130
South-East - South-East Coast	3	60
- Chatham Rise	4	20
Southland + Sub-Antarctic	5,6	40
Kermadec	10	10

Fish north of Banks Peninsula in QMA 3 are part of the east coast stock (QMAs 1, 2, 7, 8); those south of the peninsula may be a different stock. The TAC for the east coast stock was set at 20% of 1983 catches. That for the Kermadec FMA was an administratively set value. All other TACs were set at 1983 catch levels. Unreported landings of moki for rock lobster bait are ignored for the purposes of setting TACs.

C. Literature review

Biological information on blue moki is given by Francis (1979, 1981).

II. Review of the Fishery

A. Catch, landings, and effort data

Blue moki landings built up steadily from <100 t in 1945 to about 1000 t in 1970 and have fluctuated markedly since (Fig. 1). Anecdotal evidence indicates that much of the Gisborne and Napier trawl catch over the late 1960's and early 1970's was dumped because of marketing difficulties. Trawl landings declined rapidly after 1970 related to an apparent decline in stock size and a shift of effort to more profitable species and have remained consistently low (approx. 10% of total landings) in all areas since 1981. Some moki (<1%) are taken by lines and pots.

Catches of moki have never been recorded by foreign licensed or New Zealand chartered vessels.

Landings of moki by statistical area for 1984-86 (Fig. 2) show that the fishery is concentrated between the Bay of Plenty and Banks Peninsula. Landings by port are given for Napier, Gisborne, Kaikoura, Wellington and Castlepoint (Fig. 3).

An analysis of catch by month in areas 009-018 shows that the fishery is seasonal and linked to the spawning migration (Fig. 4). Landing peaks are similar to those apparent in 1974-78 (Fig. 5), except that catches of post-spawning fish at Kaikoura (October) appear to have declined relative to catches of pre-spawning moki.

Set net fisheries developed in areas 012-018 in the mid 1970's at a time when the stock size had already been severely depleted by trawling (Francis, 1985). For set net vessels fishing areas 012-015, CPUE data were calculated for the 1986 calendar year using the following procedures used in previous years.

1. Areas 012-014

Landings were included only if moki constituted more than about 20% of the vessel's catch. This eliminated many set netters not targeting for blue moki. The period June-October was chosen as the moki season. A CPUE index was calculated individually for each vessel, each month. A monthly mean for all vessels was calculated, and the mean of the five monthly means was used as the final CPUE index. CPUE for 1986 decreased slightly from the previous year, but was still greater than in the years 1982-84 (Fig. 6). CPUE in this fishery appears to have remained relatively constant.

2. Area 015

All vessels using more than 200 m of net were included regardless of their catch mix. The period May-October was chosen as the moki season. The CPUE index was calculated as above. CPUE has been relatively constant in this fishery since its initial development (Fig. 6).

B. Other information

Moki are abundant around Stewart Island and the Chatham Islands. Much is caught, but not reported, for use as rock lobster bait. Baxter (1988) gave estimates of quantities of blue moki used as bait.

No recent data on the size and age composition of the catch is available. Limited information on commercial catches at Gisborne and Kaikoura in 1977-79 is available in Francis (1979).

C. Recreational, traditional, and Maori fisheries

Non-commercial landings of blue moki are significant, but have not been assessed in detail. Blue moki are taken by recreational set netters, spear fishermen, and line fishermen (including surfcasters). Although not taken in the same quantities as some other "southern" species (e.g. blue cod, tarakihi) moki are still an important component of the recreational catch in the Central, South-East, and Southland FMAs. It was the ninth most commonly caught finfish species reported in the national recreational fishing survey. Blue moki also support a traditional Maori set net fishery in some areas, particularly the eastern Bay of Plenty and East Cape regions. There was a popular winter fishery for moki last century for tribes around Wellington and in the eastern Bay of Plenty (Francis, 1981).

III. Research

A. Stock Structure

Francis (1981) concluded that there is a single migratory stock of adult moki between East Cape and Banks Peninsula. Fish from this stock are probably also found in the Bay of Plenty and the South Taranaki Bight. This east coast stock makes annual spawning migrations from Kaikoura (autumn) to Gisborne (winter) and back to Kaikoura (spring). The location of this stock during summer is not known. Evidence for the existence of this stock was obtained by examining seasonal abundance patterns, reproductive state and fish condition over time, and tag return data (Francis, 1981).

B. Other studies

Moki grow rapidly initially and reach a length of 40 cm at 5-6 years, but growth slows substantially thereafter (Francis, 1985). Fish with a length of 60 cm range from 10 to 20 years old, and moki may grow to at least 80 cm and 33 years of age (Francis, 1979). The natural mortality rate is not known, but is probably low in view of the longevity of the species.

Age at maturity is about 5-6 years. Full recruitment into the fishery occurs at about 60 cm and 8-10 years of age (Francis, 1985). Juvenile and adult moki generally occupy different habitats. Juveniles are found inshore, usually associated with rocky reefs. Adults generally school offshore over open bottom. The only known spawning ground is the Mahia-East Cape region. Spawning occurs in August.

On the basis of declines in catches and CPUE, Francis (1985) considered that the east coast stock may have reached a level low enough to make recruitment failure a real concern.

C. Yield Estimates

1. Estimation of maximum constant yield (MCY)

Two estimates of MCY (=cY) were calculated from different periods of the fishery. Effort was relatively constant, and catch steadily increased, over the period 1930-1961. The peak catch in 1961 (450 t) is therefore an estimate of MCY (c=1). Catch, and probably effort, over the period 1961-1986 varied considerably (annual landings ranged from 450-957 t). However, no clear trend in landings over that period is apparent. Mean annual landings (705 t) weighted by c=0.6 (to account for high variability in landings and some variability in effort) gives an MCY of 420 t.

2. Estimation of current annual yield (CAY)

Not applicable for blue moki due to the absence of recent, appropriate, data.

IV Management implications

The implementation of ITQs in the 1986-87 fishing year caused a significant reduction in catch relative to previous years. Provisional landings in the 1986-87 fishing year were 214 t. Anecdotal information from commercial and recreational fishers suggests that moki were relatively abundant in 1987. However, it is possible that the views of commercial fishers were influenced by their ability to quickly fill their quotas, which were probably about half their previous year's catch.

If recruitment failure did occur in the early 1980's, then it would not be fully apparent for another 2-7 years (as it takes 7-10 years for newly-spawned fish to be recruited into the commercial fishery). Continued monitoring of CPUE should indicate whether a failure occurred. Analysis of CPUE data from areas 012-015 over the period 1976-86 does not indicate any consistent decline in relative abundance. However, these data may be biased and should be used only as a rough guide to stock size (Francis, 1985).

Based only on CPUE data, the current TAC appears to be sustainable. This yield level is probably permitting the

stocks to rebuild; landings have exceeded this level every year since 1950. Because of the possibility of recruitment failure, it is not considered wise to increase the TAC for the east coast stock at this time.

References

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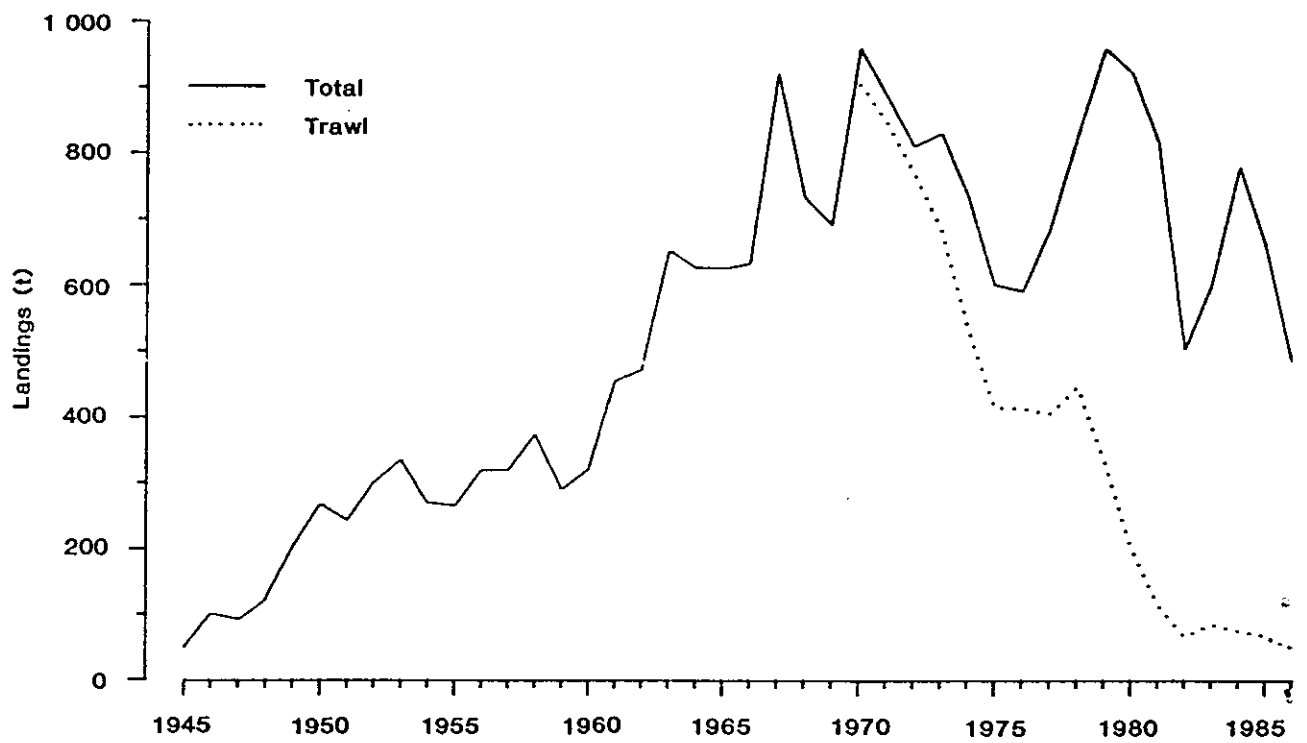


Fig. 1: New Zealand blue moki landings, 1945-86.

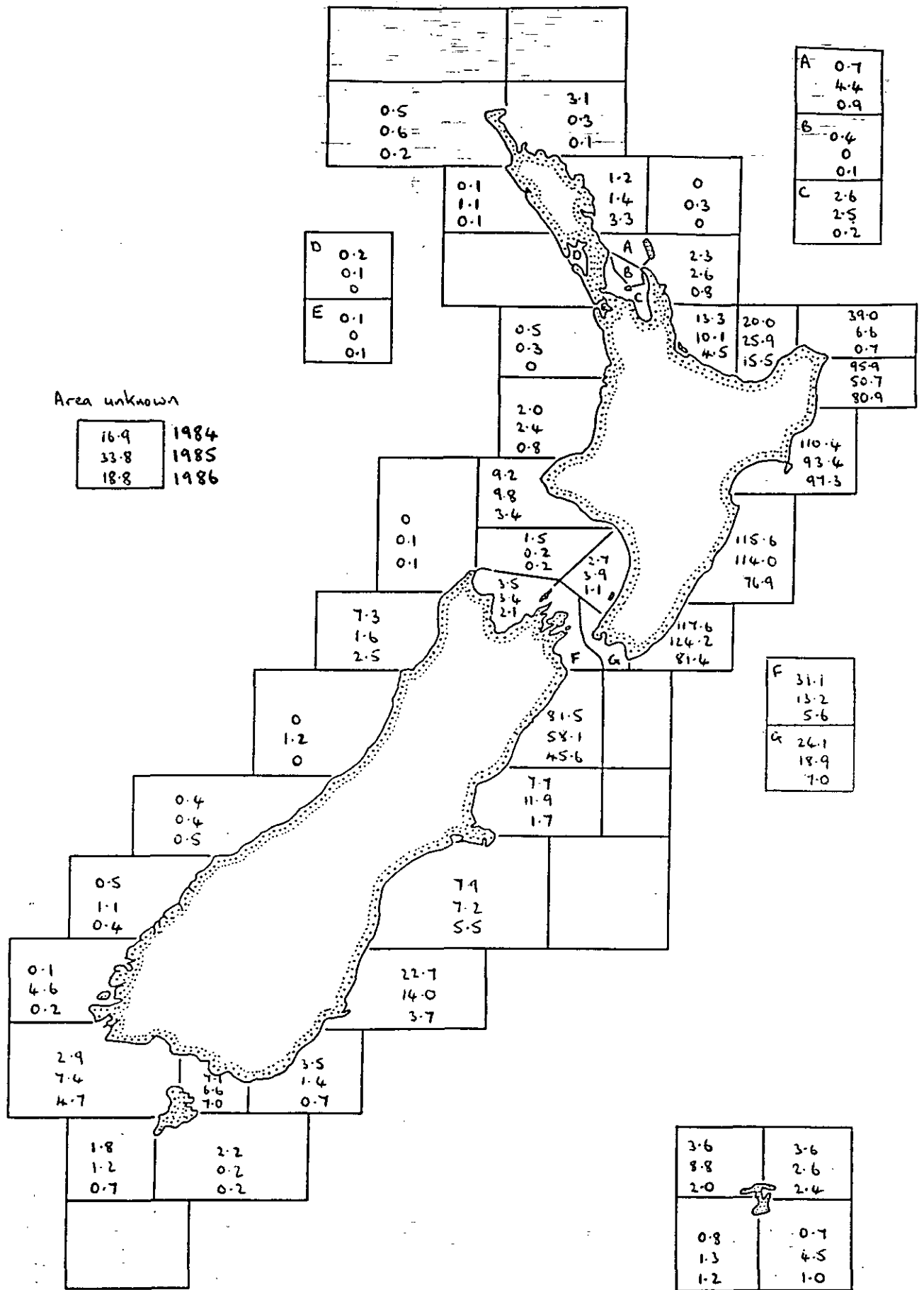


Fig. 2: Domestic landings (£) of blue moki for calendar years 1984-86, by fishing return area.

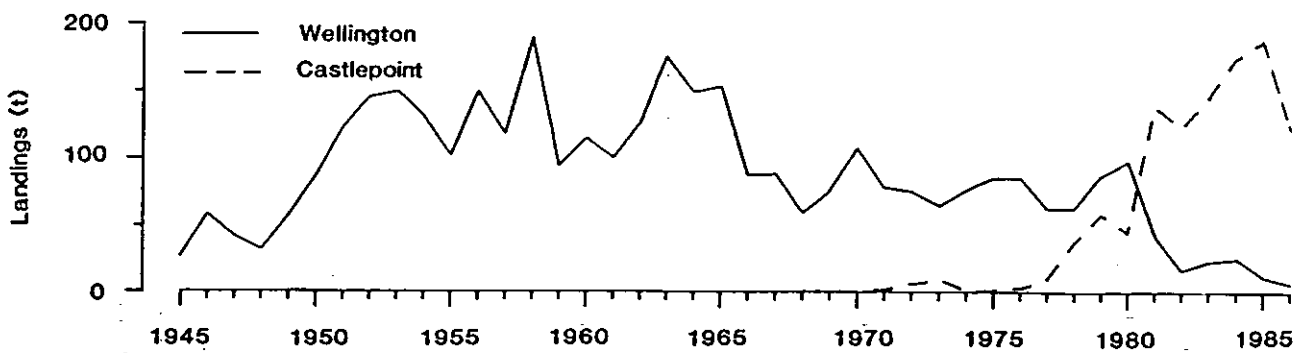
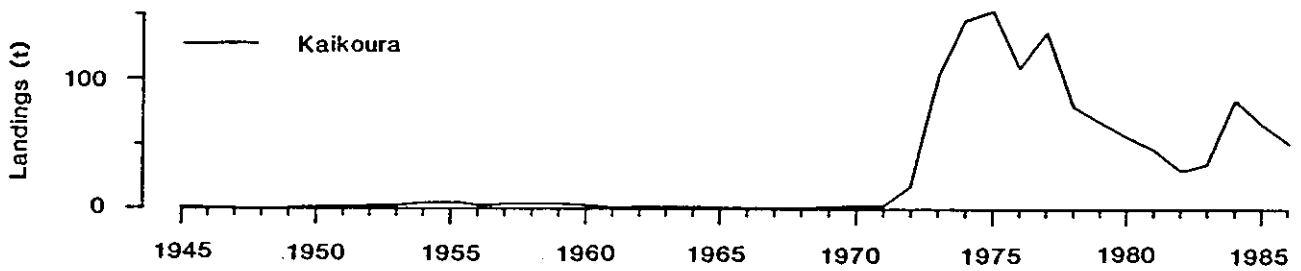
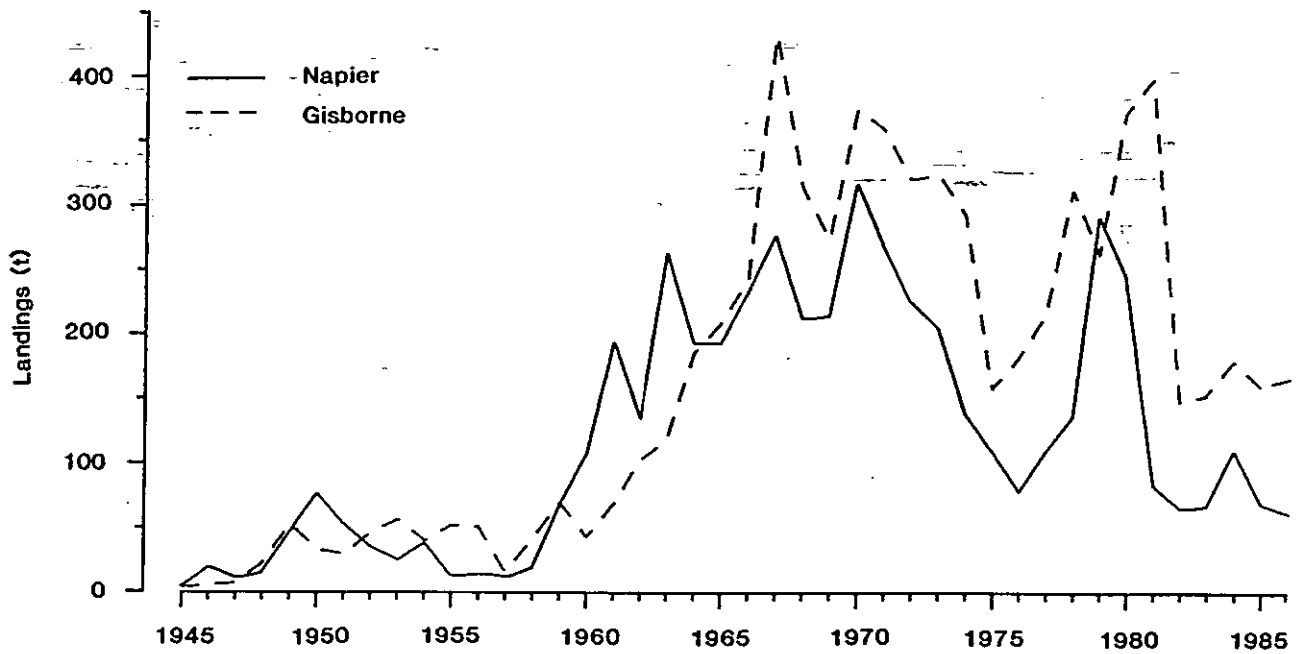


Fig. 3: Landings of blue moki by port, 1945-86, for the ports of Napier, Gisborne, Kaikoura, Wellington and Castlepoint.

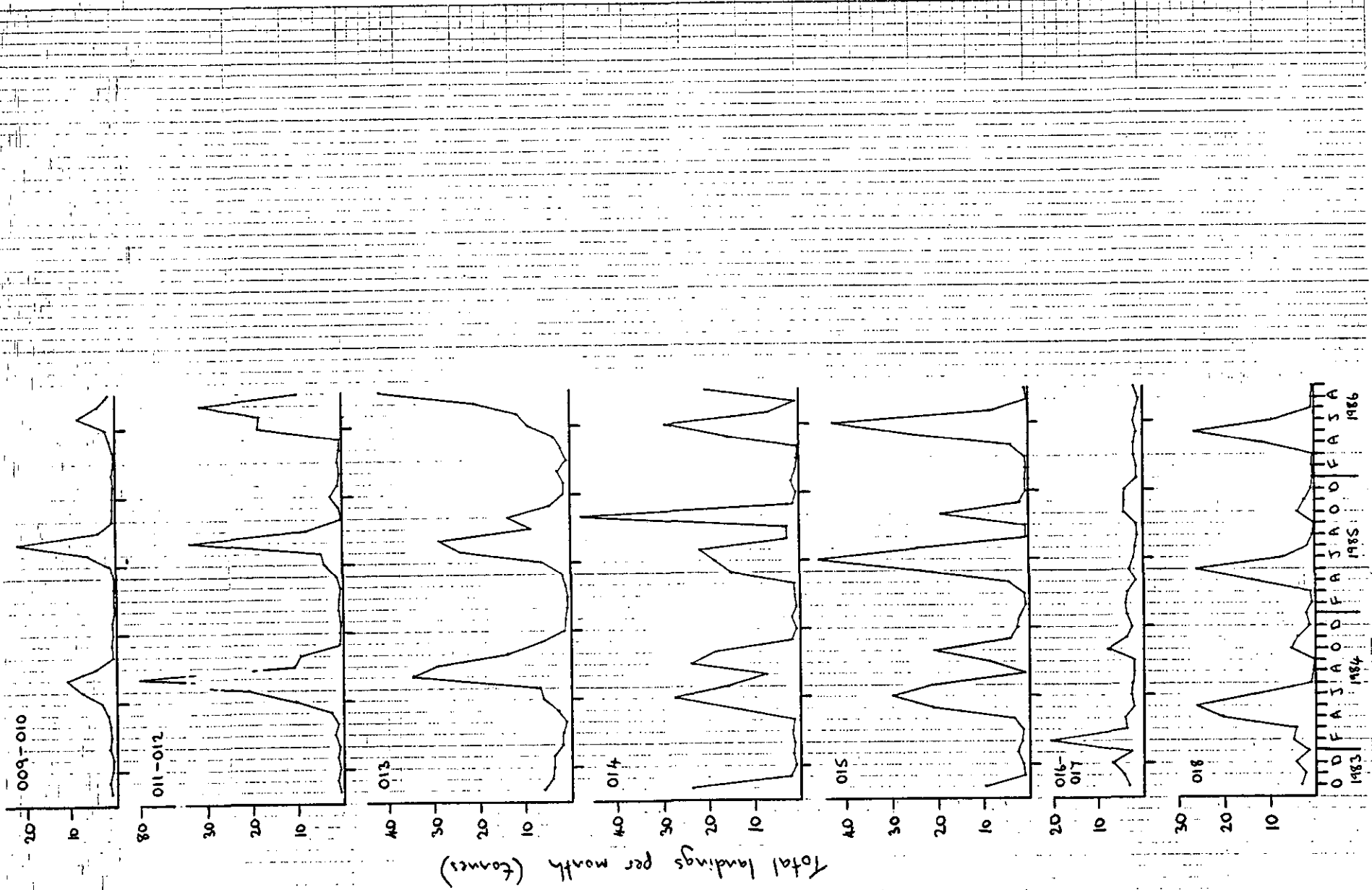


Fig. 4: Landings (t) of blue moki by month from fishing return areas 009-018; for the fishing years 1983/84 - 1985-86.

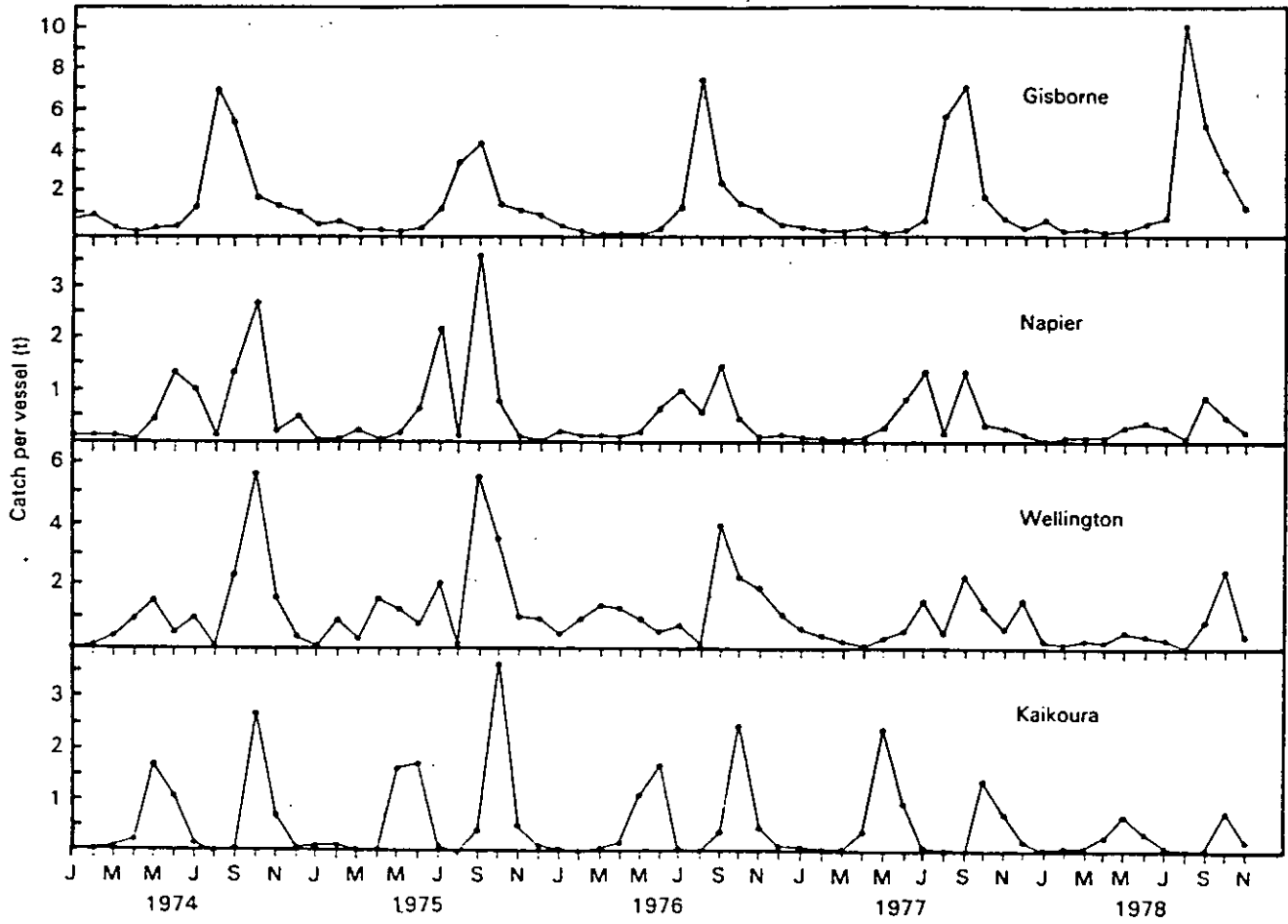


Fig. 5: Moki (*Lamidopsis ciliaris*) catch per vessel for Gisborne, Napier, and Wellington (trawl) and Kaikoura (set net) at monthly intervals, 1974–78; vertical axes not to same scale (Ministry of Agriculture and Fisheries, unpubl. data). (From Francis, 1981.)

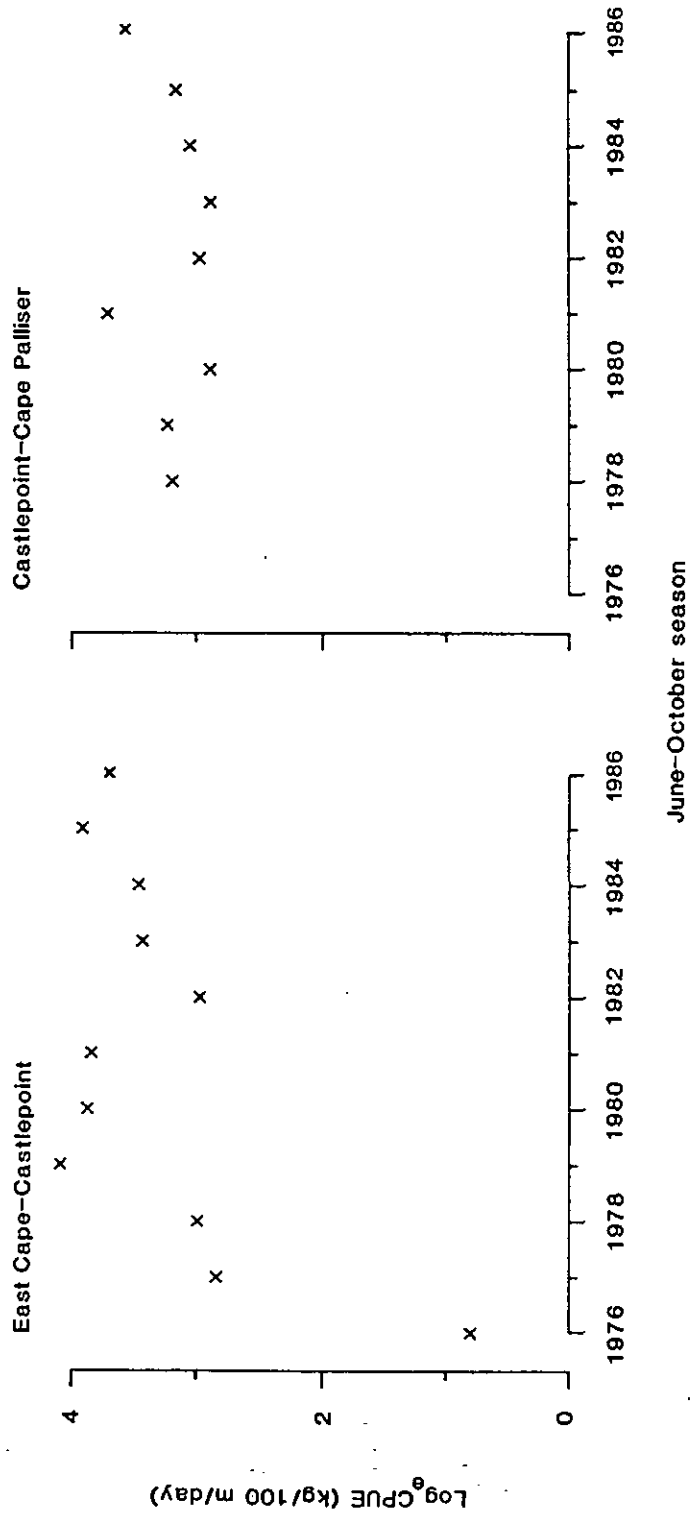


Fig. 6: Trends in set net CPUE for blue moki from East Cape to Castlepoint (012-014) and Castlepoint to Cape Palliser (015).