

Not to be cited without permission of the author(s)

New Zealand Fisheries Assessment Research Document 88/9

Bluenose

P. Horn

MAFFish Fisheries Research Centre
P O Box 297
Wellington

December 1988

MAFFish, N.Z. Ministry of Agriculture and Fisheries

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.

BLUENOSE
(*Hyperoglyphe antarctica*)

I. Introduction

A. Overview

Bluenose is a semi-pelagic species, distributed widely around NZ but caught commercially mainly off the north-east and central east coasts. It can be readily taken by trawl, line, and setnet. Bluenose is moderately fast-growing, but other aspects of its biology and behaviour are poorly understood. There is some concern that the TAC in the Central East FMA may not be sustainable.

B. Description of the fishery

Bluenose has been landed at least since the 1930's (Graham, 1953) although the fishery did not really develop until the late 1970's when there was an increase in target line fishing for the species. The development since 1983 of the trawl fishery for alfonsino on the lower east coast of the North Island (of which bluenose is the major associated catch), combined with the transferability of quotas, has led to virtually all bluenose in this area now being trawl-caught. Target fisheries for bluenose in other areas still predominantly use lining methods, although set netting for bluenose is becoming increasingly important in the Bay of Plenty.

Bluenose is currently managed in 6 Quota Management Areas (QMA), with TACs as follows:

FMA	QMA No.	Domestic TAC (t)
Auckland	1	450
Central - Central East	2	660
- Central West	8	20
Challenger	7	60
South-East + Southland	3,4,5,6	150
Kermadec	10	10

TACs in all except the Central East and Kermadec FMAs were set at 1983-84 catch levels. The Central East TAC was set 70 t less than the 1983-84 catch because of reported falling catch rates of line-caught bluenose on the major alfonsino grounds. The Kermadec TAC was administratively set.

There have been two recent major developments in the Central fishery. First, most commercial line fishermen sold their quotas to the Government and private buyers. Consequently, from the 1986-87 fishing year virtually all bluenose from the Central FMA will be taken by trawl. Second, since the development of the alfonsino-bluenose trawl fishery, the

bluenose by-catch as a relative proportion of the alfonsino catch has increased. This has led to a considerable over-run of bluenose quotas by companies involved in the alfonsino fishery in the 1986-87 fishing year.

C. Literature review

Little published information about bluenose is available. Australian studies have examined feeding (Winstanley, 1978; Jones, 1985), catch-effort data and growth (Webb, 1979; Jones, 1985). Results of a recent study of bluenose on the alfonsino grounds between East Cape and Cape Palliser (Fig. 1) are generally unpublished (Horn & Massey, in press), although the growth study has been finalised (Horn, 1988).

II. Review of the Fishery

A. Catch, landings, and effort data

Before 1981 most bluenose was landed under various names and coded as groper or hapuku. If landed as "bonita" it was reported separately, but in some years this was also confused with other species (Paul, 1985). Therefore, the amount of bluenose that has been landed in past years cannot be estimated accurately, although it was probably low (Paul, 1985). Very little target fishing for bluenose occurred as most fishermen concentrated on the more traditional "groper" species, hapuku and bass.

Since 1981 there has been a marked increase in bluenose landings (Table 1). This can be attributed to the separate reporting of bluenose, to increased target fishing for the species, and in some areas to an increased catch associated with the development of the alfonsino fishery.

Most bluenose is caught off the east coast between North Cape and Banks Peninsula (Fig. 2). Regional differences in catching methods are shown in Fig. 3. The bluenose fishery is seasonal in the Auckland and Bay of Plenty regions, with highest catches taken in the autumn (Fig. 4). Catches on the lower east coast of the North Island are erratic with no apparent seasonality. Troughs in July-August result when trawlers are diverted to the hoki fishery. Catches from the east coast South Island have been higher during autumn-winter. However, no seasonality is apparent for west coast South Island catches.

Reported landings of bluenose by foreign licensed and New Zealand chartered vessels have been small since 1978, although they have increased in recent years (Table 2). Most catches are taken in EEZ areas F, G and C. Landings prior to 1978 may have been more significant. Japanese bottom long-line catches in 1975, 1976 and 1977 were approximately 100, 600, and 800 t, respectively (from Table 5 in Paul & Robertson, 1979). Any foreign trawl-caught bluenose were probably included with

"butterfish" or "warehou" (Tables 4 and 8 in Paul & Robertson, 1979).

CPUE values were calculated for the bluenose catch of the alfonsino-bluenose trawl fishery. A more detailed analysis of these data (see Appendix 2 of the 1988 Alfonsino Fishery Assessment Research Document (88/7)) show a decline in catch per day targeted on all grounds. On the 4 grounds examined, CPUE for 1987 had decreased by 50-83% below peak rates.

The ratio of alfonsino to bluenose landings taken by the domestic trawl fleet in QMA 2 has steadily declined since 1983-84.

Fishing Year	83-84	84-85	85-86	86-87	87-88
Landings - BYX	1533	1785	1454	1387 ¹	?
- BNS	520	635	742	953 ¹	?
Ratio BYX:BNS	2.95	2.81	1.96	1.46	0.97 ²

¹ Landings provisional.

² Projected value.

Projecting the trend of these ratios implies that catches of alfonsino and bluenose will be approximately equal in the current fishing year, and are likely to be in favour of bluenose by 1988-89.

B. Other information

Length-frequency (and age-frequency) distributions of commercial catches can vary greatly between grounds, though on individual grounds the distribution remains fairly constant throughout the year (Horn & Massey, in press). Few bluenose from commercial trawl catches in the Central FMA appear to be ≥ 9 years old (0.4% from the Palliser Bank and 2.3% from the Paoanui Ridge). On all grounds, at least 50% of the catch comprised fish in age classes 2 and 3.

C. Recreational, traditional, and Maori fisheries

The extent of Maori and other non-commercial catches of bluenose is unknown, but likely to be small because of the usual depth range of the fish (100-500 m).

III. Research

A. Stock structure

It is not known if there is more than one stock of bluenose in New Zealand. Tagging of bluenose on 6 grounds between Gisborne and Cape Palliser indicates that in the short term (6-8 months) bluenose are either relatively sedentary or move to areas not currently fished. Only three fish (out of 37 captured tagged bluenose) had moved from the ground on which they were tagged. One moved from the Madden Canyon to White

Island in 138 days (490 km), one from the Motukura Ridge to the Madden Canyon in 90 days (45 km), and one from the Madden Canyon to the Motukura Ridge in 197 days.

B. Resource surveys

Resource surveys of bluenose in the Central FMA have been generally unsuccessful (Horn & Massey, in press) because the behaviour of bluenose is erratic and poorly understood. Much of the bluenose resource in the Central FMA occurs in mixed alfonsino-bluenose schools. No satisfactory methods have been found to estimate the density of fish within schools, or the relative proportion of each species. Bluenose is also present in areas other than the alfonsino grounds.

C. Other studies

No statistically significant differences in growth rates were found for bluenose on 3 grounds between East Cape and Cape Palliser (Horn, 1988). Growth is rapid during the first two years, but then slows markedly. Bluenose are probably best placed in the category of moderately fast-growing, short-lived fish.

Bluenose do not appear to recruit into the fishery until they attain a particular size (45-50 cm). Their age at this size can range from 1 to 3 years. As for other stromateoids, bluenose probably live in the pelagic environment prior to this recruitment, when they enter a demersal phase. The distribution of the pelagic juveniles is presently unknown.

No running-ripe bluenose were recorded on the Palliser Bank during the 1985-86 sampling period, although peak gonadosomatic indices occurred in December 1985 and November 1986. This agrees with anecdotal reports from commercial fishermen that bluenose spawn from January to April. Bluenose appear to mature sexually at about 3-5 years old. Therefore, on the Palliser Bank, about two-thirds of the fish caught by trawl are pre-reproductive. It appears likely that spawning does not occur on grounds currently exploited by trawl.

Estimates of the instantaneous natural mortality rate (M) derived from age-frequency distributions (Fig. 5) were 0.8 for the Palliser Bank and Tuaheni High, and 0.5 for the Paoanui Ridge. Clearly these values are unrealistic. An M as high as 0.5 would be most unlikely for fish of this size and age. It seems likely that older bluenose leave the commercial grounds, resulting in inflated M values on these grounds. Accurate estimates of M cannot be obtained from age-frequency distributions until the direction and extent of any migration is determined.

D. Yield estimates.

1. Estimation of maximum constant yield (MCY)

No estimates of biomass or mortality are available for bluenose, although they are known to be moderately fast-growing, short-lived fish. Catch data prior to 1981 are inaccurate and incomplete (bluenose were usually coded with other species). Since 1981 catches have steadily increased, and changes in effort and fishing methodology have been considerable. Consequently, no MCY can be calculated.

2. Estimation of current annual yield (CAY)

Estimates of CAY were calculated for bluenose in QMA 2 using a 'status quo' methodology (i.e. maintain a constant fishing mortality, F). An analysis of CPUE data from the domestic trawl fishery indicated a significant decline in abundance on all grounds. The mean catch per day targeted dropped by 50-83% and the mean decline over all grounds since the development of the fishery was about 67%. Assuming that CPUE is an accurate index of fish abundance, then the yield (=CAY) necessary to equate current F with F in 1983-84 would be 33% of the 1983-84 catch. Landings of bluenose from QMA 2 in 1983-84 were 690 t. Hence, CAY = 230 t.

IV. Management Implications

In the 1986-87 fishing year, the TAC in the Auckland FMA was about 30% undercaught, while that for Central East was about 50% overcaught. The over-run in Central was caused by the greater proportion of bluenose in the species mix than in previous years.

Several factors suggest bluenose are resilient to fishing pressure.

1. They are moderately fast-growing and fairly short-lived.
2. They have a widespread distribution.
3. They occur frequently in habitats that are unlikely to be trawlable, even by the semi-pelagic trawl technique.
4. The presumed pelagic life-style of bluenose during their first 1-2 years of life ensures that these fish are not exploited.

However, the realisation that about two-thirds of the fish caught by trawl are pre-reproductive is cause for some concern. Also, the degree of mixing between fishing areas is unknown, so localised overfishing cannot be ruled out.

Assuming that CPUE values are accurate indices of biomass, then it appears that stocks of bluenose on the major alfonsino grounds in 1987 have been reduced to about $\frac{1}{3}$ of their level in 1984. If this trend continues in 1988, then the current TAC in the Central FMA may not be sustainable.

References-

- Graham, D.H.. 1953: A treasury of New Zealand fishes. A.H. & A.W. Reed, Wellington. 404 p.
- Horn, P.L. 1988: Age and growth of bluenose, *Hyperoglyphe antarctica* (Pisces: Stromateoidei) from the lower east coast, North Island, New Zealand. *N.Z. Journal of Marine and Freshwater Research* 22: 369-378.
- Horn, P.L. & Massey, B.R. in press: Investigations of biology and resource abundance of alfonsino (*Beryx splendens*) and bluenose (*Hyperoglyphe antarctica*) from the lower east coast, North Island, New Zealand. *N.Z. Fisheries Technical Report*.
- Jones, G.K. 1985: An exploratory dropline survey for deepsea trevalla (*Hyperoglyphe antarctica*) in continental slope waters off South Australia. *Fisheries Research Paper, Department of Fisheries, South Australia, No. 15*: 20 p.
- Paul, L.J. 1985: The estimation of hapuku and bass yields for New Zealand fishing regions. *Fisheries Research Centre Internal Report No. 26*: 31 p.
- Paul, L.J. & Robertson, D.A. 1979: Species composition of the demersal fish resource. In Elder, R.D. & Taylor, J.L. (Comps.), *Prospects and problems for New Zealand's demersal fisheries*, pp. 117-123. *New Zealand Fisheries Occasional Publication 19*.
- Webb, B.F. 1979: Preliminary data on the fishery for deep sea trevalla (*Hyperoglyphe porosa*) in Tasmania. *Tasmanian Fisheries* 22: 18-29.
- Winstanley, R.H. 1978: Food of the trevalla (*Hyperoglyphe porosa*) off south-eastern Australia. *N.Z. Journal of Marine and Freshwater Research* 12: 77-79.

Table 1: Reported domestic landings of bluenose for the calendar years 1981-86, from areas approximating each FMA.

FMA	Landings (t)					
	1981	1982	1983	1984	1985	1986
Auckland	146	246	250	464	432	440
Central	101	170	353	811	648	632
Challenger	12	22	47	30	26	53
Southern	36	46	51	81	73	33
Area unknown*			25	25	147	408
Total	295	484	726	1411	1326	1566

* Area unknown shows the quantity of fish recorded by EEZ area or where no area information was supplied. Of the landings listed for area unknown in 1985 and 1986 respectively, at least 98 t and 378 t were taken from the Paoanui Ridge east of statistical area 014 (Central FMA).

Table 2: Reported catch (t) of bluenose by foreign licensed (F) and New Zealand chartered (C) vessels by EEZ area. All foreign landings were taken by Japanese vessels.

Period		B	C	EEZ Area		F	G	H	Total
				D	E				
Apr 78-Mar 79	C								0
	F		0.8					0.3	1.1
Apr 79-Mar 80	C		0.4	6.2	0.1	0.2	0.1		6.9
	F	5.3		3.6		0.2			9.2
Apr 81-Mar 82	C		0.1	0.6	0.1	6.4	3.9		11.2
	F			0.3	0.2	1.2			1.7
Apr 82-Mar 83	C		10.5	5.7	0.4	24.8	3.3	0.7	45.5
	F			3.4	1.1	1.3			5.9
Apr 83-Sep 83	C		5.4	2.2	0.3	11.6	17.8	0.8	38.0
	F			1.1					1.1
Oct 83-Sep 84	C		8.4	3.8		8.1	14.9		35.1
	F			0.1	0.2				0.3
Oct 84-Sep 85	C		5.0	1.5		17.3	7.2		32.0
	F			0.8	0.8	4.6			6.3
Oct 85-Sep 86	C		7.6	5.1	4.7	22.6	31.2		71.0
	F			0.2	0.4	9.3			9.9

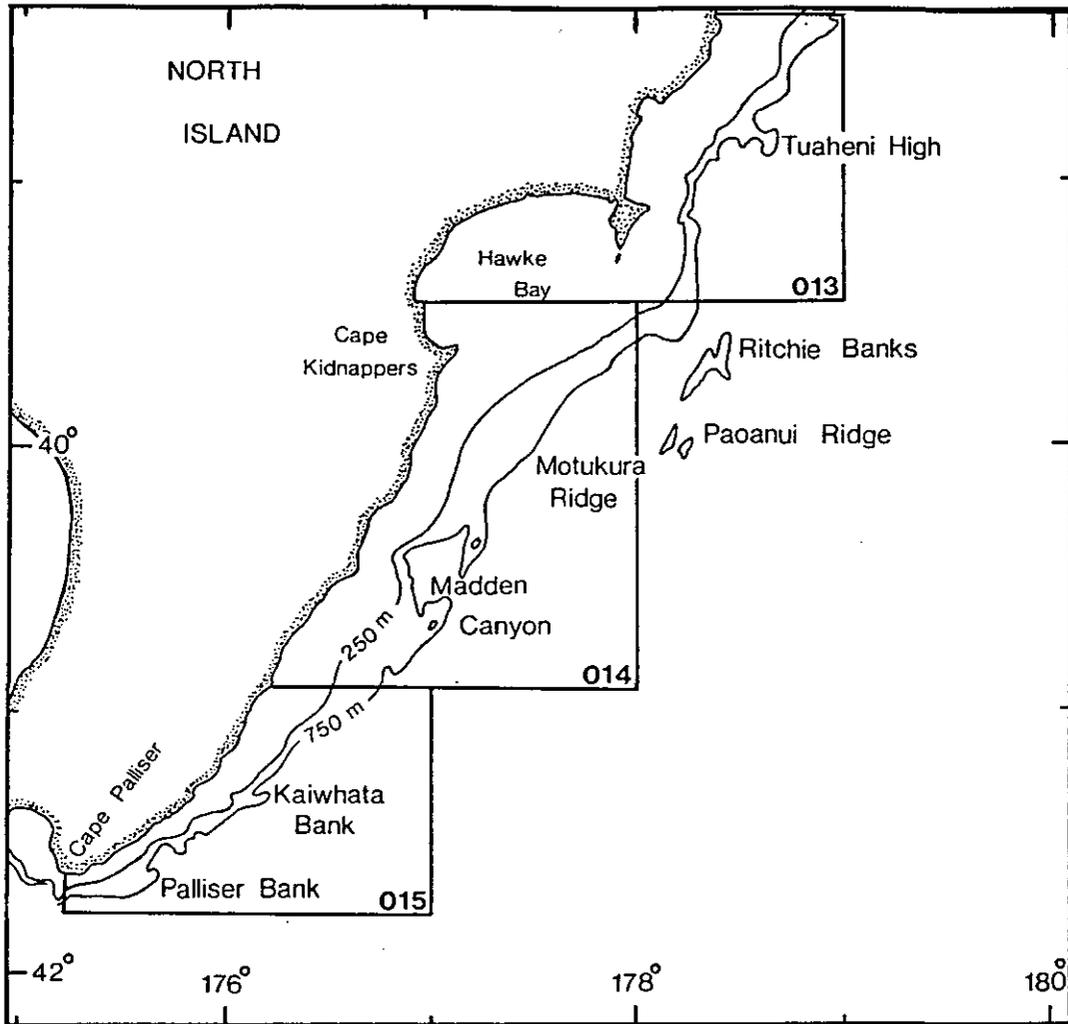


Fig. 1: Alfonso trawl grounds on the lower east coast, North Island. Fishing return areas 013-015 are also shown.

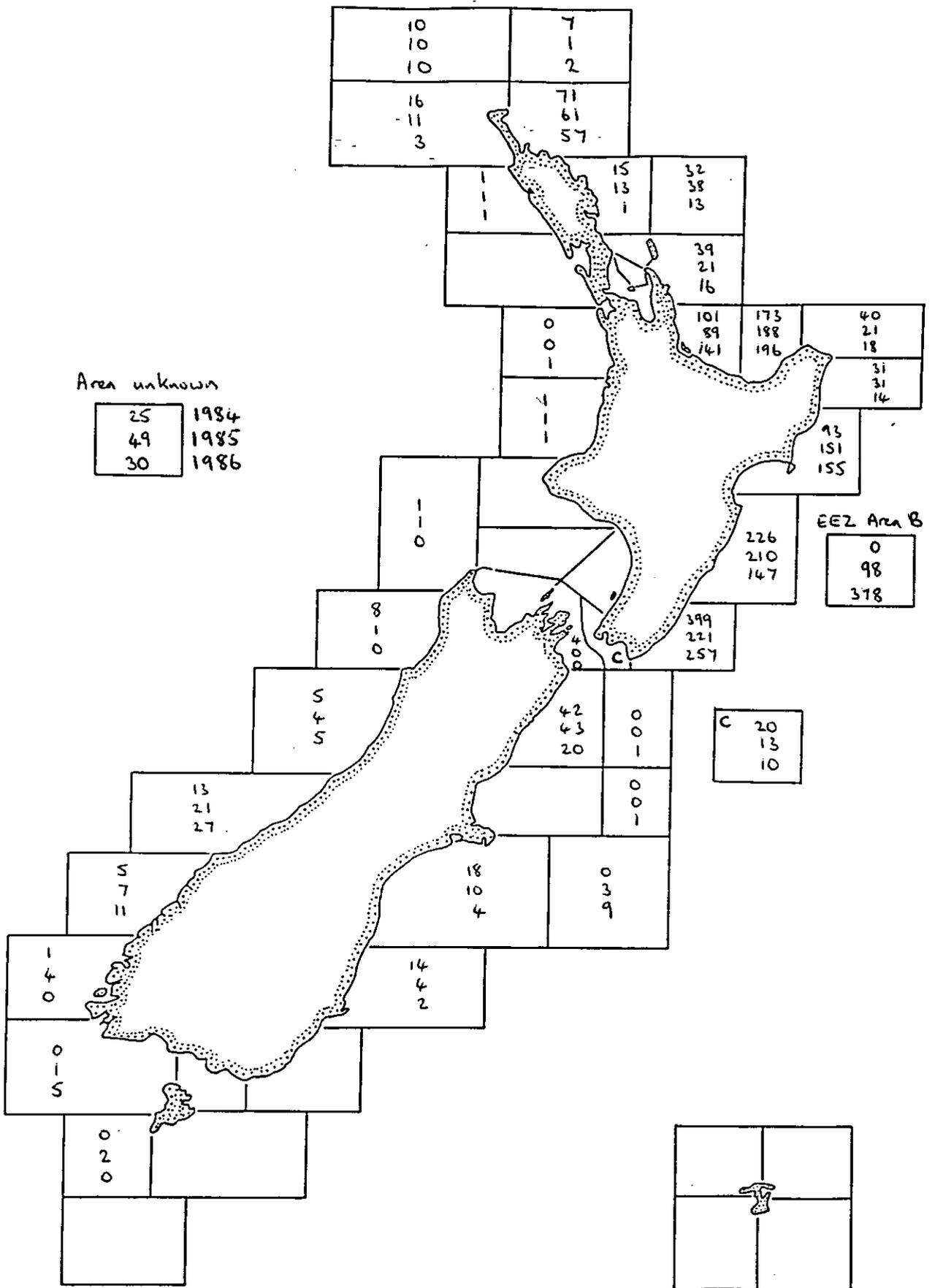


Fig. 2: Domestic landings of bluenose, rounded to the nearest tonne, by fishing return area (and EEZ Area B) for the calendar years 1984-86.

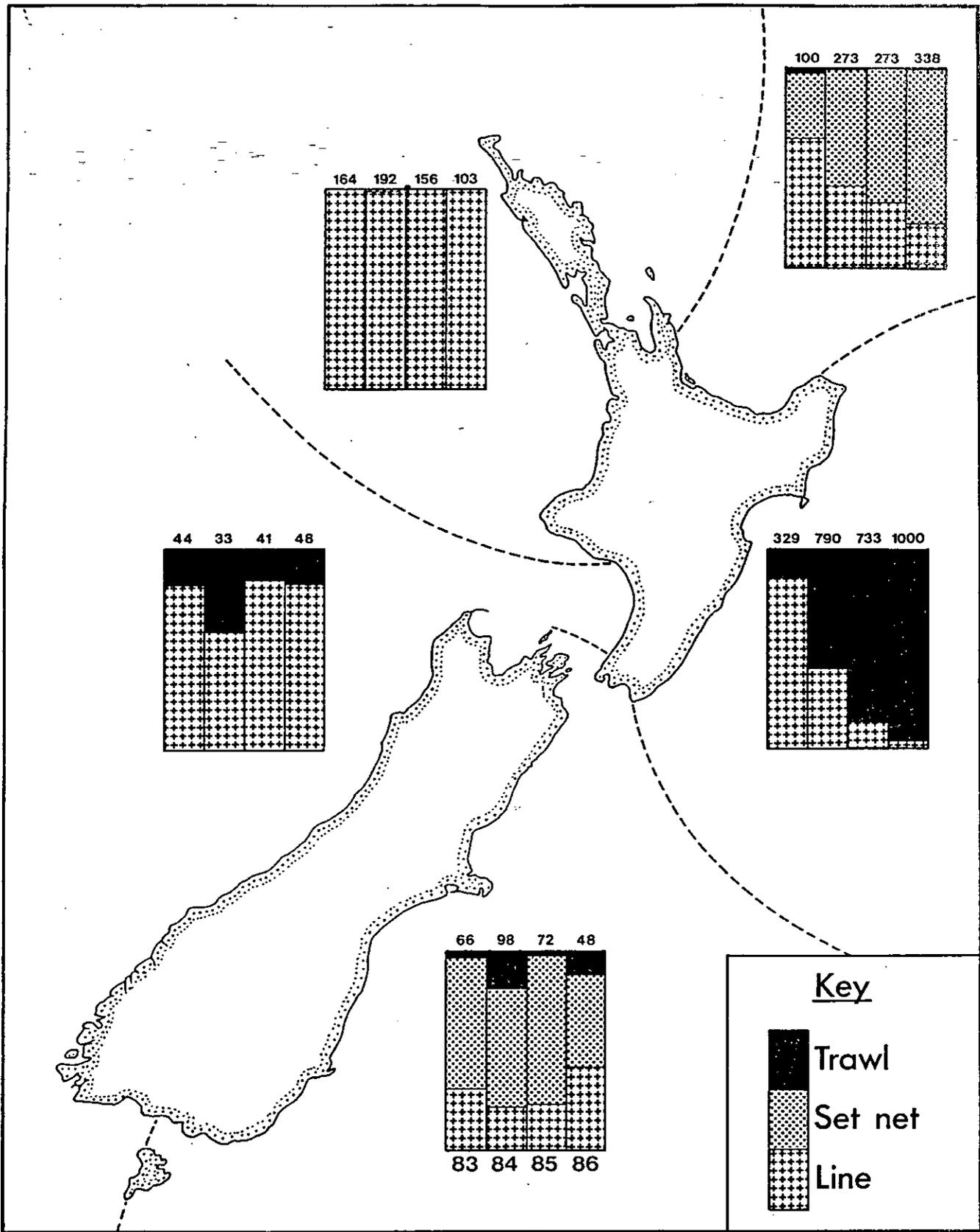


Fig. 3: Regional differences in methods used to catch blue whiting, for calendar years 1983-86. Numbers above bars show total landings (t).

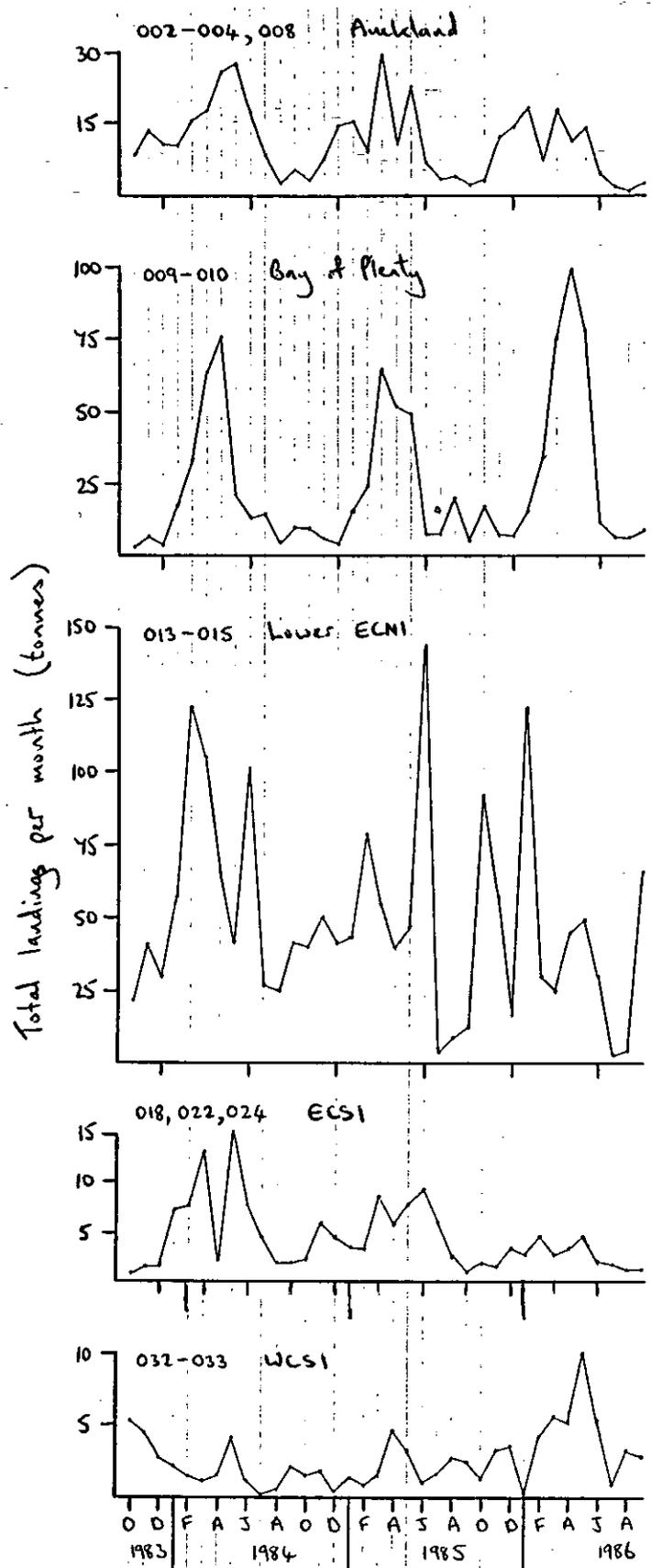


Fig. 4: Landings (t) of bluenose by month from major fishing areas around New Zealand, for fishing years 1983/84 - 1985/86.

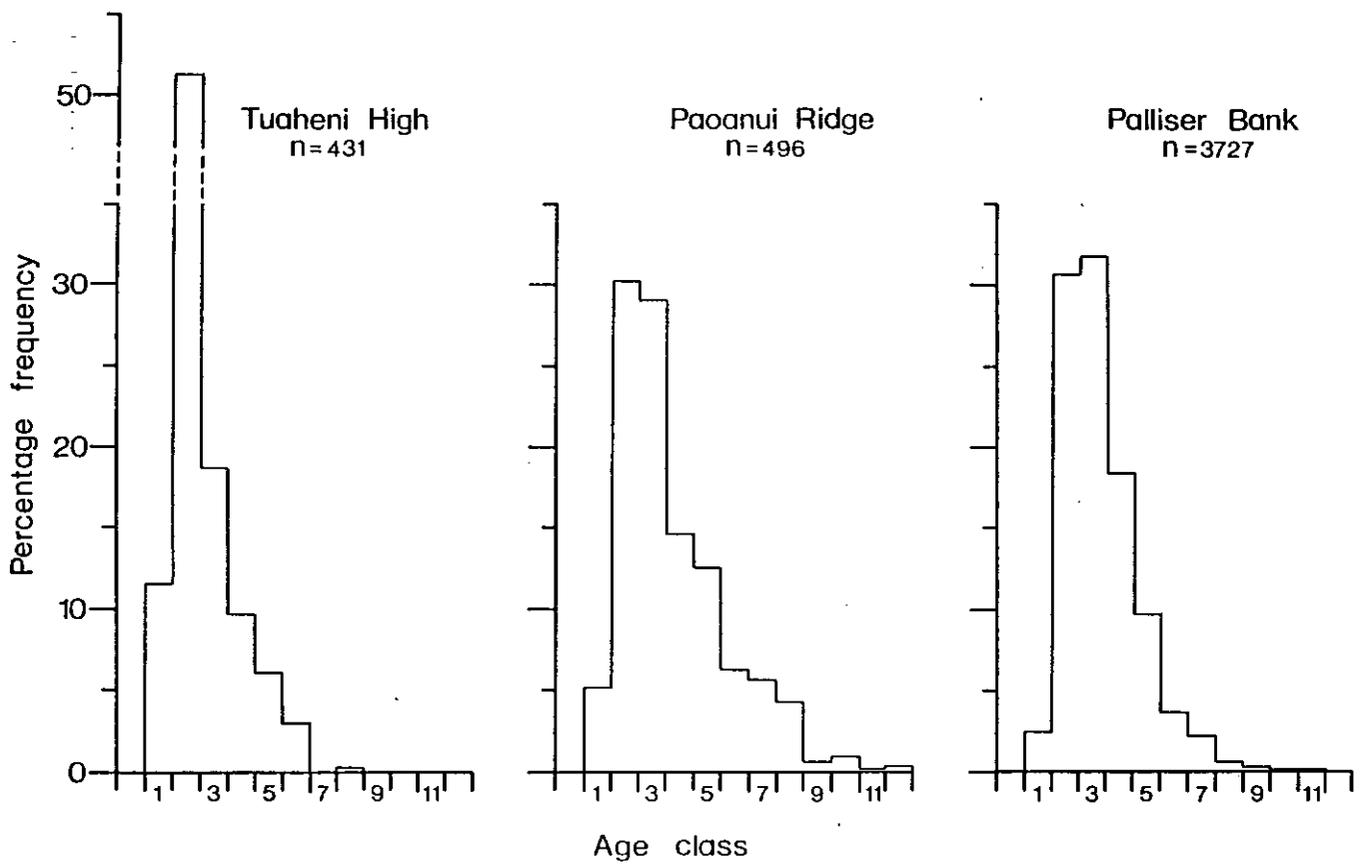


Fig. 5: Age-frequency distributions of commercial catches of blueox from 3 grounds.