THE NEW SOUTH WALES RED SPOT WHITING FISHERY

Prepared for SEFC Demersal and Pelagic Fish Research Group Workshop on Trawl Fish Resources, May 1986

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The New South Wales Fishery For Red Spot Whiting.

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Introduction.

The New South Wales red spot whiting Fishery is the subject of a FIRTA funded research programme aimed at providing the biological and population dynamics data necessary for stock assessment of the resource and its rational management. The programme began in July 1984 and is scheduled to finish in June 1987.

Total New South Wales landings of red spot whiting (*Sillago bassensis*) in 1982-83 were 1200 tonnes, valued at approximately $950,000. Production is likely to further increase as facilities for export are expanded and upgraded. Despite the importance of this fishery and its increasing value to fishermen (see *Australian Fisheries*, July 1984 p14) little is known about the biology of the species or the dynamics of its population. Analysis of the fishery off northern New South Wales is complicated by the presence of a similar species, the stout whiting (*S. robusta*), which is lumped with red spot whiting in records of landings. Recent work at the University of New South Wales suggests there are at least two stocks of red spot whiting in New South Wales waters (Dr P. Dixon, personal communication).

The specific objectives of the Programme are:

1) To determine the present level of utilisation of the species.
2) To determine whether the population of red spot whiting exploited by fishermen off the east coast comprises a homogeneous stock.
3)To determine the relationship between populations of red spot whiting and stout whiting.

This report describes the history of the fishery and presents preliminary results of an analysis of catch statistics.

History of the Fishery

Prawn trawlers in New South Wales waters were originally banned from taking red spot whiting, but a Ministerial concession, in the mid 1970's, was granted to trawlers north of Smoky Cape allowing the retention of red spot whiting, of any size, in prawn trawls following the opening up of export markets to Japan. Prior to the concession the species was discarded as a "trash fish". There followed a rapid increase in landings, and the species has become an important by-catch of the northern prawn fishery, with considerable "targeting". (Figure 1).

In May 1982 the concession was extended to cover the area south to Barrenjoey Head, just north of Sydney, and in July 1985 extended to cover the remaining state waters between Cape Howe and Barrenjoey Head. This allows all prawn vessels, fishing in state waters, to retain red spot whiting as a by-catch of

prawning. The concession in waters south from Smoky Cape is in force until June 1987.

In 1979, two Danish seine vessels, at Eden, were granted permits to use 40-50mm cod-ends to allow targeted fishing on red spot whiting. Area and time of operation were controlled. These vessels demonstrated commercial quantities of whiting. In July 1985 the permit system was discontinued and a concession introduced to cover all Danish seine vessels.

The progressive opening of the fishery can be directly linked to concern about the possible deleterious effects of a whiting fishery on stocks of tiger flathead. Juvenile flathead are found on the same trawl grounds as whiting, especially in the south of the state. The current study provides the oppurtunity to provide data on the extent of the overlap between the fisheries.

Fishing methods for whiting can be divided into three types:

1) Triple gear, in which three nets separated by sleds are towed. These are used by prawn trawlers operating on north coast of New South Wales. The bulk of whiting are caught by this method

2) Single net gear is used commonly by fishermen on the central and southern coasts of NSW. This reflects the multi-purpose type fishery in these areas, where fish trawling is also undertaken.

3) Danish seining using 40-50mm cod-ends on standard fish trawls.

Landings at the major ports are shown in Table 1. Landings by the fleet operating out of Iluka and Yamba make up the bulk of all whiting landed in the state. Catches are off-loaded at the Iluka Depot of the Clarence River Fishermen's Cooperative where whiting are graded and frozen prior to export. Virtually all whiting landed at Iluka are exported.

The stout whiting makes up about 10% of total landings in the northern ports, but is rarely found in catches from Newcastle south. The species is generally more plentiful at shallower depths than red spot whiting (Smith 1985).

The only other fishery for red spot whiting is located at Lakes Entrance, in Victoria, where Danish seining is the fishing method employed.

The Iluka/Yamba Fishery

Detailed catch statistics for whiting, from the inception of the fishery, are being extracted from the records of the Clarence River Fishermen's Cooperative. This is a large data base, and consequently the detailed results presented here are only for the period January 1983-June 1985. These data demonstrate the nature and extent of the fishery and highlight problems with analysis. By the finish of the programme detailed catch per unit effort figures for at least 10 years data will be analysed. These data are for combined species.

The fishery at Iluka developed rapidly (Figure 1). The peak and recent reduction in annual catches is misleading. The data for 1981/82 and 1982/3 include landings for other ports, notably Evans Head and Coffs Harbour which were bought by the Clarence River Fishermen's Cooperative. Also, during winter 1983 there was a downturn in the market. It does, however, appear that the rate of increase in annual catches is slowing.

Monthly landings are strongly seasonal with peak landings occuring during late-autumn/winter (Figure 2). King prawn catches during the same period are not so markedly seasonal (Figure 3, Steven Montgomery, unpublished data). The question is whether these peaks represent true increases in abundance. Whiting are a low value high quantity by-catch in a high value low quantity fishery. Effort directed at whiting may be effected by three factors, and it is important to isolate these when analysing CPUE statistics. These are:

1) whiting abundance,
2) prawn abundance, and
3) price paid to fishermen for whiting

The first two can be considered together. The peaks in whiting landings may reflect a shift in effort from king prawns to whiting as a function of king prawn abundance. However, mean monthly landings of whiting, king prawns and sea school prawns (for 1979/80-1984/85) (Figure 4) do not indicate this. High whiting and king prawn catches occured during the same months. Catches of both appear inversely correlated with sea school prawn

catches, which is not surprising as this species is caught at shallower depths than the other two.

The relationship between mean daily landings for whiting and king prawns for April and May 1984 is shown in Figure 5. If spatial separation exists between these species, it should be apparent in relative catch rates. Each point represents mean daily landings for a single vessel. Those vessels which fished predominantly for school prawns or only fished one or two days during the month are not included. These months were chosen because relatively high catches of both species were taken. During April there is no trend, daily king prawn catches were independent of whiting catches. In May, however, the data suggests that vessels that targeted on whiting landed less prawns.

Many fishermen have said that they will not target on whiting unless the price is at a certain level. Price paid to fishermen may therefore be a determinant of catch rates. In fact a plot of monthly catch vs price for 1980-1985 shows little trend (Figure 6). It should be pointed out that the price for whiting is set by the export market and fishermen know the price they will get for whiting in advance.

These data show that the fishery is complex and dynamic. The relationships between whiting and prawn catches and price are not obvious. Consequently, for the analyses presented here, only individual whiting landings of greater than 100kg were included, regardless of prawn catches. This 'targeted catch' accounts for at least 90% of the total (Figure 7).

Total catch, targeted catch, effort (in target boat days) and CPUE, for whitng, for January 1983-July 1985 are shown in Figure 7. There was an increase in CPUE during March to July 1984, when catches were highest, indicating a true increase in availability.

Landings for these months were analysed in detail to provide data showing the distribution of catches per vessel. Landings of 26 vessels, which consistantly landed whiting during this period were extracted. The 'targeted' landings of the vessels accounted for 86% of total whiting production over 30% of total fishing days during March to July 1984 and 98% and 40%, respectively, during May (Table 2). Mean catch per days landings were 720kg and 1200kg for March-July and May respectively. The distribution of catch rates of these vessels is shown in Table 3. A further breakdown of these vessels into those whose daily landings averaged greater than 500kg is also shown (Table 2).

These data demonstrate that 40% of the Yamba/Iluka fleet landed the bulk of whiting caught during this period. The size distribution of the 'whiting' fleet is similar to the total fleet (Table 4). If all vessels had targeted on whiting during this period effective effort would have least doubled. A considerable 'latent' effort currently exists at this port.

Other Ports.

Landings at other ports, apart from Eden, where the Danish seine vessels have operated, are less consistent. From the fishermen's own observations the season for whiting in the central coast ports is summer-early autumn. Catches are much more dependent on

the availablity of prawns. It also appears that whiting abundance, from year to year, is much more variable in these areas.

With the change of regulations discussed above, prawn trawlers on the south coast of NSW are now allowed to retain whiting. Prawn trawlers operating out of Eden landed 10 tonnes of whiting between December and March 1986.

Length frequency distibutions of red spot and robust whiting are shown in Figures 8 and 9, respectively. Differences between the size distributions of catches from the northern ports tends to reflect different fishing and marketing strategies, e.g., whiting landed at Coffs Harbour are sorted and only medium and large fish are sent to the market. Small fish are disposed of locally or to processors.

References.

Anon, (1984). 'By-catch' pays the bills for Clarence prawners. Australian Fisheries, July 1984, p14.

Smith, D.C. (1985). Assessment of the New South Wales red spot whiting fishery. Progress Report, July 1984 - November 1985. Fisheries Research Institute, Internal Report No 3.

Table 1. Landings of red spot whiting, 1980/81-1984/85. Stout whiting are included in the figures for Iluka and Coffs Harbour. Sydney Fish Market figures include catches from Eden and Coffs Harbour.

	Catch (tonnes) Year				
Port	80/81	81/82	82/83	83/84	84/85
Iluka	564	699	847	622	600
Coffs Harbour	32	67	162	41	65
Eden	43	45	67	13	93
SFM	105	149	243	318	241
Total Landings	700	900	1200	950	980

Source: records of fishermens' cooperatives, and Sydney Fish Market.

Table 2 Production (kg), effort (boat days) and mean catch rates for red spot whiting landed at Iluka/Yamba, March-July and May 1984.

Period	Total		Whiting Vessels			Whiting Vessels, (kg/day>500kg)		
	Catch	Effort	Catch	Effort	Mean kg/day	Catch	Effort	Mean kg/day
March-JUly	435000	1700	374255	520	720 (26)	360243	470	750 (16)
May	122000	240	120234	99	1200 (20)	118905	91	1300 (16)

NB Only daily landings of greater than 100kg are included in analyses. Vessel numbers are given in parenthesis.

Table 3. Distribution of whiting catch rates, 'whiting' vessels.

Mean daily Landings kg	Number of Vessels March-July 1984	May 1984
100-500	11	4
500-1000	11	5
1000-1500	1	6
>1500	3	5
Total	26	20

Table 4. Breakdown by length (> 12M) of Iluka/Yamba prawn fleet and of those vessels within this fleet consistently landing whiting

Length	Total	'Whiting'
12	5	1
13	10	2
14	12	6
15	16	6
16	13	5
17	2	2
>18	4	1
Total	62	25

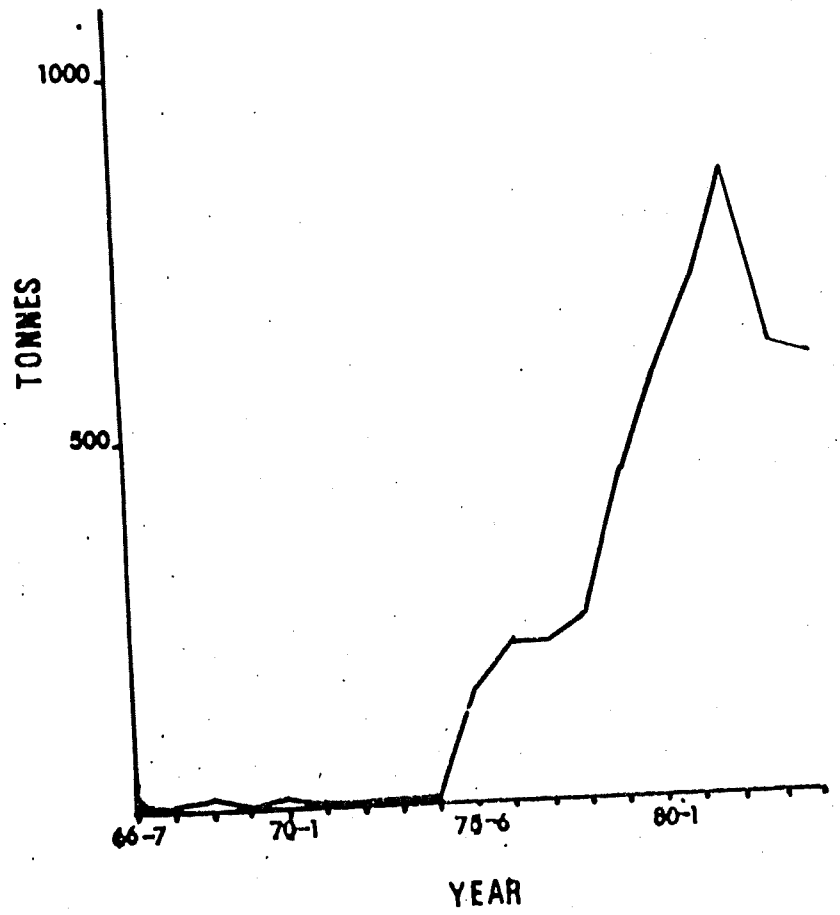


Figure 1. Landings of red spot whiting, Clarence River Fishermen's Cooperative, 1966-7 to 1982-3.

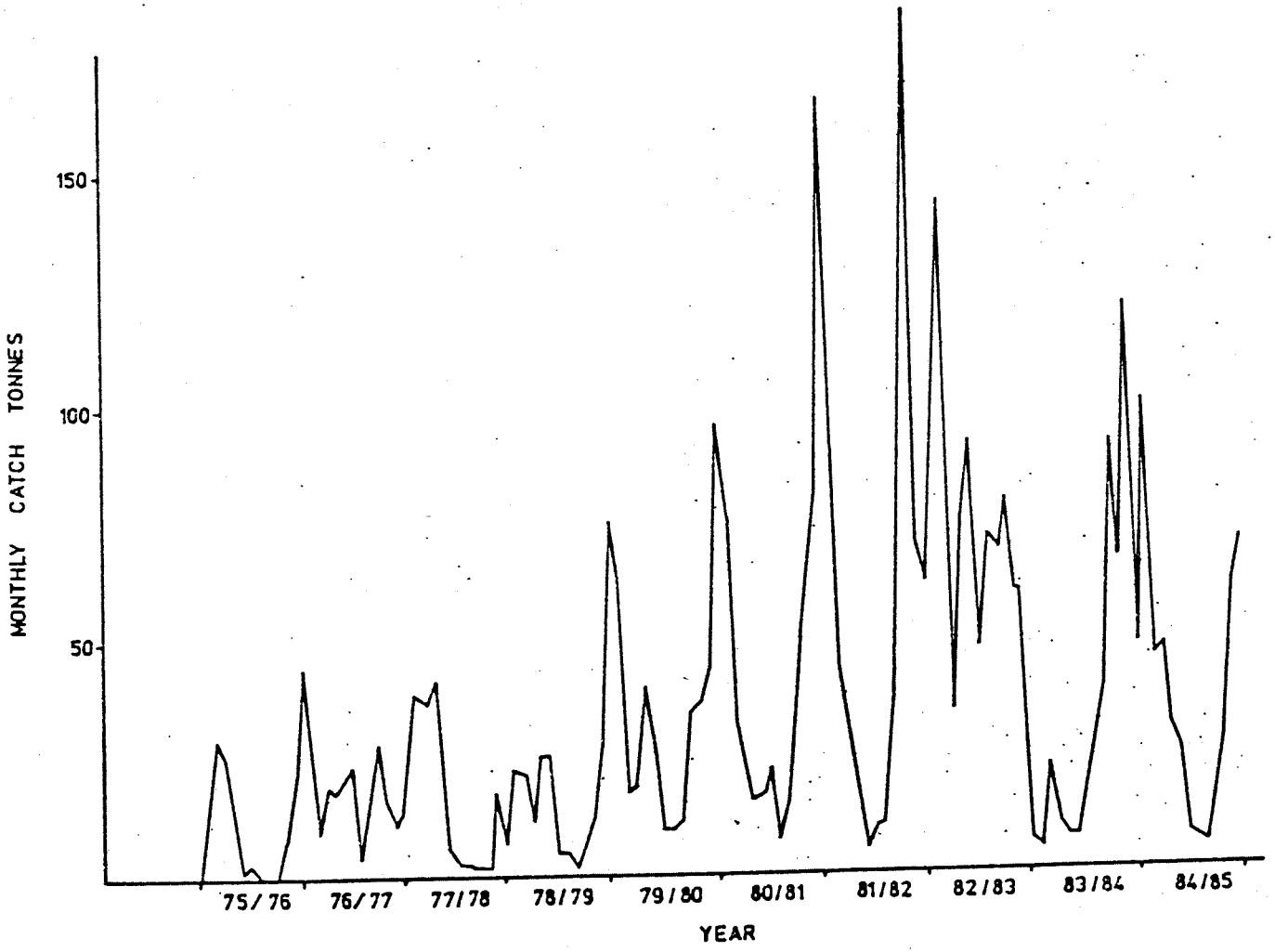


Figure 2 Monthly landings of red spot whiting, Clarence River Fishermens Cooperative, 1974/75 - 1984/85.

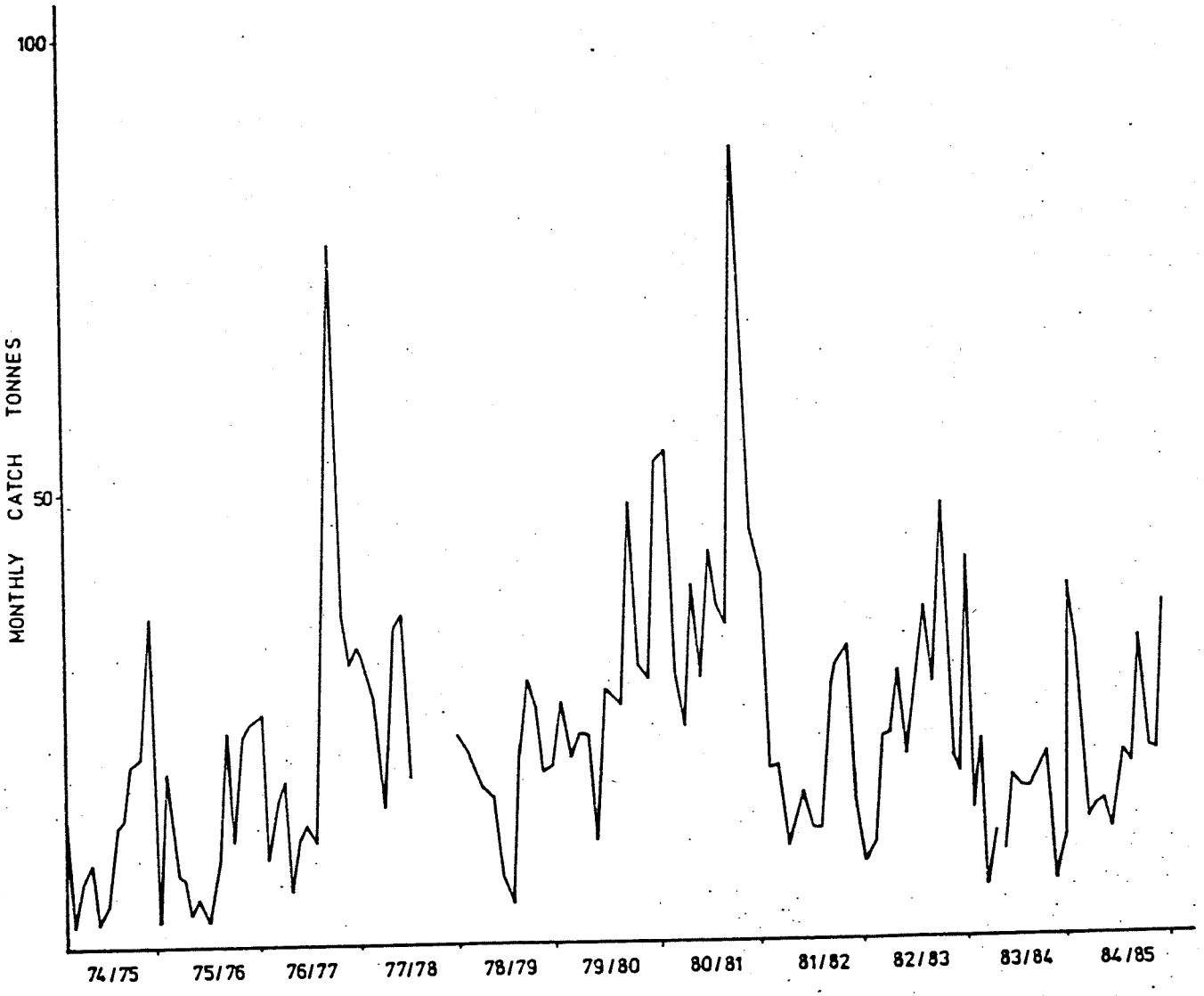


Figure 3 Monthly landings of king prawns, Clarence River Fishermen's Cooperative, 1974/75 - 1984/85.

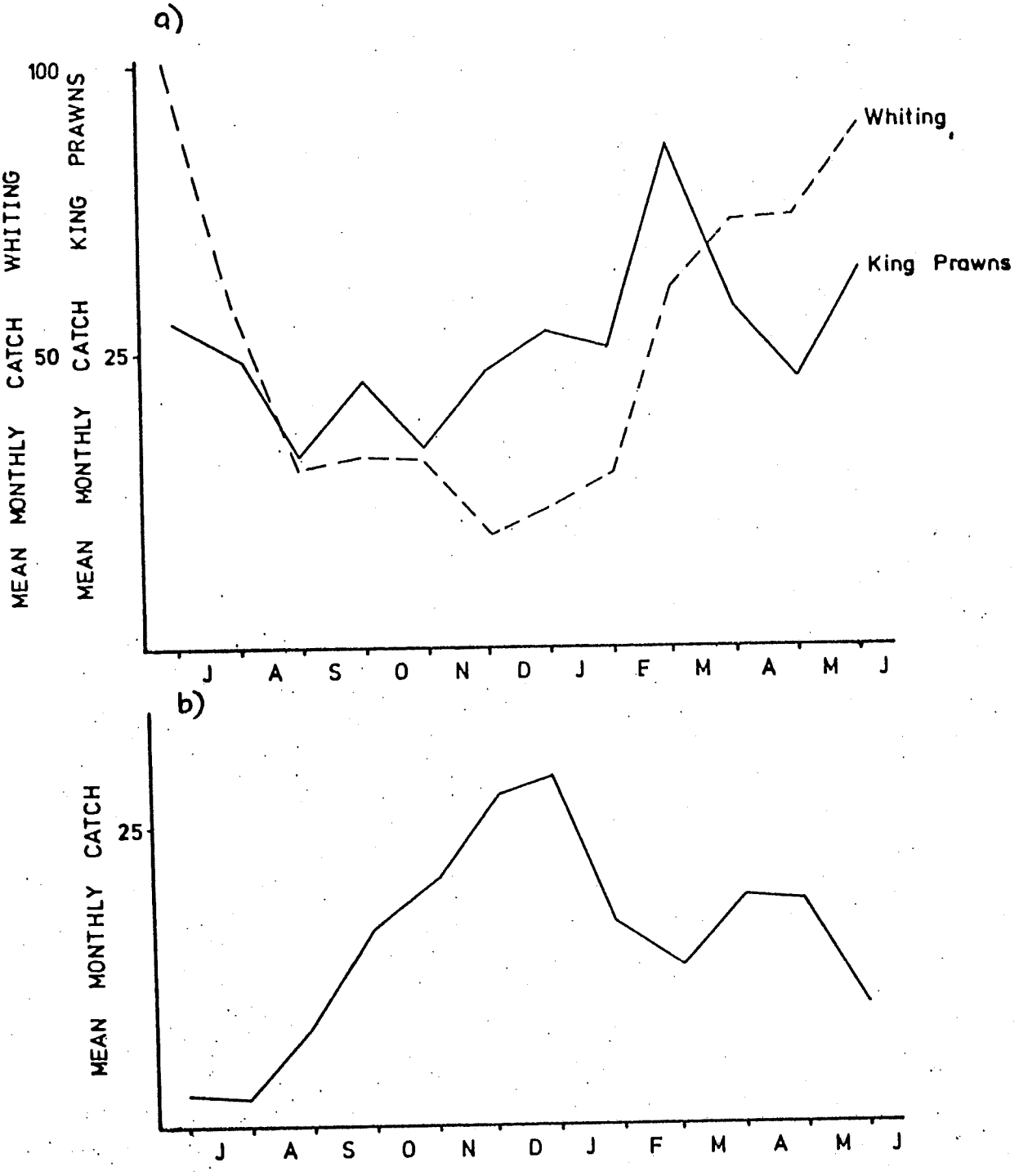
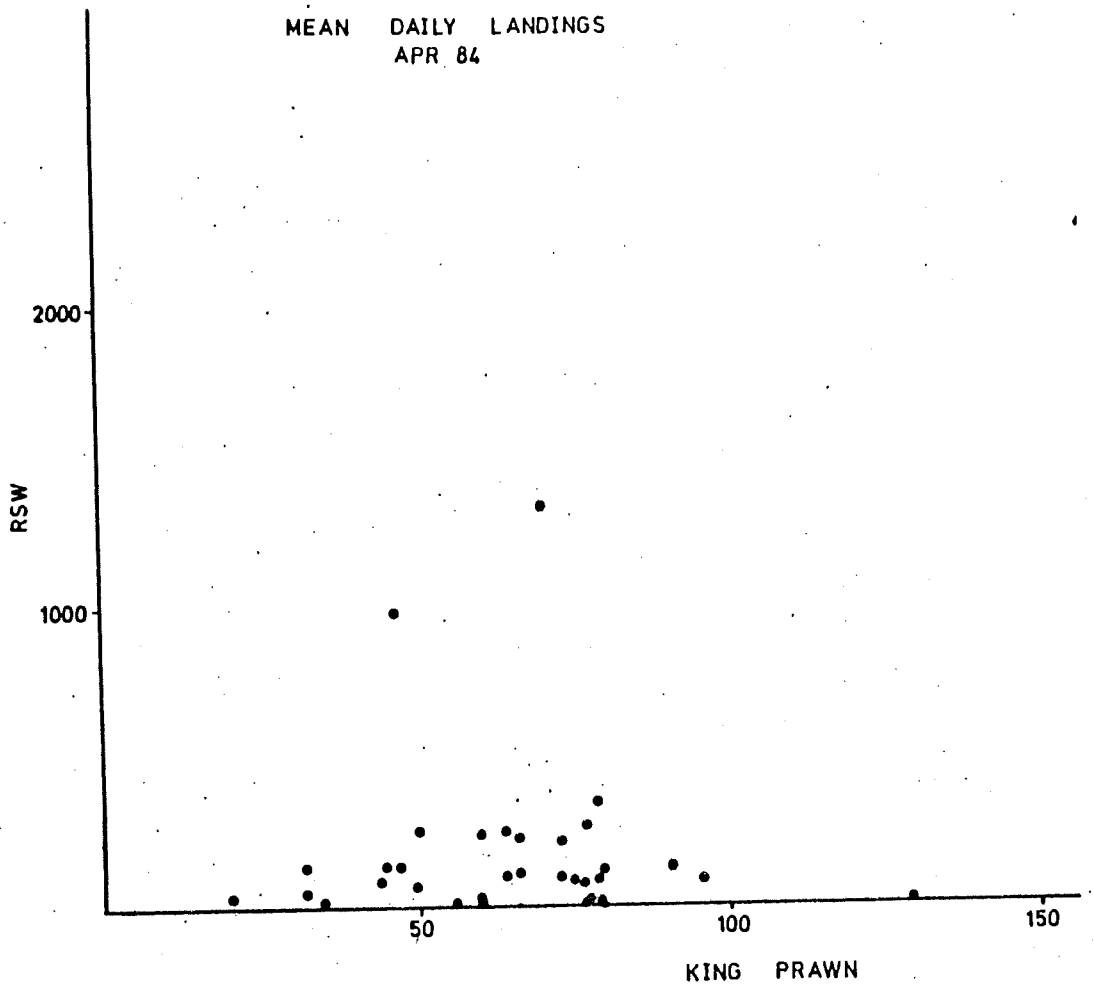


Figure 4 Mean monthly landings of a) red spot whiting and king prawns and b) ocean school prawns, 1979/80 - 1984/85.



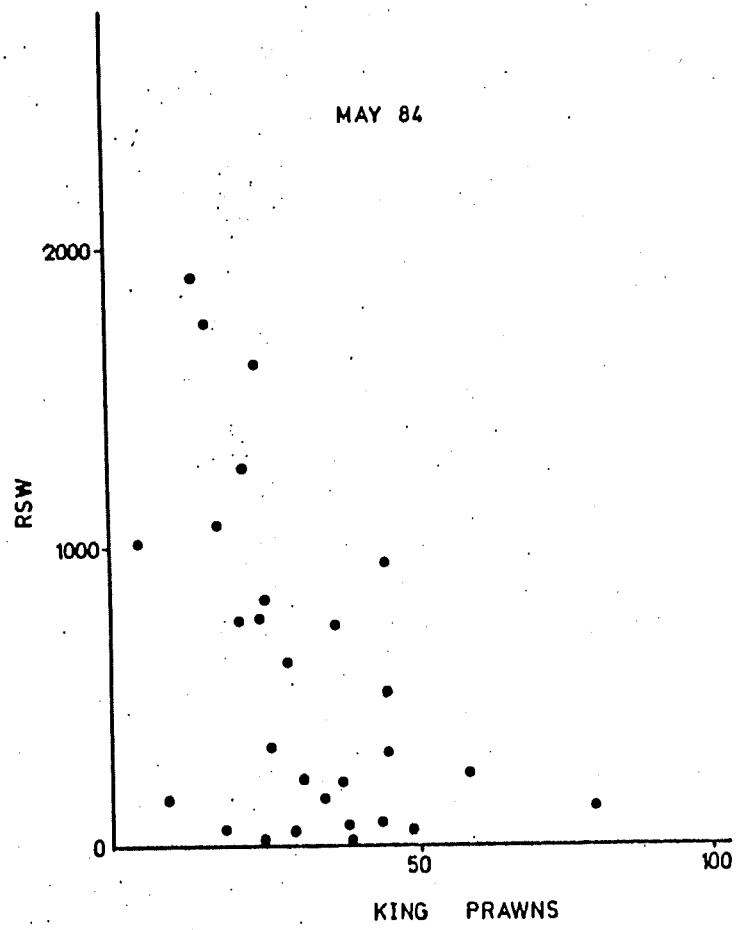


Figure 5 Mean daily landings, red spot whiting vs king prawns, April and May 1984.

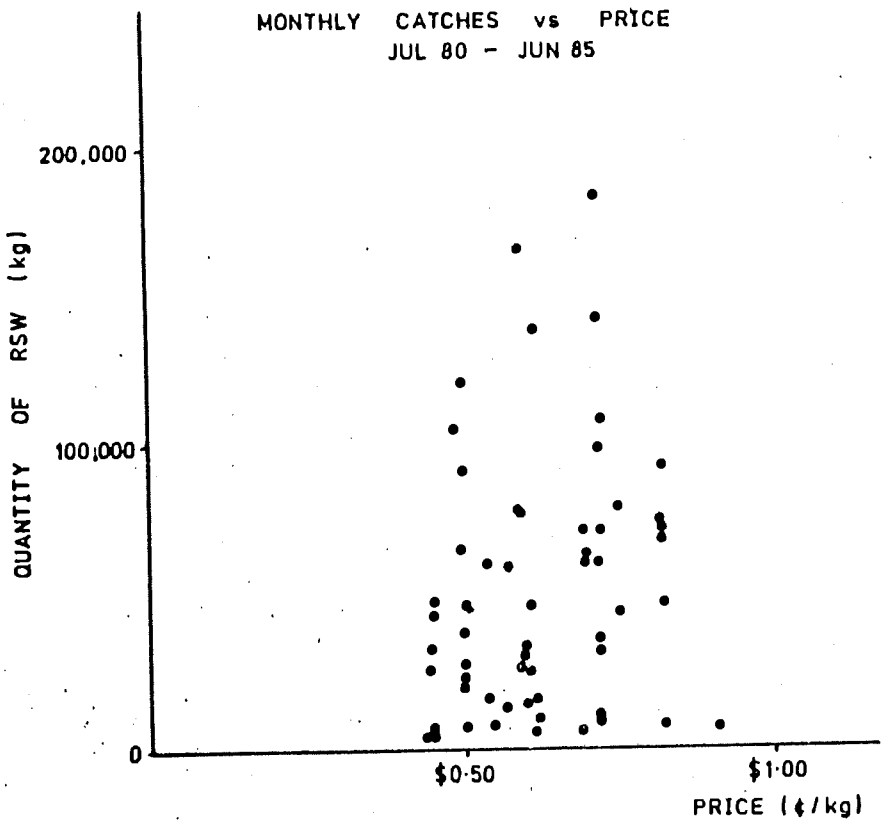


Figure 6 Monthly landings vs mean monthly price for red spot whiting, July 1980 - June 1985.

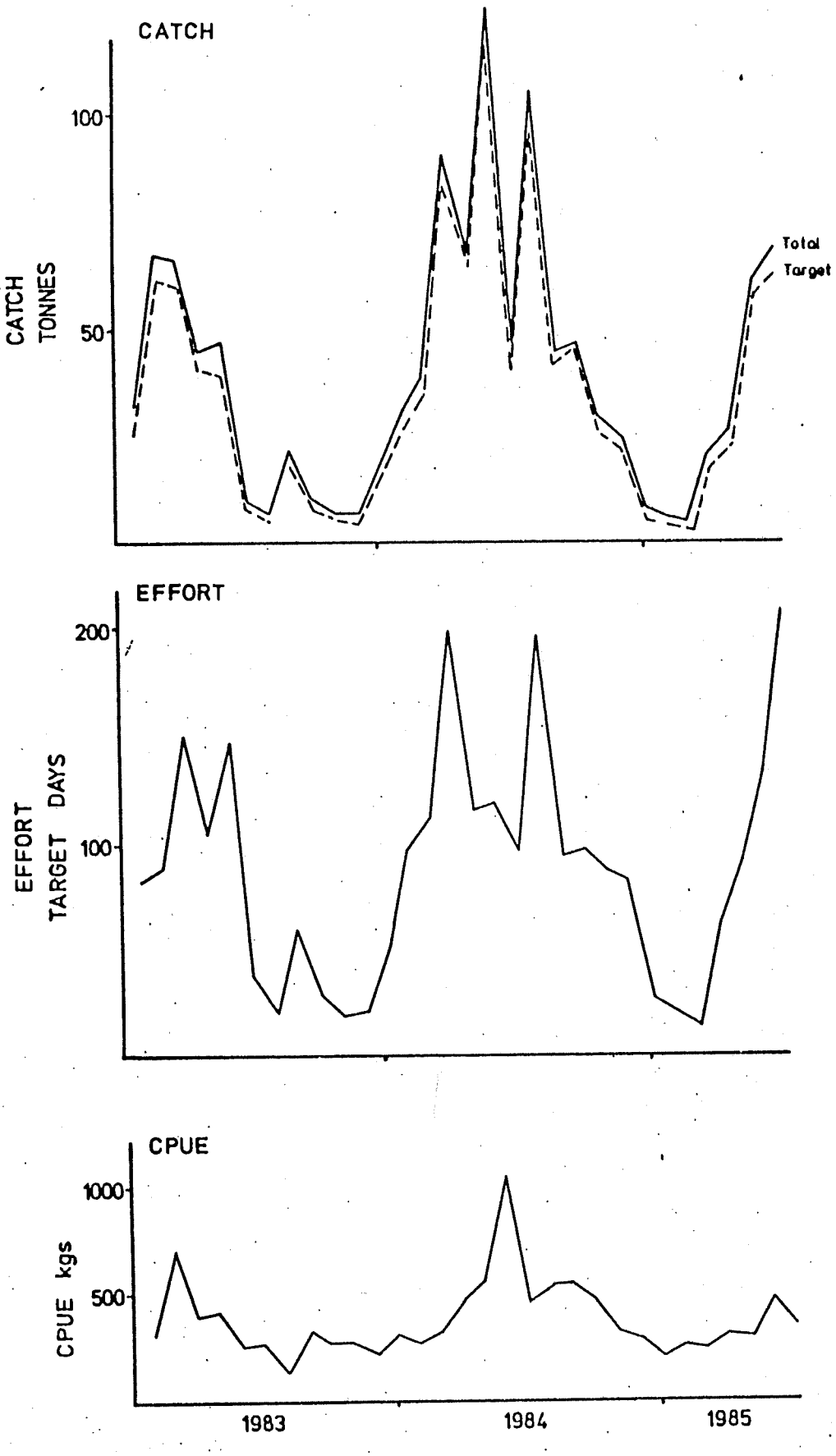


Figure 7 Monthly catch effort and CPUE for red spot whiting, landed at Iluka, January 1983 - June 1985.

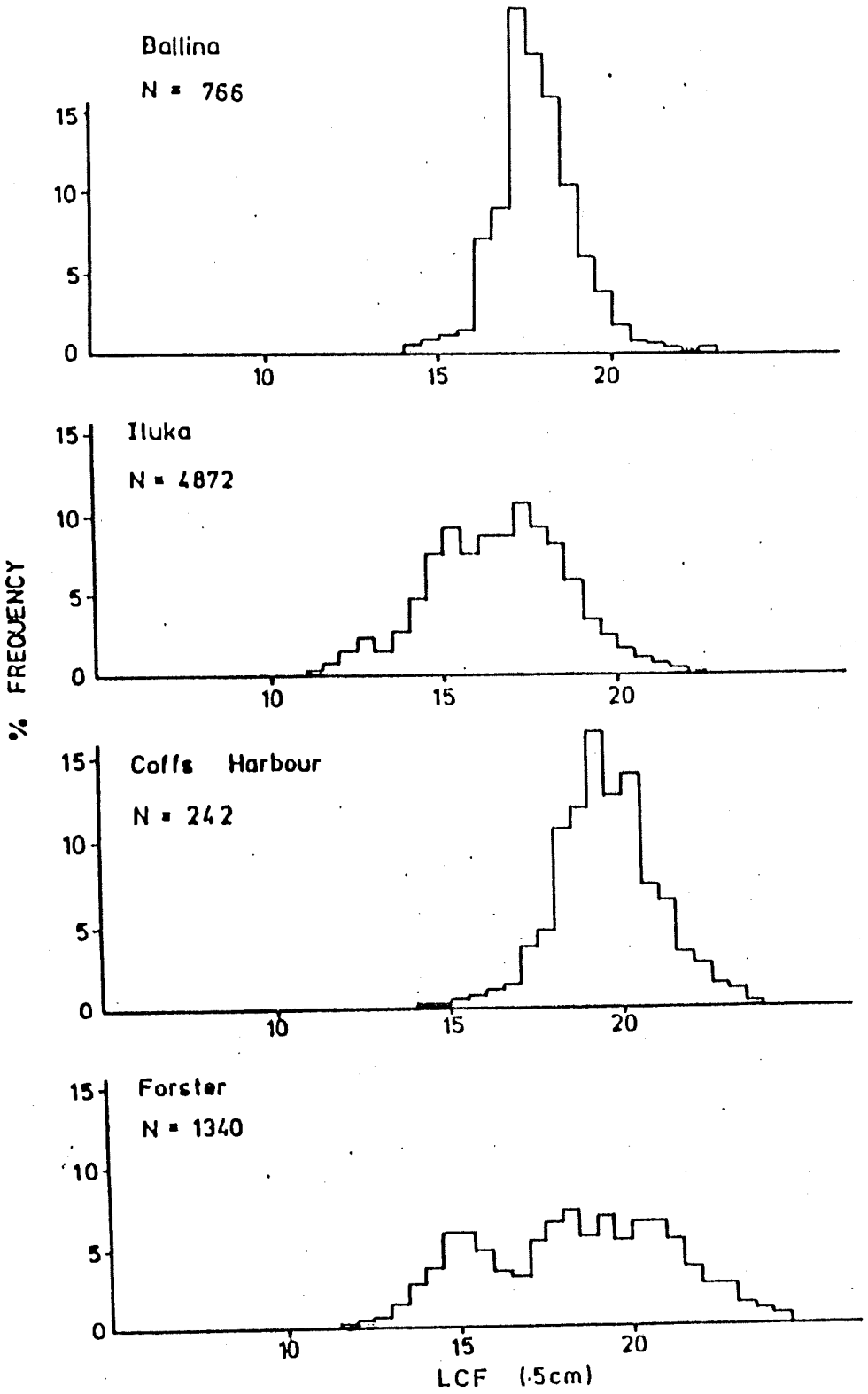


Figure 8. Length frequency distribution of red spot whiting landed at the major ports, July 84 - June 85.

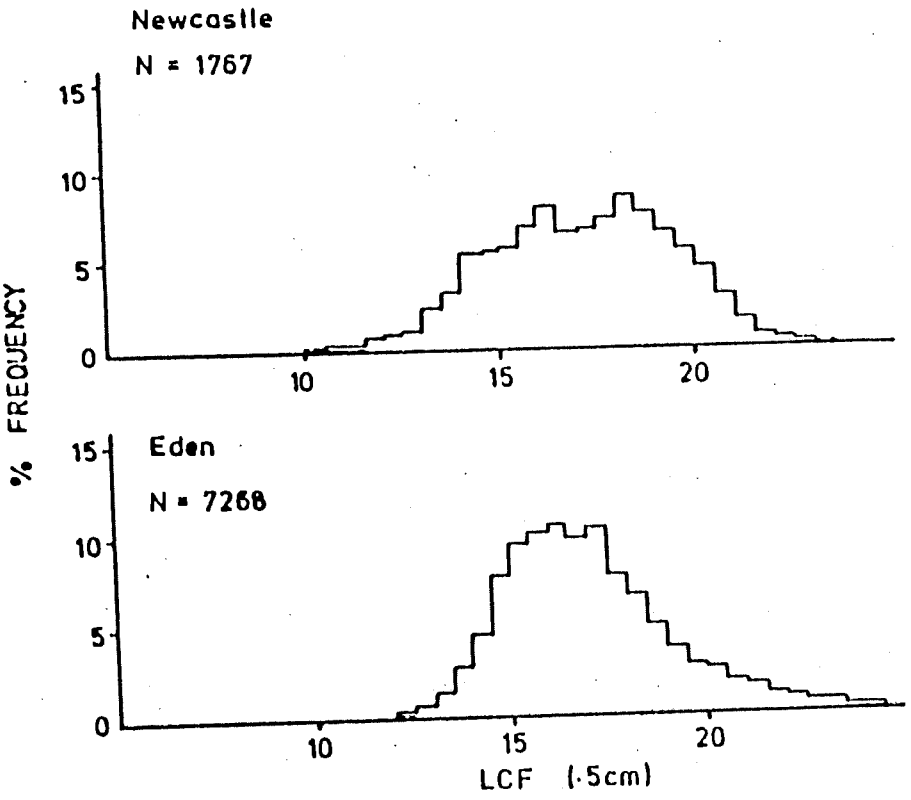


Figure 8. (cont'd)

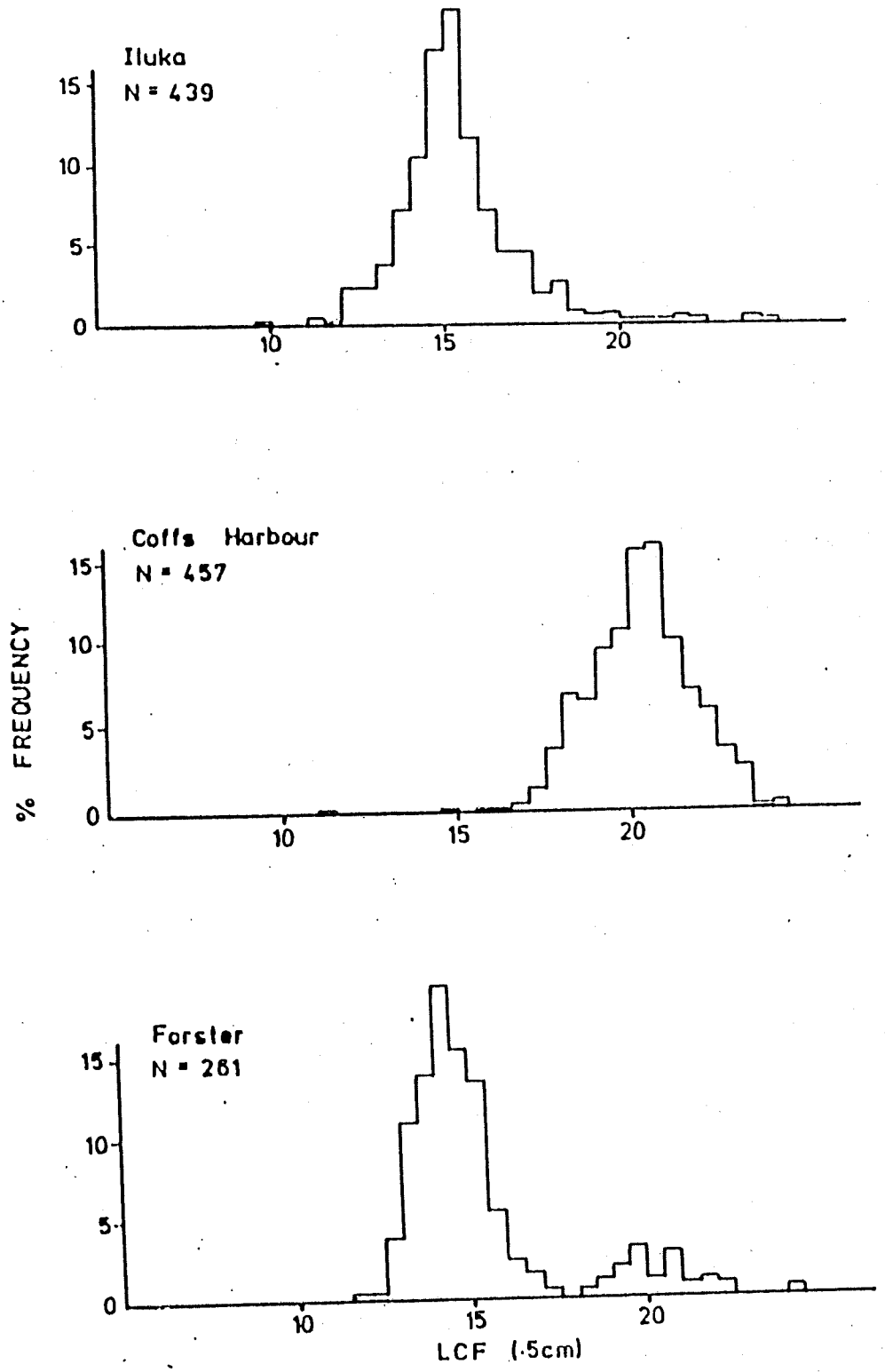
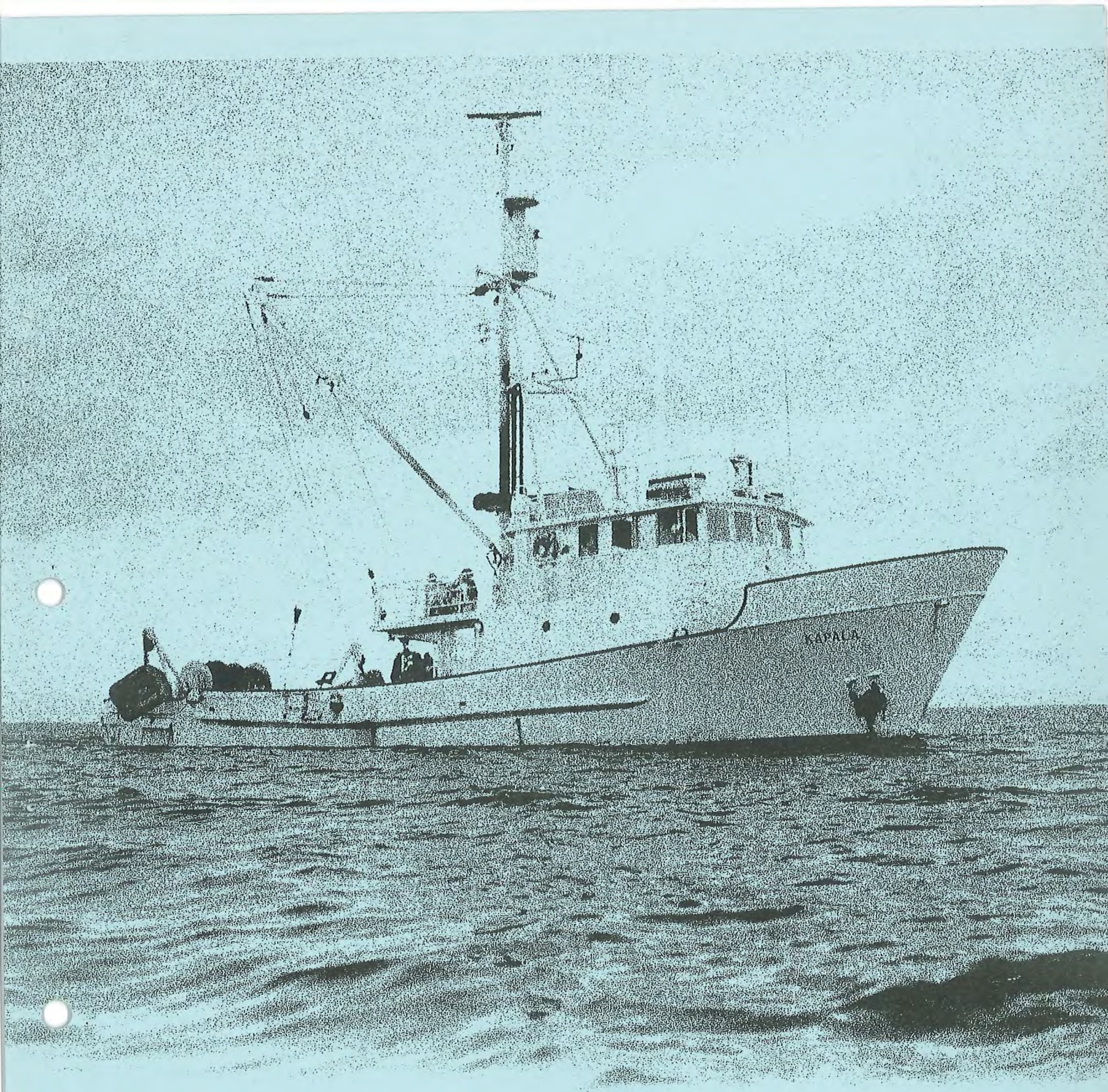


Figure 9. Length frequency distributions of stout whiting landed at major ports, July 84 - June 85.



KAPALA CRUISE REPORT NO.97

Division of Fisheries
Department of Agriculture New South Wales

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PART I

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PART II

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DIVISION OF FISHERIES
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KAPALA CRUISE REPORT NO.97

PART I

Report on redfish tagging and deepwater trawling conducted during Cruises 86-02 to 86-12 in February - May, 1986.

by T.B.Gorman and K.J.Graham

OBJECTIVES

* To tag redfish (*Centroberyx affinis*) in shelf waters between Port Stephens and Jervis Bay. (Redfish tagging by Kapala is a contribution by the Division of Fisheries to the redfish tagging program funded by the Fishing Industry Research Trust Account).

* To catch royal red prawns (*Haliporoides sibogae*) for irradiation studies.

GEAR

The redfish trawl was a 28 m headline Boris box net rigged with a rock-hopper footrope, 50 m bridles and spread by 2.0 m Vee doors.

The prawn trawl was a 27 m headline Kapala prawn net rigged with 30 m bridles and 2.0 m Vee doors.

REDFISH TAGGING METHODS

Trawling time ranged from 30 to 130 minutes, depending on the density of redfish on the ground; most trawls were for about 60 minutes. The catch was landed directly into deck tanks with circulating seawater and live redfish were quickly sorted into clean tanks. The redfish were then tagged and held for release, usually at the completion of the next trawl. On one occasion when a very large catch was taken, the fish were tagged directly into the sea.

All redfish greater than 160 mm were tagged and measured (fork length, mm); samples of redfish which did not survive capture, and other incidentally caught commercial species were also measured.

Yellow Floy anchor tags were used during Cruises 86-02 to 86-10; these were replaced by similar blue tags on Cruise 86-12.

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The tags are inscribed with " N.S.W. FISH REWARD " and a number; a reward of $5.00 is paid for returned tags (and preferably the fish), with details of size, location and date of capture.

TRAWLING AREAS

Redfish tagging

Trawling for redfish was conducted between Port Stephens and Jervis Bay. Tables 3 to 5 show the operation details of all trawls conducted for redfish during Cruises 86-02 to 86-12. The chart shows the trawling and tagging areas.

During Cruises 86-02, 03 and 04, most trawling was conducted on a seldom trawled area in 62-74 fathoms off the Shoalhaven Bight. This ground had hard bottom conditions but the rock-hopper footrope coped well and little net damage was sustained.

On later cruises, all trawling was conducted north of Sydney mainly on regular trawling grounds free of foul bottom. Most trawls (53) were in 65-75 fathoms between Port Jackson and Broken Bay.

Prawn trawling

Four trawls were conducted between Bate Bay and Jervis Bay in 240-314 fathoms.

REDFISH TAGGING RESULTS

Availability of redfish

During Cruises 86-02, 03 and 04, more redfish were caught at night than in the daytime. Off the Shoalhaven Bight 19 night trawls averaged about 46 kg of redfish per hour, whereas 18 day trawls caught less than 10 kg per hour.

On later cruises, nearly all trawling was conducted at night. Off Sydney, the night time catch rate for redfish was 95 kg per hour, whereas over five hours trawling in daylight caught just 10 kg of redfish.

Redfish mortality

To reduce capture mortality, the hauling procedure was slowed as much as practical. Using the powerblock mounted on the deck-crane, the codend handling time was short and the catch was emptied directly into deck tanks located beside the net drum. From most trawls, about 75 percent of the redfish captured survived and were tagged.

The redfish were very active when released, and quickly swam towards the seabed. Five tagged fish released during a trawl in 68 fathoms were immediately recaptured, indicating that they had descended to the seabed in less than four minutes.

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During the tagging operations off Sydney, sharks following Kapala often prevented the release of tagged fish. However, by feeding the sharks with waste fish and then steaming at speed for several minutes, the redfish were then released in apparent safety.

Tagging results

Table 1 summarises the redfish tagging for Cruises 86-02 to 86-12.

In total, 10 191 tagged redfish were released between Port Stephens and Jervis Bay: 8396 were released north of Sydney, and 1795 between Botany Bay and Jervis Bay. The uneven distribution of tags reflected the availability of redfish during the tagging period.

At the date of this report (September 1986), 18 redfish tagged by Kapala during Cruises 86-02 to 86-12 had been returned. Three were tagged in the Port Kembla-Jervis Bay area, and 15 were tagged off Sydney. All but one tag were returned from the Sydney Fish Market or by fish retailers, and consequently information on the recapture area was not available for many fish. Of the tags with recapture data, most were caught close to the release area. However four fish had moved a considerable distance to the south; three Sydney tags were recaptured off Wollongong, Ulladulla and Bermagui after being at liberty for nine, seven and 16 weeks respectively. One Shoalhaven tag was recaptured off Bermagui after 21 weeks. The longest release period was 27 weeks for a redfish tagged and recaptured off Botany Bay.

Length frequency data

Figure 1 shows the length frequency distributions for redfish tagged between Port Kembla and Jervis Bay and between Port Jackson and Broken Bay.

Redfish tagged in the Port Kembla-Jervis Bay area were mostly caught off the Shoalhaven Bight and averaged 23.5 cm fork length, considerably larger than the fish caught off Sydney (mean 20.4 cm).

Small but regular quantities of tiger flathead (*Platycephalus richardsoni*) and john dory (*Zeus faber*) were also taken. Length frequency distributions for these species are presented in Figures 2 and 3.

PRAWN TRAWLING RESULTS

Operation data for the deepwater prawn trawls conducted during Cruises 86-09 and 86-10 are shown in Table 2.

Prawn catch rates in the Sydney-Jervis Bay area during Cruise 86-09 were very low (royal red prawns 8 kg/hour; carid prawns 12 kg/hour). The two trawls off Newcastle (Cruise 86-10) however averaged about 45 kg of royal reds per hour. The results of the irradiation studies on royal red prawns collected during these and earlier cruises (reported in Kapala Cruise Report 96) will be published in Australian Fisheries.

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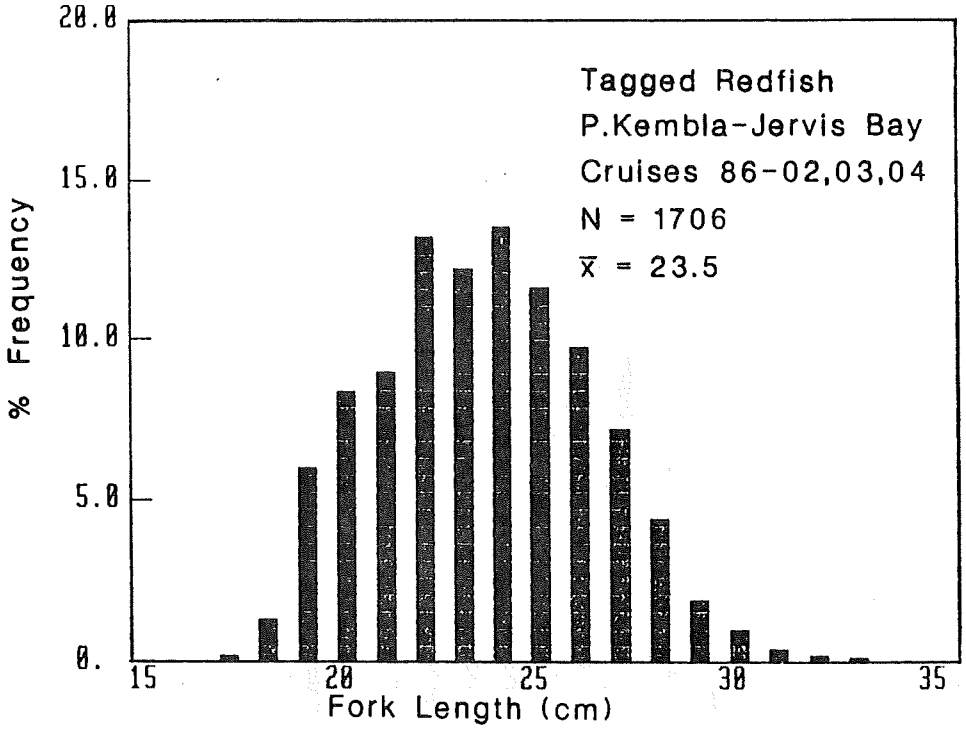
Table 1: Summary of redfish tagging operations during Cruises 86-02 to 86-12.

Area		No. of Trawls	Tagged redfish	Release depth(fm)
Port Stephens - Newcastle	32°30'- 33°00'	6	72	56-57
Newcastle - Broken Bay	33°00'- 33°30'	12	369	71-78
Broken Bay - Botany Bay	33°30' 34°00'	53	7955	55-76
Botany Bay - Port Kembla	34°00' 34°30'	8	49	70-74
Port Kembla - Jervis Bay	34°30' 35°00'	45	1723	57-73
Jervis Bay - Brush Island	35°00'- 35°30'	3	23	80

Table 2: Operation and catch data for prawn trawls conducted during Cruises 86-09 and 86-10.

Operation	Date	Start Time	Position Start	Position Finish	Depth (fm)	Trawl Time (mins)	Prawn Catch(kg)
86-09-01	14-4-86	1806	34°17' 151°25'	34°21' 151°25'	264-270	120	royal red (10) carid (10)
-02	15-4-86	0740	34°36' 151°16'	34°41' 151°15'	240-294	130	royal red (10) carid (20)
-03	"	1143	34°44' 151°14'	34°48' 151°12'	271-314	127	royal red (25) carid (45)
-04	"	1532	34°53' 151°10'	34°59' 151°08'	263-309	120	royal red (20) carid (20)
86-10-07	22-4-86	1215	33°04' 152°28'	33°00' 152°33'	240-276	130	royal red (100) carid (5)
-14	23-4-86	1045	32°58' 152°36'	33°03' 152°30'	249-275	120	royal red (80) carid (2)



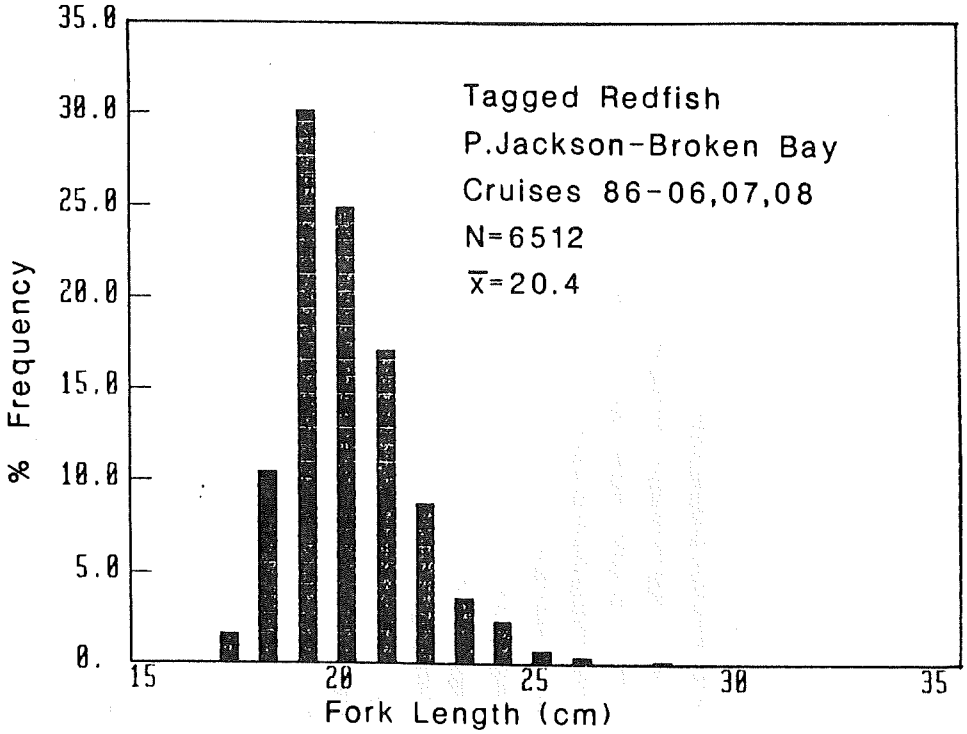


Figure 1: Length frequency histograms for redfish tagged in the P.Kembla-Jervis Bay and P.Jackson-Broken Bay areas.

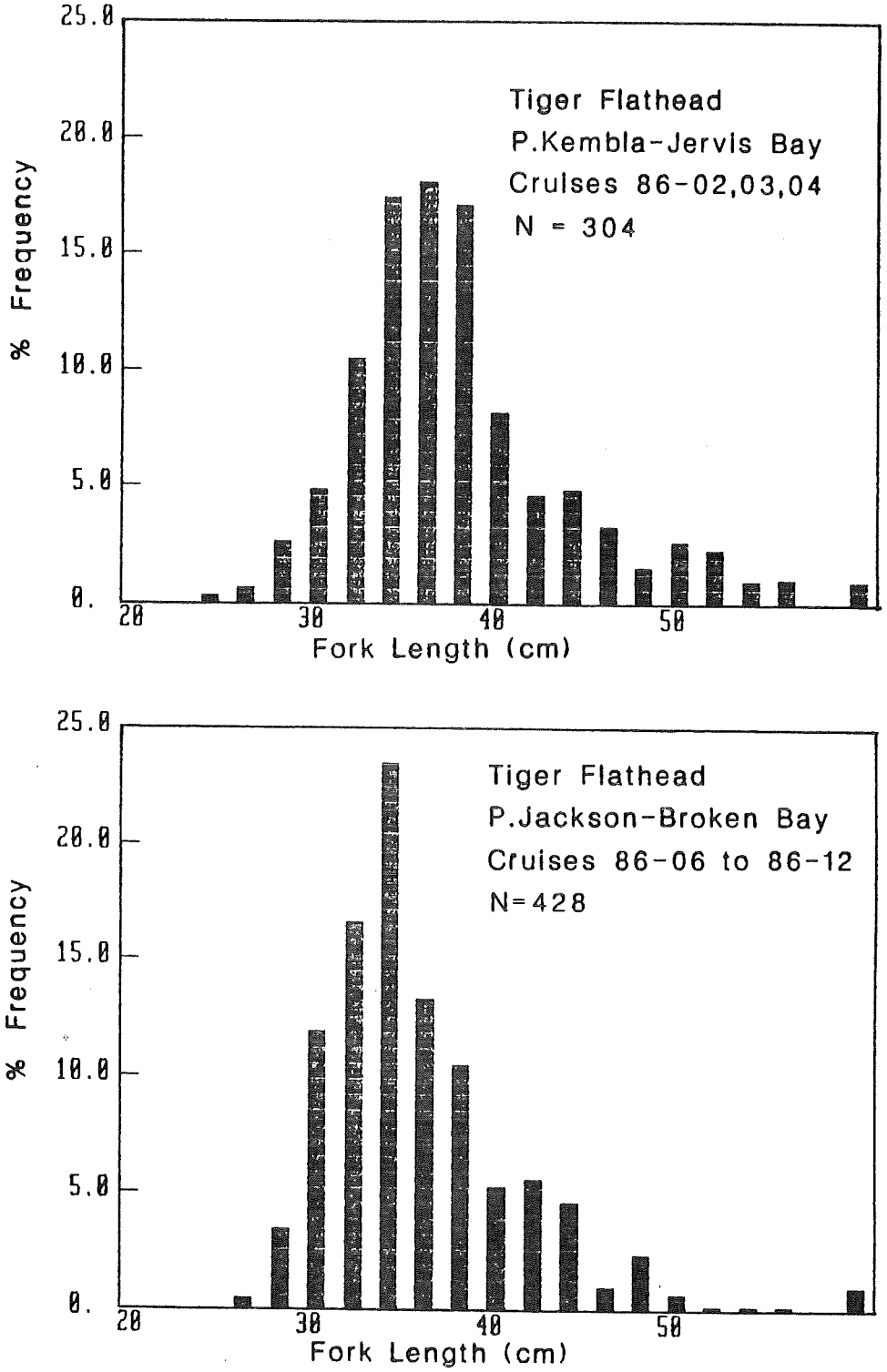


Figure 2: Length frequency histograms for tiger flathead caught in the P.Kembla-Jervis Bay and P.Jackson-Broken Bay areas.

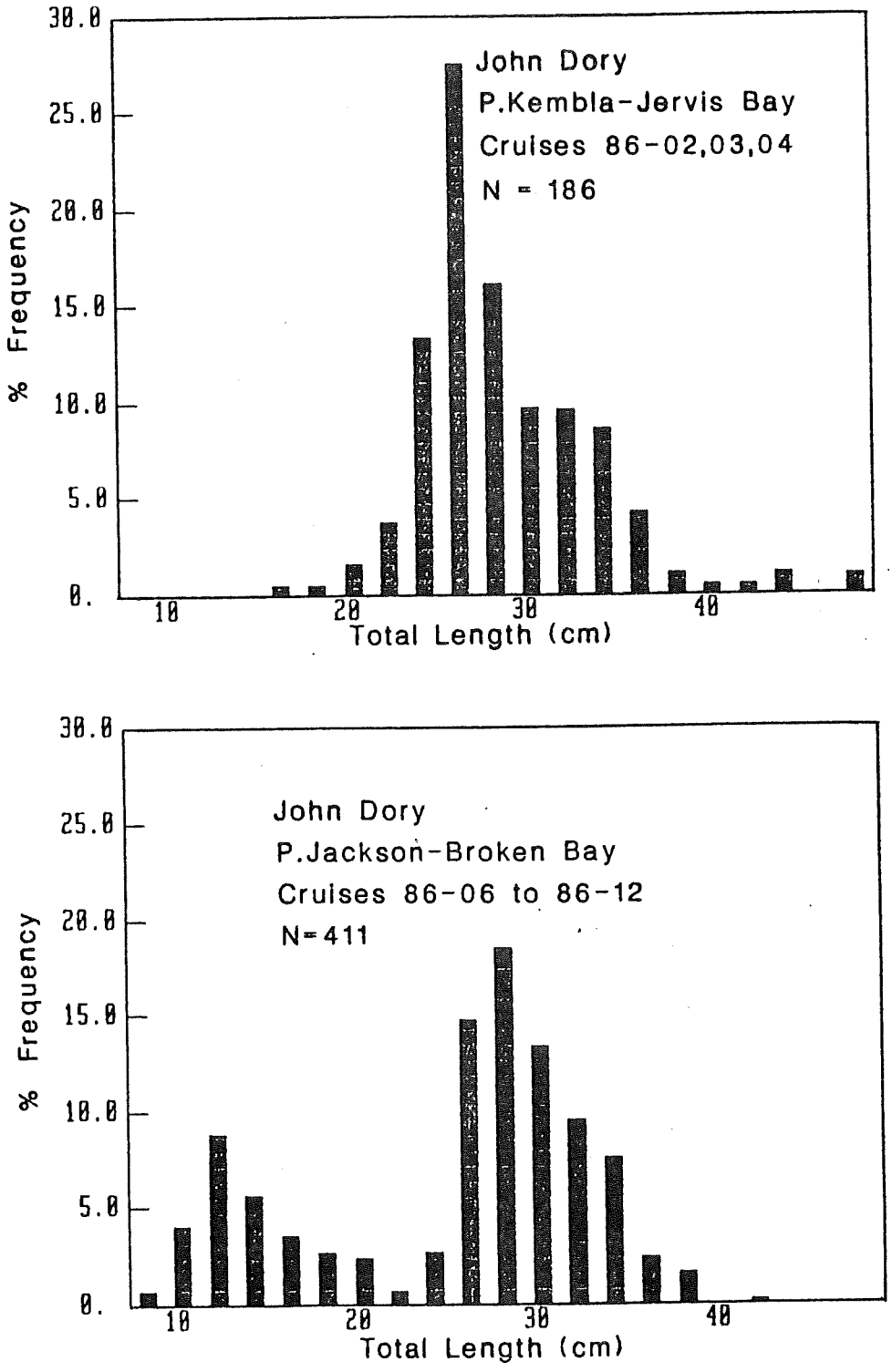


Figure 3: Length frequency histograms for john dory caught in the P.Kembla-Jervis Bay and P.Jackson-Broken Bay areas.

Table 3: Operation and catch data for trawls conducted during Cruises 86-02 and 86-03.

Trawl	Date	Start Time	Position Start	Position Finish	Trawl Depth (fm)	Time (mins)	Redfish Catch (kg)
86-02-01	17-2-86	1725	34°04'151°18'	34°08'151°16'	70	60	-
02	"	1904	34°10'151°14'	34°16'151°13'	69-70	120	1
03	18-2-86	0550	34°50'150°53'	34°55'150°53'	38	95	2
04*	"	0915	34°49'150°48'	34°51'150°48'	16-17	60	-
05	"	1125	34°50'150°51'	34°53'150°51'	26-29	60	1
06	"	1250	34°53'150°51'	34°49'150°53'	27-36	130	1
07	"	1615	34°51'151°00'	34°55'150°59'	69-70	90	40
08	"	1815	34°56'151°00'	34°50'151°00'	67-70	135	17
09*	19-2-86	1135	34°50'150°48'	34°51'150°47'	15-16	70	-
10	"	1310	34°51'150°49'	34°52'150°54'	21-43	110	-
11+	"	1610	34°49'150°54'	34°50'150°55'	41-44	15	-
12	20-2-86	1140	35°10'150°57'	35°12'150°55'	73-75	60	-
13+	"	1420	35°09'150°59'	35°08'150°59'	83	4	50
14+	"	1540	35°05'151°00'	35°07'151°00'	79	38	-
15	"	1810	34°55'150°59'	34°52'151°01'	66-70	95	50
16	"	2015	34°52'151°01'	34°55'151°00'	70	80	35
86-03-01	25-2-86	0650	34°49'151°01'	34°52'150°59'	67-70	90	25
02	"	0850	34°53'150°59'	34°49'151°00'	68	90	8
03	"	1055	34°48'150°00'	34°46'151°01'	67-68	60	-
04	"	1230	34°47'151°02'	34°51'151°01'	69-70	90	1
05	"	1435	34°53'151°01'	34°56'151°01'	69-70	60	20
06	"	1645	34°56'151°01'	34°52'151°01'	68-70	90	10
07+	"	1845	34°54'151°01'	34°58'150°59'	67-68	90	50
08	"	2140	34°56'150°58'	34°54'150°59'	64	60	60
09	26-2-86	0635	34°54'150°59'	34°50'151°01'	64-70	100	40
10	"	0840	34°51'151°01'	34°55'151°00'	68-69	90	5
11	"	1045	34°54'150°58'	34°51'150°59'	62-67	90	2
12	"	1245	34°51'150°59'	34°56'150°58	62-65	90	2
13	"	1450	34°55'150°59'	34°52'151°03'	64-72	120	5
14	"	1720	34°51'151°02'	34°48'151°02'	69-71	90	-
15	"	1930	34°50'151°01'	34°56'150°59'	65-68	115	300
16	27-2-86	0015	34°56'151°00'	34°54'151°00'	68	60	80
17	"	0140	34°53'151°00'	34°51'151°02'	68	60	40
18	"	0315	34°52'151°02'	34°55'151°00'	66-69	60	60
19	"	0500	34°55'151°00'	34°53'151°00'	66	60	20
20	"	0635	34°52'151°01'	34°48'151°01'	67-68	90	30
21	"	1815	34°05'151°17'	34°06'151°16'	68	30	-
22	"	1915	34°07'151°15'	34°12'151°14'	68-72	90	7
23	"	2150	34°14'151°18'	34°16'151°22'	78-90	90	5
24	28-2-86	0010	34°16'151°22'	34°12'151°21'	80-91	95	1
25	"	0255	34°09'151°19'	34°06'151°21'	74-75	90	2
26	"	0455	34°05'151°21'	34°02'151°21'	72-75	65	2

* Trawl with prawn net for whiting sample

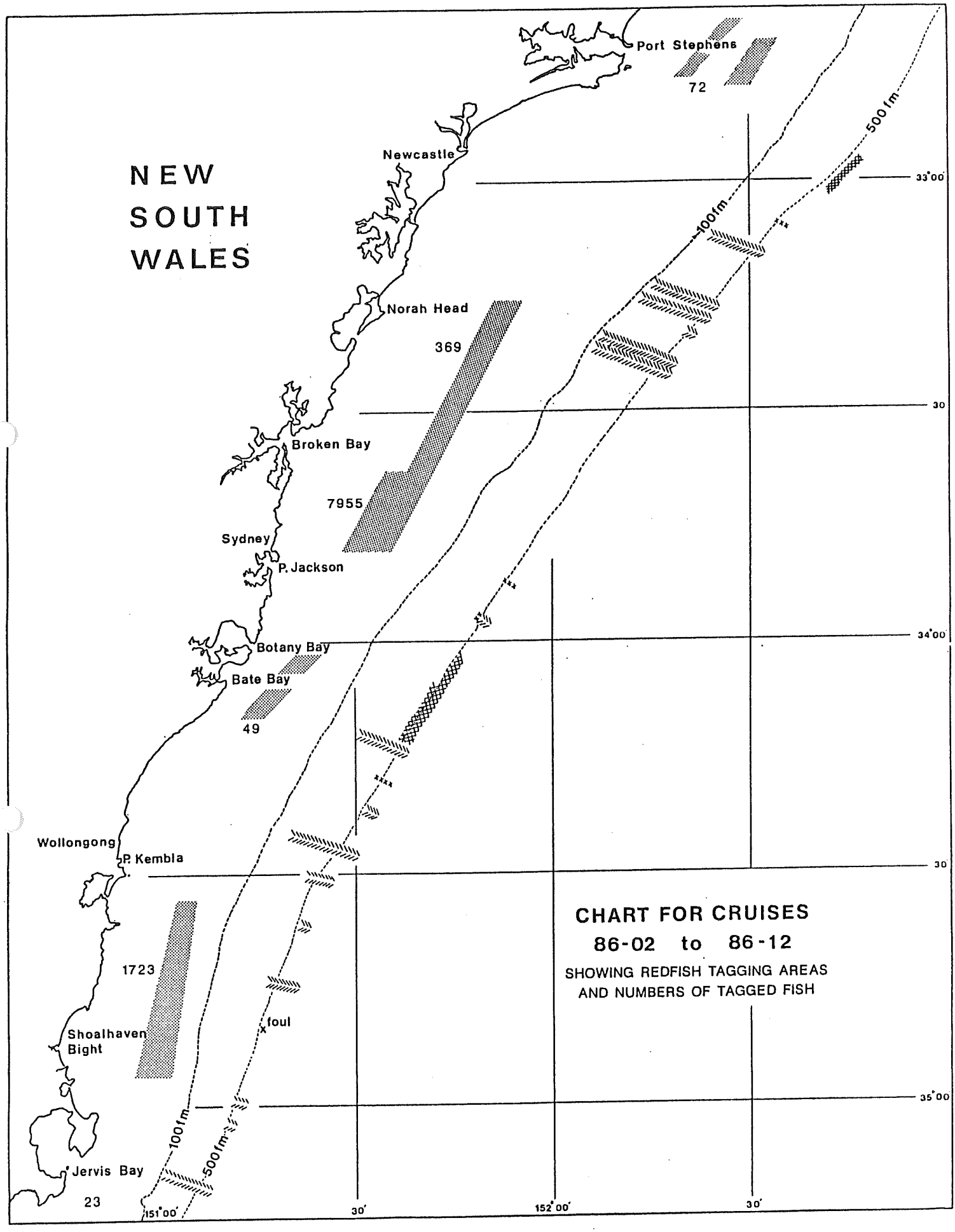
\+ Gear fouled (at finish position).

Table 4: Operation and catch data for trawls conducted during Cruises 86-04, 86-05 and 86-06.

Trawl	Date	Start Time	Position Start	Position Finish	Depth (fm)	Trawl Time (mins)	Redfish Catch (kg)
86-04-01	3-3-86	2035	34°39'151°08'	34°42'151°07'	90-91	60	-
02	"	2255	34°46'151°02'	34°49'151°01'	71-72	60	5
03	4-3-86	0030	34°50'151°01'	34°51'150°59'	68-71	90	10
04	5-3-86	1715	34°20'151°10'	34°17'151°11'	71-72	60	-
05	"	2010	34°33'151°05'	34°35'151°04'	73	60	20
06	"	2145	34°36'151°03'	34°39'151°03'	70	60	2
07	"	2355	34°43'151°01'	34°42'151°02'	67	50	150
08	6-3-86	0250	34°48'150°59'	34°46'150°59'	66-67	45	5
09	"	0440	34°42'151°01'	34°41'151°01'	68-71	30	5
10	"	0540	34°42'151°01'	34°43'151°01'	70-71	33	3
11	"	0720	34°47'151°01'	34°51'151°00'	68-71	100	-
12	"	1030	35°00'151°04'	34°55'151°04'	77-78	125	-
13	"	1325	34°49'151°03'	34°54'151°02'	71-72	120	4
14	"	1620	34°54'151°01'	34°51'151°02'	68-74	100	2
15	"	1835	34°52'151°03'	34°56'151°01'	70-74	85	60
16	"	2050	34°57'151°01'	34°55'151°02'	71-72	40	20
17	"	2215	34°55'151°02'	34°53'151°01'	69-71	60	15
86-05-01	13-3-86	1620	33°38'151°36'	33°37'151°41'	70-71	100	1
02	"	1830	33°35'151°44'	33°33'151°44'	74-75	90	30
03	"	2040	33°31'151°46'	33°28'151°47'	76-78	50	1
04	"	2210	33°29'151°49'	33°26'151°49'	78-75	60	2
05	"	2345	33°25'151°49'	33°23'151°50'	72-73	45	10
06	14-3-86	0140	33°26'151°50'	33°29'151°49'	73-76	65	1
07	"	0345	33°31'151°44'	33°33'151°43'	75-73	60	3
08	"	0520	33°35'151°41'	33°37'151°39'	72	60	300
86-06-01	18-3-86	1950	33°44'151°30'	33°42'151°33'	65-69	60	70
02	"	2125	33°44'151°32'	33°47'151°31'	68-69	60	45
03	19-3-86	0100	33°46'151°27'	33°44'151°28'	64-66	60	200
04	"	0434	33°47'151°26'	33°46'151°30'	62-65	50	250
05	"	1405	33°45'151°28'	33°43'151°33'	65-68	90	-
06	"	1845	33°39'151°35'	33°41'151°33'	69-70	60	150
07	"	2025	33°43'151°31'	33°45'151°30'	66-67	60	120
08	"	2210	33°48'151°28'	33°50'151°28'	67-68	50	120
09	20-3-86	0030	33°49'151°28'	33°48'151°29'	68-69	52	90
10	"	0204	33°47'151°29'	33°45'151°30'	66-67	45	30
11	"	1850	33°49'151°29'	33°46'151°30'	66-67	60	150
12	"	2024	33°45'151°30'	33°43'151°30'	64-67	60	150
13	"	2205	33°44'151°30'	33°47'151°28'	65	60	160

Table 5: Operation and catch data for trawls conducted for redfish during Cruises 86-07, 86-08, 86-10 and 86-12.

Trawl	Date	Start Time	Position Start	Position Finish	Depth (fm)	Trawl Time (mins)	Redfish Catch (kg)
86-07-01	24-3-86	1842	33°49'151°29'	33°48'151°28'	65-68	60	120
02	"	2120	33°47'151°30'	33°43'151°30'	66-67	60	150
03	"	2255	33°45'151°32'	33°43'151°34'	69	60	70
04	25-3-86	0045	33°43'151°35'	33°42'151°34'	69-70	60	80
05	"	0219	33°42'151°32'	33°44'151°31'	67-68	60	30
06	"	0352	33°45'151°30'	33°48'151°29'	67	60	5
07	"	0524	33°47'151°29'	33°45'151°29'	66-67	60	1
08	26-3-86	2110	33°49'151°28'	33°48'151°29'	67-68	60	250
09	"	2255	33°47'151°30'	33°46'151°31'	67-68	60	1
10	27-3-86	0048	33°47'151°29'	33°49'151°28'	67-66	60	130
11	"	0221	33°49'151°28'	33°47'151°28'	67	60	140
12	"	0400	33°46'151°28'	33°44'151°29'	66-64	60	100
13	"	0538	33°45'151°29'	33°48'151°28'	65	58	1
86-08-01	1-4-86	1833	33°49'151°28'	33°47'151°29'	68-66	60	60
02	"	2005	33°46'151°30'	33°43'151°30'	65-66	60	150
03	"	2155	33°43'151°30'	33°46'151°29'	66	60	150
04	"	2345	33°47'151°29'	33°45'151°31'	66	60	100
05	2-4-86	0129	33°43'151°31'	33°41'151°33'	67-68	60	80
06	"	0312	33°41'151°32'	33°44'151°32'	68	60	35
07	"	0450	33°45'151°30'	33°48'151°29'	66-67	75	10
08	"	1834	33°48'151°28'	33°47'151°29'	67-66	60	140
09	"	2005	33°46'151°29'	33°44'151°30'	66-65	60	110
10	"	2150	33°44'151°30'	33°47'151°30'	66	60	110
11	"	2340	33°50'151°28'	33°51'151°28'	67-68	30	30
12	3-4-86	0110	33°48'151°28'	33°46'151°29'	68-66	60	50
86-10-01	21-4-86	1849	33°33'151°42'	33°31'151°44'	72-76	60	50
02	"	2035	33°32'151°45'	33°31'151°48'	76-77	60	2
03	"	2210	33°31'151°48'	33°30'151°50'	77-78	60	1
04	"	2350	33°31'151°49'	33°27'151°51'	77-78	90	2
05	22-4-86	0240	33°24'151°48'	33°22'151°51'	71-73	60	30
06	"	0420	33°20'151°51'	33°18'151°51'	73	60	60
08	"	1745	32°45'152°21'	32°42'152°24'	57-56	105	2
09	"	2005	32°42'152°25'	32°40'152°28'	57-59	60	3
10	"	2240	32°42'152°32'	32°44'152°30'	67-74	60	1
11	23-4-86	0020	32°46'152°29'	32°48'152°28'	74-76	68	2
12	"	0309	32°46'152°18'	32°42'152°19	55-57	60	10
13	"	0443	32°44'152°19'	32°46'152°17'	55-56	55	25
15	23-4-86	1500	33°09'152°19'	33°12'152°16'	87	95	-
16	"	1910	33°14'151°56'	33°17'151°53'	71-72	60	5
17	"	2200	33°16'151°52'	33°19'151°51'	70-71	60	10
18	24-4-86	0100	33°32'151°44'	33°36'151°42'	74-76	60	50
19	"	0234	33°37'151°41'	33°40'151°39'	74-73	60	240
86-12-01	13-5-86	1520	33°45'151°27'	33°41'151°30'	64	90	8
02	"	1720	33°42'151°29'	33°41'151°32'	63-67	60	50
03	"	1845	33°41'151°33'	33°39'151°35'	67-69	70	15
04	"	2030	33°38'151°36'	33°37'151°38'	71-73	75	10
05	"	2220	33°37'151°41'	33°33'151°43'	73	90	2
06	14-5-86	0030	33°32'151°43'	33°27'151°44'	76-72	90	15
07	"	0252	33°27'151°43'	33°30'151°41'	70-68	77	25
08	"	0440	33°32'151°41'	33°34'151°38'	69-66	75	20


NEW SOUTH WALES
Port Stephens
72
Newcastle
Norah Head
369
Broken Bay
7955
Sydney
P. Jackson
Botany Bay
Bate Bay
49
Wollongong
P. Kembla
1723
Shoalhaven Bight
foul
Jervis Bay
23
100fm
500fm
33°00
30
34°00
35°00
151°00
30
152°00
30
CHART FOR CRUISES
86-02 to 86-12
SHOWING REDFISH TAGGING AREAS
AND NUMBERS OF TAGGED FISH

DIVISION OF FISHERIES
DEPARTMENT OF AGRICULTURE
NEW SOUTH WALES

KAPALA CRUISE REPORT NO. 97

PART II

Report on whiting sampling and tagging conducted off northern N.S.W. during Cruise 86-13 in May 1986

by T.B.Gorman, K.J.Graham, D.C.Smith and D.Huber.

OBJECTIVES

* To sample and tag red-spot (*Sillago bassensis*) and stout (*S.robusta*) whiting off northern N.S.W.

* To conduct plankton tows for whiting larvae. (Whiting sampling and tagging by Kapala is a contribution by the Division of Fisheries to the trawl-whiting research program funded by the Fishing Industry Research Trust Account).

GEAR

All trawls for whiting were made with a 27 m headline Kapala prawn net rigged with 50 m bridles and 1.8 m Vee doors.

The plankton tows were with a 1 m diameter ring net, the mesh size of the body was 500 microns and the collecting bag 200 microns.

AREAS OF OPERATION

Trawls for whiting samples were conducted off Tuncurry, Urunga and between Broome Head and Cape Byron; tagging was carried out off Urunga and between Broome Head and Evans Head. The chart shows the areas where whiting were tagged and released.

Plankton tows were made off Newcastle, Tuncurry, Urunga and Iluka.

METHODS

Trawls for tagging were for 15-20 minutes duration. The codend was emptied directly into deck tanks and active whiting were transferred to holding tanks for tagging. The fish were then measured and tagged with blue streamer tags inserted below the dorsal fin. The tags are inscribed with "N.S.W. FISH REWARD" and a number; a reward of $5.00 is paid for the return of any tagged fish with details of recapture location and date.

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To obviate predation by sea birds, the tagged whiting were released from a cage lowered close to the seabed. Care was also taken to release the whiting away from sharks and dolphins which frequently followed Kapala while trawling.

Samples of whiting from each station were measured for length frequency data and examined for breeding condition.

The plankton net was towed at a speed of about one knot; it was first allowed to sink close to the seabed, then slowly hauled to the surface.

RESULTS

Table 1 shows the operation and catch data for whiting trawls and plankton tows conducted during Cruise 86-13.

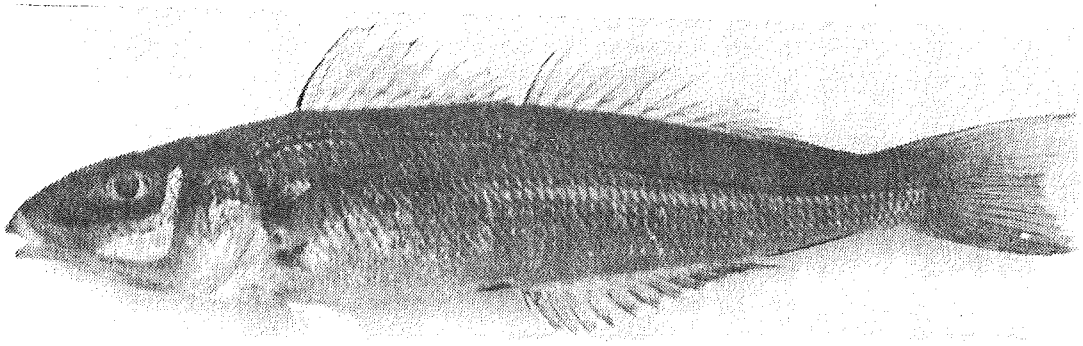
Red-spot whiting catchs were generally small, and when substantial numbers were caught, trawl mortality was very high. The few large catches of whiting consisted almost totally of stout whiting; for example the second shot at station 86-13-16 in 26 fathoms to the south of Cape Byron caught 300 kg of stout whiting in 40 minutes.

In total, 871 tagged whiting were released: 135 off Urunga and 736 in the Iluka-Evans Head area.

Several whiting larvae of two types were caught in the plankton samples, but specific identification of these has still to be determined.

DISCUSSION

Six whiting tagging cruises have now been completed by Kapala, and a total of 5000 tagged whiting have been released between Newcastle and Evans Head. However, as only 20 tagged whiting have been recaptured (all from 1985 taggings off Forster), no further whiting tagging is planned.

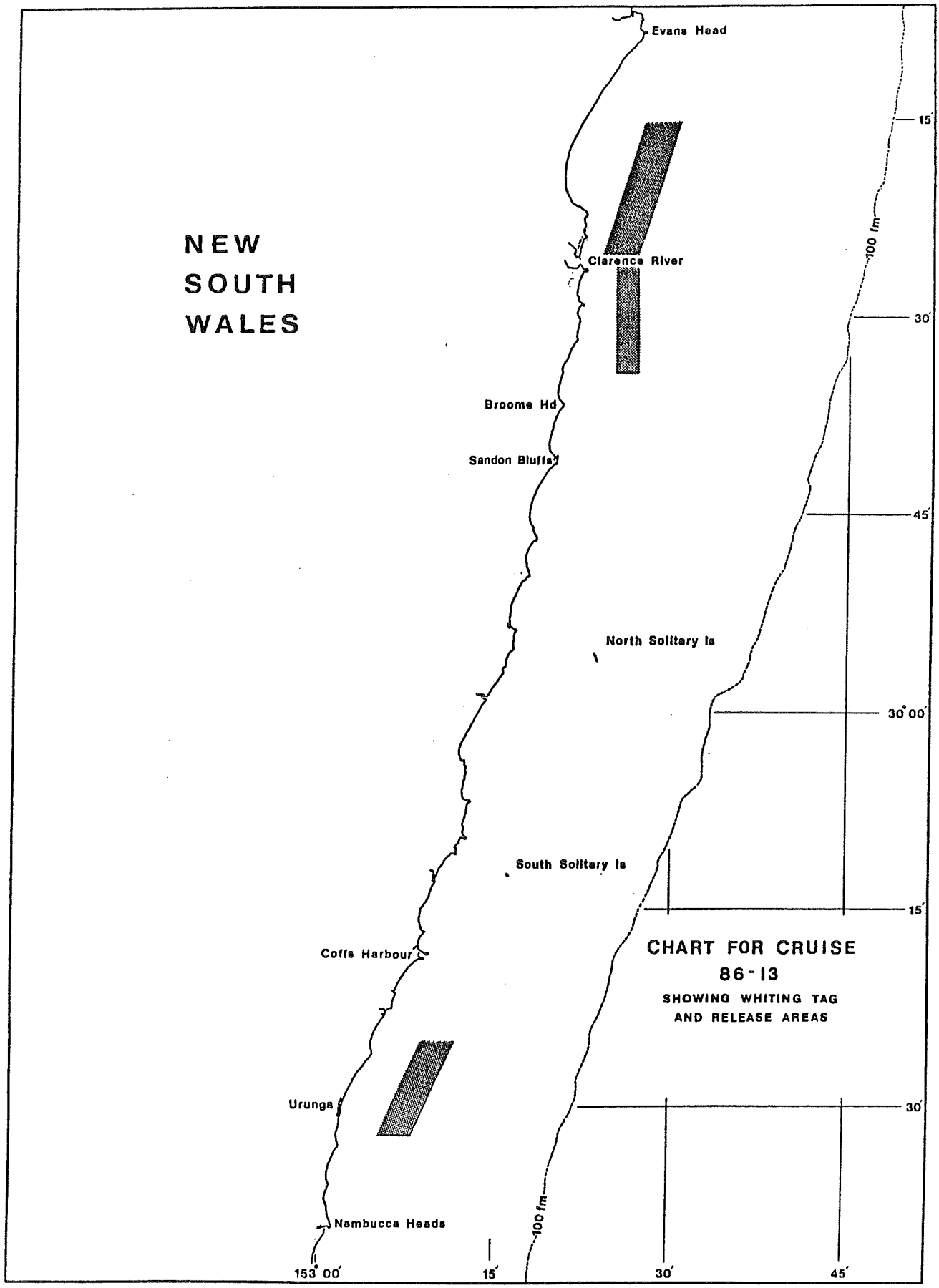


Stout Whiting (*Sillago robusta*).

Table 1: Operation and catch data for whiting trawls and plankton tows conducted during Cruise 86-13. (rsw=red-spot whiting; stout=stout whiting)

Operation	Date	Start Time	Position Start	Position Finish	Depth (fm)	No.of Trawls	Trawl Time (mins)	Whiting Catch (kg)
86-13-01*	19-5-86	2030	32°55' 151°55'		22-24	1	12	
02*	20-5-86	0715	32°09' 152°31'		14	1	12	
03	"	0825	32°08' 152°32'	32°07' 152°32'	14-15	1	30	rsw 2 stout 24
04	"	0935-1005	32°05' 152°37'	32°07' 152°36'	23-24	1	30	rsw 0 stout 0
05	"	1105-1135	32°09' 152°32'	32°08' 152°32'	9-12	1	30	rsw 1 stout 20
06*	21-5-86	1114	30°26' 153°08'		20	1	10	
07	"	1145-1600	30°27' 153°08'	30°32' 153°07'	18-23	6	90	rsw 30 stout 0
08*	22-5-86	1900	29°24' 153°25'		29	1	15	
09	"	1956-2315	29°25' 153°30'	29°18' 153°32'	27-30	6	90	rsw 80 stout 2
10	23-5-86	0840-2110	29°22' 153°27'	29°14' 153°32'	25-31	13	245	rsw 120 stout 60
11	24-5-86	0720-0820	29°12' 153°33'	29°17' 153°53'	28-29	2	40	rsw 2 stout 0
12	"	0905-1005	29°18' 153°36'	29°23' 153°36'	34-38	2	40	rsw 0 stout 0
13	"	1100-2005	29°18' 153°27'	29°22' 153°31'	22-28	8	40	rsw 50 stout 110
14	25-5-86	0835-1150	29°26' 153°29'	29°16' 153°31'	27-29	5	95	rsw 9 stout 0
15	"	1400-1626	29°06' 153°34'	28°57' 153°38'	24-29	4	80	rsw 9 stout 0
16	"	1745-2025	28°49' 153°38'	28°41' 153°39'	26-29	2	70	rsw 0 stout 300
17	26-5-86	0700-2000	29°28' 153°30'	29°33' 153°25'	28-30	12	255	rsw 80 stout 20

* plankton tows


NEW
SOUTH
WALES
Evans Head
Clarence River
Broome Hd
Sandon Bluffs
North Solitary Is
South Solitary Is
Coffs Harbour
Urunga
Nambucca Heads
100 fm
100 fm
15'
30'
45'
30° 00'
15'
30'
153° 00'
15'
30'
45'
CHART FOR CRUISE
86-13
SHOWING WHITING TAG
AND RELEASE AREAS