FISHERY SITUATION REPORT 2. JACK MACKEREL

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FISHERY SITUATION REPORT - JACK MACKEREL

INDEX

1.0 INTRODUCTION

Over the years interest has been expressed in the potential of the jack mackerel (Trachurus declivis (Jenyns) 1841), (Blackburn and Olsen 1947; Blackburn and Rayner, 1951; Wolfe, 1967) as a commercial species and, despite a number of investigatory attempts to establish a fishery, none exists at the present time.

The family Carangidae to which the Australian jack mackerel belongs is of importance commercially around the world and landings from the genus Trachurus alone average over one million tonnes annually.

This report covers general features of the species relevant to future commercial exploitation.

1.1 Distribution

The jack mackerel is found around Tasmania, Victoria and north to the mid New South Wales coast. The range extends westward across the Great Australian Bight to Western Australia, where it was first described from a specimen taken in King George Sound (Jenyns, 1841).

Research has shown that there is a seasonality in the observed distribution in the waters of south-east Australia. Surface shoaling is evident in southern New South Wales waters in the late winter and early spring (Blackburn and Rayner, 1951), while Blackburn and Tubb (1950) reported that the densest concentrations occur in south-eastern Tasmanian waters during autumn and early winter. Hynd and Robins (1967) observed significant surface aggregations off eastern Tasmania, but found the schools concentrated in the north east rather than south east as reported by Blackburn and Tubb (1950). Surface sightings of fish while useful, can give a bias in any account of seasonal distribution. The distribution of all surface sightings from 1941-1966 (Anonymous, 1969) is given in Figure 1 and shows that the majority of reported sightings were between the months of February and May in the waters of south-eastern Tasmania. Recent sonar surveys (Wolfe, 1970, 1971, 1976) suggest that the distinct seasonality of occurrence in the south east indicated by surface observations may not be the real situation and that the mackerel may be present most times of the year. The seasonality of surface sightings by recent aerial observations are shown in Figure 2(a)-(c), confirming the concentrated period of surface sightings shown in Figure 1 for the autumn and early winter. The seasonal surface sightings noted by Blackburn and Rayner (1951) of jack mackerel in New South Wales during late winter and early spring is also confirmed. It is thought that a migration southwards out of New South Wales does occur as the summer progresses and the 17^{o}C isotherm moves south. An offshore migration into deeper cooler water is also likely (see Section 1.2).

The abundance of the south eastern stocks for commercial exploitation has been reported as being between 10,000 to 100,000 tons. Hynd and Robins (1967) from their aerial survey work give 10,000 tons as a possible yield from eastern Tasmania. Butcher (1967) on the other hand reports:

> "During a recent aerial survey, surface shoals off the east and west coasts of Tasmania on March 6, 1966 were estimated by experienced spotters to be of the order of 100,000 tons."

This figure is not given as a potential yield to a fishery but as a total stock. The value of 100,000 tons potential yield appears in a number of reports and finally is reported by Gulland (1971). For south eastern Australia this value may be excessive and a more accurate value should be sought by conventional research techniques.

1.2 Biology

The jack mackerel like other species of the same genus, is an active pelagic predator. As mentioned above, the surface schooling behaviour appears to be correalated with the 17°C isotherm (Anon, 1975) and the principal pelagic and demersal concentrations inhabit water colder than this. Shuntov's (1969) observations of jack mackerel in the Great Australian Bight forming surface schooling concentrations in water temperatures of 19.5 to 21.5°C were not confirmed by a recent survey of that region (Maxwell and Brown, 1978) and any preference for water temperatures within these limits cannot be supported from observations in south-east Australian waters.

Measurements reported by Webb and Grant (1979) give a maximum theoretical length (L_∞) and value for (K) calculated from the von Bertalanffy growth equation of 46.3cm and 0.23 respectively.

From an analysis of stomach contents Webb (1966) reported a diet of 99.9% euphausids. During the investigations carried out by the CSIRO with the FV "Courageous" the diet was observed to be more catholic, consisting of euphausids and other zooplankton, molluscs and a number of fish species. The observed distribution of food items taken (Figures 3 and 4) indicates a pisciverous diet in deep water at the continental shelf edge while pelagic feeding on euphausids dominates the diet of fish on the continental shelf.

Spawning, as indicated by the presence of ripe fish, probably occurs slightly earlier in New South Wales (October to January) than off Tasmania (November to January).

2.0 THE FISHERY

There is no established Australian fishery at the present time. A purse seine vessel, the "Dageraad", owned by Lakes Entrance Processors Pty Ltd has been using the Commonwealth owned purse seine net to establish the feasibility of catching jack mackerel for processing as fish meal through the Lakes Entrance Processors Pty Ltd, in Victoria.

2.1 Fishing localities

The main concentrations of jack mackerel are found off eastern Tasmania. Quantities are also found along the New South Wales coast in early summer after which they move either southwards into Victoria or off shore into generally deeper water. Concentrations are also found in western Victoria from Cape Otway to Cape Northumberland.

2.2 Fishing methods

When specific commercial efforts are made in south-east Australia, the purse seine is used (Lorimer, 1968; Anonymous, 1975). Mid-water trawling is also possible with small boats (< 30m) (Gorman and Graham, 1977), but catch rates are highly variable on account of the species' behavioural characteristics. Where it is caught in New South Wales as an incidental catch component it is taken in conventional demersal trawl gear. It is worth noting that in New Zealand there is an active demersal trawl fishery by the Japanese, taking in the region of 20,000 tonnes annually.

2.3 Production and income

With the low status of jack mackerel as a fishery, detailed landing statistics are subject to error due to misidentification of the fish and 'lumping' landings with other incidental species. The present landings are trivial, and between 1969/70 and 1977/78 the total reported production in New South Wales was 537 tonnes, which after correction becomes 452 tonnes. The peak landings in 1973-74 for New South Wales (Table 1) when high landings were made at Twofold Bay (Table 3) illustrate the special case where a purse seine operation made a specific effort to land jack mackerel. The main landings during this period were made in Tasmania where four boats working for a six month period during the summer of 1973-74 landed over 6,000 tonnes at Triabunna in eastern Tasmania for reduction to fish protein concentrate (FPC) by the Fish Protein Concentrate (Tasmania) Pty Ltd. The collapse of this venture was in no way due to the lack of the resource but to problems relating to the land based component of the operation. A purse seine operation from Lakes Entrance in 1969-70 most likely explains Victorian landings in excess of 150 tonnes for that year.

At present Lakes Entrance Processors Pty Ltd expect $30/tonne for whole fish going to fish meal while in general the market landing price may vary between $30-60/tonne depending on how the fish is to be utilised.

2.4 The market

There is no specialised market for jack mackerel landed Australian vessels at the present time. Such landings that made in south eastern Australia as an incidental component demersal trawl catches have been used as bait and pet food.

While jack mackerel is edible, especially if canned on, 1977; Pownall, 1977), it is unlikely to become popular in tralia. A recent survey (Anon, 1979) identified Japan and ea as potential specialised markets for high quality frozen n capable of being processed for human consumption. Another or use for jack mackerel is in the production of fish-meal. Australian resource capable of sustaining fish-meal duction could have a useful home market as most fish-meal d at the present time has to be imported.

MANAGEMENT

At present no management measures are required. Future agement could well be necessary with the present interest in eloping a bait fishery in Tasmania. Such a fishery is likely be in shallow water for both jack mackerel (T. declivis) and lowtail (T. mccullochi). Juvenile jack mackerel which school hore are therefore likely to form part of the catches made by ait fishery.

While the reported annual production of yellowtail is her, the difference in landings between the two species drops nificantly (Tables 3 and 4) when ports where species ntification for statistical returns are subject to error are oved from the analysis. A possible correlation exists ween landings of the two species (Table 2).

Development of bait fisheries should be closely itored to avoid damage to pre-recruitment stocks of jack kerel, such as occurred with the South African Maasbanker achurus trachurus) (Geldenhuys, 1973).

RESEARCH AND DEVELOPMENT

The potential for an Australian jack mackerel fishery been noted many times (Blackburn and Olsen, 1947; Blackburn Tubb, 1950; Blackburn and Rayner, 1951; Hynd and Robins, 7; Wolfe, 1967; Gulland, 1971), but the requisite economic marketing circumstances for its establishment do not appear have existed.

Research on the biology and life history has continued n the 1947 work of Blackburn and Olsen to the present time, n State Fisheries Departments in both New South Wales and mania and the Federal Government in the form of the artment of Primary Industry (Fisheries Division) and the RO (Division of Fisheries and Oceanography) contributing to

the work. Knowledge has now been gained about the basic parameters influencing the species but more remains to be learned about environmental influences on distribution, population structure and population dynamics. An active fishery which could be monitored on a scientific basis would greatly assist and give impetus to a research effort.

Development of a fishery is likely in the first instance to centre around fish meal production. At present, the Commonwealth Government lends a purse seine to fishermen wishing to gain experience in its use for jack mackerel fishing. During the summer of 1977-78 the net was lent to Lakes Entrance Processors Pty Ltd who are running a pilot project for fish meal production at their Lakes Entrance plant. Adverse weather conditions (November-December 1977) and gear failure prevented any effective results.

5.0 PROSPECTS

The south eastern Australian jack mackerel resource is a potentially valuable one and worth developing. The present landings are negligible and can be expanded considerably, as has been shown when purse seine operations have been conducted. Development of a resource such as the jack mackerel should not however be viewed in isolation from other related species such as the yellowtail or those which are susceptible to similar fishing methods.

In realistic terms the development of a fishery is dependent on such a diversity of factors quite apart from the availability of the resource that the prospects for developing such a fishery are hard to predict.

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Figure 1. Reported jack mackerel surface sightings from 1941-1966 evaluated from fishing and research vessel log books (Anon, 1969). The estimated school sizes are given as a relative guide to compare reported sightings from five sectors on the Tasmanian east coast for each month.

Figure 2(a). Distribution of surface sightings by aerial observation from July 1973 to May 1974. July-October 1973.

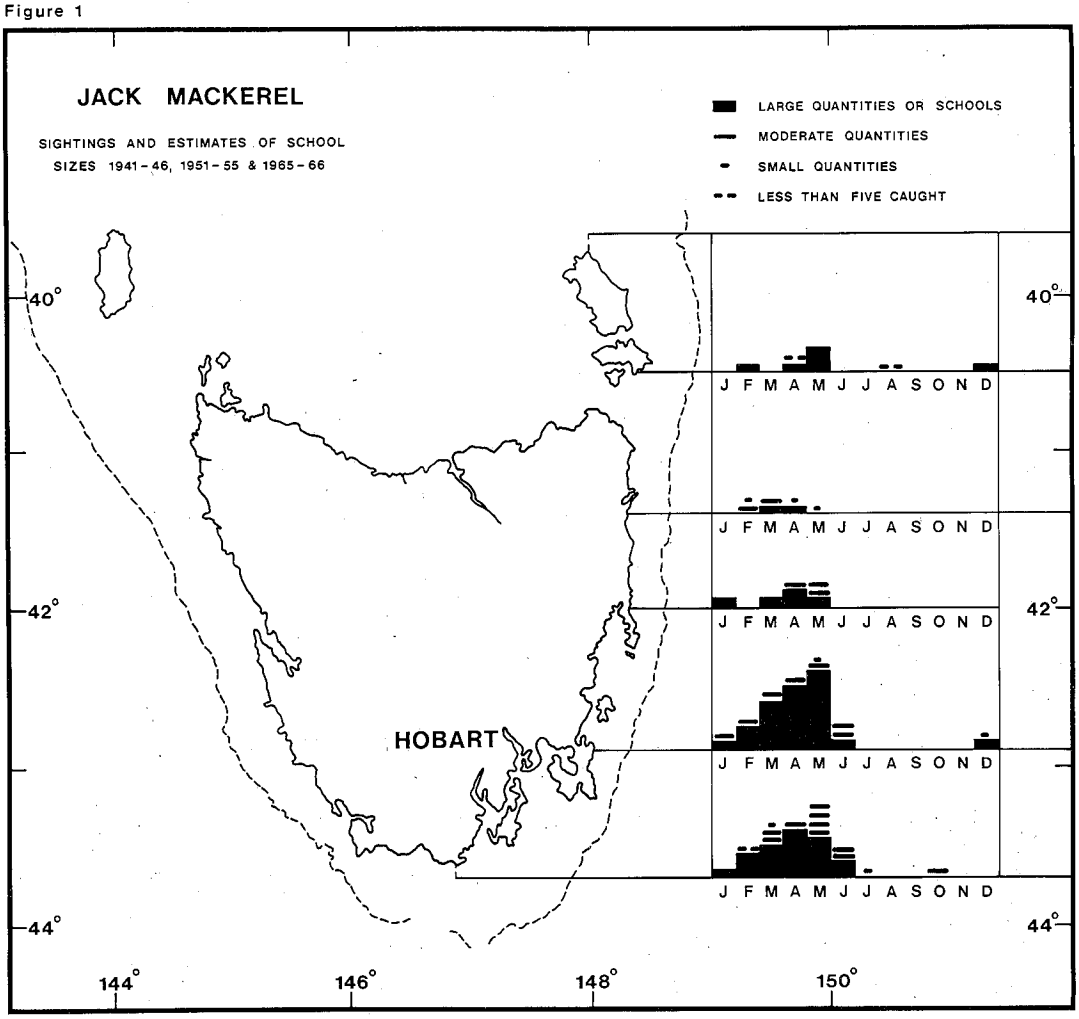
Figure 2(b). Distribution of surface sightings by aerial observation from July 1973 to May 1974. November 1973 - February 1974.

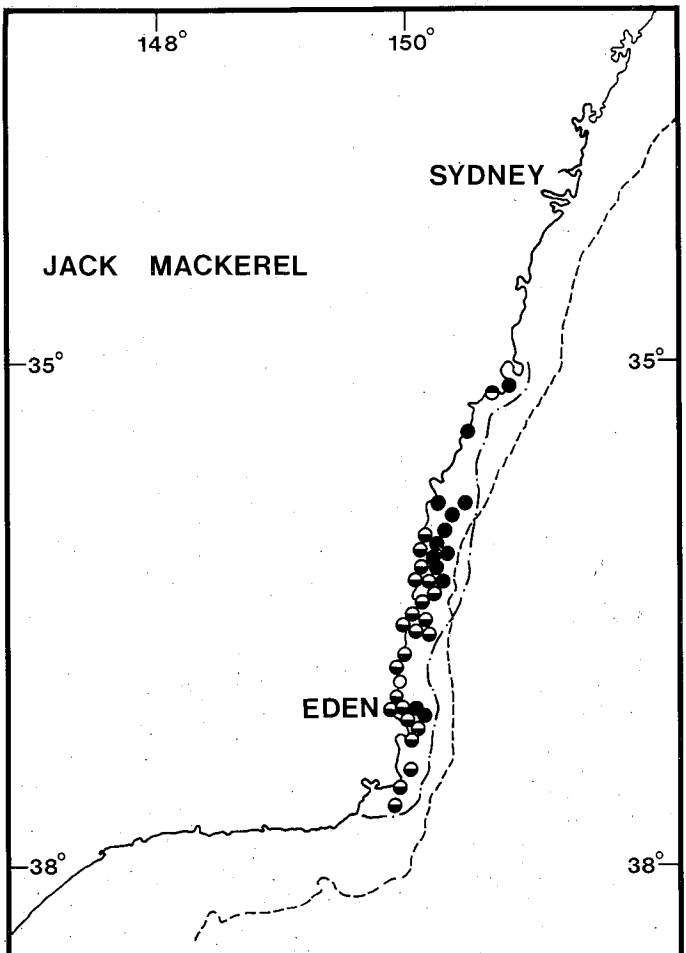
Figure 2(c). Distribution of surface sightings by aerial observation from July 1973 to May 1974. March-May 1974.

Figure 3. Observed distribution of principal food items from analysis of jack mackerel stomach contents.

Figure 4. Observed distribution of different fish components of the diet of jack mackerel.

Figure 1

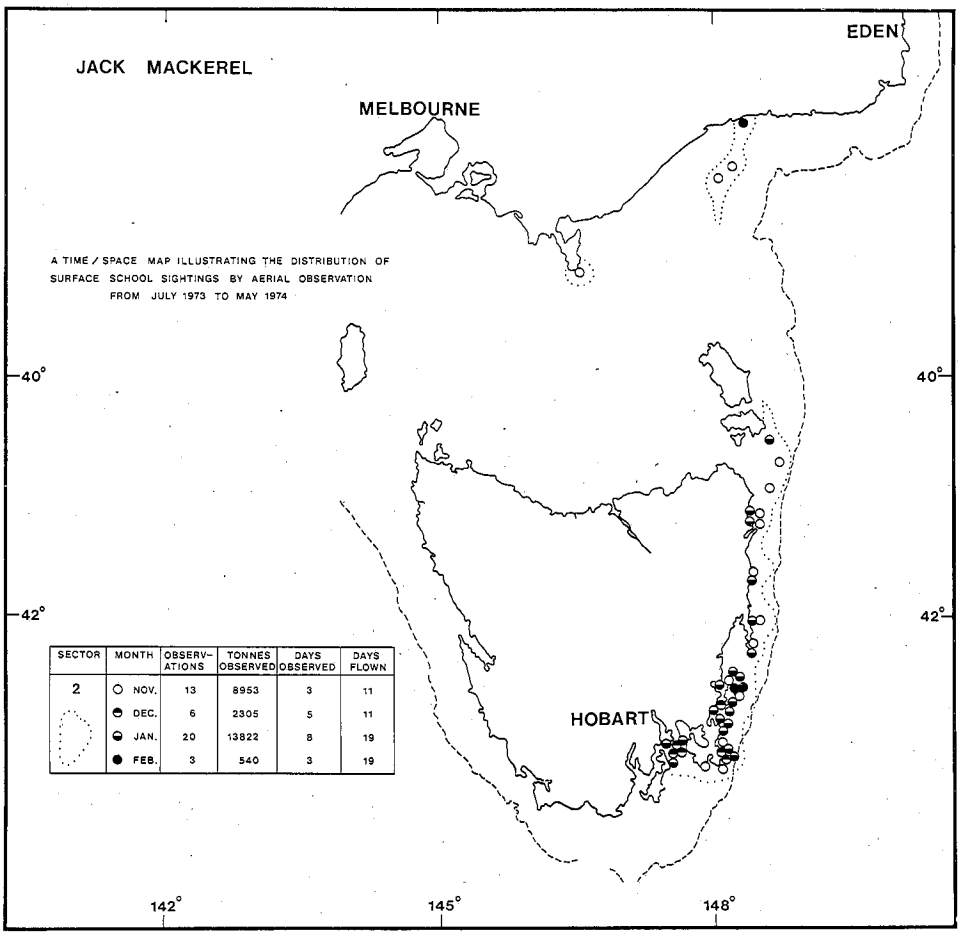

JACK MACKEREL
SIGHTINGS AND ESTIMATES OF SCHOOL SIZES 1941-46, 1951-55 & 1965-66
LARGE QUANTITIES OR SCHOOLS
MODERATE QUANTITIES
SMALL QUANTITIES
LESS THAN FIVE CAUGHT
HOBART
40°
42°
44°
144°
146°
148°
150°
J F M A M J J A S O N D



A TIME / SPACE MAP ILLUSTRATING THE DISTRIBUTION OF SURFACE SCHOOL SIGHTINGS BY AERIAL OBSERVATION FROM JULY 1973 TO MAY 1974

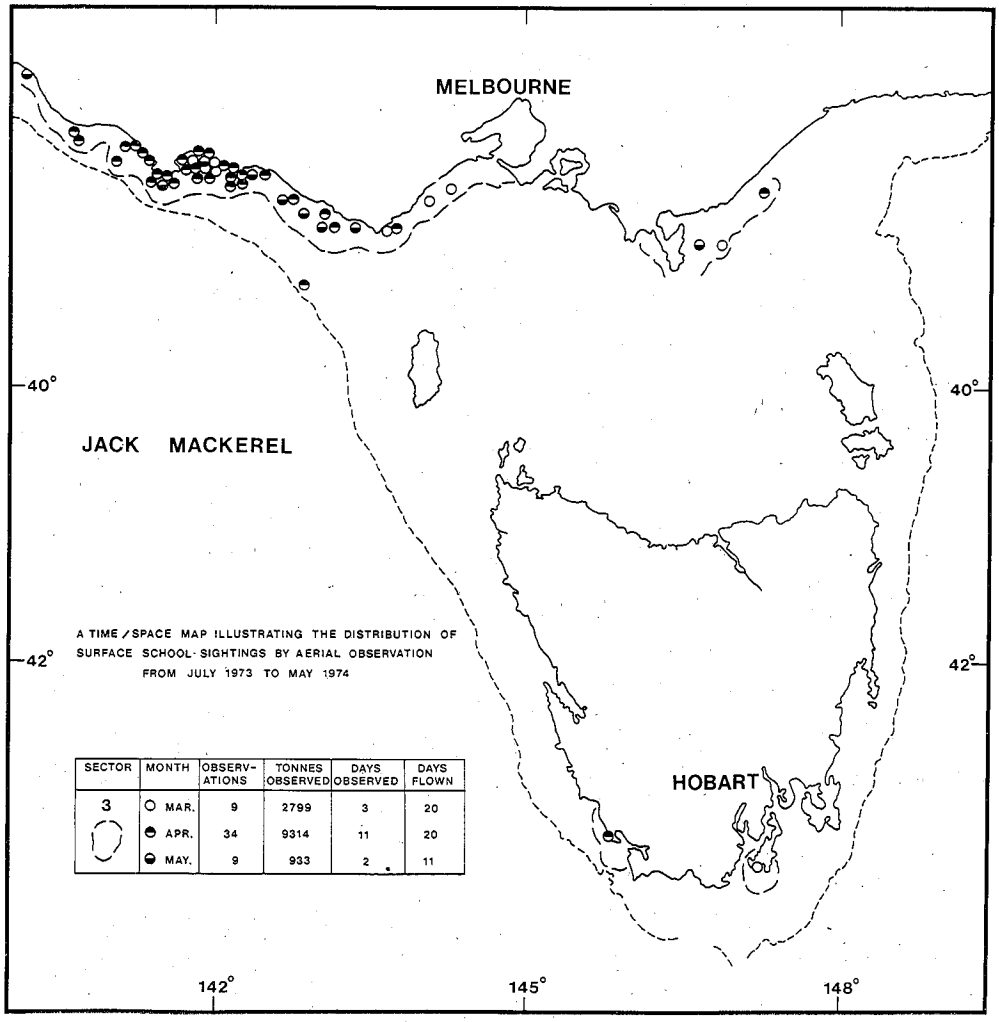
SECTOR	MONTH	OBSERV-ATIONS	TONNES OBSERVED	DAYS OBSERVED	DAYS FLOWN
1	○ JUL.	1	20	1	2
	◓ AUG.	1	120	1	9
	◒ SEP.	23	3291	6	17
	● OCT.	13	3248	4	6

Figure 2b



SECTOR	MONTH	OBSERV-ATIONS	TONNES OBSERVED	DAYS OBSERVED	DAYS FLOWN
2	NOV.	13	8953	3	11
	DEC.	6	2305	5	11
	JAN.	20	13822	8	19
	FEB.	3	540	3	19

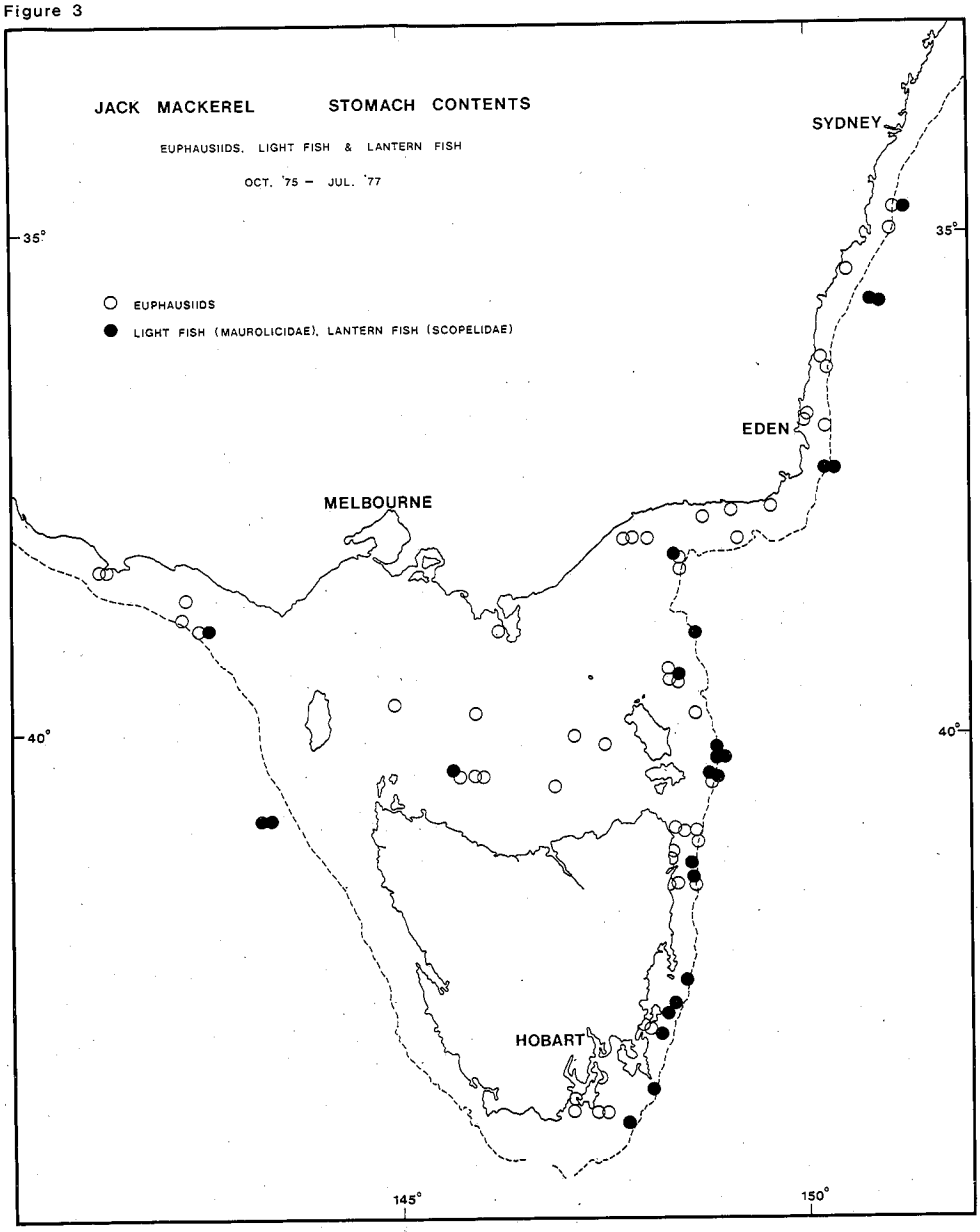
Figure 2c



A TIME / SPACE MAP ILLUSTRATING THE DISTRIBUTION OF SURFACE SCHOOL-SIGHTINGS BY AERIAL OBSERVATION FROM JULY 1973 TO MAY 1974

SECTOR	MONTH	OBSERV-ATIONS	TONNES OBSERVED	DAYS OBSERVED	DAYS FLOWN
3	MAR.	9	2799	3	20
	APR.	34	9314	11	20
	MAY.	9	933	2	11

Figure 3


JACK MACKEREL STOMACH CONTENTS
EUPHAUSIIDS, LIGHT FISH & LANTERN FISH
OCT. '75 – JUL. '77
EUPHAUSIIDS
LIGHT FISH (MAUROLICIDAE), LANTERN FISH (SCOPELIDAE)
SYDNEY
EDEN
MELBOURNE
HOBART
35°
40°
145°
150°

ɟure 4

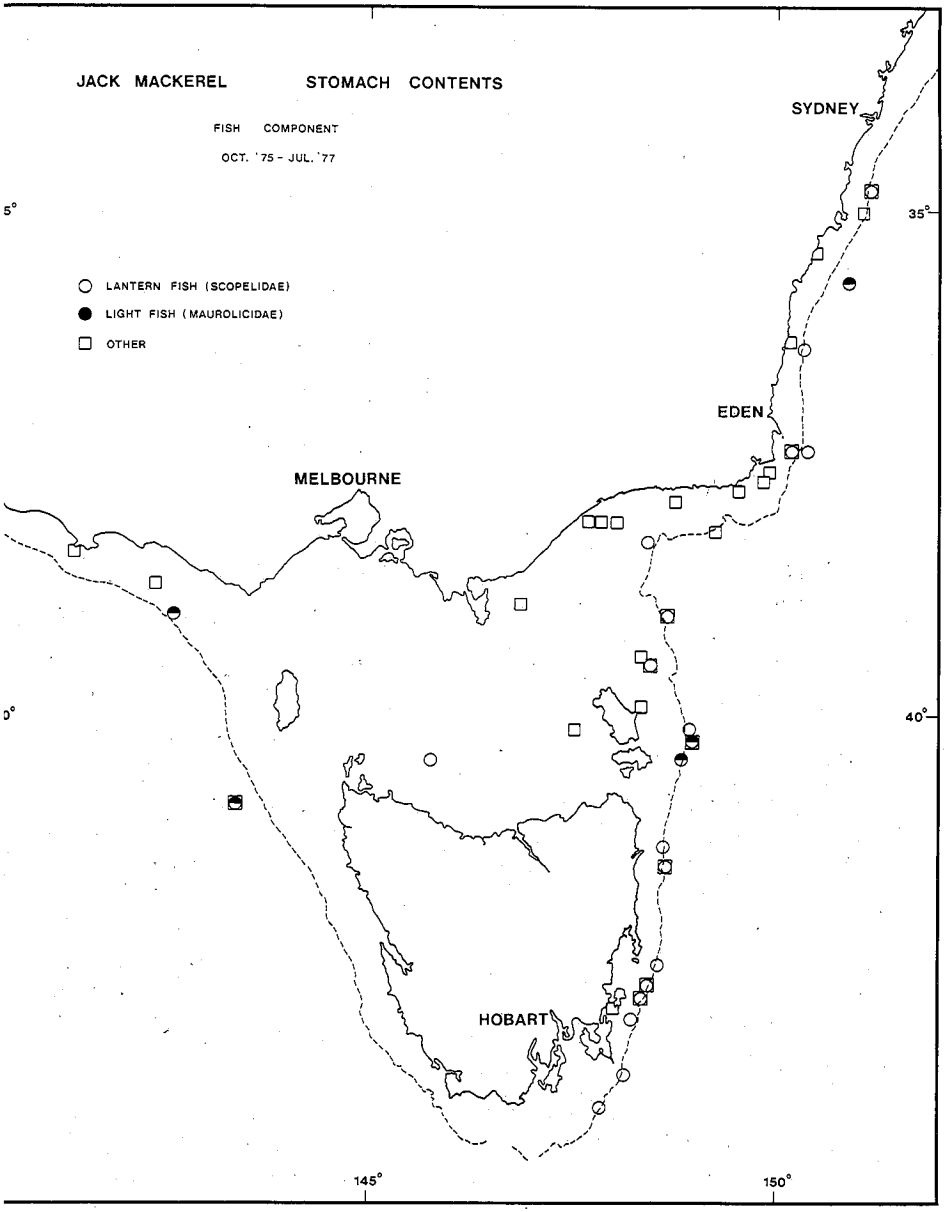

JACK MACKEREL STOMACH CONTENTS
FISH COMPONENT
OCT. '75 - JUL. '77
LANTERN FISH (SCOPELIDAE)
LIGHT FISH (MAUROLICIDAE)
OTHER
SYDNEY
EDEN
MELBOURNE
HOBART
35°
40°
145°
150°

TABLE 1

JACK MACKEREL LANDINGS (kg)

Year	New South Wales	Victoria
1969-70	8,316	150,935
1970-71	14,357	4,395
1971-72	19,529	7,348
1972-73	34,318	1,330
1973-74	365,787	2,757
1974-75	8,867	6,000
1975-76	21,547	N.A.
1976-77	33,559	N.A.
1977-78	30,499	N.A.

TABLE 2

NEW SOUTH WALES LANDINGS OF YELLOWTAIL AND JACK MACKEREL (kg)

	Yellowtail (Trachurus mccullochi)			Jack Mackerel (Trachurus declivis)
Year	Estuary	Ocean	Total	Total
1969-70	N.A.	N.A.	37,936	8,316
1970-71	5,853	32,819	38,754	14,357
1971-72	13,916	43,139	57,175	19,529
1972-73	14,748	69,726	84,474*	34,318
1973-74	31,448	77,178	108,626	365,787
1974-75	16,731	64,544	81,275	8,867
1975-76	14,343	71,603	85,946	21,547
1976-77	27,985	64,790	92,775	33,559
1977-78	40,464	48,576	89,040	30,499

Underlined totals are converted from imperial units from original reports and therefore do not give exact agreement with metric totals taken from N.S.W. State Fisheries 1975-76 Report.

N.A. = data not available

* Total of converted imperial measures for estuary and ocean landings compared to total production of yellowtail given as 65,849 kg.

TABLE 3

JACK MACKEREL (*Trachurus declivis*) LANDINGS AT PRINCIPAL PORTS IN NEW SOUTH WALES (kg)

Port	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	TOTAL
Port Jackson	259	75	538	816	4,117	10	699	104	259	6,877
Botany Bay						2	2			4
Wollongong	2,172	119	2	1,195	385	50	87	4,744	2,313	11,067
Greenwell Point			4	14	23	7	48			96
Jervis Bay				29						29
Ulladulla	895	611	779	1,857	180	1,236	7,573		495	13,626
Bateman's Bay					5					5
Narooma					76					76
Bermagui	49		615	1,247		391	485	2,036	32	4,855
Twofold Bay	71	9,988	8,731	12,632	347,654	3,135	7,222	14,661	11,986	416,080
Total	3,446	10,793	10,669	17,790	352,440	4,831	16,116	21,545	15,085	452,715
Reported total production	8,316	14,357	19,529	34,318	365,787	8,867	21,547	33,559	30,499	536,779

TABLE 4

YELLOWTAIL (Trachurus Mccullochi) LANDINGS AT PRINCIPAL PORTS IN NEW SOUTH WALES (kg)

Port	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	TOTAL
Port Jackson	16,209	12,216	22,213	17,162	5,851	28,565	18,240	16,124	21,814	158,394
Botany Bay	6,177	13,197	13,666	11,687	7,397	10,755	11,414	11,607	4,280	90,180
Wollongong	8,704	3,358	4,936	2,288	13,345	2,175	1,906	536		37,248
Lake Illawarra	9	2	99	43	1,453	43	1,787	46	21	3,503
Shoalhaven River	108	120	277	274	390	3,339	2,599	1,149		8,256
Greenwell Point	42	205	201	31	3,611	249	173	77		4,589
Jervis Bay		167	1,036	1,603	2,244	2,097	5,171	11,559	11,233	35,110
St Georges Basin	402	83	448	149	157	1,059	229	56		2,583
Ulladulla	210	239	701	3,740	9,948	3,862	11,910	5,274	1,969	37,853
Bateman's Bay	33		9			3	748	447		1,240
Narooma			32		59			3,070	2,618	5,779
Bermagui	21		1,370		32	4,425	979	633	18	7,478
Twofold Bay	3	10	825		382	1,463	18		34	2,735
Total	31,918	29,597	45,813	36,977	44,849	58,035	55,174	50,578	41,987	394,948
Reported total production	37,936	38,754	57,175	84,474	108,626	81,275	85,946	92,775	89,040	676,001

Underlined figures denote conversion from imperial to metric units from original values given in New South Wales Yearly Fisheries Report.

Only landing statistics from ports south of Port Jackson are included in Tables 3 and 4 to lessen the effect of confusion of jack mackerel with mackerel tuna, and yellowtail with yellowtail kingfish which may occur in landing returns from more northerly ports.