

FISHERY SITUATION REPORT 4. SNOEK

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SITUATION REPORT - SNOEK

SUMMARY

Annual catch weight	-	Victoria: 200 - 2,500 tonnes
	-	Tasmania: 40 - 1,600 tonnes
	-	N.S.W.: 20 - 230 tonnes
Value to fishermen	-	S.E. Australia: \$130,000 - \$500,000
Marketing method	-	Most sold directly as fresh fish; some sold as rock lobster bait and small quantities processed or smoked.
Weight marketed locally	-	All sold locally.
Number of vessels	-	Victoria: About 100
Number of men in fishery	-	Victoria: About 140
Value of boats and gear	-	Unknown
Present status	-	Under-exploited.

## 1.0 Introduction

The Australian snoek fishery has declined since the fiscal years 1945-46 and 1946-47, when it was Australia's biggest single species fishery (annual production 6,000 tonnes), to the present annual production of 300-400 tonnes. Almost all the snoek is caught off southern New South Wales, Victoria and Tasmania. The main method of fishing is still trolling from small boats.

Paradoxically the fishery has declined while demand for snoek is high and snoek are abundant but not accessible to traditional fisheries in the region. During recent years snoek has been used increasingly in processed fish products but because local supplies are seasonal and erratic the processing industry now relies on imported snoek. When snoek are trolled off south-eastern Australia the main outlets are the fresh fish markets and the rock lobster fishery in which snoek is used as bait.

Demersal trawl catches and visual observations show that snoek are seasonally abundant in subsurface waters close to the coast and offshore. The distribution and abundance of major food species can cause snoek to be scarce in traditional fishing waters hence the variable production by the troll fishery.

The decline of the snoek fishery has been most marked since 1970 and at the same time the economic state of the rock lobster fishery has deteriorated. Consequently many fishermen who used small boats to fish for snoek or for rock lobsters have left the fishery. Ironically it is during this period that the average price for snoek has risen to 74¢/kg after many years at 13-15¢/kg.

This report describes the snoek resource and fishery in south-eastern Australian waters.

### 1.1 Species and Distribution

The genus Thyrsites (family Gempylidae) is distributed around land masses in the temperate waters of the southern hemisphere: southern Australia, southern Africa, southern America, New Zealand, Tristan da Canha, St Paul and Amsterdam Islands.

Snoek or barracouta Leionura atun (Euphrasen), formerly Thyrsites atun, are common in southern Australian waters from Eden (N.S.W.) to Albany (W.A.) and are occasionally observed as far north as Moreton Bay (Qld.) and to the north of Cape Leeuwin (W.A.).

Blackburn and Gartner (1954) described five populations of snoek off southern Australia. The populations migrate to different regions to spawn: "one in winter and spring to eastern Victoria and southern New South Wales, one from spring to autumn to Bass Strait and its western approaches, one in summer and autumn to eastern Tasmania, one in autumn and winter to South Australia and western Victoria, and one (possibly not distinct from the previous population) in autumn and winter to the south coast of Western Australia". The first three groups occur in the eastern Bass Strait region during the non-migratory periods and the species actively seeks waters of 13° - 18°C. Figure 1 shows the seasonal movement patterns of snoek populations off south-eastern Australia.

## 1.2 Biology

Blackburn (1949, 1957 and 1960) and Blackburn and Gartner (1954) have described the biology and population characteristics of snoek and the development of the Australian snoek fishery until the immediate post-war years. Cowper (1966) summarised knowledge of the biology of snoek.

From direct observations, from commercial fish catches by trolling, trawling and gill-netting, and from specimens found in the stomachs of other fishes, snoek are known to occupy waters from the surface (mainly during the spawning season) to the bottom at different times.

Snoek grow to 105 cm long and 5 kg (10 + years) although specimens of up to 8 kg have been reported.

Most male snoek longer than 55 cm, females longer than 60 cm (about 3 years old) and nearly all snoek longer than 70 cm (4 + years old) are sexually mature. Off eastern and northern Tasmania, central Victoria and the Bass Strait Islands, the main spawning season (October - March) is well-defined. Off eastern Victoria and southern New South Wales snoek spawn during winter and spring (and possibly at other times), and off South Australia and Western Australia, from late autumn through winter. Off south-eastern South Australia and western Victoria there is some spawning during both the warm and cold times of the year probably because this region is frequented by the winter-spawning populations from the west and the summer-spawning population from Bass Strait.

Off south-eastern Australia the euphausiid Nyctiphanes australis Sars (commonly called brit), the southern anchovy Engraulis australis antipodum Gunther and various small fishes including clupeoids, small snoek and jack mackerel, are the snoek's main food items. Snoek feed mainly during the late spring and the summer, when spawning occurs. In the Bass Strait region, snoek feed mainly during the late spring and the summer when spawning occurs.

Of the several parasites that infest snoek the two most significant to the fishery are the sporozoan Chloromyxum sp. which causes a soft milky condition in the flesh, and the cestodes Tetrarhynchus (4 spp.) which occur in the flesh as encapsulated worms.

### Fishery

The snoek fishery in recent times has been described (on. 1968) and a synopsis of the snoek biology and fishery prepared by Cowper (1966).

In this paper the present state of the fishery is described and the reasons for the recent decline of the fishery discussed.

#### 2.1 Fishing Localities and Seasons

Although snoek are abundant and widely distributed off southern Australia, the snoek fishery is confined to Victoria, Tasmania and southern New South Wales. Snoek caught off South Australia are used mainly as rock lobster bait because of the poor market for them in Adelaide. Small quantities are taken off Western Australia.

Seasonal production peaks coincide with the spawning migrations of the various snoek populations.

The main Victorian snoek-fishing regions are off Lorne, Apollo Bay, Queenscliff and Western Port (Flinders, Newhaven, San Remo) off the central coast and off Port Fairy off the west coast. Catch rates are highest during spring and autumn here and off northern Tasmania. Off eastern Victoria the highest catch rates occur in winter and spring.

In Tasmania the main ports are in the south-east (Triabunna to Southport) and the north-west. Off eastern and south-eastern Tasmania the main fishing season is from late spring to the end of autumn.

In New South Wales during most years very little snoek is taken north of Ulladulla, and by far the largest quantity is taken off Eden. The main seasons for snoek production are winter and spring.

## 2.2 Fishing Gear and Methods

### 2.2.1 Vessels

Open or half-decked wooden boats 6-10 m long are still commonly used in the snoek fishery, particularly from traditional ports such as Queenscliff and Lorne and some of the south-eastern Tasmanian ports. Larger (8-15 m) boats of various construction are used to fish for snoek, rock lobsters, sharks or other species.

### 2.2.2 Gear and Methods

Trolling is the main snoek-specific fishing method used; jig sticks, once popular in Tasmania, may still be used occasionally.

Snoek lures or jigs are usually made from one to two barbless 12/0 heavy duty limerick hooks attached to a 10-15 cm length of painted or bare 2 cm diameter wooden rod or a moulded plastic body. The lure is attached to a 1-2 m wire trace, a swivel and to the main trolling line. Jigs can be trolled at different depths by the use of lead-weighted troll lines or small paravanes.

Where several troll lines are operated by one man each line is usually tied to a strip of rubber which is attached to the boat. This absorbs the initial tension when a snoek takes the jig.

Trolling is usually most successful in the early morning and dusk or on overcast days when snoek are feeding in the surface waters. Once a school is located boats usually circle through them at 2-4 knots. Sometimes one snoek may be towed behind a boat to entice others to take a jig. Snoek which are at midwater or close to the bottom can often be enticed to the surface to take jigs.

In the past it was common practice to operate as many as 12 lines by attaching some of them to hinged poles at either side of the boat. The jig stick, a 3 m flexible pole with a jig attached by a 10-15 cm trace, was very widely used to take snoek off Tasmania in the past but is uncommon now. The tip of the jig stick is swirled about in the water and when a snoek strikes it is jerked over the fisherman's shoulder into the boat.

The captured snoek are either headed and gutted or split for the backbone and gut to be removed. Cleaned fish are boxed for sale and the heads are packed in banana cases for sale as rock lobster bait. Because of their small size and the proximity of the grounds of the ports, few boats carry ice or have refrigeration for storage of their catches.

Snoek catches in gill net, beach seine and demersal trawl fisheries are largely incidental.

### 2.3 Production

Production of snoek during 1911-53 was listed by Blackburn and Gartner (1954). Table 1 and Figure 2 show the annual production since 1960-61. Between 1931 and 1938, annual production was constant, averaging 2,450 tonnes.

During World War II, fishing effort was diverted from "non-essential" species such as rock lobster to supply the community with bulk fish; consequently snoek production reached its maximum, averaging 4400 tonnes, in the period between 1941 and 1950.

Annual production was low during the 1950s then stabilised at an average of 2,800 tonnes from 1960-61 to 1974-75. During the following two years production slumped by more than 80% to the lowest level since records were started in 1911.

The reasons for the post-war decline are probably twofold: the loss of the canned snoek export industry, and the decrease in local consumption of fresh, canned and processed snoek caused by the availability of other species when trawling and other fisheries were resumed, and by the importing of fish products once more. But Blackburn and Gartner (1954) showed the further drop in production from 1949/50 to 1951/52 resulted not from overfishing or a natural fluctuation in snoek abundance but from an "adverse natural fluctuation in availability of the population to the fishermen, i.e. a change in behaviour of the fish". They also considered that although 60-80% of the Australian snoek production was from the Bass Strait population, fishing intensity was low.

Blackburn and Gartner (1954) rejected the hypothesis that natural fluctuations in the size of the snoek populations caused the decline, because the catches were poor only during autumn; catches in spring were normal during 1950 and above normal in 1951.



Blackburn (1957) found that euphausiids and anchovies were the main food of the snoek population in Bass Strait and that because of the seasonal behaviour of anchovies, snoek depended on euphausiids for food during much of the summer and autumn. From studies of the stomach contents of snoek and from commercial catch statistics he concluded that when euphausiids were scarce, snoek would seek food offshore and would be beyond the range of snoek fishermen.

The value of snoek catches by Victorian and Tasmanian rock lobster fishermen dropped from 12% and 3% of their gross receipts in 1964/65 to 6% and 1% in the period 1970-71 to 1972-73, respectively (Anon. 1970; Smith and Fergusson 1969; and preliminary reports on Victorian and Tasmanian rock lobster fisheries by the Commonwealth Department of Primary Industry 1976).

Figure 3A shows the extent to which snoek fishing has become a seasonal activity; Figure 3B illustrates the seasonal variability in the abundance of snoek.

#### 2.4 Markets

Almost all the snoek caught in south-eastern Australian waters is sold on the fresh fish market. Average annual prices (Table 1) shows a recent rise to 74¢/kg during 1976/77.

From 1961-62 to 1963-64 a Portland cannery purchased 583 tonnes of snoek but then closed down. SAFCOL subsequently canned snoek for many years until the early 1970s. Neither of these enterprises could continue to operate because of seasonal and unpredictable local catches of snoek.

During the 1960s and the early 1970s the Victorian fish processing industry increased its annual intake of snoek fillets to 800 tonnes but this has since decreased to about 400 tonnes, because of diminishing local sales of the products, largely fishcakes. This industry's growth and present productivity is based almost entirely on snoek imported from New Zealand.

Small quantities of snoek are smoked.

#### 2.5 Snoek as a Commodity

In 1966 the name "snoek" officially replaced "barracouta" in Australia to enhance the export market potential of the species. It was believed that confusion with the tropical barracuda could adversely affect these prospects. After consideration of several overseas synonyms the South African common name was adopted because it was known and accepted by fish importing countries.

Most of the snoek marketed in south-eastern Australia measure 70-85 cm and weigh 1.5-2.3 kg (before dressing). They are ideal for smoking and for processing as fish cakes. The average oil contents of the fillet, viscera and head are 4.4, 8.1 and 8.0%, respectively (Blackburn 1960). Condition (weight to length ratio and oil content) varies during the year and is best in early spring and late autumn in snoek from Victorian and Bass Strait waters.

Length-weight relationships derived by Blackburn (1960) are:

central Victorian waters	$W = 0.0577L^{2.36059}$
south-eastern Tasmanian waters	$W = 0.1064L^{2.38524}$

Blackburn and Gartner's (1954) relationship between LCF and cleaned length (CL) is

$$LCF = 5.329 + 1.65 CL$$

The incidence of discernible parasitisation by nematode "worms" and by the sporozoan which cause a soft "milky" condition is very low, but because the latter becomes progressively apparent with time after capture, affected snoek do reach the consumer from time to time.

### 3.0 Management

Because of the low level of exploitation there are no restrictions on the size, season or locality at which snoek can be caught.

In the past, fishermen's cooperatives have occasionally imposed catch quotas to avoid oversupply.

### 4.0 Research and Development

Staff at CSIRO have conducted most of the investigations of the fishery and the biology of snoek. In 1939, J.A. Tubb started studies of the biology, distribution and population characteristics of snoek. This work was continued by M. Blackburn who published the early findings in 1949 and then went on to investigate more deeply some aspects of the fishery (Blackburn 1950), the snoek population off southern Australia (Blackburn & Gartner 1954), the effects of food availability on snoek production (Blackburn 1957) and the variable condition of snoek in south-eastern waters (Blackburn 1960).

Age and growth studies have shown differences in growth rates between Bass Strait and eastern Tasmanian waters (Grant, Cowper & Reid 1978) and support Blackburn and Gartner's (1954) suggestions of distinct snoek populations in Bass Strait, off eastern Tasmania and off eastern Victoria and southern New South Wales.

Experimental pair midwater trawling for snoek in Victorian and Bass Strait waters during 1975 was unsuccessful (Amos 1976a), but pair bottom trawling in this region showed that snoek could be taken close to the bottom at some times of the year (Amos 1976b). During 1974 and 1975, snoek formed 21% of the total catch of 100 tonnes of marketable fish taken in regular experimental trawls (Winstanley 1979). Catch rates of up to 100 kg/h were seasonal but suggested that specialised demersal trawling could produce snoek for many months of the year on a more regular basis than trolling.

#### 5.0 Prospects

From an assessment of the fishery (Blackburn and Gartner 1954), the estimated potential annual snoek catch for southern and south-eastern Australian waters is 30,000 tonnes. This is 50% of the total Australian finned-fish catch for 1976-77 and 12 times the average snoek production since 1960/61.

Any significant increase in production will depend on the development of a fishery capable of reliable, regular supply and the promotion of snoek-based products. Specialised demersal or pelagic trawling seem the most likely methods of increasing production. The current increase in demersal trawling off south-eastern Australia will lead to increased incidental snoek catches and may stimulate some promotion of snoek fishing, processing and marketing.

Failing this, the existing fishery can expect to catch about 2,500 tonnes in most years unless troll fishermen who retire or leave the fishery when catches are poor are not replaced when snoek become available again. This is probable because of the uncertain and archaic nature of the fishery and the increasing necessity for the fishing operation to be run as a business venture based on dependable (if seasonal) resources rather than the pursuit of an often unrewarding lifestyle.

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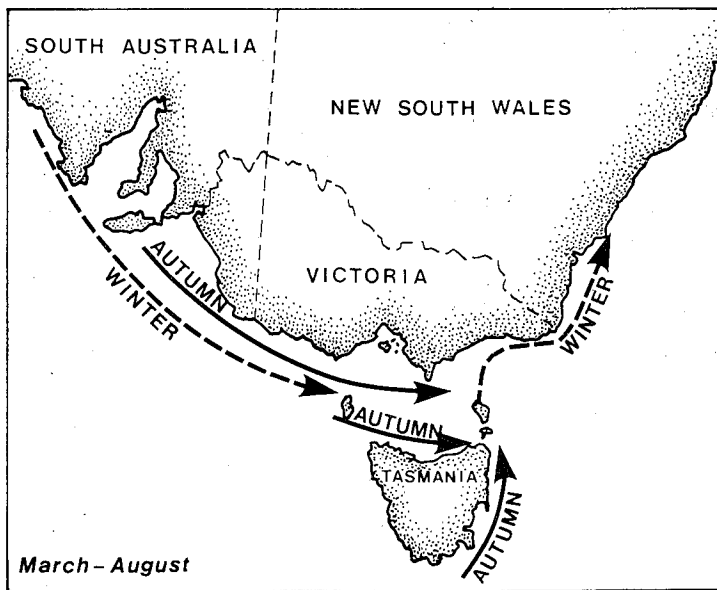
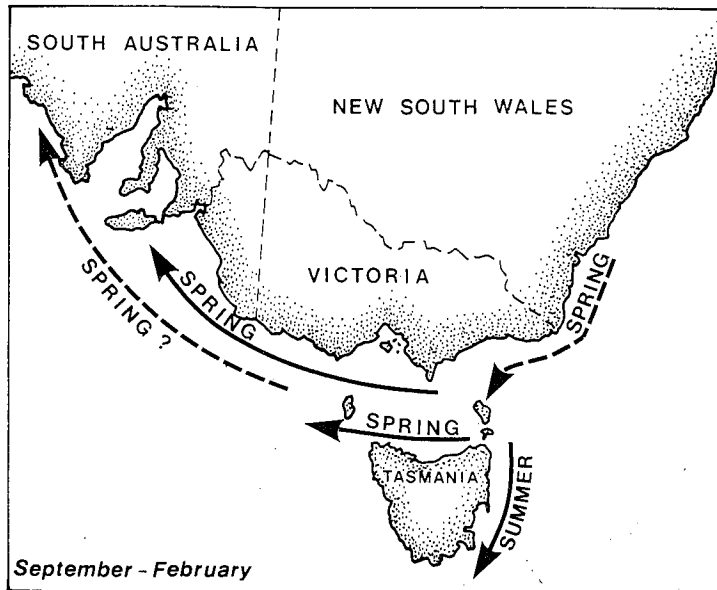


Fig. 1. Seasonal migrations of snoek populations off south-eastern Australia (after Blackburn and Gartner 1954).

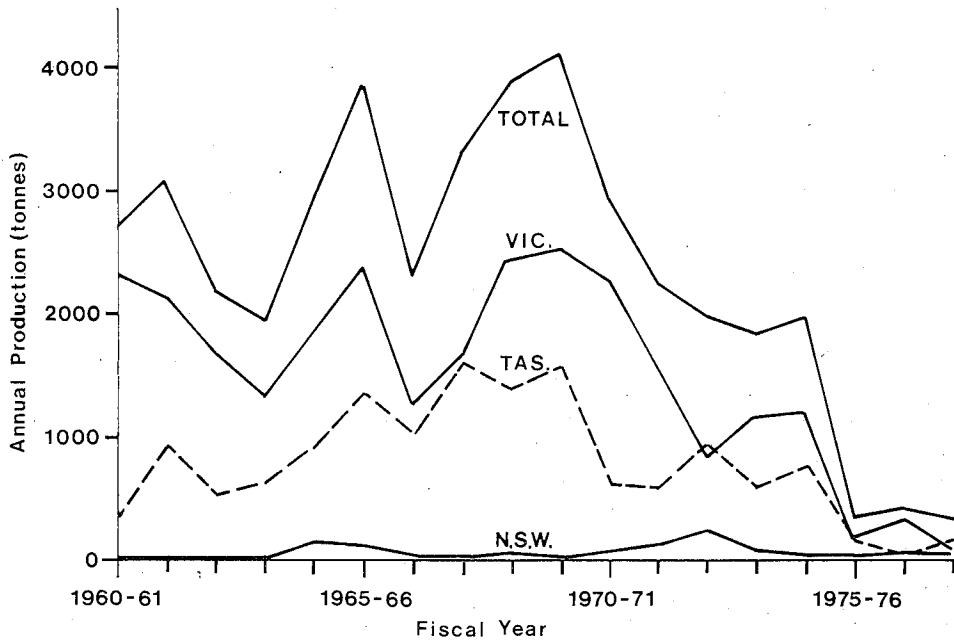


Fig. 2. Annual production of snoek from south-eastern Australian waters since 1960-61.

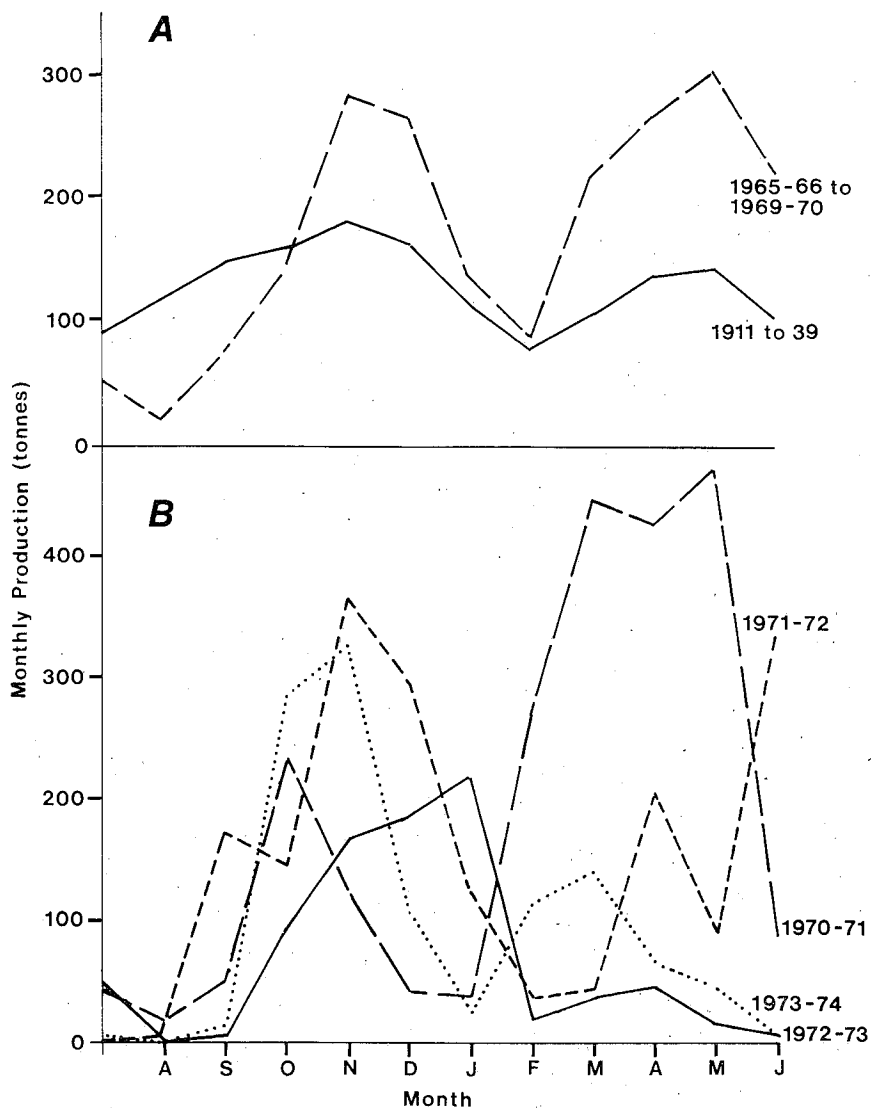


Fig. 3A. Mean monthly snook production (by all methods) for Victoria, periods 1911-1939 and 1965-66 - 1969-70;  
3B. Monthly snook catches in the Victorian troll fishery for the fiscal years 1970-71 to 1973-74.



TABLE 1 Annual production (tonnes) and value of snoek from south-eastern Australian waters since 1960-61

Fiscal Year	Victoria	Tasmania	N.S.W.	Total	Value (\$1,000)	Price (cents/kg)
1960-61	2340	374	1	2715	n.a.	n.a.
1961-62	2145	936	11	3092	n.a.	n.a.
1962-63	1678	513	7	2198	33 <sup>A</sup>	15
1963-64	1319	640	7	1966	29 <sup>A</sup>	15
1964-65	1877	916	164	2957	38 <sup>A</sup>	13
1965-66	2392	1363	122	3877	58 <sup>A</sup>	15
1966-67	1267	1038	32	2337	n.a.	n.a.
1967-68	1669	1625	23	3118	n.a.	n.a.
1968-69	2431	1401	63	3895	509	13
1969-70	2521	1579	24	4124	454	11
1970-71	2267	610	73	2950	391	13
1971-72	1533	581	132	2246	374	17
1972-73	842	915	229	1986	208 <sup>A</sup>	11 <sup>A</sup>
1973-74	1162	598	71	1831	365 <sup>A</sup>	20 <sup>A</sup>
1974-75	1198	760	30	1989 <sup>B</sup>	453	23
1975-76	176	143	26	345	128	37
1976-77	335	37	28	400	296	74
1977-78	87	194	63	344	154	45

n.a. not available

A Estimates

B Includes 1 tonne from South Australia.

Source: N.S.W. State Fisheries and Australian Bureau of Statistics.