

FISHERY SITUATION REPORT 6. PRAWNS (EAST OF CAPE OTWAY)

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SOUTH EASTERN FISHERIES COMMITTEE

The South Eastern Fisheries Committee, a committee of the Standing Committee of the Australian Fisheries Council, was set up in 1969 as one of three regional management and research committees.

The South Eastern Fisheries Committee co-ordinates interstate fisheries management and research activities in waters adjacent to New South Wales, Victoria, Tasmania and South Australia. In addition to its co-ordinating role, it also provides a forum for discussion in fisheries science and management, and advises management authorities on problems referred to it by member organisations.

The Committee is composed of representatives of the Commonwealth Department of Primary Industry, CSIRO Division of Fisheries Research, New South Wales, Victoria, Tasmania and South Australia.

A number of fisheries in the area are of such importance as to warrant special attention by a group of experts. These Research Groups constantly monitor the state of the fisheries and discuss current research.

FISHERY SITUATION REPORTS

To assist the Committee in its management role, the Research Groups prepare and maintain situation reports for these fisheries for which they are responsible. The reports outline the present state of the fishery, its history and management. In addition, the current state of knowledge on the biology of the species and the population dynamics of the exploitable stocks is outlined.

This report was prepared under the auspices of the Demersal and Pelagic Fish Research Group.

To broaden public knowledge of the fisheries of south eastern Australia, these situation reports are produced as a series by the Committee.

A.J. HARRISON
Chairman
South Eastern Fisheries Committee

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SOUTH EASTERN AUSTRALIA PRAWN FISHERY - EAST OF CAPE OTWAY

Summary

Annual catch weight	NSW	1,980 tonnes (1978/79)
	Victoria	0-14 tonnes
Value to fishermen	NSW	\$8,500,000 (1978/79)
	Victoria	\$0-40,000
Marketing method	NSW	Most sold "whole", cooked. Small but increasing percentage processed for export while further percentage sold as bait. Sold locally or through Sydney or Brisbane.
	Victoria	All sold locally.
Weight marketed domestically	NSW	1,224 tonnes (1978/79)
	Victoria	Total catch
Weight exported	NSW	756 tonnes
	Victoria	Nil
Number of vessels	NSW	100-500
	Victoria	0-16
Number of men employed	NSW	750-2000
	Victoria	0-30
Value of boats and gear	NSW	\$20 million (estimate)
	Victoria	\$0.5 million
Present status of fishery	NSW	Varies from developed to developing.
	Victoria	Minor and variable.

Introduction

N.V. Ruello (1973a) summarized the historical development of the NSW prawn fishery to 1972. Commercial exploitation commenced in the early 1800's in the Sydney area and rapidly spread to other centres along the NSW coast. The introduction of otter trawling in Port Jackson in 1926 was an early major development. Danish seiners discovered commercial quantities of school prawns off Newcastle in 1947/48 and this marked the start of the ocean prawn fishery in Australia. By 1950 the ocean fishery exceeded the estuarine fishery in production and this situation has continued. In 1953, Racek demonstrated the abundance of large eastern king prawns (*Penaeus plebejus*) and tiger prawns (*Penaeus esculentus*) in deeper offshore waters, which motivated fishermen to trawl in progressively deeper waters. The New South Wales FRV *Kapala* found commercial quantities of the deep water prawn *Hymenopenaeus sibogae* (royal red prawn) on the continental slope adjacent to Newcastle (275 - 550 m) (Gorman and Johnson 1971), and exploitation of this species began in 1975.

Currently prawns are harvested commercially from the majority of NSW estuaries, inshore ocean areas and from deepwater grounds (Figure 1).

For many years school and eastern king prawns have been taken in the estuaries and coastal lakes off eastern Victoria from Lakes Entrance to Mallacoota (Wharton 1967). Prawns have also been caught intermittently in coastal waters off Lakes Entrance by trawlers and Danish seiners. During the 1970's small numbers of vessels trawled seasonally off Lakes Entrance, mainly during autumn, taking combined annual catches of up to 14 tonnes. During 1977, 16 boats trawled specifically for prawns and the potential of a regular seasonal fishery was indicated. Only the Victorian coastal trawl fishery is described in this report.

Species

The number of species of penaeid prawns taken in commercial catches in NSW is unknown. There are certainly more than 20 species, all belonging to the subfamilies Penaeinae, Solenocerinae and Aristaeinae. Table 1 is a list of the known penaeid prawns of NSW. The NSW prawn fishery is based on four main species. In order of commercial importance, these are the school prawn and the eastern king prawn, the greasyback prawn and the royal red prawn. All four species are distributed over the entire NSW coast at various depths.

Both school and eastern king prawns are caught in the eastern Victorian estuaries and coastal waters. King prawns

TABLE 1: Penaeid prawns taken in NSW waters

Class Crustacea	
Family Penaeidae	
Sub Family Aristaeinae	Sub Family Penaeinae
Genus <i>Aristaeomorpha</i>	Genus <i>Penaeus</i>
<i>A. foliacea</i> (red)	<i>P. plebejus</i> (eastern king)
	<i>P. esculentus</i> (common tiger)
	<i>P. merguensis</i> (banana)
	<i>P. semisulcatus</i> (northern tiger)
	<i>P. monodon</i> (giant tiger)
	<i>P. indicus</i>
	<i>P. longistylus</i> (red spot)
	Genus <i>Metapenaeus</i>
	<i>M. ensis</i> (offshore greasyback)
	<i>M. macleayi</i> (school)
	<i>M. bennettiae</i> (greasyback)
	<i>M. endeavouri</i> (endeavour)
	Genus <i>Parapenaeus</i>
	<i>P. australiensis</i>
Sub Family Solenocerinae	Genus <i>Trachypenaeus</i>
Genus <i>Hymenopenaeus</i>	<i>T. curvirostris</i> (hardback)
<i>H. sibogae</i> (royal red)	<i>T. anchoralis</i>
	Genus <i>Parapenaeopsis</i>
	<i>P. cornuta cornuta</i>
	<i>P. cornuta maxillipedo</i>
	Genus <i>Metapenaeopsis</i>
	<i>M. palmensis</i>
	<i>M. insona</i>

are also caught in and offshore from Corner Inlet, off Phillip Island, in Western Port and Port Phillip Bay and on the north and east coasts of Tasmania.

Royal red prawns have been identified from trawl catches from the continental slope off western and eastern Victoria and western Tasmania and specimens of the western king prawn (*Penaeus latisulcatus*) have been trawled off Barwon Heads (Winstanley, 1975).

Biology

The greasyback prawn completes its entire life cycle within an estuary. The school prawn and king prawn spawn offshore and their postlarvae move inshore and spend the following 9-12 months growing in the estuaries before commencing their offshore (spawning) migration. The royal red prawn inhabits deeper oceanic waters throughout its life.

Despite their different habitats, the life cycles and biology of penaeid prawns are generally similar and well documented (Dakin 1938, 1940, 1946; Morris and Bennett 1951; Ruello 1971).

The Fishery

Fishing Locations

For 150 years prawn fishing in NSW was confined to the estuaries. The commencement of the ocean fishery in 1947/48 for school and king prawns saw trawling in water less than 30 fathoms deep and generally restricted to daylight hours. The trend since has been towards progressively deeper waters for larger king and more recently for royal red prawns. This trend has accelerated the use of progressively larger vessels. Much of this work is carried out at night.

The main prawn trawling ports in New South Wales are between the Hunter River and the NSW/Queensland border where approximately 80% of the total production is landed.

The only Victorian coastal waters in which prawns have been caught commercially are immediately off Lakes Entrance where a reef running parallel to and about 3 nautical miles offshore tends to keep the prawns accessible in 9-36 m of water.

Fishing Methods, Gear and Vessels

In NSW in 1978/79 there were 3,400 licensed boats engaged in the fishing industry. During the summer, December to April, an estimated maximum of 1,000 boats were prawn fishing in 1978/79. The NSW prawn fishery is an open entry

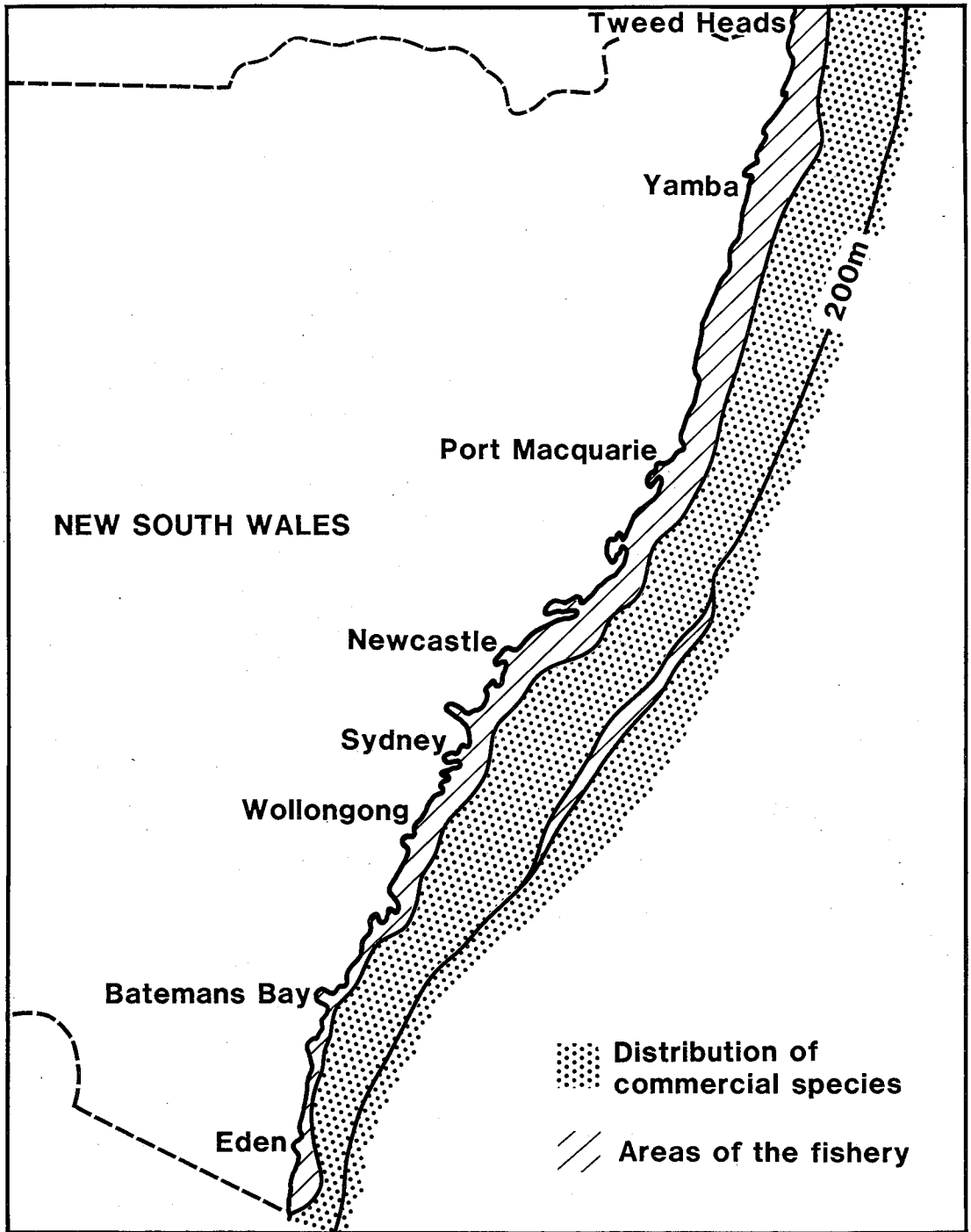


Fig. 1 N.S.W. prawn fishing grounds

one and the number of boats thus fluctuates. Numbers of fishermen engaged in a particular type of fishing also fluctuate annually and seasonally and exact figures are not available.

The size of vessels varies with the species (school and king) and area fished.

As many as 16 vessels of 7-15 m trawl seasonally off Lakes Entrance (Victoria). Many of these boats fish for scallops or rock lobsters at other times of the year. Seasonal prawn catches are also taken in estuaries by set pocket nets.

Generally, the lengths of estuarine boats are in the range 4-14 m and oceanic boats 6-25 m (Gorman, 1973).

In the late 1960's vessels began using double rigged gear which now is mainly used in estuarine waters. Since 1978 oceanic vessels have been experimenting with triple gear to the stage where many boats are now using it full time when king prawn fishing. This method is thought to increase a vessel's catch by 15-30%.

Production

The NSW prawn fishery is seasonal. A sharp rise in catches during October marks the beginning of a 6 to 8 month season (Figure 2). Prawn abundance and the duration of their occurrence gradually increases northwards (Table 2). Annual production for NSW since 1938 is given in Figure 3. This figure shows a reasonably consistent estuarine production fluctuating around 0.75×10^6 kg. Oceanic and total production have shown a decline since 1977. The most likely cause for this is a natural fluctuation in population size.

Current NSW annual prawn production is in excess of 1,900 tonnes valued at about \$8.5 million, making it the State's third richest fishing industry after fish and oysters.

Victorian coastal prawn production (off Lakes Entrance) in 1977 was 14 tonnes but in the following three years production did not exceed 1 tonne.

Marketing

The great majority of prawns caught are sold "whole" either green or boiled. A small percentage are processed into breaded prawns, prawn cutlets, raw headless prawns and raw meat, while the Clarence River supports a small prawn bait industry.

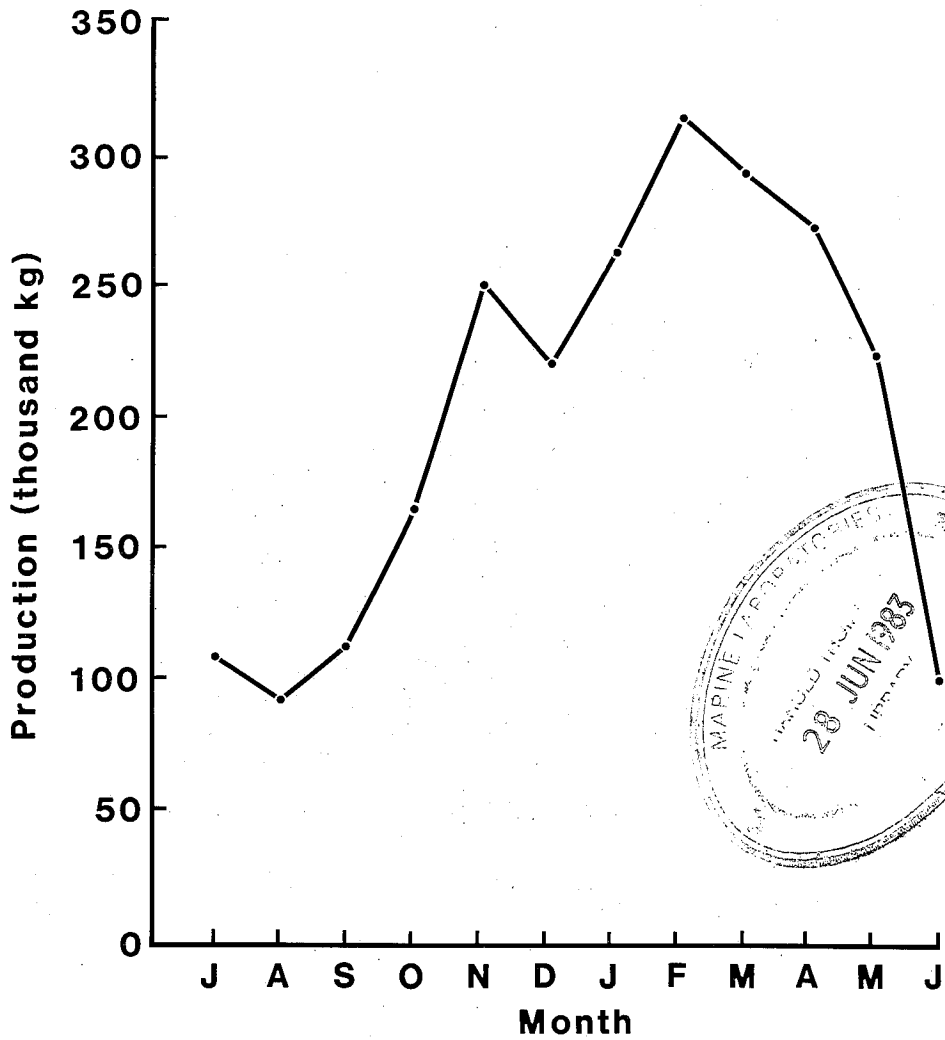


Fig. 2 N.S.W. monthly prawn production; 1975-76

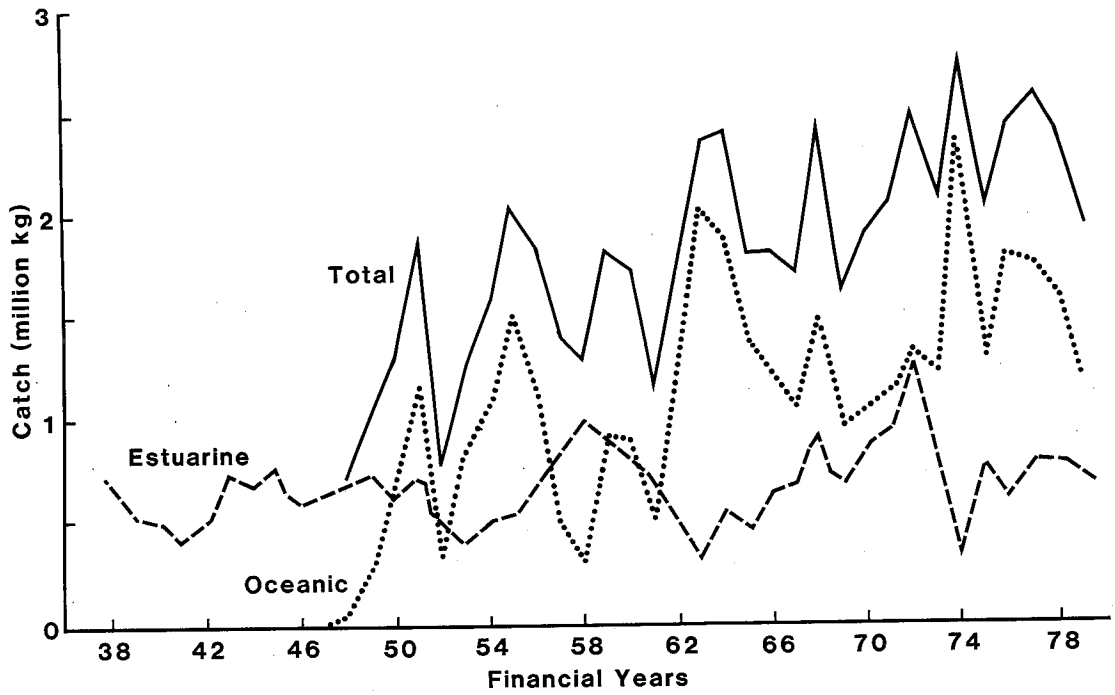


Fig. 3 N.S.W. annual prawn production; 1938-79

TABLE 2: NSW: Prawn production from the 26 most prominent ports, 1978/79 (kg)

Tweed River	14,596
Brunswick Heads	37,416
Ballina	108,814
Evans Head	140,664
Clarence River	660,054
Coffs Harbour	12,476
Hastings River	5,274
Camden Haven	8,036
Crowdy Head	19,663
Manning River	25,598
Wallis Lake	77,214
Myall Lake	4,568
Tea Gardens	52,948
Hunter River	22,803
Lake Macquarie	39,787
Tuggerah Lakes	47,616
Hawkesbury River	50,100
Pittwater	1,523
Port Jackson	49,352
Botany Bay	13,194
Wollongong	89,428
Lake Illawarra	22,203
Shoalhaven River	16,300
Jervis Bay	762
Ulladulla	2,473
St Georges Basin	1,052
Batemans Bay	19,029
Moruya River	1,098
	<hr/>
TOTAL	1,544,041
	<hr/>

TABLE 3: NSW: Prawn Fishing Net Specifications

Net	Type of fisherman	Length (m)	Minimum mesh size (mm)	Gear description
Set pocket	Professional	3 - 25	30	A bag or 'pocket' of net set across channels or inlets during the outgoing tide at night.
Otter trawl	Professional	11*	40	A pocket of net with two attached boards to spread the mouth of the net. Towed behind a boat.
Hauling	Professional	40 - 280	30	Worked from the beach or a boat. A wall of net used to encircle prawns.
Hauling	Amateur	6	30	Worked from the beach. A man on each end of a wall of net drags the wall through the water encircling prawns.
Modified hauling	Professional	140	40	A wall of net with a pocket set in the middle is laid in a semi-circle. The net is then towed by ropes attached to each end and to the boat until the mouth of the net closes up.
Running	Professional	75 - 140	30	A wall of net set at an angle to the shore.
Scissors	Amateur	Length of bottom line not more than 3 m.	30	Scissor shaped net pushed along the shore.
Scoop	Amateur	0.6 feet in diameter 1.25 feet deep	19	A cone shaped net on a long handle used by one person for scooping prawns from the water.

* Estuarine length, no oceanic length restriction.

rocessing of prawns in NSW has not matched the
ments in production. Facilities for processing
vary from very crude, simple equipment used on
g vessels to comparatively sophisticated equipment
re based processing plants. Less than 4% (about
kg) of boiled prawns offered for sale on NSW markets
ear are condemned.

apers on the processing of prawns available include
of Allen (1953) and J.H. Ruello (1973).

ost prawns are sold locally or sent to the large city
s. The export market in 1978/79 constituted about 38%
catch. The markets serviced by NSW prawn exporters
n order of importance, Japan, USA, South Africa and
n Europe.

ll prawns fit for human consumption must be sold to a
ized fishermen's co-operative or a fish market, or may
d by a fisherman holding a "consent" to sell. The
may arrange for a fisherman to sell his catch elsewhere
y a levy; a fisherman may sell interstate provided he
d from that State.

ll Victorian prawns are marketed locally usually directly
he fisherman to the public, restaurants, hotels etc.

anagement

icensed fishermen are free to enter and leave the
y without restriction. N.V. Ruello (1970, 1973b) and
er (1978) suggest that although juvenile stocks are
y exploited at the commencement of river seasons,
amental fluctuations account for most of the variation
uction. The fishery shows no signs of over-exploitation.

etails of maximum mesh size and gear restrictions are
in Table 3.

ere are no restrictions on seasons, gear or the number
sels which trawl for prawns off Victoria.

esearch

acek (1959) researched the commercially important
d prawn stocks in NSW estuarine and oceanic waters.
s work began in 1953 and formed the basis of NSW prawn
y investigations.

TABLE 4: Results from preliminary study on juvenile king prawns during 1979-80

Release		Recapture						
Location	Date	Number	Location	Days free	Distance travelled (km)	Rate of travel (km/day)	Sex	Growth increment (mm)
Sydney	Jan '80	942	Red Head	59	98	1.7	M	6
			Newcastle	63	113	1.8	F	6
			Port Stephens	65	161	2.8	F	6
			Port Stephens	81	152	1.9	M	10.3
			Iluka	146	516	4.0	M	13.2
			Ballina	155	630	4.1	F	6
			Ballina	176	602	3.4	F	16.4
			Cape Moreton	218	876	4.0	F	N.D.
			Broken Head	208	645	3.1	M	20.7
			Merimbula	Feb '80	316	Woody Head	169	550
Lakes Entrance	Apr '80	2,255	Kingscliff	287	1,083	3.8	M	11.6
			Coffs Harbour	310	925	2.9	M	N.D.
Lakes Entrance	Apr '80	2,255	Newcastle	117	746	6.4	F	9.6
			Morna Point	172	774	4.5	F	N.D.
			Kingscliff	184	1,333	7.2	F	6.3
			Iluka	342	1,030	3.0	N.D.	N.D.

Note: M = Male, F = Female
N.D. = No Data

Growth increment is measured as the increase in carapace length being the distance from the base of the eye stalk to the back of the carapace.

NSW State Fisheries commenced investigations of prawn culture in 1966 as a result of widespread interest in aquaculture and the Brackish Water Fish Culture Research station was opened at the end of 1971. Current research at the station includes developing methods for the mass rearing of larvae and large scale rearing of juvenile prawns.

NSW State Fisheries have been involved in prawn deepwater stock exploration and gear technology for the past 7 years.

As a result of continuing pressure to introduce licence limitation, NSW State Fisheries has embarked upon an assessment of the prawn fishery including economics as a basis for further management measures.

Since 1978 NSW State Fisheries has been conducting research into the population dynamics of the eastern king prawn. The first two years have been spent investigating the biology of the adult king prawn and the level of exploitation of this stock on commercial grounds. Information on size, growth and movement has been collected and at present is being analysed.

The second segment of this program will be the study of the biology of the juvenile king prawn with a view to determining the recruitment pattern to the adult stock. The results from the 1979/80 releases are given in Table 4. During 1980/81 juvenile king prawns were released in the following estuaries:

- | | |
|------------------|------------------|
| . Lakes Entrance | . Lake Macquarie |
| . Merimbula Lake | . Myall River |
| . Wallaga Lake | . Wallis Lake |
| . Lake Illawarra | . Clarence River |
| . Sydney Harbour | |

Prospects

The present condition of the NSW prawn fishery is satisfactory. There is no evidence of a decline in estuarine or oceanic prawn stocks. In addition, fishermen are beginning to exploit recently located commercial stocks of deepwater prawns.

The fishery is capable of supporting a greater catch than the present, provided the facilities for processing and marketing improve and research is maintained.

In Victoria it appears that prawn trawling will continue to be an irregular seasonal activity off Lakes Entrance.

December 1980

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