

CHAPTER 24

FISHERIES

Further information on subjects dealt with in this chapter is contained in the annual printed bulletin *Non-Rural Primary Industries* and in the annual mimeographed statistical bulletin *Fisheries*, particularly as regards types of fish, etc. caught.

Fisheries resources and their commercial exploitation

Fish

It has been estimated that there are approximately 2,000 species of fish (including freshwater species) in Australia and the waters surrounding it. Fishing is carried out continually in estuarine, coastal and offshore Australian waters in the east and south from Port Douglas in Queensland to Ceduna in South Australia, and in Western Australia from Esperance to Exmouth Gulf, and more recently in the Onslow, Broome, Darwin, and Karumba areas in the north. Most fishing is done in waters over the continental shelf, which varies greatly in width around the continent, but tuna is sometimes fished beyond the shelf. As in other countries, fisheries in Australia may be divided into estuarine fisheries, located in the tidal waters of rivers and coastal lakes, beaches and bays; pelagic fisheries, which exploit species inhabiting the surface layers of the open ocean; and demersal fisheries, which fish the bottom layers of the sea. The estuarine fisheries produce considerable quantities of the table varieties, such as mullets (*Mugil cephalus* and associated species) and breams (*Acanthopagrus spp.*). In addition to these there is a small freshwater commercial fishery, principally in New South Wales and South Australia, exploiting Murray cod (*Maccullochella macquariensis*), golden perch (*Plectroplites ambiguus*). The pelagic fisheries produce species exploited during their seasonal migration, such as Australian 'salmon' (*Arripis trutta*), which is a member of the order Perciformes, or perch-like fishes, tunas (*Fam. Thunnidae, Katsuwonidae, Sardidae*), snoek (*Leionura atun*), garfish (*Hemirhamphidae*), and mackerels (*Cybiium spp.*). These fisheries, with the exception of some tuna, mackerel and reef fisheries, are concentrated in the temperate waters around the southern half of the continent. The offshore demersal fisheries include those carried out on reefs which may be found virtually right around the continent, and which yield such species as snapper (*Chrysophrys auratus*), whiting (*Sillaginidae*), the so-called 'cods' (*Epinephelus, Choerodon, Callyodon spp.*) and associated species; the trawl fisheries which produce species such as flathead (*Neoplatycephalus, Trudis spp.*), morwong (*Nemadactylus spp.*), John Dory (*Zeus faber*), etc.; and the important fishery for school shark (*Galeorhinus australis*) and gummy shark (*Mustelus antarcticus*) in south-eastern Australia.

Crustaceans

Crustaceans taken in Australia include crayfish (i.e. rock lobster), prawns, crabs, and freshwater crayfish. Crayfish (southern, *Jasus lalandei*; western, *Panulirus cygnus*; and eastern, *Jasus verreauxi*) constitute the most important crustaceans exploited in Australia, and various species occur on the reefs of the continental shelf in all States. The commercial fishery has not extended to the tropical species (*P. ornatus*), etc., for technical reasons, but is concentrated on species found around the southern half of Australia. Prawns (*Penaeus* and *Metapenaeus spp.*) are taken in the estuarine coastal and offshore waters of New South Wales and Queensland, in the Shark Bay and Exmouth Gulf region of Western Australia, in restricted areas of South Australia, in the Gulf of Carpentaria, and in the waters of the Northern Territory. Crabs (*Scylla* and *Portunus spp.*) are taken mainly in Queensland and Western Australia, but small quantities are also taken in the other States. Freshwater crayfish (*Euastacus serratus*) are caught in inland streams in New South Wales, and one species, marron (*Cherax tenuimanus*) forms the basis of an amateur fishery in the south-west of Western Australia.

Molluscs

Edible molluscs produced in Australia include oysters (mainly *Crassostrea commercialis*), scallops, mussels, squid, octopus, cuttlefish, and abalone. Naturally-grown oysters are produced in all States. In New South Wales, and to a lesser extent in Queensland, edible oysters are cultured commercially. The scallops (*Pecten meridionalis* and *Equichlamys bifrons*) are taken in Tasmania, the saucer scallop

(*Amusium balloti*) is harvested in Queensland and there are prospects for the establishment of a scallop fishery in Western Australia, but the major fishery is that in Port Phillip Bay, which is based on *Pecten alba*. Mussels (*Mytilus planulatus*) are gathered mainly in Victoria. Small quantities of cephalopods, mainly squid (*Loligo spp.*), are produced in many localities. The fishery for abalone (mainly *Notohalotis ruber*), which has developed very rapidly in recent years, now extends from southern New South Wales to South Australia, with Tasmania and Victoria providing the bulk of the catches.

Pearl-shell and trochus-shell

The shell of the Australian species of pearl oyster (*Pinctada maxima*) is taken in the tropical waters of Australia from Exmouth Gulf in Western Australia to Cairns in Queensland for the manufacture of buttons, knife handles, etc. Live pearl-shell is used for pearl culture, *Pinctada maxima* being capable of producing pearls which are the largest in the world and which command top market prices. Trochus-shell is found mainly on coral reefs off the Queensland coast, although small quantities occur in Western Australia.

Whales

The Australian whaling industry formerly exploited the baleen (humpback) whales during their winter migrations along the east and west coasts of Australia. However, owing to the total prohibition placed on their capture by the International Whaling Commission in 1963, Australian whaling is now confined to the sperm whale (*Physeter catodon*) which has been taken in the southern waters of Western Australia since 1955.

Marine flora

Seaweeds of possible commercial value occur in the coastal waters of New South Wales, Tasmania, South Australia, and Western Australia. At Triabunna, Tasmania, a factory is processing seaweed (*Macrocystis pyrifera*) for its alginate content.

History of the development of fisheries industries in Australia

Fishing

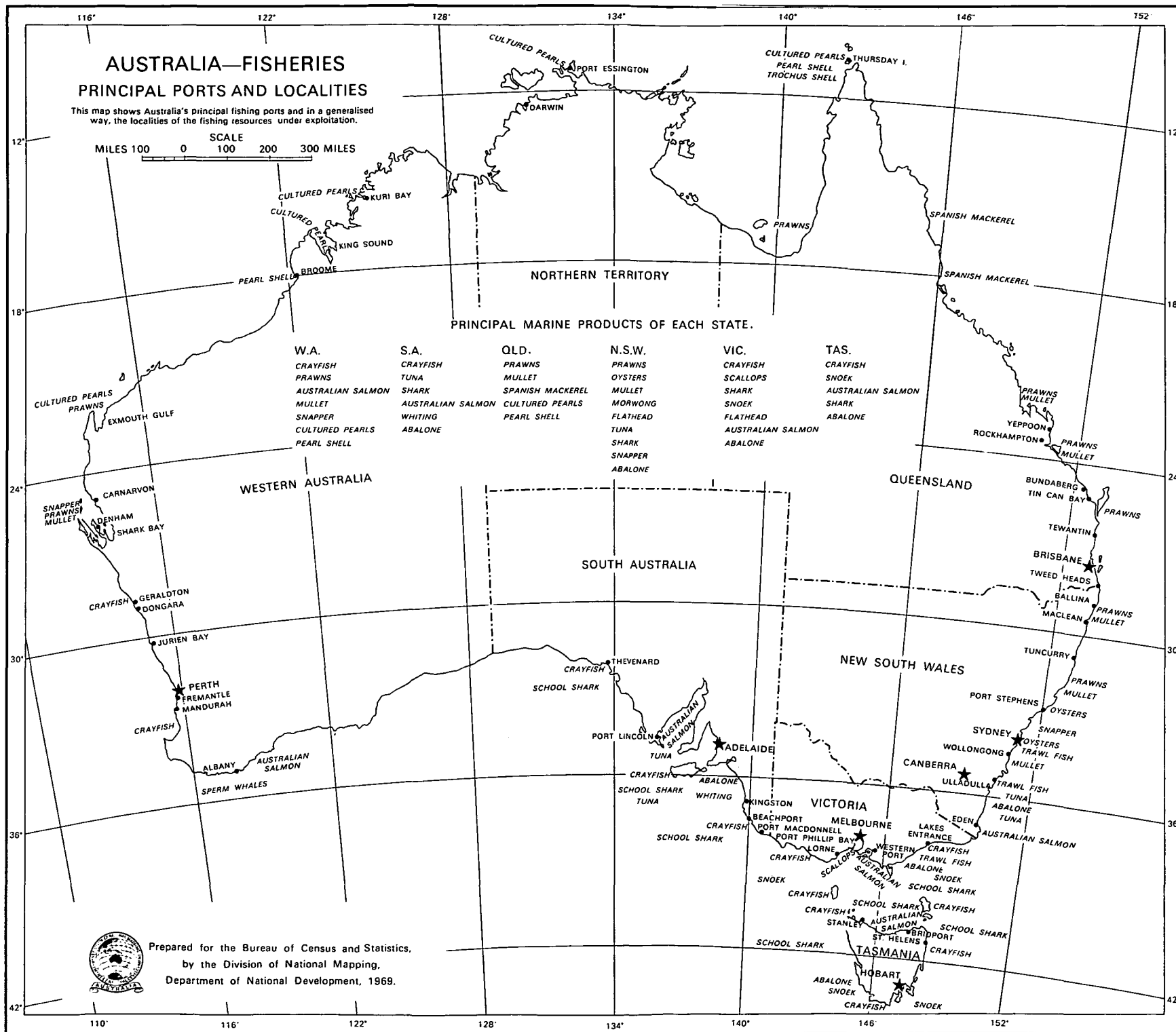
At the beginning of this century Australian fisheries were principally estuarine and onshore, and the deeper offshore resources were comparatively unknown. Vessels were generally sail-powered, and catching and preservation methods were primitive.

From 1909 to 1914 a Commonwealth vessel was engaged in research into fisheries resources around Australia. As a result of this exploration, otter trawling in the south-eastern waters began in 1915. There have been several years of high production from this fishery, but in each case the peak year was followed by a period of low production. Danish seine trawlers entered this fishery in 1936. In 1958–59 the steam otter trawlers used in this area were taken out of service. This fishery is at present stabilised at a relatively low level of production.

The tuna fishery began with the establishment in 1937 of a cannery at Narooma in New South Wales to exploit the occurrences, mainly of southern bluefin tuna (*Thunnus thynnus maccoyii*), which had been revealed by aerial surveys in 1936. However, landings were insignificant for over a decade. In 1950 the Commonwealth Government sponsored an American-owned clipper and trained crew to instruct fishermen in the pole-and-live-bait method of catching tuna. Development of the South Australian tuna fishery followed the visit of two American tuna experts in 1956. Attempts have been made to use gill netting, long lining, and the purse seine techniques, but these have not become established in the tuna fisheries.

Crustaceans

The crayfishery, which is undertaken off south-eastern Australia and off the west coast of Western Australia, was for many decades small. It was not until 1944 that the major sector, the western crayfishery, began to develop into what is now Australia's most productive single fishery. Between 1944 and 1947 production from the shallow areas of Houtman Abrolhos was used for canning for the armed forces. From 1948 to 1953 mechanisation of the fleet was introduced progressively and deeper waters were worked. The United States market for frozen craytails was established during this period. The period 1954 to 1962 saw the introduction of larger and more powerful vessels, of conservation measures designed to maximise the sustainable yield, and of increased processing facilities. The number of boats operating in this fishery is now carefully controlled. In the southern crayfishery development has followed similar lines, but production is lower because of the smaller crayfish population.





Boats and equipment employed by industry

The following two tables show details of boats and equipment employed in the taking of fish, crustaceans and edible molluscs, pearl-shell and trochus-shell, and the number of chasers and stations engaged in whaling operations. The reservations mentioned below regarding the use of employment information are also applicable to these tables. Boats employed in more than one industry are classified to their main activity.

**FISHERIES: BOATS AND EQUIPMENT EMPLOYED AND WHALING STATIONS
OPERATING, STATES AND NORTHERN TERRITORY, 1967-68**

		<i>N.S.W.</i>	<i>Vic.</i>	<i>Qld</i>	<i>S.A.</i>	<i>W.A.</i>	<i>Tas.</i>	<i>N.T.</i>	<i>Aust.</i>
General fisheries—									
Boats employed	no.	2,220	1,084	1,234	2,360	1,487	585	53	9,023
Value of boats and equipment	\$'000	7,263	7,961	8,073	8,762	11,413	5,784	458	49,714
Edible oyster fisheries—									
Boats employed	no.	1,505	..	94	..	..	..	..	1,599
Value of boats and equipment	\$'000	1,393	..	52	..	..	..	..	1,444
Pearl-shell and trochus-shell(a)—									
Boats employed	no.	..	..	31	..	15	..	3	49
Value of boats and equipment	\$'000	..	..	n.a.	..	n.a.	..	n.a.	n.a.
Whaling(a)—									
Chasers	no.	..	..	..	..	3	..	..	3
Stations operating	..	..	..	..	..	1	..	..	1

(a) Source: Department of Primary Industry.

**FISHERIES: BOATS AND EQUIPMENT EMPLOYED AND WHALING STATIONS
OPERATING, AUSTRALIA, 1963-64 TO 1967-68**

		1963-64	1964-65	1965-66	1966-67	1967-68
General fisheries—						
Boats employed	no.	8,473	9,426	8,983	8,991	9,023
Value of boats and equipment	\$'000	31,794	36,401	40,602	46,102	49,714
Edible oyster fisheries—						
Boats employed	no.	1,424	1,419	1,415	1,549	1,599
Value of boats and equipment	\$'000	976	1,125	1,161	1,127	1,444
Pearl-shell and trochus-shell(a)—						
Boats employed	no.	53	40	42	42	49
Value of boats and equipment	\$'000	480	n.a.	n.a.	n.a.	n.a.
Whaling(a)—						
Chasers	no.	3	3	3	3	3
Stations operating	..	1	1	1	1	1

(a) Source: Department of Primary Industry.

Employment in fisheries

Persons engaged in fishing activities, 1966 census

The number of persons whose industry statements were classified to 'fishing' at the 1966 census was 8,021 out of a total of 512,994 in all primary industries and 4,856,455 in the total work force. The census classification 'fishing' includes such activities as fishing, whaling, pearl-shell fishing, oyster-farming, etc. For further information see the chapter Employment and Unemployment, also 1966 Census Bulletin No. 9.6, *Population: By Industry and Occupational Status, Australia*.

Classification of registered commercial fishermen by industry

The following two tables are derived mainly from the licensing records of the various State fisheries authorities. Because the definitions and licensing procedures used by these authorities are not uniform the statistics should not be used to compare the relative productivities of fishing industries in the several States. Persons engaged in more than one industry are classified according to their main activity, and so may be classified differently from one year to the next.

In Australia the basic source of statistical information on commercial fishing operations is the fishermen. In four of the six States monthly returns of catch by species have been obtained from fishermen for a number of years. In the other two States (Queensland and South Australia) there have been no statistical collections from fishermen, and catch statistics have been derived from other sources such as markets and receiving depots. In general it is recognised that catch statistics in Australia have been somewhat incomplete in past years. For example, details of production given in this chapter refer in most cases only to the recorded commercial production. In view of the importance of amateur fishermen in certain types of fishing, details shown cannot be taken as representing the total catch. In addition, it is likely that the figures shown understate the full commercial catch because no information is available on fish taken for sale by persons not licensed as professional fishermen.

Two weaknesses of fisheries statistical collections in Australia to date have been the lack of uniformity, which makes it difficult to compile statistics on an Australia-wide basis, and the lack of data on the effort involved in taking fish (time spent fishing, gear used, etc.). Recognising these weaknesses, the Commonwealth-States Fisheries Conference in 1960 appointed a Statistics Committee 'to examine all aspects of fisheries statistics and fully document a proposed system for submission to the States and Commonwealth for approval'.

Model system of catch and effort statistics, 1962

The model system of catch and effort statistics designed by the Committee was adopted by the Commonwealth-States Fisheries Conference in 1962. The new system was introduced in Tasmania in 1963 and in Victoria and Western Australia in 1964. The system was introduced in Queensland for the otter trawl fishery early in 1965, but there are no definite plans at present to extend it to other fisheries. The system is now being introduced into South Australia in respect of major fisheries, and arrangements are proceeding for its introduction into New South Wales.

Under the new system fishermen are asked to report monthly the various fishing methods used, catch of each species taken and the locality where the greatest proportion of the catch is taken. Fishermen record catch in terms of landed weight, and appropriate conversion factors are used to obtain live weight where this is required. A grid system of 1° rectangles (relating to latitude and longitude) is used for recording location of catches at sea, and estuaries and inland waters are recorded where appropriate. Other data obtained include details of fishing effort, ports at which catch is landed, and employment details.

The eventual implementation of this system in all States is expected to ensure the availability of statistical information of a much higher standard. In addition to the new system of catch and effort statistics, a uniform boat registration system has been introduced by all States. This new system will provide details of various characteristics of the commercial fishing fleet on a uniform basis for all States.

Boats and equipment used in fisheries

Fish, crustaceans and molluscs (edible)

The boats used for the estuarine fisheries are mostly small vessels, propelled by diesel or petrol engines of low power. The offshore vessels range in length from 30 feet to 120 feet and are almost invariably powered by diesel engines. Many of them have insulated holds to carry fish in ice, and some of the crayfish boats are fitted with wells in which the catch is kept alive. Some vessels have dry refrigeration and others, including some of the tuna live-bait pole-fishing vessels, are equipped with brine refrigeration.

A recent survey showed that about 50 per cent of Australia's commercial fishing fleet, including tenders, consists of vessels up to twenty feet in length, about 25 per cent are in the 20-29 feet category, and the remainder are greater in length. Only a very small number are greater than fifty feet in length. More precise information on this aspect of the fishing fleet will be available in the future when results from the uniform boat registration system become available. A great variety of fishing equipment is used, and the following are the types of equipment most commonly used for the main types of fish, crustaceans, and molluscs: mullet, beach seine, gill net; shark (edible), long-lines, gill net; Australian salmon, beach seine; snoek, trolling lines; flathead, Danish seine, otter trawl; snapper, long-lines, traps, gill net, hand-line; morwong, Danish seine, otter trawl, traps; whiting, handlines, Danish seine, beach seine; garfish, gill net, beach seine; mackerel, trolling lines; tuna, pole and live-bait, trolling lines (lampara nets and purse seines are used for taking live bait for tuna); prawns, otter trawl, beam trawl, seine net; crayfish, pots, traps; scallops, dredge, otter trawl.

Pearls, pearl-shell and trochus-shell, whaling

Ketch-rigged luggers about fifty-five feet long which carry crews of eight to fourteen members are used for pearl and pearl-fishing around Australia.

The whaling industry is highly mechanised. Standard equipment includes aircraft to locate whales, diesel-powered catchers of about 100 to 125 feet in length, and tow boats.

Fish stocks inhabiting Australian waters are a common property resource. With the exception of the Western Australian and Tasmanian crayfisheries and the Shark Bay and Exmouth Gulf prawn fisheries, there are no restrictions on recruitment of men and vessels to any fishery. It has, therefore, been necessary for governmental action to be taken to control operations in certain fisheries which are sensitive to over-exploitation. The policy basic to the management of these fisheries is the greatest sustainable yield consistent with economic operations. Where a fishery, for economic reasons, is not producing its maximum yield, efforts to discover new methods of utilisation of the catch are made.

The *Continental Shelf (Living Natural Resources) Act* 1968 is expected to become operative during late 1969. The Act repeals the *Pearl Fisheries Act* 1952-1966 and provides for regulation of the exploitation of the living natural resources of the continental shelf. These resources comprise species proclaimed as being sedentary organisms to which the Act applies. The Convention on the Continental Shelf, Geneva, 1958, defines sedentary organisms as those which 'at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil'. The Act requires boats and operators engaged in searching for and taking of sedentary organisms for commercial purposes on the continental shelf to be licensed and this applies 'to all persons, including foreigners, and to all ships including foreign ships'. It also provides for the protection of organisms for conservation purposes generally, i.e., for the regulation of certain kinds of non-commercial collection.

Under the *Whaling Act* 1960-1966 the Commonwealth controls whaling from Australian stations in accordance with conditions laid down by the International Whaling Commission. This Commission was established by the International Convention for the Regulation of Whaling, 1946, to organise world-wide conservation measures.

Research

The main aim of fisheries research in Australia is to achieve the greatest sustainable yield of fish and to assist in the development of an efficient industry. To this end much of the biological research already undertaken has been directed at formulating recommendations for management of various fisheries. Research work is also carried out which is expected to lead to the development of new fisheries, the expansion of under-exploited fisheries, more economical operations, and the use of more efficient equipment.

The organisations in Australia at present engaged in research into fisheries matters are:

- (i) Division of Fisheries and Oceanography, C.S.I.R.O. (fisheries science and oceanography);
- (ii) Division of Food Preservation, C.S.I.R.O. (research into handling, storage, processing, and transportation of fish);
- (iii) the several State fisheries departments (general biological research);
- (iv) Fisheries Branch, Department of Primary Industry (economic and management research, gear technology, extension work to the industry).

Collection and presentation of fisheries statistics

Source and basis of statistics

Statistics presented in this chapter have been collected by a number of authorities. The various State fisheries authorities have supplied, through the Deputy Commonwealth Statisticians in the States, the details of employment, boats, equipment, and production of the general fisheries and the pearl and shell fisheries. The Fisheries Branch of the Department of Primary Industry has supplied particulars of the whaling industry. Statistics of the processing of general fisheries products and of overseas trade in the products of fishing and whaling have been compiled in the Commonwealth Bureau of Census and Statistics.

The statistics refer, in general, to financial years. However, pearl and shell fishing data refer to the season ended in the financial year shown. Whaling statistics are shown by calendar years, and refer to the season in the calendar year. All overseas trade information refers to financial years.

In the preparation of Australian fisheries production statistics the quantities of individual products are generally in terms of the form in which they are taken from the water. For example, the statistics of fish production published in this chapter are in terms of 'estimated live weights' which are calculated from landed weights by using conversion factors for each species in each State. These conversion factors allow for the fact that the quantities of fish reported are frequently in a gutted, headed and gutted, or otherwise reduced condition. Crustaceans are reported on a 'whole weight' basis and molluscs (edible) on a 'gross (in-shell) weight' basis. The figures of pearl-shell and trochus-shell refer to the actual quantities of dry shell for sale and exclude the weight of the fish.

The prawn fishery was pursued for many decades on a small scale, but it was not until the discovery that prawns spawn in oceanic waters that interest developed in catching them during this phase of their life cycle. The discovery in 1947 of stocks of prawns in Stockton Bight and off Evans Head (both in New South Wales) initiated the development of deep-sea prawning in Australia. Since that time the prawn fishery has expanded to the eastern offshore grounds. Commercial prawn fisheries in Western Australia commenced at Shark Bay in 1962 and at Exmouth Gulf in 1964. More recently grounds at Nickol Bay, Western Australia and further north have been exploited. The greatest development in the prawn fishery in recent years has occurred in the Gulf of Carpentaria. A joint Queensland-Commonwealth Government survey of a part of this area in 1963-1965 showed the presence of quantities of prawns, and commercial operators have now begun to exploit this resource on a large scale. The success of the ventures has encouraged the establishment of other ventures around northern Australia and substantial development of these fisheries is expected.

Molluscs

Natural oyster-beds were being harvested soon after the first settlement, but by 1870 rapid depletion of the stocks had resulted in restrictive legislation being passed in New South Wales. By the end of the nineteenth century, however, farms had been established in New South Wales and oyster cultivation was a notable industry. This cultivation has been almost entirely confined to the river estuaries of New South Wales. Very few oysters are exported and importation of oysters is necessary to cope with home demand. During 1964 an important scallop fishery was established in Port Phillip Bay, and a commercial fishery for abalone was developed in the waters of New South Wales, Tasmania, Victoria, and South Australia.

Whaling

Whaling has been undertaken from time to time in Australia since the early days of settlement. Baleen (humpback) whaling was carried out from stations on the west coast of Australia from 1949 and on the east coast from 1952. However, depleted stocks of the species resulted in the closing down of the eastern stations by 1962, and in 1963, following a severe decline in world stocks of humpback whales, the International Whaling Commission, of which Australia is a member, prohibited the capture of the species south of the equator for an indefinite period. Australian whaling is now carried out from Albany only, and the catch is confined to sperm whales.

Pearling

Since the middle of the nineteenth century, when pearling by Europeans first began in Australia, the collection of natural pearls has been incidental to the production of mother-of-pearl shell. Although attempts to establish pearl culture in Australia had been partially successful as early as the end of the last century, it was not until 1956 that the modern technique, as developed by the Japanese, was introduced into Australia at Kuri Bay in Western Australia. The joint venture between Australian and Japanese interests proved successful, and others entered the industry. There are now eighteen pearl culture farms in Western Australia, the Northern Territory, Queensland and Papua. Fifteen of the farms are operated as joint ventures by Australian and Japanese interests, while three are wholly Australian enterprises. The technique of pearl culture is still a closely-guarded trade secret.

General

A map showing Australia's principal ports and the localities of the fishery resources under exploitation appears on plate 48.

Fisheries administration and research

Government administration

The fisheries within territorial waters are administered by State departments and Territory administrations. The Fisheries Branch of the Department of Primary Industry develops and administers fisheries in extra-territorial waters and co-ordinates fisheries administration. In 1968 the Commonwealth Government established an exclusive fishing zone around Australia from three to twelve miles. This does not involve any change in territorial waters.

The fisheries laws of each State and Territory and of the Commonwealth provide for the licensing of boats used in commercial fishing operations and of commercial fishermen. The provisions are broadly similar in each State, the general requirement being that any person who takes fish for sale, and any boat used in such fishing operations, must be licensed in the State or Territory concerned. Some States extend the licensing requirements to amateur or part-time fishermen. Australian nationals who fish commercially outside the territorial waters of a State or Territory, but within Australian waters as proclaimed under the *Fisheries Act* 1952-1966, are required to take out licences and to register their boats under that Act.

REGISTERED COMMERCIAL FISHERMEN: STATES AND NORTHERN TERRITORY
1967-68

Industry	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	Aust.
General fisheries	2,604	2,053	2,153	(a)2,400	2,724	1,118	123	13,175
Edible oyster fisheries	1,092	..	223	..	4	n.a.	..	1,319
Pearl-shell and trochus-shell(b) . . . . .	..	..	371	..	131	..	36	538
Whaling(b)—								
At sea . . . . .	..	..	..	..	45	..	..	45
Ashore . . . . .	..	..	..	..	40	..	..	40

(a) Estimated. (b) Source: Department of Primary Industry.

REGISTERED COMMERCIAL FISHERMEN: AUSTRALIA, 1963-64 TO 1967-68

Industry	1963-64	1964-65	1965-66	1966-67	1967-68
General fisheries	11,862	11,414	12,256	12,657	13,175
Edible oyster fisheries	1,467	997	1,072	1,249	1,319
Pearl-shell and trochus-shell(a)	640	533	544	571	538
Whaling(a)—					
At sea	42	45	44	45	45
Ashore	40	38	42	43	40

(a) Source: Department of Primary Industry.

Production, processing and domestic marketing of fisheries products

The tables on pages 981-3 show details of the production of the main types of fish, crustaceans, and molluscs caught in each State and the Northern Territory in 1967-68 and throughout Australia for the years 1963-64 to 1967-68.

Fish

FISH: PRODUCTION, BY TYPE, STATES AND NORTHERN TERRITORY, 1967-68
(⁰000 lb estimated live weight)

Type	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	Aust.
Marine types—								
Australian salmon	715	1,303	..	2,382	10,502	606	..	15,508
Tuna	(a)8,096	34	85	6,560	144	54	..	14,974
Shark	1,964	5,810	..	3,266	710	1,600	21	13,371
Mullet	5,606	536	3,645	527	1,384	20	1	11,719
Snoek	50	3,676	..	..	..	5,984	..	9,710
Flathead	3,491	1,568	193	..	18	101	..	5,370
Whiting	267	462	625	1,809	516	..	..	3,679
Snapper	1,635	374	124	855	559	..	2	3,548
Morwong	2,792	167	..	..	..	14	..	2,975
Mackerel	129	..	1,860	..	201	7	25	2,221
Bream (including Tarwhine)	710	726	456	94	73	..	6	2,065
Garfish	268	371	145	809	39	25	..	1,658
Luderick	1,200	83	203	..	..	..	..	1,486
Tailor	322	147	814	..	79	..	..	1,362
Ruff . . . . .	..	44	..	524	745	..	..	1,313
Leatherjacket	795	35	..	..	24	..	..	854
Other	4,707	1,256	2,284	1,266	1,752	210	552	12,028
Total, marine	32,745	16,593	10,435	18,092	16,747	8,623	607	103,841
Freshwater types	260	423	n.a.	193	..	206	..	(b)1,082
Grand total	33,005	17,016	10,435	18,285	16,747	8,829	607	104,923

(a) Source: C.S.I.R.O. (b) Excludes freshwater fish caught in Queensland, particulars of which are not available.

FISH: PRODUCTION, BY TYPE, AUSTRALIA, 1963-64 TO 1967-68
(*000 lb estimated live weight)

Type	1963-64	1964-65	1965-66	1966-67	1967-68
Marine types—					
Australian salmon	11,260	8,291	11,184	14,898	15,508
Tuna	17,932	15,838	18,595	12,455	(a)14,974
Shark	10,463	10,470	11,597	13,326	13,371
Mullet	12,496	12,146	14,152	12,461	11,719
Snoek	4,331	6,514	8,539	5,146	9,710
Flathead	6,151	6,836	5,824	5,848	5,370
Whiting	3,498	3,658	3,600	3,619	3,679
Snapper	4,160	3,877	3,344	3,668	3,548
Morwong	4,545	3,218	3,021	3,772	2,975
Mackerel	2,215	2,316	2,298	2,153	2,221
Bream (including Tarwhine)	1,233	1,293	1,508	1,692	2,065
Garfish	1,740	1,422	1,471	1,780	1,658
Luderick	1,293	1,356	1,698	1,455	1,486
Tailor	1,627	1,748	1,357	799	1,362
Ruff	1,093	1,507	1,442	1,636	1,313
Leatherjacket	1,125	1,343	1,494	986	854
Other	10,907	11,401	11,792	11,666	12,028
<i>Total, marine</i>	<i>96,067</i>	<i>93,234</i>	<i>102,916</i>	<i>97,360</i>	<i>103,841</i>
Freshwater types(b)	1,015	1,183	1,060	1,184	1,082
Grand total	97,082	94,417	103,976	98,544	104,923

(a) See footnote (a) previous table. (b) Excludes freshwater fish caught in Queensland, particulars of which are not available.

Crustaceans

**CRUSTACEANS: PRODUCTION, BY TYPE, STATES AND
NORTHERN TERRITORY, 1967-68**
(*000 lb gross weight)

Type	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	Aust.
Crayfish(a)	368	1,533	56	5,264	22,024	4,031	..	33,276
Prawns	5,343	5	10,572	295	3,862	..	23	20,101
Crabs	166	..	565	10	68	..	..	809
Total	5,877	1,538	11,193	5,569	25,955	4,031	23	54,186

(a) Includes freshwater crayfish caught in New South Wales and shovelnosed lobster taken in Queensland.

CRUSTACEANS: PRODUCTION, BY TYPE, AUSTRALIA, 1963-64 TO 1967-68
(*000 lb gross weight)

Type	1963-64	1964-65	1965-66	1966-67	1967-68
Crayfish(a)	27,633	26,386	29,908	31,639	33,276
Prawns	13,369	12,076	12,547	13,624	20,101
Crabs	708	832	815	966	809
Total	41,711	39,293	43,270	46,228	54,186

(a) Includes freshwater crayfish caught in New South Wales and shovelnosed lobster taken in Queensland.

Molluscs (edible)

MOLLUSCS: PRODUCTION, BY TYPE, STATES, 1967-68
(*000 lb gross [in-shell] weight)

Type	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	Aust.
Scallops		29,150	311	..	273	496	..	30,230
Oysters	15,832	8	793	2	(a)	(a)	2	16,636
Abalone	(b)1,200	7,310	..	4,051	9	6,142	..	18,712
Squid . . . . .	..	253	82	(c)35	7	..	..	377
Mussels . . . . .	..	246	..	..	(a)	..	..	246
Octopus . . . . .	..	15	..	(d)	2	..	..	18
Cuttlefish . . . . .	..	..	..	(d)	..	..	..	1
Total	17,032	36,983	1,185	4,088	293	6,639	2	66,221

(a) Not available for publication; excluded from Australian total. (b) Estimated. (c) Includes cuttlefish and octopus. (d) Production for South Australia is included with squid.

MOLLUSCS: PRODUCTION, BY TYPE, AUSTRALIA, 1963-64 TO 1967-68
(*000 lb gross [in-shell] weight)

Type	1963-64	1964-65	1965-66	1966-67	1967-68
Scallops	(a)15,373	(a)24,739	(a)29,524	(a)29,923	30,230
Oysters	12,775	14,636	15,067	16,115	(b)16,636
Abalone	192	966	2,975	10,825	18,712
Squid	303	217	233	(c)369	(d)377
Mussels	410	334	425	(a)260	(a)246
Octopus	16	13	34	(e)34	(f)18
Cuttlefish	2	1	3	(f)	(f)1
Total(g)	29,073	40,907	48,262	57,527	66,221

(a) Excludes particulars for Western Australia which are not available for publication. (b) Excludes particulars for Western Australia and Tasmania which are not available for publication. (c) Includes octopus for Queensland and cuttlefish and octopus for South Australia. (d) Includes cuttlefish and octopus for South Australia. (e) Excludes production for Queensland and South Australia, which is included with squid. (f) Production for South Australia is included with squid. (g) Incomplete, see relevant footnotes.

Pearls, pearl-shell and trochus-shell

PEARL CULTURE OPERATIONS: AUSTRALIA, 1963 TO 1967
(Source: Fisheries Branch, Department of Primary Industry)

		1963	1964	1965	1966	1967
Purchases of shell	no. of shells tons	503,100 241.0	590,729 288.3	635,003 311.6	697,433 345.5	783,733 427.6
Production of—						
Cultured pearls—						
Round and baroque pearls	no. momme(a)	30,512 18,279	58,839 35,892	65,735 40,098	105,121 63,073	56,653 30,061
	\$'000	420	2,102	1,760	2,975	1,539
Half pearls	no. \$'000	147,764 272	232,887 764	278,637 883	264,012 621	266,466 680
Manufacturing shell	tons \$'000	61.4 11	107.9 38	155.4 67	160.1 70	168.2 80

(a) A momme is a pearl weight measurement equivalent to 0.13 oz (avoirdupois).

**PEARL-SHELL AND TROCHUS-SHELL: PRODUCTION
STATES AND NORTHERN TERRITORY, 1963 TO 1967**

(Tons)

	1963	1964	1965	1966	1967
Pearl-shell(a)—					
Queensland	221.5	215.4	193.3	179.6	189.2
Western Australia	217.8	79.9	97.4	103.2	132.7
Northern Territory	4.9	5.4	8.9	16.6	4.8
<i>Australia</i>	444.2	300.7	299.6	299.4	326.7
Trochus-shell—					
Queensland	63.6	30.6	10.8	2.6	1.0

(a) Excludes manufacturing shell produced from pearl culture operations.

Whales

Sperm whales only have been taken since 1963, which was the last season during which baleen whales were also taken.

WHALES TAKEN(a): AUSTRALIA, 1964 TO 1968
(Source: Fisheries Branch, Department of Primary Industry)
(Number)

	1964	1965	1966	1967	1968
Male	695	636	595	560	585
Female	15	32	11	27	73
Total	710	668	606	587	658

(a) Sperm whales only.

Processing of fish

Quick-freezing is used at sea and ashore to preserve fish before delivery to consumers. The main technique employed in Australia is brine-freezing, as used extensively in the tuna and salmon fisheries.

Fish canning in Australia on a modern scale dates from 1937, before which fish canning was carried out on an occasional basis only by factories handling other foodstuffs. The main canneries handle tuna (Eden, New South Wales; Melbourne, Victoria; Port Lincoln, South Australia); Australian salmon (Eden, New South Wales; Melbourne, Victoria; Port Lincoln and Adelaide, South Australia; Albany, Western Australia; Margate, Tasmania); snoek (Melbourne, Victoria; Margate, Tasmania); scallops and abalone (Melbourne, Victoria).

Other methods of fish processing include smoking and bottling, but these are undertaken on a minor scale only. Among the few fish by-products produced are small quantities of fish meal.

FISH PROCESSING (EXCEPT FREEZING): AUSTRALIA, 1963-64 TO 1967-68

	1963-64	1964-65	1965-66	1966-67	1967-68
Fish used(a)—	'000 lb	'000 lb	'000 lb	'000 lb	'000 lb
Whole	17,506	16,464	17,030	18,782	24,143
Headed and or gutted	5,148	5,491	5,866	6,872	7,769
<i>Estimated live weight equivalent, fish used</i>	<i>23,600</i>	<i>22,900</i>	<i>23,900</i>	<i>26,700</i>	<i>33,200</i>
Production(b)—					
Canned fish(c)—					
Australian salmon	5,335	3,875	4,664	6,344	6,737
Tuna	4,647	5,482	4,839	5,639	8,191
Other	1,167	1,557	2,350	1,759	2,450
<i>Total, canned fish</i>	<i>11,149</i>	<i>10,914</i>	<i>11,853</i>	<i>13,742</i>	<i>17,377</i>
Smoked fish	274	222	258	241	196
Fish paste	1,212	944	1,018	1,146	1,334
Fish meal(d)	2,222	2,373	1,778	1,813	2,776

(a) Fish used for canning (including fish loaf), smoking and the manufacture of fish paste, but excluding the weight of oysters, other shellfish and crustaceans used for canning. (b) Excludes canned crayfish, lobsters, prawns, oysters, and clams, details of which are not available for publication. (c) Includes fish loaf, fish cakes, etc. (d) Excludes whale meat.

Processed crustaceans and molluscs

The chief technique employed to preserve crayfish and scallops is blast freezing, although plate contact freezing is also being used. Crayfish for the domestic market are usually cooked whole and then frozen, as are some exported crayfish. However, the bulk of crayfish exports consists of frozen raw craytails. Most prawns for domestic consumption are sold in a whole cooked condition. Some are also exported in this form, after freezing. As a rule, however, the majority of prawn exports consist of green headless prawns, sometimes de-veined, sometimes split in 'butterfly' style, but in all cases frozen into five pound blocks. Scallops are normally frozen in cello-wrapped five pound blocks, although packaging of individually frozen scallops is growing in popularity. Small quantities of frozen abalone are now being exported to the United States of America and Asia. Canned abalone is also packed for the Asian market, and small quantities of abalone soup are being prepared for the domestic and overseas markets.

Whale processing

Oil from sperm whales is used in the manufacture of soap, plastics and watch lubricants, and in automatic transmission systems in motor cars.

WHALE PROCESSING: AUSTRALIA, 1964 TO 1968
(Source: Fisheries Branch, Department of Primary Industry)

		1964	1965	1966	1967	1968
Quantity of sperm whale oil produced	barrels(a)	27,534	25,002	24,252	22,428	23,472
Value of whale oil produced	\$'000	620	510	540	423	435
Value of by-products (meal, meat, solubles, etc.)	"	120	244	398	282	313
<i>Total value of products</i>	<i>"</i>	<i>740</i>	<i>754</i>	<i>938</i>	<i>705</i>	<i>748</i>

(a) 6 barrels = 1 ton.

Domestic marketing of fisheries products

Although virtually the whole of the tuna and Australian salmon catches and a large proportion of the snoek catch are canned, the greater part of Australian fisheries production is marketed fresh or frozen.

Marketing arrangements for fresh fish vary. In New South Wales fish marketing is the responsibility of the New South Wales Fish Authority, which operates the Metropolitan and Wollongong Fish Markets. In other coastal centres of New South Wales fishermen's co-operatives may become registered as local fish markets. Fish for industrial use do not pass through any of these markets. The Queensland Fish Board sells all production on behalf of fishermen in that State, and has branches in eighteen centres, as well as depots at eight others. The Board also purchases fish on its own account to stabilise prices. In Victoria, Western Australia and Tasmania the marketing of fish is undertaken through agents. In South Australia the great majority of the fishermen are members of the South Australian Fishermen's Co-operative Ltd, which handles the whole of their production. Canned fish and frozen fish in the form of consumer packs are marketed mainly by the supermarket-type retail establishments. Oysters are usually sold live in the shell directly to restaurants, or are shelled and bottled before being sent to retailers.

Value of fisheries production

The following tables show details of the values of production of edible fisheries products, pearl-shell and trochus-shell for the years 1963-64 to 1967-68. See also the chapter Miscellaneous for an explanation of the value terms used.

SELECTED FISHERIES PRODUCTS: GROSS VALUE, STATES AND NORTHERN TERRITORY 1967-68 (\$'000)

Product	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	Aust.
Fish	5,434	2,253	(a)1,847	2,884	1,100	722	92	14,333
Crustaceans	3,003	1,030	3,973	3,518	18,441	2,898	14	32,877
Molluscs (edible)	3,591	2,618	136	590	(b)13	1,087	..	8,036
Pearl-shell(c) . . . . .	..	..	99	..	(d)91	..	(d)1	(e)271

(a) Excludes freshwater fish, particulars of which are not available. (b) Excludes scallops, particulars of which are not available for publication. (c) Source: Department of Primary Industry. (d) Estimated. (e) Includes manufacturing shell produced from pearl culture operations; details classified by States are not available for publication.

SELECTED FISHERIES PRODUCTS: GROSS VALUE, AUSTRALIA, 1963-64 TO 1967-68 (\$'000)

Product	1963-64	1964-65	1965-66	1966-67	1967-68
Fish(a)	13,660	12,187	13,730	12,646	14,333
Crustaceans	15,629	22,386	24,008	24,906	32,877
Molluscs (edible)	(b)3,351	(b)3,804	(b)4,159	(b)6,580	8,036
Pearl-shell(c)	352	271	291	307	271
Trochus-shell(c)	10	5	2	..	..

(a) Excludes freshwater fish caught in Queensland. (b) Excludes scallops in Western Australia. (c) Source: Department of Primary Industry.

GROSS VALUE OF FISH, BY PRINCIPAL TYPES, 1967-68(a) (\$'000)

Type of Fish	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	Aust.
Australian salmon	(b)	169	..	214	397	49	..	(b)
Tuna		5	4	590	14	5	..	
Shark		780	..	370	105	215	2	
Mullet		59	311	53	117	2	..	
Snoek		357	..	..	..	286	..
Flathead		219	23	..	2	10	..	
Snapper		109	32	187	74	..	..
Morwong		23	..	..	1	2	..
All other species	530	(c)1,478	1,470	391	153	89		
Total fish	5,434	2,253	1,847	2,884	1,100	722	92	14,333

(a) A breakdown of value according to species is not available for previous years. (b) Details of individual species not available. (c) Excludes freshwater fish, particulars of which are not available.

**FISHERIES: GROSS AND LOCAL VALUE OF PRODUCTION
STATES AND NORTHERN TERRITORY, 1967-68**
(\$'000)

<i>State or Territory</i>	<i>Gross value</i>	<i>Marketing costs</i>	<i>Local value</i>
New South Wales	12,028	1,817	10,212
Victoria	5,902	579	5,322
Queensland	7,309	412	6,896
South Australia	6,993	830	6,162
Western Australia	21,910	148	21,762
Tasmania	4,707	860	3,847
Northern Territory	107	n.a.	107
Australia	58,956	4,646	54,308

In the following table the local value of fishing and whaling production and the local value per head of population are shown by States. Because the value of materials used in the course of production is not available for all States it is not possible to show a comparison of net values.

FISHERIES: LOCAL VALUE OF PRODUCTION, STATES, 1963-64 TO 1967-68

<i>Year</i>	<i>N.S.W.</i>	<i>Vic.</i>	<i>Qld</i>	<i>S.A.</i>	<i>W.A.</i>	<i>Tas.</i>	<i>N.T.</i>	<i>Aust.</i>
LOCAL VALUE (\$'000)								
1963-64	7,856 (a)	4,202	4,324	3,436	(a) 10,088	1,726	52	31,684
1964-65	8,263	3,212	5,298	4,480	15,167	2,194	71	38,685
1965-66	8,555	3,797	5,588	5,294	15,683	2,747	61	41,725
1966-67	8,836	4,307	6,130	5,420	16,468	3,024	82	44,267
1967-68	10,212	5,322	6,896	6,162	21,762	3,847	107	54,308

LOCAL VALUE PER HEAD OF POPULATION
(\$)

1963-64	1.93 (a)	1.37	2.71	3.36	(a) 12.63	4.76	1.04	2.86
1964-65	1.99	1.02	3.26	4.26	18.56	5.99	1.34	3.43
1965-66	2.03	1.19	3.37	4.89	18.73	7.43	1.10	3.63
1966-67	2.07	1.33	3.81	4.91	19.10	8.09	1.41	3.81
1967-68	2.35	1.61	4.01	5.51	24.38	10.14	1.76	4.55

(a) Not comparable with subsequent years because of changes in methods of valuation.

Consumption of edible fisheries products

Particulars of the estimated supplies of fish, crustaceans and molluscs available for consumption per head of population, in terms of edible weight, are included in the table below. For the purpose of compiling this table, an allowance has been made for the non-commercial fish catch.

**FISHERIES PRODUCTS: ESTIMATED SUPPLIES AVAILABLE FOR CONSUMPTION
AUSTRALIA, 1963-64 TO 1967-68**
(lb edible weight per head per annum)

	1963-64	1964-65	1965-66	1966-67	1967-68
Fresh or frozen—					
Fish—					
Australian origin(a)	3.3	3.2	3.3	3.1	3.0
Imported	3.1	3.0	3.8	3.3	3.5
Crustaceans and molluscs	1.2	1.5	1.5	1.8	2.1
Cured (including smoked and salted)	1.0	0.7	0.9	0.6	0.7
Canned—					
Australian origin	0.8	1.0	1.1	0.9	0.7
Imported	2.3	2.3	2.4	2.4	2.2
Total	11.7	11.7	13.0	12.1	12.1

(a) Includes an allowance for non-commercial catch of fish; excludes fish exported.

Overseas trade in fisheries products

Edible fisheries products

**OVERSEAS TRADE IN EDIBLE FISHERIES PRODUCTS: AUSTRALIA
1965-66 TO 1967-68**

	Quantity ('000 lb)			Value (\$'000 f.o.b.)		
	1965-66	1966-67	1967-68	1965-66	1966-67	1967-68
IMPORTS						
Fresh and frozen(a)	50,666	45,597	46,886	13,972	12,456	10,741
Smoked, dried and salted	10,516	7,393	8,975	2,551	1,568	2,018
Potted and concentrated	194	323	153	206	198	160
Canned—						
Herrings	6,528	5,844	4,676	1,384	1,281	1,095
Salmon	11,145	12,785	11,226	6,522	7,705	6,681
Sardines and pilchards	6,759	5,318	6,260	2,228	1,919	2,306
Tuna	216	148	258	65	51	93
Other fish	1,973	2,870	2,241	579	747	749
Crustaceans and molluscs	1,527	1,432	2,085	1,096	1,071	1,764
Total, canned	28,148	28,397	26,746	11,874	12,774	12,688
Products not elsewhere included	1,599	2,542	2,634	811	1,693	1,725
Grand total . . . . .	..	..	..	29,414	28,689	27,332
EXPORTS						
(Australian produce only; excludes re-exports)						
Fresh and frozen(b)—						
Fish	4,857	988	296	782	211	116
Crustaceans and molluscs—						
Crayfish tails	9,735	10,266	11,016	18,079	17,172	22,540
Prawns	1,822	2,078	3,290	1,616	2,192	3,476
Other	2,618	3,456	5,648	1,367	1,999	3,740
Boiled and frozen crustaceans and molluscs	2,194	1,727	1,136	1,964	1,536	1,111
Prepared and preserved—						
Fish	277	545	384	97	205	146
Crustaceans and molluscs	884	2,435	4,259	458	1,392	2,376
Products not elsewhere included	70	155	163	43	141	245
Grand total . . . . .	..	..	..	24,406	24,848	33,750

(a) Excludes frozen smoked, which is included in item Smoked, dried etc. (b) Excludes frozen smoked, which is included in item Products not elsewhere included.

Pearls

Pearls valued at \$451,000 were imported into Australia in 1967-68 (\$405,000 from Japan), compared with imports valued at \$583,000 in 1966-67 (\$554,000 from Japan).

Cultured pearls exported from Australia in 1967-68 (excluding re-exports) were valued at \$1,532,000 compared with exports valued at \$1,888,000 in 1966-67, the bulk of the exports each year being shipped to Japan. The value of natural pearls exported from Australia in 1967-68 (excluding re-exports) was \$12,000 compared with \$19,000 in 1966-67, the major proportion again being shipped to Japan.

Pearl, etc., shell and marine animal oils

Of the pearl-shell exported in 1967-68, exports valued at \$129,000 were consigned to the United States of America, \$128,000 to Japan and \$66,000 to the Federal Republic of Germany.

OVERSEAS TRADE IN SHELLS: AUSTRALIA, 1965-66 TO 1967-68

	Quantity ('000 lb)			Value (\$'000 f.o.b.)		
	1965-66	1966-67	1967-68	1965-66	1966-67	1967-68
Imports—						
<i>Total imports</i>	88	68	92	31	32	38
Exports(a)—						
Pearl-shell	1,141	1,326	1,204	427	540	381
Trochus-shell	24	84	79	2	32	15
Other	18					
<i>Total exports</i>	1,183	1,411	1,283	437	572	396

(a) Australian produce only; excludes re-exports.

Of the whale oil exported in 1966-67, about one-half was exported to the United Kingdom, the United States of America, the Federal Republic of Germany, and the Netherlands sharing the bulk of the remainder.

OVERSEAS TRADE IN MARINE ANIMAL OILS: AUSTRALIA, 1965-66 TO 1967-68

	Quantity ('000 gal)			Value (\$'000 f.o.b.)		
	1965-66	1966-67	1967-68	1965-66	1966-67	1967-68
Imports—						
Whale oil from—						
Norway	98	..	607	91	..	433
Japan	1,095	727	261	1,084	714	170
United Kingdom	54	104	61	84	135	73
Other countries	34	18	30	39	17	27
<i>Total whale oil</i>	1,281	849	959	1,298	866	702
Cod liver oil	108	93	94	97	84	81
Unrefined fish oils	82	61	73	76	54	54
Other	21	15	17	28	22	20
<i>Total imports</i>	1,492	1,010	1,143	1,499	1,026	857
Exports(a)—						
Whale oil	1,288	932	1,532	620	466	640
Other	2	2	1	1	3	1
<i>Total exports</i>	1,290	934	1,533	621	469	641

(a) Australian produce only; excludes re-exports.

