

CHAPTER XXV

FISHERIES

NOTE.—Further information on subjects dealt with in this chapter is contained in the annual printed bulletin *Primary Industries, Part II.—Non-Rural Industries and Value of Production* and in the annual mimeographed statistical bulletin *Fishing and Whaling*, particularly as regards types of fish, etc., caught.

§ 1. Resources, Development and National Aspects

1. Natural Resources.—(i) *Edible Fauna.* (a) *Fish.* Australian fishery resources, in comparison with those of some other areas, are not large. It has been calculated that there are approximately 2,000 species of fish in Australia and the waters surrounding it (including freshwater species), but the stocks of each species are comparatively small. Australia lacks adequate resources of such highly productive species as the herrings, cods, halibuts and true salmon (except for the Tasmanian whitebait and acclimatized freshwater species) on which the major proportion of world fisheries production is based.

The marine life of northern Australia is similar to that of the south-east Asian region; for example, the giant perch (*Lates calcarifer*) of northern Australia is also taken in Thailand and Malaya, and the parrot fishes (*Labridae*) are also distributed over the region. Some similarities with the fishes of South Africa can also be noted. For instance, the barracouta (*Leionura atun*) of Australia is also caught in South African waters. Mulletts, which form the basis of Australia's largest single species catch, occur throughout the world, as do the tunas.

Fishing is carried out continuously in estuarine, coastal and off-shore Australian waters in the east and south from Port Douglas in Queensland to Ceduna in South Australia, in Western Australia from Esperance to Shark Bay, and sporadically 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 three types: the estuarine fisheries, located in the tidal waters of rivers and coastal lakes; the pelagic fisheries which exploit species inhabiting the surface layers of the open ocean; and the 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), breams (*Acanthopagrus spp.*), and some crustaceans. In addition to these, there is a small freshwater commercial fishery, principally in New South Wales and South Australia, exploiting Murray cod (*Maccullochella macquariensis*) and 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. Thynnidae, Katsuwonidae, Sardidae*), barracouta (*Leionura atun*) 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 pursued on the reefs which may be found virtually right around the continent, and which yield such species as snapper (*Chrysophrys auratus*), the so-called "cods" (*Epinephelus, Choerodon, Callyodon spp.*), and associated species; those pursued on the trawling grounds, which produce species such as flathead (*Neoplatycephalus, Trudis spp.*), morwong (*Nemadactylus spp.*), John dory (*Zeus faber*), etc.; and the important fishery for edible shark (school shark, *Galeorhinus australis*, and gummy shark, *Mustelus antarcticus*), in south-eastern Australia.

(b) *Crustaceans.* Crustaceans taken in Australia include crayfish, prawns, crabs and freshwater lobsters. Crayfish (southern, *Jasus lalandei*; western, *Panulirus cygnus*; and eastern, *Jasus verreauxi*) is the most important crustacean exploited in Australia, and various species occur on the reefs of the continental shelf in all States. The commercial fishery, for technological reasons and through lack of knowledge of numbers, has not extended to the tropical species (*P. ornatus*, etc.), but is concentrated on species found around the southern

part of Australia. Prawns (*Penaeus* and *Metapenaeus* spp.) are taken in the estuarine, coastal and offshore waters of New South Wales and Queensland, and in the Shark Bay region of Western Australia. Crabs (*Scylla* and *Portunus* spp.) are taken mainly in Queensland and Western Australia, but small quantities are also taken in the other States. Fresh-water lobsters (*Euastacus serratus*) are caught in inland streams in New South Wales, and one species, marron (*Cheraps tenuimanus*) forms the basis of an amateur fishery in the south-west of Western Australia.

(c) *Molluscs*. Edible molluscs produced in Australia include oysters (mainly *Crassostrea commercialis*), scallops, mussels and some of the cephalopods (squid, octopus, cuttlefish). Naturally-grown oysters are produced in all States except South Australia. In New South Wales and, to a lesser extent, in Queensland, edible oysters are cultured commercially. Scallops (*Pecten meridionalis* and *Equichlamys bifrons*) are taken in Tasmania. A new fishery exploiting the species *Pecten alda* has developed in Port Phillip Bay. The saucer scallop (*Amusium balloti*) is obtained in the Queensland fishery. The scallop resources in the Shark Bay area of Western Australia have not been developed, and are still the subject of scientific investigations. Mussels (*Mytilus planulatus*) are gathered mainly in Victoria. Small quantities of cephalopods, mainly squid (*Loligo* spp.), are produced in many localities. Increased interest in the abalone (*Haliotis* spp.) has resulted in the development of small fisheries off southern New South Wales and the east coast of Tasmania. Other edible molluscs taken from time to time include pipis (*Plebidonax deltooides*).

(ii) *Pearl-shell and Trochus-shell*. Pearl-shell (*Pinctada maxima*), which is used for the manufacture of buttons, knife handles, etc., is taken in the tropical waters of Australia from Onslow in Western Australia to Cairns in Queensland. Trochus-shell is found mainly on coral reefs off the Queensland coast, although very small quantities occur in Western Australia.

(iii) *Whales*. Baleen whales, particularly humpback (*Megaptera nodosa*), migrate during winter from their summer feeding grounds in Antarctic waters to their breeding and nursery grounds in warmer waters off the north-east and north-west coasts of Australia. Since the war, the Australian whaling industry has exploited humpback whales on both coasts during the winter migrations. However, the same stocks have been available to Antarctic whalers in the summer, and this, together with their slow reproduction rate, has resulted in the stocks of Antarctic humpback whales in the Southern Hemisphere being subjected to exploitation greater than they can sustain.

Sperm whales (*Physeter catodon*) have been taken in the southern waters of Western Australia since 1955.

(iv) *Marine Flora*. Seaweeds of possible commercial value occur in coastal waters of New South Wales, Tasmania and Western Australia. During 1962, a venture was launched to exploit seaweed (*Macrocystis pyrifera*) beds for their derivatives, principally alginates, in Tasmanian waters.

2. **Development of Fisheries in Australia.**—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, 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, steam trawling vessels used in this area were taken out of service, and a modern diesel trawler was introduced. This fishery is now stabilized 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 the visit of a Fijian tuna 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 1954. Recent developments in tuna fishing include the use of gill netting and long-lining. Techniques of taking species of tuna other than southern bluefin are being investigated.

The crayfishery, which is pursued off south-eastern Australia and off the west coast of Western Australia, was for many decades on a small scale. 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's Abrolhos was used for canning for the armed forces. From 1948 to 1953, mechanization 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 maximize the sustainable yield, and of increased processing facilities. In the southern crayfishery, development has followed similar lines, but on a smaller scale because of the smaller crayfish population.

The prawn fishery was pursued for many decades on a small scale, but it was not until the discovery of the need for prawns to spawn at sea 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 offshore grounds. In 1962, a commercial prawn fishery was commenced in Shark Bay, Western Australia.

Whaling has been undertaken from time to time in Australia since the early days of settlement. Humpback whaling has been carried out from stations on the west coast of Australia since 1949, and off the east coast since 1952. A station was established on Norfolk Island in 1956. Despite the introduction of catch quotas by the Commonwealth Government, the humpback whale stocks, like most other baleen whale stocks throughout the world, have been over exploited. By the end of the 1962 whaling season, whale stocks had been depleted to the extent that the stations on the east coast and Norfolk Island had either gone into liquidation or otherwise disposed of their assets. On the west coast, the station at Albany, by 1962, had almost completely changed its operations to sperm whaling, and the station at Carnarvon was extending its activities into other types of fisheries. As a result of a decision at the 15th Meeting of the International Whaling Commission in July, 1962, the taking of humpback whales in waters south of the Equator has been prohibited. The Commonwealth Government has accepted this decision.

3. Government Administration of the Fishing Industry.—The fisheries within territorial waters (that is, within three miles of the shore) 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.

The fisheries legislation of each State and Territory and of the Commonwealth provides 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 1952-1959*, are required to take out licences and to register their boats under that Act.

Fish stocks inhabiting Australian waters are a common property resource. With the exception of the Western Australian crayfishery and the Shark Bay prawn fishery, there is no restriction on recruitment of men and vessels to any fishery. It has, therefore, been necessary for governmental action to be taken in an endeavour to provide rules of operation in certain fisheries which are vulnerable to depletion. 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 utilization of the catch are made.

The *Pearl Fisheries Act 1952-1953* aims at the management of the pearl-shell resources in accord with Australia's proclamation of sovereign rights over the natural resources of the sea bed and subsoil to the 100 fathom line. It requires that all pearlers, vessels, etc., must be licensed, and prohibits the removal of live shell from Australian waters except with the written permission of the Minister for Primary Industry.

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

4. **Research.**—The aim of all 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 conservation measures in various fisheries. Future work is expected to concentrate on the discovery, development and conservation of new fisheries, on the expansion of under-exploited fisheries, on the economics of the industry and on the improvement of equipment.

The organizations, committees, etc., in Australia at present engaged in research into fisheries matters are:—

- (i) Division of Fisheries and Oceanography, C.S.I.R.O. (biological and oceanographic research);
- (ii) Division of Food Preservation, C.S.I.R.O. (research into handling, storage, processing and transport 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);
- (v) Southern Pelagic Project Sub-committee and the Western Fisheries Sub-committee of the Commonwealth-State Fisheries Conference (co-ordination and planning of research); and
- (vi) Advisory Committee to the Minister for Primary Industry on the Fisheries Development Trust Account (consideration and recommendation to the Minister on projects to be subsidized from the Account, which was set up from the sale of the Commonwealth Government's whaling assets in 1956).

§ 2. Collection and Presentation 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 oversea 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 (from May to October) in the calendar year. All oversea 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 catch is generally shown according to the State in whose waters it was taken. However, a quantity of sharks and crayfish taken by Victorian-based fishermen in Tasmanian waters, but marketed in Victoria, is included in the Victorian catch, since the economy of that State is most directly affected. Similarly, pearl-shell taken by Queensland luggers operating in Northern Territory waters is included in the Queensland take. Pearl-shell taken by Japanese fishermen operating in Australian waters is excluded from Australian production figures, although the quantities taken up until 1961-62 are shown as a footnote to the table on page 1123. The Japanese pearling fleet did not operate in Australian waters during 1962-63.

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 to some extent the full commercial catch, because no information is available on fish taken for sale by persons not licensed as professional fishermen.

§ 3. The Fishing Industry

1. Persons Engaged in Fisheries.—In the following table, which shows particulars collected in the Population Censuses of Australia at 30th June, 1947, 1954 and 1961, the numbers of persons whose industry statements were classified to "fishing and whaling" are shown together with the numbers engaged in all primary industries and the total work force.

PERSONS ENGAGED IN FISHERIES: AUSTRALIA

Particulars	Census, 30th June—		
	1947	1954	1961
Persons engaged in—			
Fishing and whaling	10,656	8,637	8,252
All primary industries	563,607	560,100	513,286
Total work force	3,196,431	3,702,022	4,225,096
Persons engaged in fishing and whaling as a proportion of—			
All primary industries %	1.9	1.5	1.6
Total work force %	0.3	0.2	0.2

NOTE.—An adjustment was made to the 1947 and 1954 industry data by distributing over the range of recorded industry the number of persons whose industry was not stated. No such adjustment was made to the 1961 figures.

2. General Fisheries.—(i) *Employment, Boats and Equipment.* 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.

Almost every type of fishing equipment is used. The following table sets out the main types of fish, crustaceans and molluscs and the equipment most commonly used.

FISHING EQUIPMENT USED IN AUSTRALIA

Type of fish	Equipment used
Mullet	Beach seine, gill net
Shark (edible)	Long-lines
Australian salmon	Beach seine
Barracouta	Trolling lines
Flathead	Danish seine, otter trawl
Snapper	Long-lines, traps
Morwong	Danish seine, otter trawl, traps
Whiting	Handlines, Danish seine
Garfish	Gill net, beach seine
Mackerel	Trolling lines
Tuna(a)	Pole and live-bait, trolling lines, gill netting
Prawns	Otter trawl, beam trawl, seine net
Crayfish	Pots, traps
Scallops	Dredge, otter trawl

(a) Lampara nets and purse seines are used for taking live bait for tuna.

The following two tables show details of persons, boats and equipment employed in the taking of fish, crustaceans and edible molluscs, and data relating to oyster leases. These statistics 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 the fishing industries in the several States. Figures for 1962-63 are not comparable with those for previous years as persons engaged in fishing in South Australia included licensed part-time (non-commercial) fishermen prior to 1962-63. In 1962-63, an estimate of full-time (commercial) fishermen engaged has been recorded.

Boats and persons engaged in more than one type of fishing are classified according to their main activity, and so may be classified differently from one year to the next.

The table below gives details by States for 1962-63.

EDIBLE FISHERIES: BOATS AND EQUIPMENT IN USE, PERSONS ENGAGED, ETC., 1962-63

Particulars	Unit	N.S.W.	Vic.	Qld	S.A.	W.A. (a)	Tas.	N.T.	Aust.
General fisheries(b)—									
Boats engaged	No.	2,879	784	1,855	1,650	1,325	511	30	9,034
Value of boats and equipment	£'000	3,066	1,692	2,230	1,700	4,294	1,127	40	14,149
Persons engaged	No.	2,445	1,004	2,336	(c) 2,000	2,483	1,208	68	11,544
Edible oyster fisheries—									
Boats engaged	No.	1,256	(d)	36	..	2	(d)	(d)	1,294
Value of boats and equipment	£'000	445	(d)	16	..	(e)	(d)	(d)	461
Persons engaged	No.	1,067	(d)	81	..	6	(d)	(d)	1,154
Leases granted	No.	5,149	5	235	..	..	..	4	5,393
Length of foreshore in leases	'000 yds	908	16	(f)	..	..	..	26	(g) 950
Off-shore leases	acres	7,342	330	(f)	..	..	..	24,000	g 31,672

(a) Year ended December, 1961. (b) Excludes edible oyster fisheries but includes crustacean and other mollusc fisheries. (c) In addition, approximately 5,000 licensed fishermen operate on a part-time (non-commercial) basis. () No boats or persons had oyster fishing as their main activity in 1962-63. (e) Less than £500. (f) Not available. (g) Excludes Queensland.

The following table shows similar information for Australia for the years 1959-60 to 1962-63.

EDIBLE FISHERIES: BOATS AND EQUIPMENT IN USE, PERSONS ENGAGED, ETC., AUSTRALIA

Particulars	Unit	1959-60	1960-61	1961-62	1962-63
General fisheries(a)—					
Boats engaged	No.	7,890	7,756	8,460	9,034
Value of boats and equipment	£'000	10,762	12,411	12,899	14,149
Persons engaged	No.	13,319	14,955	15,878	(b) 11,544
Edible oyster fisheries—					
Boats engaged	No.	1,213	1,449	1,349	1,294
Value of boats and equipment(c)	£'000	368	412	484	461
Persons engaged	No.	917	822	993	1,154
Leases granted	No.	4,897	5,085	5,231	5,393
Length of foreshore in leases(d)	'000 yds	860	920	918	950
Off-shore leases(d)	acres	5,537	6,051	7,040	31,672

(a) Excludes edible oyster fisheries, but includes crustacean and other mollusc fisheries. (b) Not comparable with previous years; see explanation in text preceding tables. (c) Excludes particulars for the Northern Territory for 1959-60. (d) Excludes Queensland.

(ii) *Production. (a) Fish.* The following table shows details of the production of the main types of fish caught in each State and the Northern Territory in 1962-63.

FISH: PRODUCTION BY TYPE, 1962-63
(⁰000 lb. estimated live weight)

Type	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	Aust.
Marine types—								
Mullet	6,446	979	4,402	550	1,346	12	1	13,736
Tuna	2,769	106	47	7,932	121	24	6	11,005
Shark	2,018	(a)4,336	25	2,632	681	(a) 832	..	10,524
Australian salmon ..	1,564	1,023	..	885	3,157	1,165	..	7,794
Flathead	4,756	1,832	178	..	17	45	..	6,828
Morwong	4,663	277	..	..	..	9	..	4,949
Barracouta	15	3,697	..	..	..	1,130	..	4,842
Snapper	1,743	303	38	637	1,386	..	..	4,107
Whiting	438	300	467	1,875	619	..	..	3,699
Mackerel	322	..	1,718	..	140	(b)	12	2,192
Leatherjacket	1,893	28	..	..	34	(b)	..	1,955
Garfish	329	503	140	500	35	138	..	1,645
Bream (incl. Tarwhine)	727	196	453	67	79	(b)	9	1,531
Ruff .. ..	..	61	..	460	839	..	..	1,360
Luderick	1,130	56	125	..	197	..	..	1,311
Tailor	222	..	537	..	..	..	..	956
Other	3,994	1,431	1,646	970	1,483	114	303	9,941
<i>Total, Marine</i>	33,029	a 15,128	9,776	16,508	10,134	(a)3,469	331	88,375
Freshwater types	498	211	(c)	600	..	..	..	(d) 1,309
Grand Total	33,527	a 15,339	(d)9,776	17,108	10,134	(a)3,469	331	(d)89,684

(a) 935,000 lb. taken by Victorian fishermen in Tasmanian waters is included in Victoria.
(b) Less than 500 lb. (c) Not available. (d) Excludes freshwater fish caught in Queensland, particulars of which are not available.

The total Australian production of these more common types of fish is shown in the following table for the years 1958-59 to 1962-63.

FISH: PRODUCTION BY TYPE, AUSTRALIA
(⁰000 lb. estimated live weight)

Type	1958-59	1959-60	1960-61	1961-62	1962-63
Marine types—					
Mullet	14,063	12,340	11,362	13,242	13,736
Tuna	5,493	7,099	9,767	10,616	11,005
Shark	7,375	8,457	7,636	8,691	10,524
Australian salmon ..	8,543	7,601	6,630	11,534	7,794
Flathead	4,599	4,902	5,141	6,458	6,828
Morwong	2,572	2,329	2,258	2,773	4,949
Barracouta	4,300	5,871	5,981	6,810	4,842
Snapper	3,115	4,602	4,684	3,756	4,107
Whiting	2,990	3,297	3,267	3,513	3,699
Mackerel	2,193	1,641	1,779	1,631	2,192
Leatherjacket	1,866	2,476	2,516	2,193	1,955
Garfish	1,079	1,024	1,315	1,465	1,645
Bream (incl. Tarwhine)	1,207	1,123	1,236	1,382	1,531
Ruff	1,860	1,506	1,288	1,188	1,360
Luderick	1,063	1,199	1,096	1,020	1,311
Tailor	845	1,199	1,407	1,148	956
Other	8,927	9,819	10,137	9,780	9,941
<i>Total, Marine</i>	72,090	76,485	77,500	87,200	88,375
Freshwater types	2,293	1,612	(a) 1,597	(a) 1,260	(a) 1,309
Grand Total	74,383	78,097	(a) 79,097	(a) 88,460	(a) 89,684

(a) Excludes freshwater fish caught in Queensland, particulars of which are not available.

(b) *Crustaceans*. In terms of gross value of catch, the importance of crustaceans has increased in recent years, and in 1962-63 was greater than that of fish. The crayfish is the most important crustacean. The bulk of Australian production of crayfish is exported, nearly all going to the United States of America. Details of the production of crustaceans in each State and the Northern Territory in 1962-63 are shown in the following table.

CRUSTACEANS: PRODUCTION BY TYPE, 1962-63
(*000 lb. whole weight)

Type	N.S.W.	Vic.	Q'land	S. Aust.	W. Aust.	Tas.	N.T.	Aust.
Crayfish ..	(a) 498	(b)1,531	(c) 31	4,650	d 21,380	(b)3,310	..	ac 31,400
Prawns ..	6,623	3	4,971	..	1,017	..	2	12,616
Crabs ..	227	..	571	..	36	..	8	842
Total ..	7,348	(b)1,534	5,573	4,650	d 22,433	(b)3,310	10	44,858

(a) Includes catch of freshwater lobster (7,000 lb. in 1962-63). (b) The catch of crayfish by Victorian fishermen in Tasmanian waters (451,000 lb. in 1962-63) is included in Victoria. (c) Includes take of shovel-nosed lobster (21,000 lb. in 1962-63). (d) Partly estimated.

The following table shows details of the production of crustaceans in Australia in the years 1958-59 to 1962-63.

CRUSTACEANS: PRODUCTION BY TYPE, AUSTRALIA
(*000 lb. whole weight)

Type	1958-59	1959-60	1960-61	1961-62	1962-63
Crayfish(a) ..	26,314	28,023	27,494	29,355	31,400
Prawns ..	6,751	7,749	6,529	9,322	12,616
Crabs ..	906	1,044	787	875	842
Total ..	33,971	36,816	34,810	39,552	44,858

(a) Includes freshwater lobster caught in New South Wales and shovel-nosed lobster taken in Queensland.

(c) *Molluscs (edible)*. Details of the production of molluscs in each State and the Northern Territory in 1962-63 are shown in the table below.

MOLLUSCS(a): PRODUCTION BY TYPE, 1962-63
(*000 lb. gross (in shell) weight)

Type	N.S.W.	Vic.	Q'land	W. Aust.	Tas.	N.T.	Aust.
Oysters ..	12,604	63	330	28	1	3	13,029
Scallops ..	..	..	627	(b)	5,871	..	(b)6,498
Mussels ..	..	683	..	..	..	..	683
Squid ..	..	167	119	6	..	..	292
Octopus ..	..	17	..	1	..	..	18
Cuttlefish ..	..	..	..	1	..	..	1
Total ..	12,604	930	1,076	36	5,872	3	20,521

(a) Excludes pipis taken in New South Wales and scallops taken in Western Australia, details of which are not available for publication. (b) See footnote (a).

The following table shows the production of molluscs in Australia in the years 1958-59 to 1962-63.

MOLLUSCS(a): PRODUCTION BY TYPE, AUSTRALIA

('000 lb. gross (in-shell) weight)

Type	1958-59	1959-60	1960-61	1961-62	1962-63
Oysters	<i>bc</i> 12,885	<i>(c)</i> 12,690	14,220	12,613	13,029
Scallops	<i>(b)</i> 4,786	<i>(b)</i> 6,105	6,896	5,172	<i>(b)</i> 6,498
Mussels .. .. .	..	87	394	646	683
Squid	225	210	228	319	292
Octopus	2	52	36	58	18
Cuttlefish	57	60	34	7	1
Total	<i>(d)</i> 17,955	<i>(d)</i> 19,204	21,808	18,815	<i>(d)</i> 20,521

(a) Excludes pipis, particulars of which are not available for publication. (b) Excludes Western Australia. (c) Excludes Northern Territory. (d) Incomplete; see footnotes to individual types.

(iii) *Marketing.* The greater part of Australian fisheries production is marketed fresh or frozen. For practical purposes, the whole of the tuna and Australian "salmon" catches are canned, as is a large proportion of the barracouta catch.

Marketing arrangements for fresh fish vary from State to State. In New South Wales, fish marketing is controlled by the Chief Secretary's Department, 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 does 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 18 centres, as well as depots at eight others. The Board also purchases fish on its own account to stabilize 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.

Quick-freezing is widely used at sea and ashore to preserve fisheries products before delivery to consumers. The main techniques employed in Australia are brine freezing, which is used in the tuna and salmon fisheries, and air blast freezing, which is used chiefly for crayfish and scallops. Cold preservation with ice is still widely used.

(iv) *Processing.* Fish canning in Australia on a modern scale dates from 1937, prior to which the only fish canning carried out was on an occasional basis in factories handling other foodstuffs. In 1962-63, there were 25 fish canneries operating in Australia. The main canneries handle tuna (Eden, Melbourne, Port Lincoln), Australian salmon (Eden, Melbourne, Margate, Port Lincoln, Adelaide, Albany), and barracouta (Melbourne, Margate, Portland). A long-established general cannery in Sydney handles a small quantity of tuna each year, as well as prawns and fish paste, and a general cannery in Melbourne produces paste and other fish products.

Apart from canning, other processes used on fish products include smoking and bottling. These processes take place only on a small scale.

There are few by-products derived from fish, crustaceans, and molluscs taken in Australia. Small quantities of fish meal are produced from scrap products. Oil from the livers of sharks was produced on a small scale until 1962, when cheaper substitutes became available.

The following table gives further details of fish processing in Australia during the years 1958-59 to 1962-63.

FISH PROCESSING (EXCEPT FREEZING): AUSTRALIA

Particulars	1958-59	1959-60	1960-61	1961-62	1962-63
Number of factories	18	19	18	20	25
Fish used(a)—	'000 lb.	'000 lb.	'000 lb.	'000 lb.	'000 lb.
Whole	10,603	12,507	13,737	18,494	15,590
Headed and/or gutted	4,825	3,773	3,758	6,796	5,827
<i>Estimated live weight equivalent(b)</i>	16,300	16,900	18,200	26,500	22,445
Production(c)—					
Canned fish(d)—					
Australian salmon	4,756	4,550	3,480	5,772	3,976
Tuna	1,609	1,983	3,070	3,624	4,201
Other	1,417	1,585	1,647	2,637	2,151
<i>Total</i>	7,782	8,118	8,197	12,033	10,328
Smoked fish	286	296	301	181	286
Fish paste	1,314	1,379	1,261	1,027	1,053
Fish meal(e)	1,442	1,718	2,041	2,640	2,076

(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) The weight of headed and/or gutted fish is taken as 85 per cent. of live weight. (c) Excludes canned crayfish, lobsters, prawns, oysters and clams, details of which are not available for publication. (d) Includes fish loaf, fish cakes, etc. (e) Excludes whale meal.

3. Pearls, Pearl-shell and Trochus-shell.—NOTE.—Prior to the 1962-63 season, considerable quantities of pearl-shell were taken from Australian waters by Japanese pearling luggers. Details of this pearl-shell taken and boats and equipment employed are excluded from the following tables. Production data are, however, shown as a footnote to the table reporting production of pearl-shell and trochus-shell for the years 1958-59 to 1961-62. The Japanese fleet did not operate in Australian waters in 1962-63.

(i) *Employment, Boats and Equipment.* Ketch-rigged luggers about 55 feet long and with crews of 8 to 14 members are used for pearl and shell fishing around Australia. Divers using suits collect the shells from the sea bed, at depths ranging from 3 to 45 fathoms. Details of employment of persons and equipment in the shell fisheries in 1962-63 are contained in the following table.

PEARL-SHELL AND TROCHUS-SHELL: BOATS AND EQUIPMENT IN USE, PERSONS ENGAGED, 1962-63

Particulars	Unit	Q'land	W. Aust.	N.T.	Aust.
Boats engaged	No.	42	16	2	60
Value of boats and equipment	£'000	181	74	20	275
Persons engaged	No.	534	171	22	727

The following table gives similar details for Australia for the years 1958-59 to 1962-63.

**PEARL-SHELL AND TROCHUS-SHELL: BOATS AND EQUIPMENT IN USE,
PERSONS ENGAGED, AUSTRALIA (a)**

Particulars	Unit	1958-59	1959-60	1960-61	1961-62	1962-63
Boats engaged	No.	110	85	85	56	60
Value of boats and equipment	£'000	647	515	467	254	275
Persons engaged	No.	1,419	1,120	995	724	727

(a) Excludes Japanese pearlers operating in Australian waters. See text p. 1122.

(ii) *Production.* The production of cultured pearls was introduced into Australia in 1956, when a station was established off the north coast of Western Australia. The industry has since expanded, and in 1963, there were eleven pearl culture farms in operation in Queensland and Western Australia. Particulars of cultured pearl production are not available for publication.

In recent years, plastics have replaced pearl-shell in many uses. However, since the introduction of pearl culture, live pearl-shell has been in demand for this purpose. The following table gives details of pearl-shell and trochus-shell production in Australia in the years 1958-59 to 1962-63.

**PEARL-SHELL AND TROCHUS-SHELL: PRODUCTION
(*000 lb.)**

Particulars	1958-59	1959-60	1960-61	1961-62	1962-63
Pearl-shell—					
Queensland(a)	889	1,082	1,821	860	788
Western Australia(b)	1,687	1,138	1,270	802	782
Northern Territory(a)	314	188	222	147	115
<i>Australia</i>	<i>(c)2,890</i>	<i>(c)2,408</i>	<i>(c)3,313</i>	<i>(c)1,809</i>	<i>1,685</i>
Trochus-shell—					
Queensland(a)	887	847	309	457	357
Western Australia(b)	29	22	10	..	..
<i>Australia</i>	<i>916</i>	<i>869</i>	<i>319</i>	<i>457</i>	<i>357</i>

(a) Season ended January of years shown. Shell taken by Queensland luggers operating in Northern Territory waters is included in Queensland. (b) Season ended December of years shown. (c) Excludes pearl-shell taken by Japanese pearlers operating in Australian waters. The quantities taken were as follows:—1958-59, 1,064,000 lb.; 1959-60, 763,000 lb.; 1960-61, 860,000 lb.; 1961-62, 813,000 lb. The Japanese pearling fleet did not operate in Australian waters in 1962-63.

Particulars of the production of natural pearls in Australia are not available.

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

Whale meat is marketed as pet food. Oil from baleen whales is used in the manufacture of margarine, soap and cosmetics. Oil from sperm whales is used in the manufacture of soap, plastics and watch lubricants, and in automatic transmission systems in motor cars.

Owing to the scarcity of whales during the 1962 season, catches fell far below quotas set. Consequently, the stations on the east coast and Norfolk Island ceased operations at the close of the 1962 season. The Western Australian stations operated during the 1963 season with poor results in humpback whaling. These stations caught a substantial number of sperm whales to compensate in part for the deficiency of humpbacks. The table below gives details of the whaling industry in Australia during the years 1959 to 1963.

Quotas set by the Department of Primary Industry are in terms of humpback whales, and for this purpose 1 blue whale is taken as the equivalent of 2 fin, 2½ humpback, 6 sei or 6 bryde whales.

WHALING STATISTICS: AUSTRALIA(a)
(Source: Fisheries Branch, Department of Primary Industry)

Particulars	1959	1960	1961	1962	1963
Stations operating No.	4	4	4	4	2
Chasers engaged "	12	11	12	11	8
Persons employed—(b)					
At sea "	151	139	161	123	85
Ashore "	444	421	240	164	90
Types of baleen whales taken—					
Humpback "	1,510	1,355	1,311	716	87
Blue "	12	2	..	..	1
Bryde .. .. . "	..	..	2	..	..
Sei .. .. . "	..	..	..	2	..
Fin "	1	..	..	..	..
Sex of baleen whales—					
Male "	880	767	755	404	37
Female "	643	590	556	314	51
<i>Total Baleen Whales Taken</i> "	<i>1,523</i>	<i>1,357</i>	<i>c 1,313</i>	<i>718</i>	<i>88</i>
Humpback Equivalent(d) "	1,541	1,360	1,312	717	89
Quota of Humpback Whales(d) "	1,930	1,680	1,390	1,300	550
<i>Sperm Whales Taken</i> "	<i>138</i>	<i>282</i>	<i>454</i>	<i>591</i>	<i>598</i>
Sex of sperm whales—					
Male "	138	274	451	570	587
Female "	..	8	3	21	11
Total Whales Taken "	1,661	1,639	1,767	1,309	686
Whale oil produced—				(e)	(e)
Baleen oil barrels(f)	80,601	69,738	59,187	30,849	3,865
Sperm oil "	5,910	11,312	18,929	24,833	23,860
Value of oil £'000	1,279	1,171	1,180	782	443
Value of by-products (meal, meat, solubles, etc.) "	395	320	346	224	69
Total Value "	1,674	1,491	1,526	1,006	512

(a) Excludes details of Norfolk Island. was not recorded. (d) See text above. research. (f) 6 barrels=1 ton.

(b) Estimated.

(c) The sex of two whales processed

(e) Includes produce from whales taken for scientific

5. Value of Production.—(i) *Gross Value of Products.* The following table shows details of gross values of production at principal markets of edible fisheries products, pearl-shell, and trochus-shell in each State and the Northern Territory in 1962-63.

FISHERIES PRODUCTION: GROSS VALUE, 1962-63

(£'000)

Product	N.S.W.	Vic.(a)	Qld	S. Aust.	W. Aust.	Tas.(a)	N.T.	Aust.
Fish(b)	2,225	1,469	735	930	602	162	19	6,142
Crustaceans ..	1,199	384	846	770	4,068	737	2	8,006
Molluscs (edible) ..	c 1,103	29	42	..	2	228	(d)	1,404
Pearl-shell(e) .. ..	..	..	(f) 158	..	(g) 156	..	(f) 20	334
Trochus-shell .. ..	..	..	(f) 18	..	..	..	..	18

(a) Victorian figures include catch by Victorian fishermen in Tasmanian waters (shark, £66,000; crayfish, £113,000). (b) Includes shark livers for oil extraction; excludes freshwater fish caught in Queensland, particulars of which are not available. (c) Excludes pipis, particulars of which are not available for publication. (d) Less than £500. (e) Queensland luggers operating in Northern Territory waters. (f) Season ended January. (g) Season ended December.

The table below gives this information for Australia for the years 1958-59 to 1962-63.

FISHERIES PRODUCTION: GROSS VALUE, AUSTRALIA

(£'000)

Product	1958-59	1959-60	1960-61	1961-62	1962-63
Fish(a)	5,294	5,851	5,907	6,075	6,142
Crustaceans	4,585	5,561	5,906	7,477	8,006
Molluscs (edible)(b) ..	1,037	1,089	1,186	1,252	1,404
Pearl-shell(c)	(d) 561	(d) 558	(d) 724	(d) 361	334
Trochus-shell(c)	106	78	27	28	18

(a) Includes shark livers for oil extraction; excludes freshwater fish caught in Queensland in 1960-61 and subsequent years. (b) Excludes pipis in New South Wales for all years, scallops in Western Australia and oysters in the Northern Territory for 1958-59 and 1959-60, and oysters in Western Australia for 1958-59. (c) Season ended December (Western Australia) or January (Queensland and Northern Territory) of years shown. (d) Excludes pearl-shell taken by Japanese pearl-livers in Australian waters.

(ii) *Gross and Local Values, 1962-63.* Gross and local values of fishing and whaling production for each State are shown in the following table. A more detailed reference to the value of production of fishing and whaling and other industries in Australia, as well as a brief explanation of the terms used, is included in Chapter XXX. Miscellaneous.

**FISHING AND WHALING: GROSS AND LOCAL VALUE OF PRODUCTION,
1962-63**

(£'000)

State or Territory	Gross value(a)	Marketing costs	Local value(b)
New South Wales	4,565	765	3,800
Victoria	1,881	257	1,624
Queensland	2,116	194	1,922
South Australia	1,700	227	1,473
Western Australia	5,610	46	5,564
Tasmania	1,127	242	885
Northern Territory	43	n.a.	43
Australia	17,042	1,731	15,311

(a) Gross production valued at principal markets.
production.

(b) Gross production valued at place of
production.

(iii) *Local Values, 1958-59 to 1962-63.* In the following table, the local value of fisheries 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.

FISHING AND WHALING: LOCAL VALUE OF PRODUCTION

Year	N.S.W.	Vic.	Qld	S. Aust.	W. Aust.	Tas.	Aust.(a)
LOCAL VALUE							
(£'000)							
1958-59	2,947	1,265	1,343	1,071	3,867	664	11,243
1959-60	3,101	1,771	1,448	975	4,276	683	12,325
1960-61	3,299	1,787	1,372	1,237	4,220	813	12,813
1961-62	3,288	1,741	1,633	1,379	5,291	909	14,294
1962-63	3,800	1,624	1,922	1,473	5,564	885	15,311

LOCAL VALUE PER HEAD OF POPULATION

(£)

1958-59	0.8	0.5	0.9	1.2	5.5	2.0	1.2
1959-60	0.8	0.6	1.0	1.0	6.0	2.0	1.2
1960-61	0.9	0.6	0.9	1.3	5.8	2.3	1.2
1961-62	0.9	0.6	1.1	1.4	7.1	2.6	1.4
1962-63	0.9	0.6	1.2	1.5	7.2	2.5	1.4

(a) Includes Northern Territory.

§ 4. Consumption of Fish

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, the non-commercial fish catch has been estimated at ten per cent. of the recorded catch.

FISHERIES PRODUCTS: ESTIMATED SUPPLIES AVAILABLE FOR CONSUMPTION, AUSTRALIA

(lb. edible weight per head per annum)

Particulars	1958-59	1959-60	1960-61	1961-62	1962-63
Fresh or frozen—					
Fish—					
Australian origin	3.1	3.2	3.1	3.1	3.3
Imported	2.2	3.2	3.0	2.7	2.7
Crustaceans and molluscs	0.9	1.0	1.2	1.0	1.3
Cured (including smoked and salted)	0.8	1.1	1.1	0.9	1.0
Canned—					
Australian origin	0.8	0.8	0.7	0.8	0.9
Imported	1.7	2.0	2.6	2.0	1.9
Total	9.5	11.3	11.7	10.5	11.1

§ 5. Oversea Trade in Products of Fishing and Whaling

NOTE.—Values shown are expressed as £A. f.o.b. port of shipment. The tables of exports relate to Australian produce only, but quantities and values quoted in the text sometimes include re-exports, the amounts involved, however, generally being small.

1. **Edible Products.**—A large proportion of the fish consumed in Australia is imported. Of the edible products imported in 1962-63, those originating in Japan were valued at £2.1 million (24 per cent. of the total value), United Kingdom, £2 million (22 per cent.), and South Africa, £1.2 million (13 per cent.).

South Africa supplied 9 million lb. (27 per cent., valued at £0.7 million) of the fresh or frozen fish products imported in 1962-63, and the United Kingdom 8.8 million lb. (26 per cent., valued at £1.2 million). Of the smoked or dried fish products imported in 1962-63, South Africa supplied 6.8 million lb. (70 per cent., valued at £0.6 million). Japan supplied 9.4 million lb. (44 per cent., valued at £2.1 million) of the canned fish products imported in 1962-63.

The value of exports of edible products in 1962-63 was 3 per cent. less than that in 1961-62. The value of crayfish tails exported in 1962-63 was 82 per cent. of the value of all exports of edible products. Of all crayfish tails exported in 1962-63, 97 per cent. (8,745,000 lb., valued at £5,029,000) were consigned to the United States of America.

The table below gives further details of Australia's oversea trade in edible products in the years 1960-61, 1961-62 and 1962-63.

OVERSEA TRADE IN EDIBLE FISHERIES PRODUCTS: AUSTRALIA

Particulars	Quantity ('000 lb.)			Value (£A.'000 f.o.b.)		
	1960-61	1961-62	1962-63	1960-61	1961-62	1962-63
IMPORTS						
Fresh and frozen (a)	34,594	32,290	33,630	3,423	3,561	3,822
Smoked and dried	8,695	8,359	8,945	692	718	835
Potted and concentrated (b) ..	361	177	256	131	58	94
Canned—						
Herrings	7,427	4,504	3,333	821	473	376
Salmon	10,398	9,370	9,158	2,775	2,211	2,255
Sardines and pilchards	7,598	5,460	6,136	1,241	884	960
Tuna	424	709	415	63	96	61
Other fish	812	1,251	1,869	110	147	163
Crustaceans and molluscs	834	736	619	298	276	224
Total, Canned	27,493	22,030	21,530	5,308	4,087	4,039
Products not elsewhere included	..	..	..	139	112	141
Grand Total .. ..	..	..	..	9,693	8,536	8,931

EXPORTS

(Australian produce only; excludes re-exports)

Fresh or frozen(c)—						
Crayfish tails	6,023	9,875	9,002	3,401	6,020	5,169
Whole crayfish	1,783	513	1,380	649	173	478
Fish	(d)	1,351	1,635	} 267 {	166	127
Other	(d)	195	1,260		66	494
Canned—						
Salmon	21	30	38	4	6	7
Other fish	114	130	113	14	17	12
Crustaceans and molluscs	97	57	25	43	17	11
Total, Canned	232	217	176	61	40	30
Products not elsewhere included	..	..	..	2	3	2
Grand Total .. ..	..	..	..	4,380	6,468	6,300

(a) Excludes frozen smoked, which is included with "Smoked and dried". (b) Includes extracts and caviare. (c) Excludes frozen smoked, which is included in item Products not elsewhere included. (d) Not available separately.

2. **Pearls.**—Cultured pearls valued at £245,000 were imported into Australia in 1962–63. This was 30 per cent. greater than the value imported in 1961–62 (£189,000). In 1962–63, imports of cultured pearls valued at £240,000 (98 per cent. of the total value of cultured pearl imports) originated in Japan.

Cultured pearls exported from Australia in 1962–63 were valued at £361,000, £308,000 more than 1961–62. In 1962–63, cultured pearl exports consigned for Japan were valued at £352,000, 98 per cent. of the value of all cultured pearls shipped in that year.

The value of natural pearls exported from Australia in 1962–63 was £6,000, 78 per cent. lower than that in 1961–62 (£27,000).

3. **Unmanufactured Shells.**—Of the pearl-shell exported in 1962–63, 595,000 lb. (33 per cent.) were consigned to the Federal Republic of Germany, 552,000 lb. (30 per cent.) to the United States of America, and 475,000 lb. (26 per cent.) to Japan. More than 57 per cent. (116,000 lb.) of the trochus-shell exported was consigned to Italy.

Imports of unmanufactured shells included quantities of pearl, trochus and green snail shell from New Guinea, Papua and the Pacific Islands, which were subsequently re-exported from Australia.

Further particulars of Australia's oversea trade in unmanufactured shells are shown in the table below.

OVERSEA TRADE IN UNMANUFACTURED SHELLS: AUSTRALIA

Particulars	Quantity ('000 lb.)			Value (£A.'000 f.o.b.)		
	1960–61	1961–62	1962–63	1960–61	1961–62	1962–63
IMPORTS						
<i>Total</i>	<i>114</i>	<i>96</i>	<i>105</i>	<i>10</i>	<i>14</i>	<i>10</i>
EXPORTS (Australian produce only; excludes re-exports)						
Pearl-shell	3,089	1,999	1,811	661	384	343
Trochus-shell	455	567	176	46	44	12
Other	10	22	38	2	4	5
<i>Total</i>	<i>3,554</i>	<i>2,588</i>	<i>2,025</i>	<i>709</i>	<i>432</i>	<i>360</i>

4. **Marine Animal Oils.**—The value of whale oil exported in 1962–63 was 52 per cent. less than that in 1961–62. Further details of oversea trade in marine animal oils are shown in the table below.

OVERSEA TRADE IN MARINE ANIMAL OILS: AUSTRALIA

Particulars	Quantity ('000 gals.)			Value (£A.'000 f.o.b.)		
	1960-61	1961-62	1962-63	1960-61	1961-62	1962-63
IMPORTS						
Whale oil from—						
Norfolk Island	348	316	8	141	127	3
Japan	1	..	311	1	..	99
Other countries	137	181	91	48	82	51
Total, Whale Oil	486	497	410	190	209	153
Cod liver oil	115	94	95	53	45	44
Unrefined fish oils	127	100	107	70	58	50
Other .. ..	..	..	..	25	21	20
Grand Total .. ..	..	..	..	338	333	267

EXPORTS

(Australian produce only; excludes re-exports)

Whale oil	2,298	1,900	950	865	671	322
Other .. ..	..	..	..	18	48	5
Total .. ..	..	..	..	883	719	327