

CHAPTER 14

FORESTRY AND FISHERIES

FORESTRY

Forestry in the States

In the Australian Federal framework, State Governments are primarily responsible for land management. Each State has a forest service responsible for the management and control of publicly-owned forests, in accordance with Forestry Acts and Regulations. Forest management aims to satisfy all reasonable demands by the community on the forest estate including timber production, provision of minor forest products, grazing, protection of native flora and fauna, recreation and watershed protection.

Forestry in the Territories

The Department of Territories and Local Government is responsible for the management and control of forests in the Australian Capital Territory. Forestry in the Northern Territory is the responsibility of the Northern Territory Conservation Commission.

Commonwealth Forestry Administration

The Department of Primary Industry is responsible for forestry matters at the national level. Its primary responsibilities are the administration of a control on the export of unprocessed timber, liaison with State, national and international organisations concerned with forestry, provision of the Secretariat for the Australian Forestry Council and compilation of national statistics on the forest industries.

Existing Forest Estate

Native Forests

The total area of native forest, defined as land dominated by trees with an existing or potential mature height of twenty metres or more, including native stands of cypress pine in commercial use regardless of height, was estimated at 40.8 million hectares as at 30 June 1982. Thirty-five million hectares of the natural forests are dominated by eucalypts. For a more detailed examination of Australian native forests, see Yearbook No. 61, Chapter 24.

The following tables show classifications of native forest areas in Australia by forest type and ownership. Plantation areas are dealt with separately.

NATIVE FOREST AREAS CLASSIFIED BY FOREST TYPE, 30 JUNE 1982
(*000 hectares)

Forest type group	N.S.W.(a)	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Rainforest	253		1,074	-	-	472	38	-	1,837
Eucalypt									
Productivity Class I(b)	1,220	631	204	-	180	502	-	-	2,737
Class II(c)	3,649	3,981	1,290	-	2,792	1,845	-	51	13,608
Class III(d)	8,320	293	3,140	-	19	-	-	-	11,772
Tropical eucalypt and paperbark	-	-	4,078	-	-	-	2,450	-	6,528
Cypress pine	1,908	6	1,685	-	-	-	778	-	4,377
Total	15,350	4,911	11,471	-	2,991	2,819	3,266	51	40,859

(a) Details last revised 30 June 1972; adjustment made to rainforest following 1981 re-inventory of this forest type. (b) Relatively high productivity. (c) Moderate productivity. (d) Relatively low productivity.

NATIVE FOREST AREAS CLASSIFIED BY OWNERSHIP, 30 JUNE 1982
(^{'000 hectares})

Ownership category	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
State forestry (a)	2,866	1,916	3,126	—	1,919	1,272	312	—	11,411
Other public (b)	6,208	1,536	5,672	—	390	399	2,639	51	16,895
National parks (c)	993	853	1,394	—	140	122	315	—	3,817
Private (d)	5,283	606	1,279	—	542	1,026	—	—	8,736
Total	15,350	4,911	11,471	—	2,991	2,819	3,266	51	40,859

(a) Publicly owned land, permanently reserved or dedicated primarily for timber production. (b) Publicly owned land, vacant or occupied under lease, not specifically reserved for timber production, but on which control of timber rests with the Crown. (c) Publicly owned land, permanently reserved for purposes other than timber production. Some wood production is allowed in certain national and forest parks in Victoria. (d) Privately owned land, and leasehold where the Crown has no control over timber rights.

Plantations

Tree plantations of a few coniferous species now provide a large part of Australian-grown wood supplies. The large scale establishment of these plantations was commenced by State Forest Services early this century, and in the case of South Australia, last century, to overcome the shortage of native coniferous timber. In an eleven year period covered by the *Softwood Forestry Agreements Acts* 1967, 1972 and 1976, the Commonwealth provided financial assistance to the States in the order of \$55 million for an extended program of softwood plantation development. A further Act in 1978, provided funds for a five year period to 30 June 1982 for the maintenance of the area of plantations established previously with Commonwealth funds.

Privately owned plantations amount to approximately two-fifths the area under State ownership. New plantations (including replanting) are currently being established at the rate of 30,000 hectares per annum, of which almost one-third is by private enterprise. A detailed account of the history and development of coniferous plantations and of the characteristics of individual species is included in Year-book No. 59, page 880. The following table shows total area of plantations in Australia classified by species.

PLANTATION AREAS(a), CLASSIFIED BY SPECIES, 31 MARCH 1982
(Hectares)

Species group	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Coniferous—									
Pinus radiata	177,975	169,564	3,563	90,985	38,834	56,761	—	13,500	551,182
Pinus elliotii	4,819	—	96,307	—	124	—	—	—	101,250
Pinus pinaster	—	1,513	—	5,383	25,742	—	—	—	32,638
Pinus caribaea	1,341	—	23,456	—	—	—	1,717	—	26,514
Araucaria	1,488	—	42,848	—	—	—	1	—	44,337
Other coniferous (b)	8,032	3,154	5,719	501	139	370	2,545	860	21,320
Total coniferous	193,655	174,231	171,893	96,869	64,839	57,131	4,263	14,360	777,241
Broadleaved—									
Eucalyptus	7,290	13,117	2,905	861	8,398	6,534	2	—	39,107
Populus	2,188	345	—	—	—	—	—	—	2,533
Other broadleaved	—	80	524	—	—	107	1	—	712
Total broadleaved	9,478	13,542	3,429	861	8,398	6,641	3	—	42,352
Total	203,133	187,773	175,322	97,730	73,237	63,772	4,266	14,360	819,593

(a) Public and private ownership. (b) Includes all species other than P. radiata in private ownership.

Australian Forestry Council

In 1964, the Australian and State Governments formed the Australian Forestry Council to co-ordinate the development of the forest resource in the general interest of the community and to guide national programmes for the production, utilisation and conservation of Australian forests. Membership of the council comprises the State and Northern Territory Ministers responsible for forestry and the Commonwealth Minister for Primary Industry. The council is serviced by a Standing Committee and specialist sub-committees.

Research

Commonwealth Scientific and Industrial Research Organization (CSIRO)

The Division of Forest Research in the Institute of Biological Resources conducts research in the core areas of forest ecology, forest diseases, forest physiology, forest operation, fire behaviour and soils, nutrition and hydrology. The Division also conducts research into taxonomy, modelling and seed research. The Division maintains close liaison with relevant State authorities and, on occasion, collaborates with private companies. It operates two regional stations and three regional groups in the States.

Within the Institute of Biological Resources (Divisions of Plant Industry, Entomology, Soils, Water and Land Resources and Wildlife and Rangelands Research) and the Institute of Energy and Earth Resources (Division of Groundwater Research) research is undertaken on forestry problems relevant to the disciplines pursued in these Divisions.

Within the Institute of Industrial Technology, the Division of Chemical and Wood Technology carries out a wide range of investigations relating to the properties of wood, the processing and uses of wood and wood products. The research programs of the Division are directed towards developing ways whereby Australia's forest resources can be more effectively utilised. The programs include processing of wood and timber, technology of fibre separation, wood and fibre properties, composite wood and paper products, assessment of cellulosic resources and conservation of wood-based materials. Technology for the production of high value chemicals from wood and other plant materials is also being investigated.

The Divisions provide assistance to individuals and industry, provide training and experience for overseas technologists and maintain co-operative aid projects with developing countries.

Education

The Australian National University's Department of Forestry in Canberra and the Faculty of Agriculture and Forestry of the University of Melbourne offer undergraduate courses leading to a Bachelor of Science degree in Forestry. Most States provide for sub-professional forestry training.

Each year the Department of Primary Industry makes available awards for full-time postgraduate research, normally leading to the degree of Master and/or Ph. D at an Australian University. The Department also administers an award based upon a private bequest for postgraduate study at Oxford University.

Timber and timber products

The selected details shown below have been compiled from the annual census of manufacturing establishments. For further details see Chapter 17, Manufacturing and Internal Trade.

MANUFACTURING ESTABLISHMENTS(a)—SUMMARY OF OPERATIONS, 1981-82

1978 ASIC code(b)	Industry description	Establish- ments at 30 June	Persons employed (c)	Turnover	Value added	Fixed capital expenditure less disposals
		No.	No.	\$'000	\$'000	\$'000
2531	Log sawmilling	729	13,217	582,101	322,068	19,976
2533	Veneers and manufactured boards of wood	82	5,838	402,395	155,054	7,542
2537	Hardboard woodchips	11	728	145,155	54,670	3,964

(a) All manufacturing establishments owned by multi-establishment enterprises and single establishment enterprises; with four or more persons employed. (b) Australian Standard Industrial Classification. (c) Average over whole year includes working proprietors.

TIMBER AND SELECTED TIMBER PRODUCTS PRODUCED (a)

Item		1979-80	1980-81	1981-82
Undressed sawn timber—				
Recovered from sawn logs—				
Australian grown—				
Broadleaved	'000 cu m	2,143	2,217	2,152
Coniferous	"	1,136	1,190	1,125
Total	"	3,279	3,407	3,276
Woodchips (green weight)—				
Hardwood (broad leaved)	'000 tonnes	4,798	4,410	3,943
Plywood—				
Commercial—(surface measure)	'000 sq m	4,611	5,275	4,502
(1 mm basis)	"	38,619	42,494	39,109
Waterproof—(surface measure)	"	3,843	4,032	4,076
(1 mm basis)	"	46,591	48,680	47,980
Particle board (resin bonded)	'000 cu m	667	686	707
Wood pulp—				
Chemical	tonne	174,223	168,555	181,097
Mechanical	"	513,347	537,775	487,498
Other	"			
Paper—				
Newsprint	tonne	221,198	214,447	303,563
Printings	"	91,559	102,514	96,775
Writing (incl. cartridge)	"	(b)	(b)	(b)
Wrapping	"	382,032	411,322	372,457
Blotting	"	(c)	(c)	(c)
Duplicating	"	(d) 119,052	(d) 118,526	(d) 101,669
Other paper	"	(e) 29,426	(e) 23,680	(e) 25,001
Tissue and sanitary papers	"	104,599	108,343	110,570
Paperboard (incl. strawboard)	"	482,466	485,995	486,627

(a) Excludes production of small single establishment enterprises with less than four persons employed and establishments engaged in non-manufacturing activities but which may carry on, in a minor way, some manufacturing. (b) Combined with 'Duplicating' paper. (c) Combined with 'Other paper'. (d) Includes 'Writing (incl. cartridge)' paper. (e) Includes 'Blotting' paper.

Woodchips

The woodchip industry entails the procurement of wood and its mechanical reduction to chips about the size of an Australian 50 cent piece. These chips are either exported for pulping or retained for use in domestic pulping operations.

Timber and timber products

The major forest industries include the sawmilling, ply and veneer, reconstituted board (particleboard, fibreboard) and pulp and paper industries. The sawmilling industry is the largest single user of logs harvested from Australian forests (51 per cent), followed by the pulp and paper industry (39 per cent). Currently about 72 per cent of total volume of logs harvested are obtained from natural forests and the remainder mainly from coniferous plantations. This proportion will change over time so that towards the end of this century about half the supply of logs may be from coniferous plantations. Total removals at that time are estimated at 23 million cubic metres compared to current log removal of 16 million cubic metres.

The value of imports of forest products in 1981-82 was in the order of \$1,157 million while the value of exports of timber products was \$239 million.

The following table shows the production, imports, exports and domestic consumption of sawn timber and major timber products

SAWN TIMBER AND MAJOR TIMBER PRODUCTS, 1981-82

(Source: Forestry Branch, Department of Primary Industry and Australian Bureau of Statistics)

Item		Production (1)	Imports (2)	Exports (3)	Domestic Consumption (1 + 2 - 3)
Sawn timber	cu m	3,157,216	1,140,006	32,738	4,264,484
Plywood	cu m	89,126	81,225	1,468	168,883
Railway sleepers	cu m	207,335	-	17,755	189,580
Particleboard	cu m	647,163	496	6,289	641,370
Hardboard	cu m	101,819	1,393	3,155	100,057
Newsprint	tonne	307,183	251,912	1,432	557,663
Printing and writing	tonne	193,383	289,300	12,748	469,935
Other paper	tonne	503,657	149,062	62,590	590,129
Paperboard	tonne	453,804	57,328	3,342	507,790

In addition to the products listed above, exports for 1981-82 of pulpwood (virtually all in the form of woodchips) was 3,820,595 tonnes (green).

FISHERIES

Collection and presentation of fisheries statistics

Source and basis of statistics

Statistics presented in this section of the chapter are obtained from the collections of State Fisheries Authorities. In all States except Queensland and Tasmania, the information is derived from returns collected from licensed fishermen. In Queensland the statistics have, to date, been based mainly on Fish Board receipts; but a new collection from fishermen, fish wholesalers and processors is now being developed. Tasmanian data are obtained from buyers and processors. Additionally, details of New South Wales tuna production are supplied by the CSIRO and particulars of Australian pearl culture have been collected and supplied by the Fisheries Division of the Department of Primary Industry.

Australian fisheries production statistics are generally in terms of the form in which the products 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 an 'estimated live weight' basis and molluscs (edible) on a 'gross (in-shell) weight' basis. The figures for pearl-shell and trochus-shell refer to the actual quantities of dry shell for sale and exclude the weight of the fish.

For more details of employment and boats and equipment for general fisheries and particulars of the whaling industry see earlier issues of this publication.

Fisheries resources and their commercial exploitation

Fish

Over 3,000 species of marine and freshwater fish occur in and around Australia. Australian fishermen concentrate their efforts on estuarine, coastal, pelagic (surface and mid-water swimming) and demersal (bottom living) fish that occur off the north-east, south-east and south-west coasts. Off north Australia, barramundi (*Lates calcarifer*) constitutes the most important estuarine and coastal species, while in the south-east and south-west regions, mullet (mainly *Mugil cephalus*), bream (*Acanthopagrus* spp.) Australian salmon (*Arripus trutta*) and Australian herring (*Arripus georgianus*) are important catch components.

Major pelagic fisheries are Spanish mackerel (*Scomberomorus commerson*) off north Australia, and southern bluefin tuna (*Thunnus maccoyii*), snoek (*Leionura atun*), pilchards (*Sardinops neopilchardus*) and anchovies (*Engraulis australis*) off south-east Australia. Southern bluefin tuna are also fished off south-west Australia. Significant stocks of jack mackerel off southern Australia are as yet lightly fished.

A large multispecies demersal fishery that targets on flathead (*Neoplatycephalus* and *Platycephalus* spp.) morwong (*Nemadactylus* spp.), redfish (*Centroberyx affinis*) gemfish (*Rexea solandri*) and blue grenadier (*Macruronus novaezelandiae*), exists off south-east Australia. Demersal inshore snapper (*Chrysophrys auratus*) fisheries exist off south-west and south-east Australia; in the

latter region, stocks of whiting (*Sillaginidae*) are also fished. In the northern tropical region, reef fish such as cods (*Epinephelus* spp.) are exploited. A large demersal fishery for edible school and gummy sharks (*Galeorhinus australis* and *Mustelus antarcticus*, respectively) is centred in Bass Strait.

Establishment of the 200 nautical mile Australian Fishing Zone (AFZ), has brought portions of oceanic tuna stocks, and demersal and pelagic fish stocks presently exploited by foreign fishing vessels, under Australian control. A foreign pelagic gill-net fishery off the north coast catches sharks (mainly *Carcharhinus* spp.), tuna (*Thunnus tonggol*) and Spanish mackerel while a demersal pair trawl fishery off the north-west coast exploits a tropical, multispecies fauna that includes threadfin bream (*Nemipteridae*) tropical snappers (*Lutjanidae*), emperors (*Lethrinidae*) goatfish (*Mullidae*) and hair tails (*Trichiuridae*).

Crustaceans

Prawns (*Penaeus* and *Metapenaeus* spp) provide the most valuable fishery in Australia and are taken in estuarine, coastal and offshore waters of all States except Tasmania. The western and southern rock lobsters (*Panulirus longipes cygnus* and *Jasus novaehollandiae*), also a valuable resource, are taken on rocky reefs around the southern half of Australia. Bay lobsters (*Thenus* spp and *Ibacus* spp) are taken incidentally to prawn trawling operations. Crabs (*Scylla* spp and *Portunus* spp) are taken mainly in Queensland, New South Wales and Western Australia.

Molluscs (edible)

Naturally-occurring oysters are harvested in all States; in New South Wales and Queensland the Sydney rock oyster (*Crassostrea commercialis*) is cultured commercially. The introduction of the Pacific oyster (*Crassostrea gigas*) to Tasmania and South Australia has provided a limited supply in those States. Following a serious decline in catches in the scallop (*Pecten meridionalis*) fishery based on stocks in Port Phillip Bay, Victoria, new offshore beds were located in southern New South Wales, eastern Victoria, northern Tasmania and south-western Western Australia. However, substantial fluctuations in abundance have resulted in erratic production from year to year. A fishery based on the saucer scallop (*Amusium balloti*) is located off south and central Queensland and there is a small fishery for the same species in Shark Bay, Western Australia. An important abalone (*Haliotis* spp) fishery has been developed since 1964 in south-east Australia with Tasmania, Victoria and South Australia providing the bulk of the catch. There is also a small abalone fishery in south-west Australia. Mussels (*Mytilus planulatus*) are harvested in Victoria, Western Australia and New South Wales. Prior to 1978 small quantities of cephalopods, mainly squid, were produced in many localities. Feasibility fishing located promising squid resources (*Notutodarus gouldi*) in the south east. Squid (*Loligo* spp) form an important component to the trawl catch in the Arafura Sea.

Pearl-shell and trochus-shell

The shell of the Australian species of pearl oyster (*Pinctada maxima*) is taken from various localities in the tropical waters of Australia between Broome in Western Australia and 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

Whales are now a protected species in the Australian Fishing Zone.

Fisheries administration and research

The Commonwealth Parliament has enacted a number of laws dealing with fisheries in Australian waters beyond territorial limits. The fisheries laws of the States and the Northern Territory apply to all kinds of fishing within the territorial sea and in inland waters. These laws require the licensing of persons and boats in the commercial fisheries and provide a range of other regulatory powers. The Commonwealth Government laws relating to fishing are the *Fisheries Act 1952*, the *Continental Shelf (Living Natural Resources) Act 1968*, *Foreign Fishing Boats Levy Act 1981* and the *Fisheries Agreements (Payments) Act 1981*.

Fisheries Act 1952

This Act applies to commercial fishing for swimming species, by Australians in waters extending from 3 to 200 nautical miles seaward of the territorial sea baseline of Australia and the external terri-

tories excluding the territorial sea of another country, and by foreign boats in the 200 nautical miles Australian fishing zone. The Australian fishing zone comprises waters which extend 200 nautical miles seaward of Australia's territorial sea baselines but does not include territorial seas within the accepted fishing zones of adjacent countries or waters adjacent to Australia's Antarctic Territory.

Continental Shelf (Living Natural Resources) Act 1968

This Act regulates the searching for and taking, from the continental shelf of Australia and the external territories, of living sedentary species by Australians and foreigners. Sedentary species are those that, at the harvestable stage, are either immobile on or beneath the seabed or are unable to move except in constant physical contact with the seabed. The continental shelf is the seabed beyond the territorial sea and adjacent to permanently exposed land masses, extending to a depth of 200 metres or, beyond that depth, to where the exploitation of the seabed is possible.

Both these Acts require the holding of licences and empower the Minister to prohibit fishing activities as necessary for the conservation of resources and the management of the fisheries.

Foreign Fishing Boats Levy Act 1981; Fisheries Agreements (Payments) Act 1981

These Acts facilitate the imposition and collection of access fees for foreign boats fishing in the Australian fishing zone.

Administration

Australian fisheries are administered by the authority having jurisdiction over the waters concerned. In inland waters and in waters within territorial limits, administration is the responsibility of the State or Territory fisheries authority. In proclaimed waters, and on the continental shelf beyond territorial limits, administration is the responsibility of the Commonwealth Government which by agreement, has delegated to State fisheries authorities the necessary authorities for day-to-day administration of the Acts.

The Commonwealth and all State Parliaments as well as the Northern Territory House of Assembly have enacted amendments to fishery laws for the purpose of implementing the fisheries elements of the offshore constitutional settlement adopted by the Premiers' Conference in 1979. Those amendments, which came into force on 14 February 1983, authorise the Commonwealth and one or more States to enter into a formal legal arrangement to apply a single law (Commonwealth or State) to the management of a particular fishery from low water mark and to vest executive power under that law in:

- (i) a joint authority, the membership of which would comprise the Commonwealth and the relevant State or States;
- (ii) a State alone; or
- (iii) the Commonwealth alone.

The administration of the fisheries is directed to a number of objectives of which the two most important are: conservation and management of the living resources of the Australian Fishing Zone to ensure that they are not endangered by over exploitation; and achievement of the optimum utilisation of the living resources by the Australian fishing industry and foreign interests. Consistent with these objectives, a number of controls have been introduced to prevent the depletion of the more heavily fished species. These controls take the form of seasonal closures, gear limitations, minimum size requirements and limited access rights, as well as outright prohibitions on the taking of certain species.

The Fisheries Development Trust Account (established under the *Fishing Industry Act 1956*) and the Fishing Industry Research Trust Account (established under the *Fishing Industry Research Act 1969*) are available to support financially, projects for the development and management of the fisheries and fishing industry which are consistent with the purposes of those Acts. The former was established with the proceeds of the sale of the assets of the Australian Whaling Commission and is replenished from Consolidated Revenue as necessary. The latter is a matching fund into which is paid each year an appropriation from Commonwealth Government Revenue equal to amounts collected from the fishing industry by the State Fisheries Authorities and paid into appropriate State research accounts for the same purpose.

Research

The main aim of fisheries research in Australia is to provide a background of biological, technical and economic information which will provide guidance for the efficient and rational utilisation of fisheries resources. To this end much of the research already undertaken has been directed at formulating recommendations for management of various fisheries. Research work, including feasibility

fishing projects involving foreign fishing vessels, is also carried out and is expected to lead to the development of new fisheries, the expansion of under-exploited fisheries, greater economy in operations and the use of more efficient equipment and methods.

Organisations in Australia at present engaged in research into fisheries matters are:

- (i) CSIRO Division of Fisheries Research, which has its headquarters and main laboratory at Cronulla, N.S.W. and regional laboratories in Western Australia and Queensland (fisheries science);
- (ii) CSIRO Division of Oceanography which has its headquarters and laboratory at Cronulla, N.S.W.;
- (iii) CSIRO Division of Food Research, conducts research into handling, storage, processing and transportation of fish at its laboratory in Hobart, Tasmania;
- (iv) State fisheries departments (fisheries laboratories have been established in Perth, Hobart, Melbourne, Sydney, Brisbane, Darwin and Cairns); research vessels are operated by New South Wales, Victoria, Western Australia, Tasmania and Queensland;
- (v) Fisheries Division, Department of Primary Industry, Canberra (economic and management research, fishing technology, extension and education service); and
- (vi) private fishing companies (surveys of fisheries resources, research into handling, processing and marketing).

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 up to 40 metres in length and are almost invariably powered by diesel engines. Most of them have either insulated holds and carry ice, or are equipped with dry or brine refrigeration. Some rock lobster vessels are fitted with wells in which the catch is kept alive.

The following are the types of equipment most commonly used in the main fisheries: *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, gill-net; *garfish*, beach seine; *Spanish mackerel*, trolling lines; *tuna*, pole and live-bait, purse seine, trolling lines (lampara nets and purse seines are used for taking live bait for tuna); *prawns*, otter trawl, beam trawl, beach seine net; *rock lobster*, pots, traps; *scallops*, dredge, otter trawl; *abalone*, diving using hookah gear; and *pilchards*, *anchovies*, *jack mackerel* and *striped tuna*, purse seine.

Pearls, pearl-shell and trochus-shell

Ketch-rigged luggers about 15 metres long which carry crews of eight to fourteen members are used for pearl-shell fishing in northern Australia.

Production, processing and domestic marketing of fisheries products

Value of fisheries production

The following table shows the gross value of fishing by States. As 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. Gross value of production is the value placed on recorded production at the wholesale price realised in the principal markets. In general, the 'principal markets' are the metropolitan markets in each State, although, in cases where commodities are consumed locally or where they become raw material for a secondary industry, these points are presumed to be the principal markets. Gross value includes marketing costs which were estimated at \$18.8 million for Australia for the year 1979-80. Details on marketing costs are not available for 1980-81.



PLATE 38

Tuna fishing off South Australian coast

Australian Information Service

FISHERIES: GROSS VALUE OF PRODUCTION
(S'000)

<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>
GROSS VALUE								
1975-76	31,599	10,601	(a)17,137	(b)22,474	51,079	8,511	5,228	(c)146,629
1976-77	36,059	16,014	(a)34,955	(b)27,199	69,094	11,662	11,357	(c)206,340
1977-78	39,665	17,977	(a)40,808	(d)23,615	88,340	12,609	10,337	(c)233,351
1978-79	42,698	20,025	58,214	(d)29,924	80,233	14,636	19,576	(c)(g)279,258
1979-80	58,661	28,614	(e)62,789	(d)35,438	85,652	20,463	16,806	(c)(g)326,550
1980-81	70,027	33,686	(e)(f)86,292	(d)46,570	82,764	26,514	19,518	(c)(g)383,723

(a) Incomplete: excludes oysters and rock lobster. (b) Incomplete: excludes oysters. (c) Incomplete: see individual States.
 (d) Incomplete: excludes octopus, cuttlefish, oysters and scallops. (e) Incomplete: excludes rock lobster. (f) Incomplete: excludes shark. (g) Includes value of pearling which has been excluded from State totals.

Production of selected fisheries

SELECTED FISHERIES PRODUCTS: PRODUCTION AND GROSS VALUE

1980-81

Product	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	Aust.
QUANTITY (tonnes)								
Fish(a)	28,025	11,176	(b)4,864	15,437	11,961	2,527	1,634	(f)75,623
Crustaceans(a)	3,215	851	(c)15,294	5,227	13,121	1,553	4,287	(f)43,548
Molluscs (edible)(a)	10,003	4,662	(d)2,800	(e)1,338	1,207	7,314	46	(f)27,369
GROSS VALUE (\$'000)								
Fish	27,893	14,210	(b)7,036	16,699	10,128	3,654	2,267	(f)81,887
Crustaceans	15,608	5,611	(c)75,590	26,183	70,648	8,385	17,195	(f)219,220
Molluscs (edible)	26,526	13,865	(d)3,666	(e)3,688	1,988	14,476	57	(f)64,265

(a) Estimated live weight. (b) Excludes shark and freshwater fish caught. (c) Excludes rock lobster. (d) Incomplete. Excludes oysters. (e) Incomplete. Excludes octopus, cuttlefish, oysters and scallops. (f) Incomplete; see individual States.

SELECTED FISHERIES PRODUCTS: PRODUCTION, AND GROSS VALUE, AUSTRALIA

Product	1978-79	1979-80	1980-81
QUANTITY (tonnes)			
Fish(a)(b)	61,444	(c)69,030	(c)75,623
Crustaceans(a)	37,900	(c)38,029	(c)43,548
Molluscs (edible) (a)	25,285	(c)25,241	(c)27,369
Pearl-shell(d)(e)	185.0	309.6	226.0
Trochus-shell(d)(e)	—	n.a.	n.a.
GROSS VALUE (\$'000)			
Fish(b)	56,501	(c)73,119	(c)81,887
Crustaceans	176,451	(c)188,009	(c)219,220
Molluscs (edible)	32,355	(c)47,296	(c)64,265
Pearl-shell(d)(e)	188	905	534
Trochus-shell(d)(e)	—	n.a.	n.a.

(a) Estimated live weight. (b) Excludes shark and freshwater fish caught. (c) Incomplete see individual States in table above. (d) Excludes manufacturing shell produced from pearl culture operations. (e) Source: Department of Primary Industry, year ended 31 December.

Pearls, pearl-shell and trochus-shell

PEARL CULTURE AND PEARL AND TROCHUS SHELL FISHING OPERATIONS(a)

(Source: Department of Primary Industry)

	1978	1979	1980
QUANTITY			
Pearl and Trochus shell fishing operations—			
Production of—			
Pearl shell(b)	tonne	185.0	309.6
Trochus shell	tonne	—	n.a.
Pearl culture operations—			
Live shell introduced	No.	438,496	358,022
	tonne	130.5	112.6
Production—			
Round and baroque pearls	No.	88,369	77,231
	momme(c)	55,553	54,500
Half pearls	No.	248,360	138,687
Manufacturing shell	tonne	66.7	133.6

PEARL CULTURE AND PEARL AND TROCHUS SHELL FISHING OPERATIONS(a)—continued

(Source: Department of Primary Industry)

	1978	1979	1980
VALUE (\$'000)			
Pearl and Trochus shell fishing operations—			
Production of—			
Live pearl shell	813	739	911
Pearl shell	188	905	534
Trochus shell	—	n.a.	n.a.
Pearl culture operations—			
Production of—			
Round and baroque pearls	11,768	15,281	15,340
Half pearls	1,104	594	1,078
Manufacturing shell	58	309	328

(a) Figures refer to the year ended January for the Northern Territory and Queensland and to the year ended December for Western Australia. (b) Excludes manufacturing shell produced from pearl culture operations. (c) A momme is a pearl weight measurement equivalent to 3.769 grams.

Processing of fish, crustaceans and molluscs

Processing plants are located strategically throughout Australia close to fishing grounds. A number of shore-based plants have been established in remote areas of northern Australia to service the expansion of the northern prawn fishery.

Rock lobsters, prawns, abalone and scallops are frozen for export; tuna, snoek, Australian salmon and abalone are canned; small amounts of fish are smoked; and some molluscs are bottled. Hand labour is still used extensively in processing operations, but mechanisation is being progressively introduced.

Ice is used extensively for the chilling of fish taken in estuarine and inshore fisheries. Refrigeration is used particularly on vessels operating in the tuna fishery and prawn fisheries to chill or freeze the catch.

Fish, crustaceans and molluscs intended for export are processed in establishments registered under the Export (Fish) Regulations. Edible fish for local consumption is mainly dispatched fresh-iced to markets.

Domestic marketing of fisheries' products

Although virtually the whole of the tuna and Australian salmon catches are canned, the greater part of Australian fish production is marketed fresh or frozen.

Marketing arrangements for fresh fish vary. In New South Wales, fish marketing is the responsibility of the Fish Marketing Authority which operates the Metropolitan Fish Markets. In other coastal centres of New South Wales, fishermen's co-operatives may become registered as local fish markets. In Queensland until recently the Fish Board sold all production on behalf of fishermen in that State, except fish intended for export and interstate trade. However, new legislation was passed in March 1982 giving fishermen a choice of selling their catch either through the Fish Board, Fishermen's co-operatives or licensed private processors and wholesalers. In Victoria, South Australia, Western Australia and Tasmania, there is no restriction on market outlets. In Victoria, South Australia and Western Australia, most fish is sent to metropolitan wholesale fish markets for auctioning; small quantities are processed for sale locally, chiefly by co-operatives. Nearly all fresh fish in Tasmania is consigned direct to processors. The principal outlets for fish products in Australia are retail and catering establishments.

