

# CHAPTER 14

## FORESTRY AND FISHERIES

### FORESTRY

#### Source of statistics

Statistics relating to forested areas have been compiled by the Forestry Branch, Department of Primary Industry from data supplied by State and Territory Forest Services and by private forestry companies. Statistics of timber and by-products have been compiled from the annual factory collections undertaken by the Deputy Commonwealth Statisticians in the several States. Figures of production of gums, resins and tanning barks have been provided by the State forestry authorities. Data of imports and exports of forest products and timber products have been compiled by the Australian Statistician as part of the statistics of overseas trade. The figures shown relate, in general, to years ended 30 June.

#### Objects of forestry

The main object of forestry authorities is to manage the forests of the country in a manner that will provide maximum benefits, both direct and indirect, for the community. The authorities aim to promote the multiple use concept in management under which forests remain in perpetuity as sources of valuable raw material, areas of natural beauty, sanctuaries for fauna and flora, and areas for scientific investigation and watershed protection. The provision of special protected areas such as forest parks for recreational use and for the conservation of plants and animals is an objective. Forestry also aims at improving existing forests and woodlands by properly controlled harvesting, by protection from such destructive agencies as fire, insects and diseases, and by inducing regeneration. The provision of a partial tree cover on denuded lands where this cover is necessary for protective purposes, and a complete cover when the land is more suited under forest than under other land use, are further aims of forestry.

#### General account of forests and timbers

The area of land in Australia suitable for the production of commercial timber as the principal objective is very small in comparison with the size of the continent. Productive or potentially productive forests cover 43 million hectares, and of these 98 per cent are natural forests. Thirty-five million hectares of the natural forests are dominated by eucalypts. For a description of the types of timber grown in Australia see Year Book No. 61, Chapter 24.

#### Extent of forested areas

The total area of forest, 43 million hectares, is based on a definition which includes plantations, native forest with existing or potential mature height of 20 metres or more, and cypress pine forest in commercial use regardless of height. The following tables show classifications of native forest areas in Australia by forest type and by ownership. Plantation areas are dealt with separately.

#### NATIVE FOREST AREAS CLASSIFIED BY FOREST TYPE, 30 JUNE 1979

(Source: Forestry Branch, Department of Primary Industry)

('000 hectares)

Forest type	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Rainforest . . . . .	300	—	1,085	—	—	472	38	—	1,895
Eucalypt—									
Productivity—Class I . . . . .	1,173	645	205	—	176	504	—	—	2,703
Class II . . . . .	3,649	4,582	1,290	—	2,816	1,848	—	51	14,236
Class III . . . . .	8,320	559	3,300	—	19	—	—	—	12,198
Tropical eucalypt and paperbark . . . . .	—	—	4,078	—	—	—	2,450	—	6,528
Cypress pine . . . . .	1,908	—	1,686	—	—	—	778	—	4,372
<b>Total . . . . .</b>	<b>15,350</b>	<b>5,786</b>	<b>11,644</b>	<b>—</b>	<b>3,011</b>	<b>2,824</b>	<b>3,266</b>	<b>51</b>	<b>41,932</b>

## NATIVE FOREST AREAS CLASSIFIED BY OWNERSHIP, 30 JUNE 1979

(Source: Forestry Branch, Department of Primary Industry)

('000 hectares)

Ownership	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
State forestry(a)	2,866	(b) 2,358	3,203	-	1,913	1,272	(b) 312	-	11,924
Other public(c)	6,208	2,750	1,394	-	435	399	2,639	51	13,876
National parks(d)	993	128	5,747	-	105	122	315	-	7,410
Private(e)	5,283	550	1,300	-	558	1,031	-	-	8,722
<b>Total</b>	<b>15,350</b>	<b>5,786</b>	<b>11,644</b>	<b>-</b>	<b>3,011</b>	<b>2,824</b>	<b>3,266</b>	<b>51</b>	<b>41,932</b>

(a) Publicly owned land, reserved for or dedicated primarily to timber production. (b) As at 30 June 1971. (c) Publicly owned land, vacant or occupied under lease on which control of timber harvesting is in Government control although the land is not reserved for production forestry purposes. (d) Publicly owned land reserved for purposes other than timber production and on which such harvesting is not normally allowed. (e) Privately owned land and public land on which the Government has not reclaimed the rights of timber marketing.

## Plantations

The indigenous forest of Australia does not contain adequate supplies of coniferous timber, and Australia's requirements have had to be met largely by imports. As a result of the planned policy of the forest services and of several private commercial organisations, the area of coniferous plantations, mainly of exotic species, is steadily increasing. It was natural that this aspect of forestry should receive earliest attention in South Australia, as this is the State most poorly endowed with natural forest. South Australia now has a large area of productive coniferous plantations, and for some years has been obtaining considerable quantities of timber from these plantations. Production is also increasing in other States, and the thinnings from their plantations are already supplying a significant volume of timber. At 31 March 1979, the total area of coniferous plantations was about 681,500 hectares.

The total production of roundwood from Australia's coniferous plantations is now about 3.4 million cubic metres per annum and is expected to increase substantially during the next decade.

A special article giving 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.

Broadleaved plantations (mainly *Eucalyptus* and *Populus* spp) comprise about 45,800 hectares, a much smaller area than for the coniferous plantations. Plantations of ash eucalypts (including *E. delegatensis* and *E. regnans*) for pulpwood in Victoria, and poplar plantations in the Eastern States make up a substantial proportion of the total broadleaved plantation area. The following tables show total area of plantations in Australia classified by species and by ownership.

## PLANTATION AREAS BY PUBLIC OWNERSHIP (a), CLASSIFIED BY SPECIES, 31 MARCH 1979

(Source: Forestry Branch, Department of Primary Industry)

(Hectares)

Species group	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
<b>Coniferous—</b>									
<i>Pinus radiata</i>	118,472	78,045	2,516	66,584	22,250	31,231	-	12,788	331,886
<i>Pinus pinaster</i>	-	495	-	5,411	23,221	-	-	-	29,127
<i>Pinus elliottii</i>	3,883	-	58,574	-	43	-	-	-	62,500
<i>Pinus caribaea</i>	1,026	-	12,147	-	-	-	313	-	13,486
<i>Araucaria</i> spp.	1,550	-	39,814	-	-	-	-	-	41,364
Other coniferous spp.	4,576	3,741	4,432	535	136	248	900	851	15,419
<b>Total coniferous</b>	<b>129,507</b>	<b>82,281</b>	<b>117,483</b>	<b>72,530</b>	<b>45,650</b>	<b>31,479</b>	<b>1,213</b>	<b>13,639</b>	<b>493,782</b>
<b>Broadleaved—</b>									
<i>Eucalyptus</i> spp.	8,556	6,903	1,623	859	8,300	554	-	-	26,795
<i>Populus</i> spp.	-	17	-	-	-	-	-	-	17
Other broadleaved spp.	-	55	472	-	-	-	-	-	527
<b>Total broadleaved</b>	<b>8,556</b>	<b>6,975</b>	<b>2,095</b>	<b>859</b>	<b>8,300</b>	<b>554</b>	<b>-</b>	<b>-</b>	<b>27,339</b>
<b>Total</b>	<b>138,063</b>	<b>89,256</b>	<b>119,578</b>	<b>73,389</b>	<b>53,950</b>	<b>32,033</b>	<b>1,213</b>	<b>13,639</b>	<b>521,121</b>

(a) Includes both State forestry and other public authorities.

## PLANTATION AREAS BY PRIVATE OWNERSHIP, CLASSIFIED BY SPECIES 31 MARCH 1979

(Source: Forestry Branch, Department of Primary Industry)

(Hectares)

Species group	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
<b>Coniferous—</b>									
<i>Pinus radiata</i> . . . . .	30,216	76,476	1,200	19,536	10,992	9,840	—	—	148,260
<i>Pinus pinaster</i> . . . . .	—	3	—	—	179	—	—	—	182
<i>Pinus elliotii</i> . . . . .	7,680	—	26,649	—	—	—	—	—	34,329
<i>Pinus caribaea</i> . . . . .	—	—	623	—	—	—	1,178	—	1,801
<i>Araucaria</i> spp. . . . .	—	—	724	—	—	—	—	—	724
Other coniferous spp. . . . .	—	—	852	—	—	—	1,600	—	2,452
<i>Total coniferous</i> . . . . .	37,896	76,479	30,048	19,536	11,171	9,840	2,778	—	187,748
<b>Broadleaved—</b>									
<i>Eucalyptus</i> spp. . . . .	7,034	5,497	1,262	—	—	1,819	—	—	15,612
<i>Populus</i> spp. . . . .	2,318	450	—	—	—	—	—	—	2,768
Other broadleaved spp. . . . .	—	—	91	—	—	—	—	—	91
<i>Total broadleaved</i> . . . . .	9,352	5,947	1,353	—	—	1,819	—	—	18,471
<b>Total</b> . . . . .	47,248	82,426	31,401	19,536	11,171	11,659	2,778	—	206,219

**Australian Government assistance***Softwood Forestry Development*

Since 1966 the Commonwealth Government has provided loans to the States for the planting and/or maintenance of softwood forests, with a view to making Australia self-sufficient in forest products.

Under the *Softwood Forestry Agreements Act 1978* the Commonwealth Government provides assistance to the States during the five year period commencing 1977–78, to cover the cost of maintaining softwood forestry plantations established under the *Softwood Forestry Agreement Acts 1967, 1972 and 1976*. The assistance for the maintenance program is provided by way of loans repayable over 20 years with repayments commencing 15 years after the date of each advance. Depending on State preferences, interest is either capitalised over the deferment period, or paid as it falls due. Payments are of the order of \$5 million per annum.

*Other Forestry—Assistance to Tasmania*

The Commonwealth Government has agreed to provide financial assistance to Tasmania of \$136,000 per annum towards the cost of native forest improvement projects to be undertaken during the five year period commencing 1978–79. Over the four years 1979–80 to 1982–83, that assistance is being supplemented by the provision of further loan funds of \$100,000 per annum to assist the establishment of eucalypt plantations on marginal farmland and for the purchase of such farmland. The loans are repayable over 40 years commencing 20 years after each advance is made.

Tasmania received \$272,000 in 1979–80 including assistance in respect of 1978–79. The estimated payments in 1980–81 are \$336,000.

**Forest administration and research***Department of Primary Industry, Forestry Branch*

Following the transfer of research functions of the Forestry and Timber Bureau to the Commonwealth Scientific and Industrial Research Organization, Division of Forest Research in 1975, the remaining functions were subjected to a reorganisation which led to the establishment of a Forestry Branch within the Department of Primary Industry. The functions of the Forestry Branch include the formulation of policies on aspects of forestry relevant to Commonwealth Government responsibilities, to collate and publish statistics relevant to forestry and to the end use of the produce of forests, to service the Australian Forestry Council and attendant bodies and to liaise with international organisations on matters predominantly of a forestry nature.

*Bureau of Agricultural Economics, Forestry Commodity Economics Section*

The functions of the Forestry Commodity Economics Section of the Bureau of Agricultural Economics are to monitor, interpret and report on developments in the forestry and forest products industries particularly with regard to: demand, supply and price factors in domestic and overseas markets; international trade; and the effects of existing and alternative policies on production, usage and pricing of forest products.

**Commonwealth Scientific and Industrial Research Organization (CSIRO)**

The Division of Forest Research in the Institute of Biological Resources conducts research in the four core areas of forest ecology and biology, silviculture, tree breeding and genetics, and harvesting. The Division also conducts research into taxonomy, forest protection, forest assessment, and seed resource conservation and distribution. The Division maintains close liaison with relevant State authorities and, on occasion, collaborates with private companies. It operates seven regional stations in the States and the Northern Territory.

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

Within the Institute of Industrial Technology, the Divisions of Building Research, Chemical Technology and Mechanical Engineering carry out a wide range of investigations relating to tree harvesting, the properties of wood, and the uses of wood and wood products. Research on processing logs and timber, solid and composite wood products, timber engineering and the applications of wood in building is undertaken by the Division of Building Research. The research programs of the Division of Chemical Technology are directed towards developing ways whereby Australia's forest resources can be more effectively utilised. The programs include the technology of fibre separation, cellulosic composite materials, lignin technology, the assessment and development of cellulosic resources, fibre properties and problems relating to the pulp and paper industry. Technology for the production of liquid fuels from wood and other plant materials is also being investigated. The Division of Mechanical Engineering undertakes research leading to the design and development of machines for tree harvesting.

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

**Forestry in the Territories**

The management of forests in the Australian Capital Territory is the responsibility of the Forests Section of the Department of the Capital Territory. Forests in the Northern Territory are under the control of the Northern Territory Parks and Wildlife Commission.

**Forestry in the States**

The objectives of the State Forest Services are primarily the development of permanent forest reserves in each State and to manage these reserves on a multiple use basis. These uses include timber production, provision of minor forest products, grazing, protection of native flora and fauna, recreation and watershed protection. The powers and functions of the State forestry authorities are laid down under forestry Acts and Regulations, and are limited to public lands, in particular to lands set aside for forestry purposes. The functions include the introduction and implementation of proper measures for management and protection of forest land, harvesting, conversion and marketing of forest products. All State forest services are actively engaged in research programs aimed at improving the growth and yield of forest products and in some cases (New South Wales and Queensland) research aimed at improving the utilisation of forest products. All State forestry authorities publish annual reports.

Public land permanently reserved for or dedicated primarily to timber production in Australia amounts to 13.6 million hectares. State forestry authorities also have control over the timber on approximately 20 million hectares of crown land not specifically reserved for permanent timber production.

**Private forestry**

Privately owned land carrying productive or potentially productive native forests constitute an important part of Australia's forest resource. However, with the exception of forested land owned or managed by industrial forestry companies these forests are largely unmanaged for timber production. The area of privately owned coniferous plantations continues to increase. The activities of the industrial forestry companies predominate but the small private tree plantation holdings play an important role in the total supply of timber from these plantations.

In New South Wales, Victoria and Tasmania the State Forest Services provide advice and loans for the establishment of private forests. Victoria also provides financial assistance for non-commercial tree planting which will benefit the community. In other States, Forest Services provide advice and suitable planting stock for private landowners interested in forestry.

The Australian Forest Development Institute is an active association of private forest growers with chapters covering all States of the Commonwealth.

### Forestry education

The Australian National University's (ANU) 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. Universities in all States have facilities for post-graduate studies for forestry graduates. The Victorian School of Forestry at Creswick is a College of Advanced Education, administered by the Forests Commission. The school's main function until 1979 was to provide a three year Diploma course to train foresters for the State Forests Department and other State authorities of Victoria with managerial responsibility over forested land. The School is affiliated with the University of Melbourne. States other than Victoria offer traineeships tenable at the ANU to students selected for university training in forestry. These traineeships support the students and meet their expenses throughout the four year university course. Successful graduates are appointed as forestry officers in the State Forest Services. A limited number of post-graduate forestry scholarships are offered by the Commonwealth Government.

### The Australian Forestry Council

The Australian Forestry Council comprises the Ministers responsible for forestry in the six State Governments and the Commonwealth Government.

The Council is intended to provide the means for the mutual exchange between the State and Commonwealth Governments of information and views on forestry. It co-ordinates research into problems affecting the establishment, development, management, and protection of all forests, and the utilisation of forest products. It assists in co-ordinating the work of State and Commonwealth Governments and also private enterprise in the development of Australian forestry.

The Council is supported by a Standing Committee consisting of the Assistant Secretary, Forestry Branch, Department of Primary Industry, the heads of each of the six State Forest Services, the Chief of the Division of Forest Research, CSIRO, and the Secretary of the Northern Territory Parks and Wildlife Commission.

### Employment in forestry

In the following table details are shown of the number of persons employed by State forestry departments, the Department of the Capital Territory, the Northern Territory Parks and Wildlife Commission, the Forestry Branch, Department of Primary Industry in the relevant States and Territories, and the private sector of the forestry industry at 30 June 1979. The table excludes staff of forestry training establishments.

PERSONS EMPLOYED IN FORESTRY<sup>(a)</sup>, 30 JUNE 1979

Occupational group	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Professional staff—									
Foresters . . . . .	213	270	119	51	87	92	11	32	875
Others . . . . .	86	68	127	35	1	27	—	30	374
Field and other technical staff . . . . .	151	315	121	66	317	184	39	81	1,274
Clerical staff . . . . .	340	279	284	139	94	151	9	26	1,322
Labour <sup>(b)</sup> . . . . .	1,229	1,170	1,213	334	657	568	125	81	5,377
Extraction <sup>(c)</sup> . . . . .	2,788	455	2,230	167	816	2,144	1	80	8,681
<b>Total . . . . .</b>	<b>4,807</b>	<b>2,557</b>	<b>4,094</b>	<b>792</b>	<b>1,972</b>	<b>3,166</b>	<b>185</b>	<b>330</b>	<b>17,903</b>

(a) The Forestry and Timber Bureau has provided figures for employment within its own organisation. forest works, etc.

(b) Staff engaged in silvicultural  
(c) Staff engaged in felling, carting, etc. Includes direct employees only.

## Forest production

## FOREST PRODUCTION(a) 1978-79

		N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Production of logs for sawing, peeling, slicing or pulping—										
Broadleaved—										
Eucalypt and related species	'000m <sup>3</sup>	1,916	1,430	565	4	1,437	3,643	—	—	8,996
Rain forest species	"	88	—	168	—	—	—	—	—	256
Coniferous—										
Indigenous forest conifers—										
Cypress	"	596	{	196	—	—	—	—	—	3,260
Other	"			57	—	—	9	—	—	
Plantation grown conifers	"			725	935	183	151	—	170	
<b>Total</b>	"	<b>2,601</b>	<b>2,154</b>	<b>1,225</b>	<b>939</b>	<b>1,619</b>	<b>3,803</b>	<b>—</b>	<b>170</b>	<b>12,511</b>
Gross value of forest products(b)—										
Logs(c)	\$'000	55,504	39,172	27,174	15,970	22,202	60,402	—	3,249	223,673
Other forest products(d)	"	25,894	3,779	8,564	3,494	5,411	5,656	1	321	53,119
<b>Total</b>	"	<b>81,398</b>	<b>42,951</b>	<b>35,738</b>	<b>19,463</b>	<b>27,612</b>	<b>66,057</b>	<b>1</b>	<b>3,570</b>	<b>276,792</b>
Local value of forest products(e)—										
<b>Total</b>	"	<b>81,367</b>	<b>39,483</b>	<b>22,609</b>	<b>19,068</b>	<b>26,806</b>	<b>53,954</b>	<b>1</b>	<b>3,570</b>	<b>246,858</b>

(a) Excludes some production from private land, thought to be relatively small, details of which are not available. (b) Gross production is valued at principal markets. (c) See footnote (c) to the table Forest Production: Australia, below. (d) Includes firewood, sleepers, transoms, girders, bridge timbers, mining timber, poles, piles, charcoal (forest production only), tanning bark, essential oils, eucalyptus leaves, crude rutin. (e) Gross production valued at place of production. See footnote (b) above.

## FOREST PRODUCTION(a): AUSTRALIA

		1976-77	1977-78	1978-79
Production of logs for sawing, peeling, slicing or pulping—				
Broadleaved—				
Eucalypt and related species	'000 m <sup>3</sup>	9245	9086	8996
Rain forest species	"	252	274	256
Coniferous—				
Indigenous forest conifers—				
Cypress	"	2,929	3,066	3,260
Other	"			
Plantation grown conifers	"			
<b>Total</b>	"	<b>12,426</b>	<b>12,426</b>	<b>12,511</b>
Gross value of forest products(b)—				
Logs(c)	\$'000	191,246	209,096	223,673
Other forest products(d)	"	52,105	54,332	53,119
<b>Total</b>	"	<b>243,351</b>	<b>263,428</b>	<b>276,792</b>
Local value of forest products(e)—				
<b>Total</b>	"	<b>222,556</b>	<b>239,827</b>	<b>246,858</b>

(a) Excludes some production from private land, thought to be relatively small, details of which are not available. (b) See footnote (b) to the table Forest Production, 1978-79, above. (c) Included in this category are amounts attributable to sawmillers who carry out their own logging activities as a secondary part of their operations. As such, the values are attributable to the sawmilling industry which is part of manufacturing industry. However, the amount has been included in this table so that the overall value of forest products might be shown. (d) Includes firewood, sleepers, transoms, girders, bridge timbers, mining timber, poles, piles, charcoal (forest production only), tanning bark, essential oils, eucalyptus leaves, crude rutin. (e) Gross production valued at place of production. See footnote (b) to the table Forest Production, 1978-79 above.

**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, 1978-79**

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 . . . . .	759	13,031	388,836	223,380	14,728
2533	Veneers and manufactured boards of wood . . . . .	75	5,819	268,464	106,991	4,491
2537	Hardboard woodchips . . . . .	9	631	96,407	36,549	1,917

(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		1976-77	1977-78	1978-79
Undressed sawn timber—				
Recovered from sawn logs—				
Australian grown—				
Broadleaved . . . . .	'000 cu m	2,312	2,129	2,128
Coniferous . . . . .	"	852	927	982
Total . . . . .	"	3,164	3,056	3,110
Woodchips (green weight)—				
Hardwood (broad leaved) . . . . .	'000 tonnes	3,623	3,668	3,800
Plywood—				
Commercial—(surface measure) . . . . .	'000 sq m	6,550	7,290	7,696
(1 mm basis) . . . . .	"	35,298	38,948	38,517
Waterproof—(surface measure) . . . . .	"	4,097	3,985	3,723
(1 mm basis) . . . . .	"	41,219	38,424	42,975
Particle board (resin bonded) . . . . .	'000 cu m	496	522	564
Wood pulp—				
Chemical . . . . .	tonne	182,775	189,814	198,253
Mechanical . . . . .	"	416,905	424,090	473,291
Other . . . . .	" }			
Paper—				
Newsprint . . . . .	tonne	206,590	207,620	208,143
Printings . . . . .	"	55,329	66,345	79,229
Writing (incl. cartridge) . . . . .	"	87,896	82,877	(b)
Wrapping . . . . .	"	321,571	322,793	321,309
Blotting . . . . .	" }			(c)
Duplicating . . . . .	"	30,286	40,031	(d) 107,640
Other paper . . . . .	" }			(e) 27,490
Tissue and sanitary papers . . . . .	"	91,405	93,551	97,701
Paperboard (incl. strawboard) . . . . .	"	430,711	415,449	429,626

(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. In 1978-79 the production of hardwood chips in Australia amounted to 3,800,000 tonnes.

## Imports

## IMPORTS OF CRUDE WOOD AND TIMBER

		Quantity			Value f.o.b. (\$'000)		
		1977-78	1978-79	1979-80p	1977-78	1978-79	1979-80p
Crude wood, and timber—							
Wood waste and charcoal	'000 cu m	n.a.	n.a.	n.a.	8	23	19
Wood in the rough or roughly squared	"	33	24	1	2,146	1,670	155
Wood shaped or simply worked—							
Railway or tramway sleepers	"	17	7	5	3,048	1,539	1,088
Timber, sawn lengthwise, sliced or peeled, but not further prepared, of a thickness exceeding 5 mm—							
Conifer—							
Douglas fir	"	336	374	329	42,006	54,259	57,553
Hemlock and balsam	"	79	88	99	6,332	7,636	11,840
Radiata pine	"	63	29	43	2,604	2,445	4,272
Redwood	"	3	5	2	612	1,680	857
Western red cedar	"	86	75	75	13,864	18,483	23,271
Other	"	6	16	14	(a)878	(b)2,367	(c)2,001
Total conifer	"	573	587	462	66,296	86,870	99,794
Non-conifer	"	236	227	242	(d)29,813	(e)36,720	(f)53,823
Timber (including blocks, strips, etc.), planed, tongued, grooved, rebated, etc., but not further manufactured—							
Conifer	'000 cu m	61	93	125	8,539	13,771	21,690
Non-conifer	"	65	66	57	13,921	14,923	17,331

(a) Includes a value of \$3,182 for which no quantity has been included. (b) Includes a value of \$15,000 for which no quantity has been included. (c) Includes a value of \$32,000 for which no quantity has been included. (d) Includes a value of \$180,000 for which no quantity has been included. (e) Includes a value of \$182,000 for which no quantity has been included. (f) Includes a value of \$384,000 for which no quantity has been included.

## Exports

## EXPORTS OF CRUDE WOOD AND TIMBER(a)

		Quantity			Value f.o.b. (\$'000)		
		1977-78	1978-79	1979-80p	1977-78	1978-79	1979-80p
Crude wood, and timber—							
Wood waste and charcoal (including shell and nut charcoal)	'000m <sup>3</sup>	n.a.	n.a.	n.a.	62	15	20
Pulpwood	"	—	n.a.	n.a.	—	93,588	148,689
Wood in the rough or roughly squared	"	4	131	59	258	586	1,031
Wood, shaped or simply worked—							
Railway or tramway sleepers	"	23	34	33	3,797	5,569	5,586
Timber, sawn lengthwise, sliced or peeled, but not further prepared, of a thickness exceeding 5 mm—							
Conifer	"	9	4	3	41	303	737
Non-conifer—Jarrah	"	1	1	2	294	227	346
Other	"	28	41	43	4,834	7,664	11,854
Timber (including blocks, strips and friezes for parquet or wood block flooring, not assembled), planed, tongued, etc.—							
Conifer	"	1	—	3	493	29	262
Non-conifer	"	32	1	3	303	409	615

(a) Excludes re-exports.

## FISHERIES

## Collection and presentation of fisheries statistics

## Source and basis of statistics

Statistics presented in this section of the 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. The Fisheries Division of the Department of Primary Industry has supplied particulars of the whaling industry and pearl-shell fishery. Statistics of the processing of general fisheries products and of overseas trade in the products of fishing and whaling have been compiled by the Australian Bureau of Statistics.



Australian fisheries production statistics 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 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.

## Fisheries resources and their commercial exploitation

### Fish

Approximately 2,000 species of marine and freshwater fish occur in and around Australia, about forty of which support substantial commercial fisheries. Most fishing is confined to waters over the continental shelf on the populous eastern and south-eastern seaboard, including Tasmania and South Australia, and off the south-western corner of the continent. 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 are found in the surface layers of the open ocean; and demersal fisheries, which are located in the bottom layers of the sea. Estuarine fisheries produce considerable quantities of mullet (mainly *Mugil cephalus*), bream (*Acanthopagrus spp*) and, in northern Australia, the highly regarded giant perch (*Lates calcarifer*). Important freshwater fisheries in New South Wales, Victoria and South Australia include those for Murray cod (*Maccullochella spp*), golden perch (*Plectroplites ambiguus*), eels (*Anguilla australis*) and European carp (*Cyprinus carpio*). Trout are farmed in New South Wales, Victoria, South Australia, Western Australia and Tasmania. Important pelagic fisheries include those for Australian 'salmon' (*Arripis trutta*), southern bluefin tuna (*Thunnus maccoyii*), snoek (*Leionura atun*), spanish mackerel (*Scomberomerus commersoni spp*), and clupeoids (*Sardinops neopilchardus* and *Engraulis australis*). Demersal fisheries include those for snapper (*Chrysophrys auratus*), whiting (*Sillaginidae*) and from tropical waters the so called 'cods' (*Epinephelus*, etc.). Trawl fisheries off New South Wales and Victoria yield species such as flathead (*Neoplatycephalus* and *Trudis spp.*), morwong (*Nemadactylus spp.*), Silver Dory (*Cyttus Australis*) and John Dory (*Zeus faber*). Expansion of trawling onto the continental slope off central New South Wales and in Western Bass Strait has established a fishery for gemfish (*Rexea solandri*). The valuable fishery for edible school and gummy shark (*Galeorhinus australis* and *Mustelus antarcticus*) in south-eastern Australia declined significantly in the year 1972-73 because of the discovery of a high mercury content in large school shark, but production and prices have since risen as the fishery for gummy sharks has expanded, although production has not attained its former level. A fishery for clupeoids in the Bass Strait which supplies the raw material for a fish meal plant at Lakes Entrance, Victoria, is the only established 'industrial fishery' in Australia.

### 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. Over the last decade, important fisheries have been established in northern Australia and South Australia. Interest in deep water prawn stocks off New South Wales is growing. 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. Since 1978 feasibility projects involving Japanese squid jigging vessels have indicated good prospects for a commercial squid fishery in south-east Australia.

#### **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**

Since 1955, sperm whale (*Physeter catodon*) were taken in southern waters off Western Australia. However the numbers of shore stations responsible for carrying out processing operations have decreased and late in 1978 the last of these, located at Albany, Western Australia closed. Whales are now a protected species in the Australian Fishing Zone.

### **Fisheries administration and research**

The Constitution of the Commonwealth (section 51 (x)) assigns to the Commonwealth Government power to legislate for fisheries in Australian waters beyond territorial limits, the residual power in respect to waters within territorial limits (including inland waters) resting with the States. The Commonwealth Government has made similar arrangements for each of its Territories. Each State and Territory has legislation regulating fisheries in waters within its jurisdiction. Persons taking fish for sale, and their boats, are required to be licensed, and provision is made for management of the fisheries.

The Commonwealth Government laws regulating the fisheries are the *Fisheries Act* 1952, the *Continental Shelf (Living Natural Resources) Act* 1968 and the *Whaling Act* 1960. Each of these applies in accordance with the Commonwealth Government's fishery power under the Constitution.

#### **Fisheries Act**

This Act, as amended in 1978, established a 200 mile Australian fishing zone around Australia and its external Territories. It requires Australians and foreigners engaged in commercial fishing and boats used for such fishing to be licensed. As well as giving effect to Australia's sovereign rights over the living resources of the 200 mile zone, the Act, in accordance with International Law, imposes an obligation on Australia to manage the resources so that they are conserved for optimum utilisation by mankind, both now and in the future.

The *Fisheries Act* 1952 and the *Continental Shelf (Living Natural Resources) Act* 1968 were amended in 1980 to complement the *Whale Protection Act* 1980 in respect of the preservation, conservation and protection of all species of whale. The *Whale Protection Act* 1980 is administered by the Minister for Home Affairs and Environment.

As part of the Commonwealth/State arrangements for the sharing of resources in the seas surrounding Australia; the amended *Fisheries Act* 1952 provides mechanisms for the Commonwealth and a State, or States, to consult and agree on management of a particular fishery and then for one or the other to apply its laws to implement agreed measures throughout the fishery irrespective of whether the fishery is within or beyond the three mile limit of territorial waters. These arrangements will not be possible until complementary State legislation has been enacted.

#### **Continental Shelf (Living Natural Resources) Act**

This Act implements in Australian law the sovereign rights conferred on Australia by the Convention on the Continental Shelf, Geneva, 1958 in respect of the organisms belonging to sedentary species (that is, organisms 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) on the continental shelf. The continental shelf comprises the seabed and subsoil of the submarine areas adjacent to the coast but outside the territorial sea to a depth of 200 metres, or beyond that depth where the depth of the superjacent waters admits of the exploitation of the natural resources of the area. The Act requires the licensing of persons searching for and taking sedentary organisms, of boats used to search for and take sedentary organisms, and of persons employing divers, trial divers and divers' tenders in taking sedentary organisms if such activities are carried out in controlled areas of the continental shelf of Australia or the Territories for a commercial purpose. Provision is made for proclamation of sedentary organisms to which the Act applies, for the establishment of controlled areas of continental shelf

in respect of specified sedentary organisms, and for the management and conservation of sedentary organisms in controlled areas (the last of these applying to all persons whether the purpose of the taking of the sedentary organism is commercial or not). The Act applies to all persons including foreigners, and to all boats including foreign boats.

#### **Whaling Act**

In June 1980, the *Whale Protection Act 1980* received Royal Assent and will be proclaimed when arrangements have been concluded with the State Governments. The legislation prohibits killing, capturing, injuring or interference with a whale, dolphin or porpoise in the Australian fishing zone and by Australians domiciled in Australia and Australian fishing vessels and aircraft and their crews beyond the 200 mile Australian fishing zone, with penalties up to \$100,000.

#### **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 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. Although fishery resources are common property there are restrictions on trawlers greater than 40 metres in southern waters fisheries such as those for rock lobster, abalone, southern bluefin tuna and prawns in northern Australia where the number of boats are controlled, and the rock lobster fisheries where the quantities of fishing gear are controlled. The only other restrictions on the entry of boats into the Australian fishing industry are those relating to foreigners and to processing boats in the northern prawn fishery. Management measures have been introduced in several fisheries to provide controls such as minimum sizes, closed areas, closed seasons and regulation of the type of fishing gear that may be used.

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 was replenished from Consolidated Revenue in 1976-77. 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 expended by the States for the same purposes.

#### **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 and Oceanography, which has its headquarters and main laboratory at Cronulla, N.S.W. and regional laboratories in Perth and Brisbane (fisheries science and oceanography);
- (ii) CSIRO Division of Food Research, conducts research into handling, storage, processing and transportation of fish at its laboratory in Hobart, Tasmania;
- (iii) 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 South Australia;
- (iv) Fisheries Division, Department of Primary Industry, Canberra (economic and management research, fishing technology, extension and education service); and
- (v) 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; *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.

### Boats and equipment employed by industry

The following table shows details of boats and equipment engaged in the taking of fish, crustaceans and edible molluscs, and pearl-shell and trochus-shell; and the number of chasers and stations engaged in whaling operations. Boats engaged in more than one industry are classified to their main activity.

FISHERIES: BOATS AND EQUIPMENT

		1976-77	1977-78	1978-79
General fisheries—				
Boats . . . . .	No.	9,515	10,920	n.a.
Value of boats and equipment . . . . .	\$'000	247,502	n.a.	n.a.
Edible oyster fisheries—				
Boats . . . . .	No.	(a)(b)1,747	n.a.	n.a.
Value of boats and equipment . . . . .	\$'000	(a)(b)5,742	n.a.	n.a.
Pearl-shell and trochus-shell—				
Boats(c) . . . . .	No.	17	17	17
Whaling(c)—				
Chasers . . . . .	No.	3	3	..
Stations operating . . . . .	No.	1	1	..

(a) Incomplete; excludes Queensland and Tasmania.

(b) Incomplete; excludes South Australia.

(c) Source: Department of Primary Industry.

## Employment in fisheries

### Classification of registered commercial fishermen by industry

The following table has been derived mainly from the licensing records of the various State fisheries authorities. 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.

PERSONS EMPLOYED ON FISHING BOATS

Industry	1976-77	1977-78	1978-79
General fisheries(a) . . . . .	17,613	n.a.	n.a.
Edible oyster fisheries . . . . .	(b)(c)1,434	n.a.	n.a.
Pearl-shell and trochus-shell(d) . . . . .	151	156	156
Whaling(d)—			
At sea . . . . .	51	51	..

(a) Figures for general fisheries refer to number of persons (including skippers) reported as usually employed on boats. Persons reported as usually employed on more than one boat for a particular year are counted more than once for that year. Includes the number of licenced commercial fishermen in Western Australia. (b) Incomplete: excludes Queensland and Tasmania. (c) Incomplete: excludes South Australia. (d) Source: Department of Primary Industry.

## Production, processing and domestic marketing of fisheries products

### Value of fisheries production

The following table shows the gross value and local value of fishing and whaling production 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. *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. *Local value* (i.e. gross value of commodities produced at the place of production) is ascertained by deducting marketing costs from the gross value of commodities produced. Marketing costs include freight, cost of containers, commission, and other charges incurred in marketing. Gross and local values of primary commodities produced involve some duplication as they include certain primary commodities which are consumed as raw materials to produce other primary commodities (e.g. hay consumed by livestock).

### FISHERIES: GROSS AND LOCAL VALUE OF PRODUCTION (\$'000)

Year	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	Aust.
GROSS VALUE								
1973-74 . .	(a)20,974	10,895	(b)(c)15,196	17,442	30,494	7,014	(a)7,295 (a)(b)(c)109,310	
1974-75 . .	(a)24,609	8,686	(b)12,606 (d)14,083	35,130	6,928	5,667 (a)(b)(d)107,709		
1975-76 . .	31,599	10,601	(b)(c)17,137 (d)22,474	51,079	8,511	5,228 (b)(c)(d)146,629		
1976-77 . .	36,059	16,014	(b)(c)34,955 (d)27,199	69,094	11,662	11,357 (b)(c)(d)206,340		
1977-78 . .	39,665	17,977	(b)(c)40,808 (e)23,615	88,340	12,609	10,337 (b)(c)(e)233,351		
1978-79 . .	42,286	20,025	58,214 (e)30,475	90,743	14,636	19,487 (e)279,308		
LOCAL VALUE								
1973-74 . .	16,568	8,682	14,387	15,433	30,313	7,014	7,295	99,692
1974-75 . .	21,569	6,949	11,732	12,496	34,785	6,928	5,667	100,127
1975-76 . .	25,334	8,481	16,152	20,022	50,870	8,511	5,228	134,598
1976-77 . .	30,352	13,917	33,953	24,207	68,864	11,662	11,357	194,312
1977-78 . .	32,993	16,539	39,677	21,034	88,038	12,609	10,337	221,226
1978-79 . .	34,871	18,423	56,414	27,199	90,434	14,636	19,487	264,906

(a) Incomplete; excludes octopus, squid and cuttlefish in New South Wales. (b) Incomplete; excludes oysters in Queensland. (c) Incomplete; excludes rock lobster in Queensland. (d) Incomplete; excludes oysters in South Australia. (e) Incomplete, excludes octopus, cuttlefish, oysters and scallops in South Australia.

### Production of selected fisheries

### SELECTED FISHERIES PRODUCTS: PRODUCTION AND GROSS VALUE 1978-79

Product	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	Aust.
QUANTITY (tonnes)								
Fish(a) . . . . .	25,803	9,303	5,085	9,484	9,540	2,605	1,576	63,395
Crustaceans(a) . . . . .	2,326	279	10,747	4,428	15,034	1,305	3,520	37,640
Molluscs (edible)(a) . . . . .	8,912	7,816	(b)3,346 (c)1,274	932	4,380	8	(d)26,667	
GROSS VALUE (\$'000)								
Fish . . . . .	17,526	13,125	6,351	8,714	6,085	2,482	2,334	56,617
Crustaceans . . . . .	9,665	1,289	49,584	19,847	72,960	5,904	17,142	176,391
Molluscs (edible) . . . . .	15,095	5,611	(b)2,279 (c)1,913	1,188	6,250	11	(d)32,348	

(a) Estimated live weight. (b) Incomplete. Excludes oysters in Queensland. (c) Incomplete. Excludes octopus, cuttlefish, oysters and scallops in South Australia. (d) Incomplete; see individual States.

## SELECTED FISHERIES PRODUCTS: PRODUCTION, AND GROSS VALUE, AUSTRALIA

Product	1976-77	1977-78	1978-79
QUANTITY (tonnes)			
Fish(a)(b)	59,111	62,789	63,395
Crustaceans(a)	(c)36,867	(c)34,641	37,640
Molluscs (edible)(a)	(d)22,615	(d)25,517	(e)26,667
Pearl-shell(e)(f)	190.2	150.0	185.0
Trochus-shell(f)	—	—	—
GROSS VALUE (\$'000)			
Fish(b)	43,891	52,778	56,617
Crustaceans	(c)125,895	(c)139,237	176,391
Molluscs (edible)	(d)27,060	(d)26,581	(e)32,348
Pearl-shell(f)(g)	182	124	188
Trochus-shell(g)	—	—	—

(a) Estimated live weight. (b) Excludes freshwater fish caught in Queensland. (c) Excludes rock lobster in Queensland. (d) Incomplete; excludes oysters in Queensland and South Australia. (e) Incomplete see individual States in table above. (f) Excludes manufacturing shell produced from pearl culture operations. (g) Source: Department of Primary Industry.

## FISH: PRODUCTION, BY PRINCIPAL TYPES

Type	Tonnes estimated live weight			Gross value (\$'000)		
	1976-77	1977-78	1978-79	1976-77	1977-78	1978-79
Tuna(a)	10,111	12,306	11,266	4,474	5,564	5,316
Mackerel	1,266	1,481	1,041	1,279	1,439	1,168
Snoek	419	386	186	304	166	76
Mullet	5,664	6,095	5,600	2,745	3,071	3,396
Bream (including Tarwhine)	884	834	794	1,044	1,247	1,453
Australian salmon	3,704	3,225	2,390	1,147	1,203	993
Ruff	827	1,173	1,163	263	481	443
Snapper	2,175	2,128	2,045	3,452	3,585	3,939
Morwong	1,608	1,593	1,447	1,380	1,373	1,356
Whiting	2,803	2,382	2,566	(b)4,638	(b)5,441	(b)6,969
Flathead	2,039	1,966	2,169	1,557	1,590	1,896
Shark	6,795	7,935	7,452	6,446	8,647	8,465
Leatherjacket	362	365	227	240	237	171
Other	19,988	21,222	25,048	12,711	17,926	20,976
<b>Total</b>	<b>58,644</b>	<b>63,093</b>	<b>63,395</b>	<b>44,007</b>	<b>53,728</b>	<b>56,617</b>

(a) Includes estimates by CSIRO for New South Wales. (b) Value of whiting in Tasmania is not available for publication and has been included in 'Other'.

## Crustaceans

## CRUSTACEANS: PRODUCTION, BY TYPE

(Tonnes live weight)

Type	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79
Murray crayfish	(a)295	184	(a)131	83	38	21
Yabbies						
Rock lobster						
Bay lobster	(b)11,830	12,265	(a)12,865	(c)12,875	(c)14,485	15,358
Prawns	24,491	16,327	19,478	23,095	19,272	21,479
Crabs	(a)702	712	700	825	858	782
<b>Total</b>	<b>(c)37,318</b>	<b>29,488</b>	<b>(c)33,173</b>	<b>(c)36,878</b>	<b>(c)34,653</b>	<b>37,640</b>

(a) Excludes Victorian figure, which is not available for publication. (b) Excludes rock lobster in Queensland. (c) Incomplete; see footnotes to figures for individual species.

## Molluscs (edible)

## MOLLUSCS: PRODUCTION, BY TYPE

(Tonnes estimated live weight)

Type	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79
Octopus . . . . . }	(a)158	{ (b)20	(c)59	78	(c)92	(c)146
Squid . . . . . }		{ (b)212	253	280	381	583
Cuttlefish . . . . . }	(a)1	(b)-	(c)19	(c)19	(c)29	(c)90
Oysters . . . . .	(d)10,479	(c)(d)8,908	(c)(d)10,273	(c)(d)10,793	(c)(d)9,786	(c)(d)8,128
Mussels . . . . .	(a)63	1,019	1,123	544	773	689
Pipi . . . . .	203	193	195	207	303	285
Scallops . . . . .	12,425	6,062	4,642	4,396	(c)9,121	(c)10,548
Abalone . . . . .	6,032	4,971	5,256	6,313	5,057	6,197
<b>Total . . . . .</b>	<b>(e)29,362</b>	<b>(e)21,386</b>	<b>(e)21,820</b>	<b>(e)22,630</b>	<b>(e)25,543</b>	<b>(e)26,667</b>

(a) Excludes Victorian figure, which is not available for publication. (b) Excludes New South Wales figure which is not available. (c) Excludes South Australia figure, which is not available. (d) Excludes Queensland figure which is not available. (e) Incomplete; see individual species.

## Pearls, pearl-shell and trochus-shell

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

(Source: Department of Primary Industry)

		1976	1977	1978
QUANTITY				
Pearl and Trochus shell fishing operations—				
Production of—				
Pearl shell(b)	tonne	190.2	150.0	185.0
Trochus shell	tonne	—	—	—
Pearl culture operations—				
Live shell introduced	No.	464,327	495,465	438,496
	tonne	116.9	157.5	130.5
Production—				
Round and baroque pearls	No.	82,275	71,384	88,369
	momme(c)	64,173	48,056	55,553
Half pearls	No.	302,264	287,283	248,360
Manufacturing shell	tonne	82.4	244.0	66.7
VALUE (\$'000)				
Pearl and Trochus shell fishing operations—				
Production of—				
Pearl shell		182	124	188
Trochus shell		—	—	—
Pearl culture operations—				
Production of—				
Round and baroque pearls		5,752	8,853	11,768
Half pearls		1,063	1,197	1,104
Manufacturing shell		48	156	58

(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.

### Whale processing

#### WHALING

(Source: Department of Primary Industry)

		1976	1977	1978
Whales taken (a)—				
Male	No.	650	508	508
Females	"	345	116	171
<b>Total</b>	"	<b>995</b>	<b>624</b>	<b>679</b>
Quantity of sperm whale oil produced (b)	barrels	35,190	23,586	23,591
Value of whale oil produced	\$'000	2,240	2,268	1,689
Value of by-products (meal, meat, solubles, etc.)	"	751	647	962
<b>Total value of products</b>	"	<b>2,991</b>	<b>2,915</b>	<b>2,651</b>

(a) Sperm whales only were taken. (b) 6 barrels = approximately 1.016 tonnes.

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

### 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, the Fish Board sells all production on behalf of fishermen in that State, except fish intended for export and interstate trade. 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.

### Consumption of edible fisheries products

Particulars of the apparent consumption of fish, crustaceans and molluscs per head of population are included in the following table. For the purposes of estimating supplies of fish available for consumption, an allowance of 10 per cent of commercial production has been made for the non-commercial catch of fish. No such allowances have been made for crustaceans or molluscs as it is considered that the non-commercial take is not significant.

#### FISHERIES PRODUCTS: APPARENT CONSUMPTION (Kg edible weight per person per annum)

	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79p
Fresh or frozen (edible weight)—						
Fish—						
Australian	2.0	1.3	1.5	1.4	1.6	1.6
Imported	1.8	1.6	1.6	1.6	1.7	1.5
Crustaceans and molluscs	1.2	0.6	1.0	0.9	0.9	0.9
Seafood otherwise prepared (product weight)—						
Australian	0.4	0.7	0.7	0.5	0.5	0.5
Imported						
Fish	2.4	2.1	1.8	2.5	2.3	2.0
Crustaceans and molluscs						
<b>Total seafood</b>	<b>7.7</b>	<b>6.4</b>	<b>6.6</b>	<b>6.9</b>	<b>7.0</b>	<b>6.6</b>



## Overseas trade in fisheries products

## Edible fisheries products

## OVERSEAS TRADE IN EDIBLE FISHERIES PRODUCTS

	Quantity (tonnes)			Value f.o.b. (\$'000)		
	1977-78	1978-79	1979-80p	1977-78	1978-79	1979-80p
<b>IMPORTS</b>						
Fresh, chilled, frozen or boiled (a)	22,553	24,397	21,941	36,337	46,946	43,706
Smoked, dried, salted or in brine	3,267	4,715	4,178	7,823	10,413	8,698
Potted or concentrated	141	128	239	862	877	1,773
Canned—						
Herrings	1,178	1,048	796	1,966	2,093	1,774
Salmon	6,726	4,015	5,097	22,203	13,812	20,051
Sardines, sild, brisling, etc.	3,244	2,559	2,771	7,382	6,383	6,892
Tuna	1,529	1,520	2,931	3,507	3,013	7,699
Other fish	1,991	1,491	2,250	3,106	2,442	3,716
Crustaceans and molluscs	2,257	1,929	1,966	7,021	7,422	7,259
Total canned	16,925	12,562	15,811	45,185	35,165	47,391
Other prepared or preserved fish, crustaceans and molluscs	12,132	10,946	12,046	28,508	31,122	32,036
Grand total	..	..	..	118,715	124,523	133,604
<b>EXPORTS</b>						
(Australian produce only; excludes re-exports)						
Fresh, chilled or frozen (b)—						
Fish	4,692	3,390	12,007	2,693	4,045	16,801
Crustaceans and molluscs—						
Rock lobster tails	4,604	4,649	4,302	55,728	56,763	59,752
Prawns	7,489	9,327	11,536	57,217	92,215	112,682
Other	2,636	3,199	4,430	(c) 12,283	(d) 17,621	26,299
Crustaceans and molluscs boiled in water	857	1,731	1,164	6,199	13,152	10,908
Prepared and preserved—						
Fish	65	191	99	280	696	472
Crustaceans and molluscs	1,485	1,322	1,563	8,671	8,563	12,862
Grand total	..	..	..	143,071	193,055	239,776

(a) Excludes frozen smoked, which is included in item 'Smoked, dried, etc.' (b) Excludes frozen smoked, which is included in item 'Prepared and preserved crustaceans and molluscs'. (c) Includes a value of \$240,000 for which no quantity has been included. (d) Total value for this item for 1978-79 includes value of \$96,000 for which no quantity has been included.

## Non-edible fisheries products

## OVERSEAS TRADE IN SELECTED NON-EDIBLE FISHERIES PRODUCTS

		Quantity			Value f.o.b. (\$'000)		
		1977-78	1978-79	1979-80p	1977-78	1978-79	1979-80p
IMPORTS							
Fish heads, fresh or frozen	tonnes	1,482	1,081	2,231	341	318	576
Other fish waste	"	497	466	453	105	46	63
Fish, live (a)	'000	11,546	9,194	9,703	1,432	1,221	1,346
Fish meal	tonnes	2,762	6,354	13,986	1,109	1,520	5,493
Whale oil	'000 litres	10	(b)98	4	24	104	3
Cod-liver oil	"	170	185	246	123	146	271
Other oils (including seal oil)	"	542	600	179	386	455	156
Coral and shells and their waste	tonnes	102	157	175	145	190	266
Tortoise shell (including turtle shell, claws, waste)	"	-	-	-	5	-	-
Pearls		n.a.	n.a.	n.a.	1,169	870	1,381
<b>Total</b>		<b>..</b>	<b>..</b>	<b>..</b>	<b>4,839</b>	<b>4,870</b>	<b>9,555</b>
EXPORTS							
(Australian produce only; excludes re-exports)							
Australian produce—							
Whale oil	'000 litres	5,219	4,826	-	2,399	1,403	1
Other oils	"	67	2	2	69	509	195
Pearl-shell	tonnes	482	307	457	644	511	1,228
Other shell (including trochus)	"	1,591	955	1,361	510	776	1,365
Natural pearls		n.a.	n.a.	n.a.	63	25	125
Cultured pearls—							
Round	No.	95,319	100,290	64,464	4,774	16,090	11,214
Half round	"	264,415	347,984	160,998	1,261	1,135	1,034
Other		n.a.	n.a.	n.a.	902	1,758	966
<b>Total</b>		<b>..</b>	<b>..</b>	<b>..</b>	<b>10,621</b>	<b>22,207</b>	<b>16,128</b>

(a) Live fish whether or not fit for human consumption. (b) Tonne.

Further information on subjects relating to fisheries is contained in the ABS annual publications *Fisheries, Australia (Preliminary)* (7602.0) and *Fisheries, Australia* (7603.0).