
FORESTRY AND FISHING

FORESTRY

Forests are an important sustainable national resource providing a wide range of indispensable products and benefits to the community.

The cover of forest vegetation protects the soil from water and wind erosion, reduces flooding and siltation of water storages and maintains the quality of water. Forests provide habitat for a variety of native animals and plants.

Native and plantation forests contribute substantially to the Australian economy, especially to employment in rural areas. Forests also represent valuable ecosystems for education, scientific research as well as places for tourism, recreation and other purposes. Not all forests are necessarily suitable for all types of uses at the same time, yet careful management will ensure that the forests provide multiple benefits in the long-term for the Australian community.

Forestry in the States and Territories

In the Commonwealth framework, State and Territory Governments are primarily responsible for land management. Each State has a forest authority responsible for the management and control of publicly-owned forests, in accordance with the Forestry Acts and Regulations of the State or Territory concerned.

Commonwealth forestry administration

The Department of Primary Industries and Energy is responsible for forestry matters at the national level. Its main responsibilities are providing advice to the Commonwealth Minister responsible for forestry matters; administration of export licensing responsibilities in relation to unprocessed timber; liaison with State, National and international organisations concerned with forestry; provision of a Secretariat for the Australian Forestry Council; and management of policy and program initiatives.

Existing forest estate

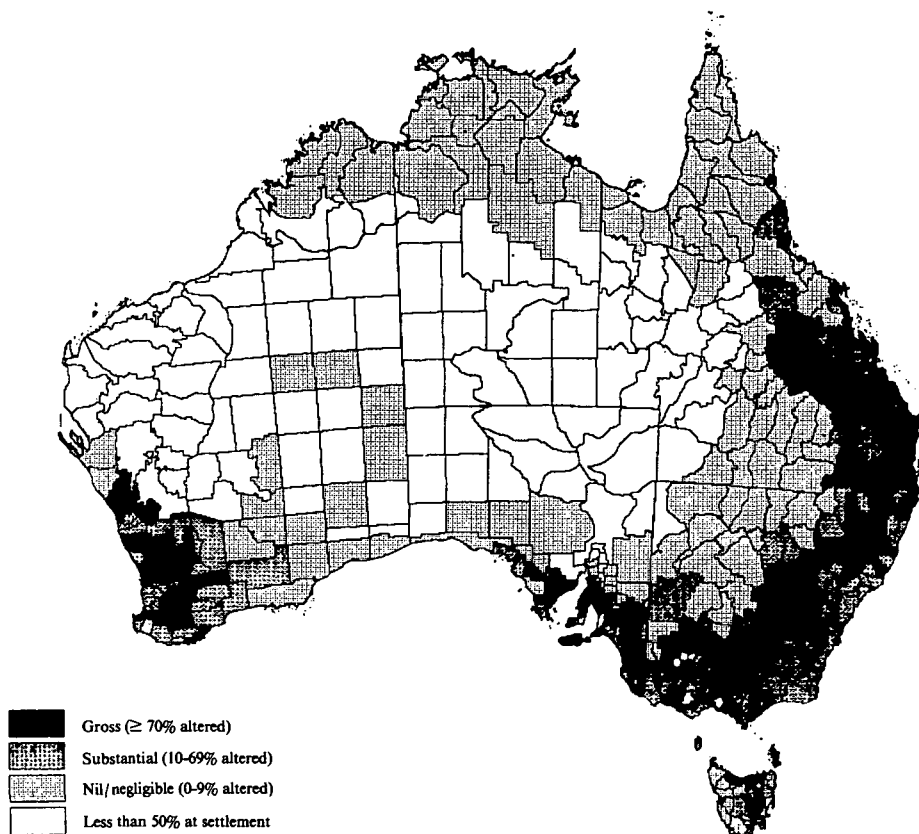
Native forest is defined as land dominated by trees with an existing or potential mature height of twenty metres or more, including native stands of cypress pine in commercial use regardless of height. The total area of native forest was estimated at 41 million hectares as at 30 June 1989.

The following map, produced by Commonwealth Scientific and Industrial Research Organisation (CSIRO) using the Australian Resources Information System (Cocks et al., 1987) shows the extent to which Australian natural forests and woodlands have been disturbed (usually meaning cleared) since European settlement.

For this map, forests and woodlands are defined as including:

- tree communities with at least 10 per cent projected foliage cover;
- tall (2 m) Eucalypt shrub communities with at least 10 per cent projected foliage cover (e.g. Mallee);
- mangroves.

DISTURBANCE TO AUSTRALIAN FORESTS AND WOODLANDS SINCE EUROPEAN SETTLEMENT



Sources:

Cocks, K.D., Walker, P.A. and Parvey, C.A. *Evolution of a Continental Scale Geographic Information System*. Submitted to the International Journal of Geographic Information Systems.

Wells, K.F., Wood, N.H. and Laut, P. (1984) *Loss of Forests and Woodlands in Australia: A Summary by State, Based on Rural Local Government Areas*. CSIRO Division of Water and Land Research Technical Memorandum 84/4.

Two factors, original vegetation and recent land cover, have been combined to estimate the changes to forests and woodlands since European settlement (Wells et al., 1984).

The percentages shown on this map are conservative, i.e. at least these percentages of the original forests and woodlands have been disturbed. Estimates of the percentage of forests and woodlands disturbed in each State are:

New South Wales, 49%; Victoria, 68%; Queensland, 35%; South Australia, 40%; Western Australia, 31%; Tasmania, 36%; Northern Territory, 0%; Australian Capital Territory, 60%.

Of the 41 million hectares, 30 million hectares are in public ownership. The bulk of the 11 million hectares of private native forest are not actively managed for wood. Of 30 million hectares of public forests, 6.2 million hectares have national park status and 12.2 million hectares are Crown forests, vacant or occupied under lease on which wood harvesting is carried out under government control but are not reserved and actively managed for wood production.

Of the 11.6 million hectares of State forests, 0.8 million hectares are special reserves managed for other than wood production purposes and on 4.3 million hectares, wood harvesting is restricted partly because of management priorities for other values and partly due to present economic inaccessibility. This leaves 6.5 million hectares or about 16 per cent of a total 41 million hectares actively managed for wood production.

NATIVE FOREST AREAS: BY FOREST TYPE AND OWNERSHIP: BY STATE
AT 30 JUNE 1989
(' 000 hectares)

Item	NSW	Vic.	Qld	WA	SA(c)	Tas.	NT	ACT	Total
CLASSIFIED BY FOREST TYPE GROUPS									
Forest type									
Rainforest	265	13	1,237	—	—	499	38	—	2,052
Eucalypt productivity									
Class I(a)	1,207	527	205	180	—	442	—	—	2,561
Eucalypt productivity									
Class II(a)	3,659	4,509	1,290	2,477	—	1,902	—	51	13,888
Eucalypt productivity									
Class III(a)	8,009	344	3,300	—	—	—	—	—	11,653
Tropical eucalypt and paperbark(b)	—	—	4,078	—	—	—	2,450	—	6,528
Cypress pine	1,819	7	1,686	—	—	—	778	—	4,290
Total	14,959	5,400	11,796	2,657	—	2,843	3,266	51	40,972
CLASSIFIED BY OWNERSHIP									
Ownership category									
Public	9,762	4,795	10,304	2,159	—	2,177	839	51	30,087
– Category 1	3,244	2,670	2,567	1,787	—	1,392	0	0	11,660
– Category 2	4,302	447	6,412	51	—	460	524	9	12,205
– Category 3	2,216	1,678	1,325	321	—	325	315	42	6,222
Private	5,197	605	1,492	498	—	666	2,427	—	10,885
Total	14,959	5,400	11,796	2,657	—	2,843	3,266	51	40,972

(a) Eucalypt forests are grouped into productivity classes in descending order of productivity. No specific indexes of productivity have been developed for these classes and there can be some overlap, especially between States, in the relative productivity levels used to assign particular forest types to productivity classes. (b) Includes tropical eucalypt and paperbark not in commercial use. (c) There is no data for S.A. as wooded areas do not fall into definition of native forests, i.e. do not have an existing height of twenty metres or more.

NOTE: Public 1: Forest land managed for multiple use including wood production. Public 2: Crown land either vacant or occupied under lease on which wood harvesting is carried out under government control but is not reserved and managed for that purpose. Public 3: Land on which wood production is excluded (National Parks etc.).

For more details on Australian native forests see *Year Book* No. 61.

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 1981 for the maintenance of the area of plantations established previously with Commonwealth funds.

Privately owned coniferous plantations amount to almost one-third the area under State ownership. New coniferous plantations (including replanting) are currently being established at the rate of 35,000 hectares per annum. 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.

Hardwood plantations are receiving increasing attention as a means of providing a secure resource base for the industry.

The Commonwealth has taken action to encourage native hardwood plantations through the establishment of the National Afforestation Program (NAP) in 1987-88, with funding of \$15 million over three years, to assist in the establishment of native hardwood plantations. NAP projects have created over 10,000 hectares of new eucalypt forests, and led to a doubling in the rate of planting prior to the NAP.

An increased interest in the establishment of eucalypt plantations is evident, particularly in Tasmania. The current annual rate of such plantations is about 8,500 hectares. The following table shows total area of plantations in Australia classified by species.

PLANTATION AREAS CLASSIFIED BY SPECIES, 31 MARCH 1989
(hectares)

<i>Species group</i>	<i>NSW</i>	<i>Vic.</i>	<i>Qld</i>	<i>SA</i>	<i>WA</i>	<i>Tas.</i>	<i>NT</i>	<i>ACT</i>	<i>Aust.</i>
PINE AND PRIVATE OWNERSHIP									
Coniferous—									
<i>Pinus radiata</i>	232,358	203,021	3,221	54,573	92,225	70,253	—	14,047	669,698
<i>Pinus elliottii</i>	n.a.	—	85,340(c)	290(e)	—	—	—	—	85,630
<i>Pinus pinaster</i>	n.a.	919	—	28,714	3,169	—	—	—	32,802
<i>Pinus caribaea</i>	n.a.	—	48,276	—	—	—	2,386	—	50,662
<i>Araucaria</i>	1,582	—	45,045	—	—	—	—	—	46,627
Other	14,269	3,158	7,062	631	368	334	1,801	514	28,137
Total	248,209	207,098	188,944	84,208	95,762	70,587	4,187	14,561	913,556
Broadleaved—									
<i>Eucalyptus</i> spp.	1,229	15,589	1,573(d)	13,491	1,340	21,965	—	—	55,187
<i>Populus</i> spp.	1,757	220	—	—	—	—	—	—	1,977
Other	38	39	200	—	—	2,696	—	—	2,973
Total	3,024	15,848	1,773	13,491	1,340	24,661	—	—	60,137
Total	251,233	222,946	190,717	97,699	97,102	95,248	4,187	14,561	973,693

(a) Native broadleaved plantations on public land are not identified separately from native forest areas. Other coniferous includes *pinus elliottii*, *P. pinaster*, *P. caribaea*. (b) Since 31 March 1986, plantations on aboriginal land have been transferred to private ownership and publicly owned plantations are no longer managed for wood production. (c) Includes APM resource, which is being liquidated. (d) Includes all hardwood species. (e) Includes *Pinus caribaea*.

Source: State and Territory forest services.

Australian Forestry Council

The Commonwealth Government and the State Governments formed the Australian Forestry Council in 1964 to coordinate the development of the nation's forest resource in the general interest of the community. Membership of the Council comprises the State and Northern Territory Ministers responsible for forestry and the Commonwealth Minister for Primary Industries and Energy. The New Zealand Minister for Forestry has observer status on Council. The Council is serviced by a Standing Committee and specialist subcommittees.

The Australian Forestry Council's current terms of reference are to:

- promote the management of Australian forests for the benefit of the people of Australia;
- advance the welfare and development of the industries based upon these forests;
- facilitate the exchange of information between parties interested in all the uses and the protection of the forests;
- facilitate consultation and coordination between the Commonwealth, State and Territory Governments on forestry matters, especially matters having interstate or national implications;
- formulate and recommend national forest policy for Australia;
- coordinate research into all aspects of forestry including the uses of forests and forest products; and
- consider matters submitted to the Council by its Standing Committee.

The Council's National Forests Strategy, which outlines important basic principles and goals associated with the management of Australia's forests as well as providing a framework for the general development of programs and ongoing administration, was tabled in Federal Parliament in November 1986.

Commonwealth Government Initiatives

The Government has indicated a commitment to securing the future of both the forests and the forests industry and to achieve this objective has taken a number of initiatives. In 1989 it established the *One Billion Trees* program, with funding of \$4 million, to help protect and enhance Australia's native tree and vegetation cover.

One Billion Trees

By the year 2000 the Government hopes to have a billion more trees around Australia planted and growing. This will entail:

- a Community Tree Planting Program to plant over 400 million trees; and
- a Natural Regeneration and Direct Seeding Program to establish over 600 million trees in open areas of Australia.

Greening Australia, a non-profit community organisation, administers the National Tree Program.

National Forests Inventory

In November 1988, the Prime Minister announced a series of new principles and processes to assist with a more harmonious resolution of the competing demands on Australia's natural resources. One of the Commonwealth Government's initiatives was the establishment of the National Forest Inventory (NFI).

The NFI is being compiled in the form of a geographic information system through the National Resource Information Centre by the NFI project team of the Bureau of Rural

Resources in Canberra. The project is being undertaken in full consultation with State and Territory Governments and will receive funding of \$2.9 million over the next three years.

The NFI will assist in informed decision making by:

- identifying and describing forest communities and their current conservation status; and
- providing the basic wood production resource information to enable the planning of efficient sustainable forest utilisation.

Research

Commonwealth Scientific and Industrial Research Organisation—CSIRO

CSIRO research on forests is mainly undertaken in the Division of Forestry and Forest Products which was formed on 1 January 1988, integrating research on land use and the production and processing of wood. The research is of two main types: longer-term strategic research that will help shape the future of the industry, and collaborative and contract research with individual companies and States.

The Division of Forestry and Forest Products is a constituent part of the Institute of Plant Production and Processing. The primary role of the Division is to conduct research and development in production forestry and forest products, taking full account of economic and environmental factors as an integral part of its work.

Objective

To benefit Australia by sustaining forests, improving yields and increasing the quality and value of forest products.

Strategy

The Division works closely with forest growers and forest-based industries in conducting research, primarily in Australia, to develop:

- improved tree-breeding, silviculture and forest management;
- improved techniques for the control of fire and biological damage to forests;
- increased profitability through efficient use of wood resources and technologies for new products and processes; and
- environmentally improved practices and processes.

The Division has its Headquarters at Clayton, Melbourne with research centres at Canberra, Hobart, Brisbane, Perth, Mount Gambier, Ridgely (Tasmania), Aspendale and Highett in Melbourne. Work is organised in six programs and is frequently undertaken in collaboration with State forest services, private companies or universities.

Australian Bureau of Agricultural and Resource Economics—ABARE

ABARE research is aimed at enhancing the efficiency of forest based industries through analysis of the institutional framework, policies and practices, and the evaluation of alternative arrangements.

Research findings are disseminated at the annual National Agricultural and Resources Outlook Conference and in the *Agricultural and Resources Quarterly*, Discussion Papers and Submission to Inquiries by, for example, the Industry Commission and the Resource Assessment Commission.

Education

The Australian National University and the University of Melbourne offer undergraduate courses leading to a Bachelor of Science degree in Forestry and a Bachelor of Forest

Science respectively. Both universities also offer postgraduate courses leading to Master and Doctor of Philosophy degrees. In addition, most States provide for sub-professional forestry training.

The Department of Primary Industries and Energy makes available postgraduate awards for full-time research, leading to the degree of Master and/or Ph.D at an Australian university. The Department also administers an award funded from a private bequest for postgraduate study at Oxford University for one year which is awarded every two to three years.

Timber and Timber Products

The selected details shown below have been compiled from the census of manufacturing establishments.

The woodchip export industry uses timber which is unsuitable for sawmilling and is not required by the Australian pulp, paper and reconstituted board industries. Before the advent of the woodchip export industry much of this material was left standing in the forest after logging, where it inhibited regeneration. After several cycles of selective logging since European settlement, many forests contained large volumes of over-mature and defective timber for which there was no market. The woodchip export industry, by making it economic to remove this poor quality timber, has enabled degraded forests to be regenerated into faster growing, more productive ones. Considerable quantities of sawmill waste material, which would otherwise be burnt, are also chipped for local pulpwood-using industries and for export.

MANUFACTURING ESTABLISHMENTS(a)—SUMMARY OF OPERATIONS, 1987-88

1983 ASIC(b) code	Industry description	Establish- ments at 30 June	Employment at 30 June(c)	Wages and salaries(d)	Turnover
		No.	'000	\$m	\$m
2531	Log sawmilling	604	11.3	201.3	820.0
2533	Veneers and manufactured boards of wood	72	5.3	125.7	763.1
2537	Hardwood wood chips	12	0.8	26.0	329.8

(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) Includes working proprietors. (d) Excludes the drawings of working proprietors.

TIMBER AND SELECTED TIMBER PRODUCTS(a)

Item	1985-86	1986-87	1987-88(b)	1988-89(b)
Undressed sawn timber—				
Recovered from sawn logs—				
Australian grown—				
Broadleaved	'000 cu m	n.a.	2,009	n.a.
Coniferous	"	n.a.	1,056	n.a.
Total	"	n.a.	3,065	n.a.
Woodchips (green weight)—				
Hardwood (broad leaved)	'000 tonnes	n.a.	5,287	n.a.
Plywood—				
Commercial — (surface measure)	'000 sq m	n.a.	6,706	n.a.
(1 mm basis)	"	n.a.	69,542	n.a.
Waterproof — (surface measure)	"	n.a.	1,171	n.a.
(1 mm basis)	"	n.a.	12,132	n.a.
Particle board (resin bonded)	'000 cu m	731	705	728
Wood pulp—				
Mechanical	"	361,356	373,789	414,297
Other	"	516,892	534,629	580,192
				597,160

For footnotes see end of table.

TIMBER AND SELECTED TIMBER PRODUCTS(a)—*continued*

Item		1985-86	1986-87	1987-88(b)	1988-89(b)
Paper—					
Newsprint	tonne	362,954	386,320	401,066	401,269
Printing	"	172,539	184,504	194,191	n.a.
Tissue and sanitary papers	"	125,592	133,402	n.p.	n.p.
Wrapping (incl. kraft)	"	338,220	362,439	n.p.	n.a.
Writing and duplicating(c)	"	82,495	77,756	72,588	n.a.
Other paper (incl. blotting)	"	40,886	65,067	n.p.	n.a.
Paperboard (incl. strawboard)	"	472,609	497,425	557,249	n.a.

(a) Excludes production of small single establishment enterprises with fewer than four persons employed and establishments engaged in non-manufacturing activities but which may carry on, in a minor way, some manufacturing. (b) Not available as figures not collected by census that year. (c) Includes cartridge.

FISHING

Source and basis of statistics

Statistics presented in this section are obtained from the Australian Bureau of Agricultural and Resource Economics (ABARE) and the Australian Fisheries Service, Department of Primary Industries and Energy. The Australian Bureau of Statistics (ABS) has reduced its involvement in the collection of fisheries statistics. The ABS no longer publishes statistics on the Australian fishing 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 animal.

Fisheries Resources and their Commercial Exploitation

Over 3,000 species of marine and freshwater fish occur in and around Australia and at least an equal number of crustacean and mollusc species. Despite this, less than 100 of these are commercially exploited. Australia's major commercially exploited species are prawns, rock lobster, abalone, tuna, other fin fish, scallops, oysters and pearls. Australian fishing operators concentrate their efforts on estuarine, coastal, pelagic (surface) species and demersal (bottom living) species that occur on the continental shelf.

Fin fish

For a detailed account of Australia's commercial exploitation of fin fish see *Year Book* No. 73.

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 largest prawn fishery, the northern prawn fishery, is located in northern Australia from Cape York (Queensland) to Cape Londonderry (Western Australia). 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. Deep water fisheries are developing off the north-west shelf for prawns, scampi and lobsters, and off Western Australia where prawns, scampi, lobsters, crabs, squid and fin fish are taken. 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. Tropical rock lobsters are taken in the Torres Strait fishery along with prawns and fin fish.

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, Victoria, and South Australia has proven successful. Production is planned to increase significantly and presently accounts for over 12 per cent of total oyster production. Following a serious decline in catches in the scallop (*Pecten meridionalis*) fishery based on stocks in Port Phillip Bay in Victoria, new offshore beds were located in southern New South Wales, eastern Victoria, northern Tasmania and south-west Western Australia. However, substantial fluctuations in abundance have resulted in erratic production from year to year. Fisheries based on the saucer scallop (*Amusium balloti*) are centred on Hervey Bay, Queensland and in Shark Bay, Western Australia. An important abalone (*Haliotis* spp.) fishery exists 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 Western Australia. Mussels (*Mytilus planulatus*) are harvested in Victoria, Western Australia and New South Wales. Small quantities of cephalopods, mainly squid, were produced in many localities. Feasibility fishing located promising squid resources (*Nototodarus 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 pearl oyster (*Pinctada maxima*) is harvested from various localities in the tropical waters of Australia between Broome in Western Australia and Cairns in Queensland. The oyster is used primarily for the production of cultured pearls, but some shell is used for mother-of-pearl production. Trochus shell is found mainly on coral reefs off the Queensland coast, in the Torres Strait and on the coasts and islands of north western Australia.

Aquaculture

Australia has enjoyed a relatively long history of success in the farming of the Sydney rock oyster. Pearl culture operations and goldfish farming are well established. The production of juveniles of several species of fin fish, molluscs and crustaceans has been undertaken for some years, initially for restocking wild populations and subsequently for grow-out operations. As in many other developed countries, there has been a surge of interest and investment in many types of aquatic farms over the last decade. Notable successes are the salmonid industry in Tasmania, consisting of about 25 farms, and commercial cultivation of the Pacific oyster, blue mussel and rainbow trout.

Developmental work is active in a number of areas such as barramundi, freshwater crayfish (yabbies and marron), prawns, mussels and algae. Research is continuing into the hatchery rearing of species such as abalone, scallops, giant clams, flat and pearl oysters.

Whales

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

Foreign fishing

Establishment of the 200 nautical mile AFZ in 1979 covering a total of 8.9 million square kilometres, brought portions of oceanic tuna stocks, and demersal and pelagic fish stocks previously exploited by foreign fishing vessels, under Australian control.

Australia has an international obligation under the Law of the Sea Convention, to allow foreign nations access to resources within the Australian Fishing Zone, that are surplus to domestic fisheries requirements and where such access does not conflict with Australian management and development objectives.

Licensed vessels from Japan, Thailand, Taiwan and Norway are currently permitted to operate in Australian waters either under bilateral agreements or joint venture arrangements with foreign Governments or fishing companies/organisations.

Foreign fishing operations by Taiwan and Thai interests in the demersal trawl fishery off the north and north-west coast take a wide range of tropical demersal fish species, including threadfin bream (*Nemipteridae*), tropical snappers (*Lutjanidae*), emperors (*Lethrinidae*), goatfish (*Mullidae*) and hair tails (*Trichuridae*). Following the introduction of controls on the length of gillnets which can be used, foreign pelagic gillnet operations have ceased. Japan is permitted, under agreement, to long line, principally for tunas, off certain areas of Australia. Four Norwegian freezer trawlers currently operate in deeper waters of the AFZ under joint venture arrangements with Australian companies.

In February 1990 the Governments of Australia and the Soviet Union signed a fisheries cooperation agreement which provides a framework with which feasibility fishing might take place under a subsidiary agreement. The agreement also establishes principles under which port access by Soviet trawlers for repairs, revictualling, refuelling and landing of catch might be authorised.

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 inland waters. These laws require the licensing of persons and boats in the commercial fisheries and provide a range of other regulatory powers.

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 external territories excluding the territorial sea of another country, and by foreign boats in the 200 nautical mile AFZ. The AFZ extends 200 nautical miles seaward of the territorial sea baseline of Australia and the external Territories but does not include waters adjacent to Australia's Antarctic Territory or waters exempted from the AFZ by proclamation under section 7A of the Act.

Australia has made maritime delimitation agreements with Indonesia, Papua New Guinea, the Solomon Islands and France. Australia has yet to make a marine delimitation with New Zealand. There are proclamations in force under section 7A of the Act for all overlappings of the AFZ with neighbours' exclusive fishing zones, whether or not Australia has made a delimitation agreement with the country concerned.

This Act requires the holding of licences and empowers the Minister to prohibit fishing activities as necessary for the conservation of resources and the management of the fisheries. The Fisheries Act authorises the publication of management plans having the force of law in relation to particular fisheries.

For a detailed account of the following Acts: *Continental Shelf (Living Natural Resources) Act 1968*; *Torres Strait Fisheries Act 1984*; *Foreign Fishing Boats Levy Act 1981*; *Fisheries Agreements (Payments) Act 1981* and *Fisheries Levy Act 1984* refer to *Year Book No. 73*.

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 Parliament and all State and Northern Territory Parliaments have enacted amendments to fishery laws for the purpose of implementing the fisheries elements of the Offshore Constitutional Settlement (OCS) 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.

OCS arrangements are now in force between the Commonwealth and the Northern Territory and all States except New South Wales. OCS arrangements simply rationalise jurisdiction and do not specify new rules for management of the fisheries concerned.

The administration of the fisheries is directed to a number of objectives. The two most important are conservation and management of the living resources of the AFZ 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 and to ensure the optimum utilisation of resources. These controls take the form of individual transferable catch quotas, seasonal and area closures, gear limitations, minimum size requirements and limited access rights as well as outright prohibitions on the taking of certain species.

Formal management arrangements have been implemented or are being developed for all Australian fisheries which are now under Commonwealth control. The aim is to conserve the resource while promoting development and improving the economic performance of the industry. Special emphasis is being placed on the development of Australia's under-utilised species and the discovery of new resources. The Government has encouraged the fishing industry to participate more fully in fisheries management. Extensive consultations between government officials, scientific agencies, industry associations and recreational fishermen have become strong features of the decision making process.

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 sustainable 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.

The Fisheries Development Trust Account (established under the *Fishing Industry Act 1956*) and the Fishing Industry Research and Development Trust Fund (established under the *Fishing Industry Research and Development Act 1987*) 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 funded by annual Commonwealth appropriation. The latter is a matching fund into which is paid each year an appropriation from Commonwealth Government Revenue. Total Commonwealth funds are linked to amounts collected from the fishing industry by the State Fisheries Authorities and paid into appropriate State research accounts for the same purpose.

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 Hobart, Tasmania, and regional laboratories in Western Australia and Queensland (fisheries science);
- (ii) CSIRO Division of Oceanography, which has its headquarters and laboratory at Hobart, Tasmania;
- (iii) CSIRO Division of Food Research, conducts research into handling, storage, processing and transportation of fish at its laboratory in Hobart, Tasmania;
- (iv) The Australian Fisheries Service, Department of Primary Industries and Energy, Canberra;
- (v) Bureau of Rural Resources, Department of Primary Industries and Energy, Canberra;
- (vi) Australian Bureau of Agricultural and Resource Economics, Department of Primary Industries and Energy, Canberra;
- (vii) State fisheries departments. Research vessels are operated by New South Wales, Victoria, Queensland, Western Australia, South Australia and Tasmania;
- (viii) Great Barrier Reef Marine Park Authority (GBRMPA) located in Townsville and Canberra;
- (ix) universities; and
- (x) private fishing companies (surveys of fisheries resources, research into handling, processing and marketing).

Boats and Equipment Used in Fisheries

Fish, crustaceans and molluscs

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, gillnet; *shark (edible)*—long-lines, gillnet; *Australian salmon*—beach seine; *snoek*—trolling lines; *flathead*—Danish seine, otter trawl; *snapper*—long-lines, traps, gillnet, handline; *morwong*—Danish seine, otter trawl, traps; *whiting*—handline, otter trawl, Danish seine, beach seine, gillnet; *garfish*—beach seine; *Spanish mackerel*—trolling lines; *tuna*—pole and live-bait, purse seine, trolling lines, longlines (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; *pilchards*, *anchovies*, *jack mackerel* and *stripped tuna*—purse seine; *pearl shell oysters*—diving; *squid*—jigging, otter trawl; *crabs*—traps, otter trawl; *barramundi*—gillnet; and *orange roughy*—otter trawl.

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 the Australian commercial fishing industry. As the value of materials used in the course of production is not available, 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 and subsequent years.

FISHERIES: GROSS VALUE OF PRODUCTION (\$ million)

Period	Value	Period	Value
1971-72	86	(a)1980-81	330
1972-73	93	(a)1981-82	344
1973-74	100	(a)1982-83	423
1974-75	100	(a)1983-84	449
1975-76	135	(a)1984-85	524
1976-77	194	(a)1985-86	635
1977-78	218	(a)1986-87	777
1978-79	265	(a)1987-88	954
1979-80	299	(a)1988-89	811

(a) Estimates provided by the Australian Bureau of Agricultural and Resource Economics and the Australian Fisheries Service.

NOTE: Figures exclude non-edible production, but may include the value of production of fishmeal and petfood.

SELECTED MAJOR FISHERIES CATEGORIES: GROSS VALUE (\$ million)

	1986-87	1987-88	1988-89
Prawns	216	246	170
Rock lobster	186	252	195
Tuna	37	41	48
Shark	15	20	20
Other fin fish(a)	122	137	124
Fish n.e.i.(b)	8	8	4
Abalone	84	96	87
Scallops	25	20	13
Oysters	31	38	43
Other(c)	53	96	107
Total	777	954	811

(a) For human consumption. (b) Not for human consumption. (c) Other aquaculture.

Processing of fish, crustaceans and molluscs

There is very little value added processing of fish products in Australia. Processing establishments vary in size, scope of operations and sophistication of technologies employed. The majority of establishments undertake only the most basic cleaning, filleting, packing and freezing processes, but others have the capacity for significant product transformation.

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-chilled to markets.

For more information on processing of fish refer to *Year Book* No. 73.

Marketing of fisheries' products

Exports of fisheries products comes under Commonwealth jurisdiction, while domestic market activity comes under that of the corresponding State or Territory.

Although a substantial proportion of the Australian salmon, and to a lesser extent tuna catches are canned, the greater part of Australian fish production is marketed fresh-chilled.

A high proportion of Australian seafood production is exported and domestic prices increasingly reflect the conditions on export markets. The Australian industry exports 40 per cent of total fish production, but depends on export markets for over 70 per cent of its revenue. The Australian fisheries export industry depends on a limited range of products sold on a few major markets, with Japan and the United States accounting for about 75 per cent of the value of our exports.

AUSTRALIAN EXPORTS OF FISH BY PRODUCT TYPE AND DESTINATION(a)

<i>Product and Destination</i>	<i>Unit</i>	<i>1984-1985</i>	<i>1985-1986</i>	<i>1986-1987</i>	<i>1987-1988</i>	<i>1988-1989p</i>
Value						
Whole	\$m	5.2	13.3	18.1	14.4	13.8
Japan	\$m	2.1	7.9	10.7	8.2	7.8
Taiwan	\$m	0.6	1.2	0.6	0.6	2.4
Saudi Arabia	\$m	0.7	1.0	0.7	0.6	0.4
Germany, FR	\$m	0.7	1.0	1.7	1.0	1.4
Thailand	\$m	0.1	1.0	1.7	0.9	0.5
Other	\$m	1.0	1.1	2.7	3.1	1.3
Fillets	\$m	1.1	1.6	11.8	14.8	17.2
Japan	\$m	0.8	1.1	3.3	5.3	6.3
United States	\$m	0	0.3	7.7	8.3	9.7
Other	\$m	0.3	0.2	0.8	1.2	1.2
Smoked, dried or salted	\$m	—	0.1	0.2	0.8	0.9
Canned	\$m	0.3	0.8	0.4	0.5	0.5
Other	\$m	0.4	0.5	2.6	2.8	1.4
Taiwan	\$m	0.1	0.3	0.5	1.3	0.2
New Zealand	\$m	0.1	0	0.3	0.3	0.2
Other	\$m	0.2	0.2	1.8	1.2	1.1
Total	\$m	7.0	16.2	32.8	33.2	33.8

(a) Excludes tuna.

Australian fisheries supply domestic markets with fresh and frozen table fish, but do not produce sufficient to meet demand. Over 60 per cent of seafood consumed in Australia is imported, mostly in the form of fresh, chilled or frozen fish. Prawns and canned fish also are significant imported items.

AUSTRALIAN IMPORTS OF FISH BY PRODUCT TYPE AND SOURCE

<i>Product and Source</i>	<i>Unit</i>	<i>1984-85</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>	<i>1988-89p</i>
Quantity(a)						
Fresh, chilled or frozen	kt	41.0	37.4	39.3	41.5	35.2
Whole	kt	14.1	12.3	14.1	13.2	19.2
New Zealand	kt	4.6	4.8	3.6	4.1	4.9
Fillets	kt	26.9	25.1	25.2	28.2	16.0
New Zealand	kt	7.9	6.9	3.8	3.3	3.9
South Africa	kt	7.6	8.2	10.0	0	0
Smoked dried or salted	kt	4.6	4.5	4.0	5.2	2.4
Smoked	kt	3.8	3.4	2.9	2.2	1.3
South Africa	kt	2.9	2.2	1.5	0	0
Dried or salted	kt	0.8	1.1	1.1	3.0	1.1
Canned	kt	15.4	15.6	17.2	16.1	21.2
United States	kt	5.0	4.4	3.4	2.9	2.7
Canada	kt	9.5	8.7	6.9	4.1	4.8
Other						
Fishballs, cakes and sausages	kt	2.2	2.2	1.8	1.5	2.0
Japan	kt	1.5	1.4	1.0	0.8	1.0
Other	kt	7.3	6.5	5.1	2.6	2.9
Value						
Fresh, chilled or frozen	\$m	111.1	118.8	132.7	124.7	95.2
Whole	\$m	20.3	20.4	26.1	26.4	35.7
New Zealand	\$m	10.0	12.7	10.1	13.1	14.3
Fillets	\$m	70.4	75.3	84.1	97.8	59.5
New Zealand	\$m	25.8	25.8	16.0	16.5	18.9
South Africa	\$m	15.9	18.3	26.1	0	0
Smoked, dried or salted	\$m	14.7	17.0	19.7	21.0	16.6
Smoked	\$m	11.7	12.4	14.1	14.7	10.8
South Africa	\$m	5.6	4.0	3.7	0	0
Dried or salted	\$m	14.7	17.0	19.7	21.0	16.6
Canned	\$m	64.3	74.6	90.4	86.0	119.4
United States	\$m	26.2	25.6	19.9	23.1	26.8
Canada	\$m	14.1	22.9	36.2	21.9	39.2
Other	\$m	24.1	27.2	27.2	18.8	20.4
Fishballs, cakes and sausages	\$m	5.6	7.1	7.6	5.9	6.7
Japan	\$m	4.6	5.2	5.0	3.7	3.9
Other	\$m	18.5	20.1	19.6	13.0	13.7
Total	\$m	193.9	214.5	248.1	263.0	265.3

(a) Product weight.

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