

CHAPTER 14

FORESTRY AND FISHERIES

FORESTRY

Forestry in the States and Territories

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

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

Commonwealth Forestry Administration

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

Existing Forest Estate

The total area of native forest, defined as land dominated by trees with an existing or potential mature height of twenty metres or more, including native stands of cypress pine in commercial use regardless of height, was estimated at 40.9 million hectares as at 30 June 1984. Thirty-five million hectares of the natural forests are dominated by eucalypts. For a more detailed examination of Australian native forests, see Yearbook No. 61, Chapter 24.

NATIVE FOREST AREAS CLASSIFIED BY FOREST TYPE, 30 JUNE 1984

('000 hectares)

| Forest type group | N.S.W. (a) | Vic. (b) | Qld | S.A. | W.A. (b) | Tas. (b) | N.T. | A.C.T. | Aust. |
|------------------------------------|---------------|--------------|---------------|----------|--------------|--------------|--------------|-----------|---------------|
| Rainforest | 253 | 13 | (c) 1,074 | - | - | 499 | 38 | - | 1,877 |
| Eucalypt | | | | | | | | | |
| Productivity Class I (d) | 1,220 | 630 | 204 | - | 187 | 502 | - | - | 2,743 |
| Class II (e) | 3,649 | 3,969 | 1,290 | - | 2,761 | 1,922 | - | 51 | 13,642 |
| Class III (f) | 8,320 | 293 | 3,140 | - | 18 | - | - | - | 11,771 |
| Tropical eucalypt and | | | | | | | | | |
| paperbark | - | - | 4,078 | - | - | - | 2,450 | - | 6,528 |
| Cypress pine | 1,908 | 6 | 1,685 | - | - | - | 778 | - | 4,377 |
| Total | 15,350 | 4,911 | 11,471 | - | 2,966 | 2,923 | 3,266 | 51 | 40,938 |

(a) Last revised 1972; rainforest areas revised 1981. (b) Revised. (c) Currently under revision. (d) Relatively high productivity. (e) Relatively low productivity. (f) Moderate productivity.

NATIVE FOREST AREAS CLASSIFIED BY OWNERSHIP, 30 JUNE 1984

('000 hectares)

| Ownership category | N.S.W. (a) | Vic. (b) | Qld | S.A. | W.A. (c) | Tas. (c) | N.T. (c) | A.C.T. (c) | Aust. |
|------------------------------|---------------|--------------|---------------|----------|--------------|--------------|--------------|------------|---------------|
| State forestry (d) | 2,866 | 1,916 | (e) 3,126 | - | 1,944 | 1,176 | 312 | - | 11,340 |
| Other public (f) | 6,208 | 1,536 | 5,672 | - | 346 | 703 | 207 | 4 | 14,676 |
| National parks (g) | 993 | (h) 853 | (e) 1,394 | - | 140 | 375 | 315 | 47 | 4,117 |
| Private (i) | 5,283 | 606 | 1,279 | - | 536 | 669 | 2,432 | - | 10,805 |
| Total | 15,350 | 4,911 | 11,471 | - | 2,966 | 2,923 | 3,266 | 51 | 40,938 |

(a) Last revised 1976. (b) As at 31 March 1980. (c) Revised. (d) Publicly owned land, permanently reserved or dedicated primarily for timber production. (e) Currently under revision. (f) Publicly owned land, vacant or occupied under lease, not specifically reserved for timber production, but on which control of timber rests with the Crown. (g) Publicly owned land, permanently reserved for purposes other than timber production. (h) Some wood production is allowed in some national parks in Victoria. (i) Privately owned land, and leasehold where the Crown has no control over timber rights.

Plantations

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

Privately owned plantations amount to almost one-third the area under State ownership. New plantations (including replanting) are currently being established at the rate of 33,000 hectares per annum. A detailed account of the history and development of coniferous plantations and of the characteristics of individual species is included in Yearbook No. 59, page 880. The following table shows total area of plantations in Australia classified by species.

PLANTATION AREAS(a), CLASSIFIED BY SPECIES, 31 MARCH 1984

(Hectares)

| Species group | N.S.W. | Vic. | Qld | S.A. | W.A. | Tas. | N.T. | A.C.T. | Aust. |
|------------------------------------|----------------|----------------|----------------|---------------|---------------|---------------|--------------|---------------|----------------|
| Coniferous— | | | | | | | | | |
| <i>Pinus radiata</i> | 187,271 | 177,254 | 3,557 | 76,361 | 42,120 | 59,279 | — | 13,182 | 559,024 |
| <i>Pinus eliottii</i> | 5,004 | — | 99,205 | — | 254 | — | — | — | 104,463 |
| <i>Pinus pinaster</i> | — | 1,468 | — | 3,572 | 26,687 | — | — | — | 31,727 |
| <i>Pinus caribaea</i> | 1,909 | — | 29,508 | — | — | — | 1,780 | — | 33,197 |
| <i>Araucaria</i> | 1,551 | — | 43,749 | — | — | — | 1 | — | 45,301 |
| Other coniferous | 6,119 | 2,855 | 5,706 | 389 | 259 | 374 | 2,545 | 758 | 19,005 |
| <i>Total coniferous</i> | 201,854 | 181,577 | 181,725 | 80,322 | 69,320 | 59,653 | 4,326 | 13,940 | 792,717 |
| Broadleaved— | | | | | | | | | |
| <i>Eucalyptus</i> | 6,618 | 13,430 | 2,788 | 1,193 | 8,698 | 8,345 | 2 | — | 41,074 |
| <i>Populus</i> | 2,086 | 304 | — | — | — | — | — | — | 2,390 |
| Other broadleaved | — | 102 | 501 | — | — | 1,212 | 1 | — | 1,816 |
| <i>Total broadleaved</i> | 8,704 | 13,836 | 3,289 | 1,193 | 8,698 | 9,557 | 3 | — | 45,280 |
| Total | 210,558 | 195,413 | 185,014 | 81,515 | 78,018 | 69,210 | 4,329 | 13,940 | 837,997 |

(a) Public and private ownership.

Australian Forestry Council

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

Research

Commonwealth Scientific and Industrial Research Organization (CSIRO)

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

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

Within the Institute of Industrial Technology, the Division of Chemical and Wood Technology carries out a wide range of investigations relating to the properties of wood, the processing and uses of wood and wood products. The research programs of the Division are directed towards developing ways whereby Australia's forest resources can be more effectively

utilised. The programs include processing of wood and timber, technology of fibre separation, wood and fibre properties, composite wood and paper products, assessment of cellulosic resources and conservation of wood-based materials. Technology for the production of high value chemicals from wood and other plant materials is also being investigated.

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

Education

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

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



Woodchopping remains one of the most popular attractions at Australia's rural and agricultural shows.

Australian Information Service

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, 1983-84

| 1983 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 | 635 | 10,700 | 617,800 | 362,200 | 10,900 |
| 2533 | Veneers and manufactured boards of wood | 75 | 4,600 | 442,700 | 165,000 | 16,300 |
| 2537 | Hardwood woodchips | 14 | 700 | 188,100 | 74,500 | 3,000 |

(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 | | 1981-82 | 1982-83 | 1983-84p |
|---|-------------|---------|---------|----------|
| Undressed sawn timber— | | | | |
| Recovered from sawn logs— | | | | |
| Australian grown— | | | | |
| Broadleaved | '000 cu m | 2,152 | 1,788 | 1,829 |
| Coniferous | " | 1,125 | 1,196 | 988 |
| Total | " | 3,276 | 2,984 | 2,817 |
| Woodchips (green weight)— | | | | |
| Hardwood (board leaved) | '000 tonnes | 3,943 | 4,031 | 4,551 |
| Plywood— | | | | |
| Commercial—(surface measure) | '000 sq m | 4,181 | 4,239 | 6,550 |
| (1 mm basis) | " | 39,109 | 37,750 | 48,119 |
| Waterproof—(surface measure) | " | 4,076 | 1,829 | 1,784 |
| (1 mm basis) | " | 47,980 | 18,938 | 19,646 |
| Particle board (resin bonded) | '000 cu m | 707 | 572 | 673 |
| Wood pulp— | | | | |
| Chemical | tonne | 181,097 | 155,675 | 147,578 |
| Mechanical | " | 487,498 | 470,207 | 445,776 |
| Other | " | | | |
| Paper— | | | | |
| Newsprint | tonne | 303,563 | 365,802 | 365,363 |
| Printings | " | 96,775 | 94,662 | 131,137 |
| Wrapping (incl. kraft) | " | 372,457 | 302,372 | 352,230 |
| Writing and duplicating (b) | " | 101,669 | 84,326 | 91,572 |
| Other paper (incl. blotting) | " | 25,001 | 38,456 | 32,246 |
| Tissue and sanitary papers | " | 110,570 | 114,249 | 114,340 |
| Paperboard (incl. strawboard) | " | 486,627 | 429,336 | 450,525 |

(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) Includes cartridge.

Woodchips

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

Timber and timber products

The major industries based on logging are sawmilling and the manufacture of ply, veneer, reconstituted board (particleboard, fibreboard), pulp and paper. The sawmilling industry is the largest single user of logs harvested from Australian forests (51 per cent), followed by the pulp and paper industry (45 per cent). Currently about 66 per cent of total volume of logs harvested are obtained from natural forests and the remainder mainly from coniferous plantations. This proportion will change over time so that towards the end of this century about half the supply of logs may be from coniferous plantations. Total removals at that time are estimated at 23 million cubic metres compared to current log removal of 15 million cubic metres.

The value of imports of forest products in 1983-84 was in the order of \$1,302 million while the value of exports of timber products was \$268 million of which \$191 million was for woodchips.

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

SAWN TIMBER AND MAJOR TIMBER PRODUCTS 1983-84

(Source: Forestry Economic Research Section, Bureau of Agricultural Economics and Australian Bureau of Statistics)

| Item | | Production (1) | Imports (2) | Exports (3) | Domestic Consumption (1 + 2 - 3) |
|--------------------------------|-------|-------------------|----------------|----------------|--|
| Sawn timber | cu m | 2,850,594 | 1,067,925 | 28,648 | 3,889,871 |
| Plywood | cu m | 82,448 | 70,315 | 101 | 152 662 |
| Railway sleepers | cu m | 174,388 | — | 10 895 | 163 493 |
| Particleboard | cu m | 645 403 | 2,743 | 7,193 | 640,953 |
| Hardboard | cu m | 90,324 | 2,193 | 4,942 | 87,575 |
| Newsprint | tonne | 378,091 | 193,520 | 3,748 | 567,863 |
| Printing and writing | tonne | 222,014 | 200,393 | 15,711 | 406,696 |
| Other paper | tonne | 480,603 | 195,921 | 32,553 | 643,971 |
| Paperboard | tonne | 439,768 | 43,342 | 5,384 | 477,726 |

In addition to the products listed above, exports for 1983-84 of pulpwood (virtually all in the form of woodchips) was 4,443,090 tonnes (green).

FISHERIES

Collection and presentation of fisheries statistics

Source and basis of statistics

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

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

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

Fisheries resources and their commercial exploitation

Fish

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

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

A large multispecies demersal fishery that targets on flathead (*Neoplatycephalus* and *Platycephalus* spp.), morwong (*Nemadactylus* spp.), redfish (*Centroberyx affinis*), gemfish (*Rexea solandri*) and blue grenadier (*Macruronus novaezelandiae*), exists off south-east Australia. Demersal inshore snapper (*Chrysophrys auratus*) fisheries exist off south-west and south-east Australia; in the latter region, stocks of whiting (*Sillaginidae*) are also fished. In the northern tropical region, reef fish such as cods (*Epinephelus* spp.) are exploited. A large demersal fishery for school and gummy sharks (*Galeorhinus australis* and *Mustelus antarcticus*, respectively) is centred in Bass Strait.

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

Crustaceans

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

Molluscs (edible)

Naturally-occurring oysters are harvested in all States; in New South Wales and Queensland the Sydney rock oyster (*Crassostrea commercialis*) is cultured commercially. The introduction of the Pacific oyster (*Crassostrea gigas*) to Tasmania and South Australia has provided a limited supply in those States. Following a serious decline in catches in the scallop (*Pecten meridionalis*) fishery based on stocks in Port Phillip Bay, Victoria, new offshore beds were located in southern New South Wales, eastern Victoria, northern Tasmania and south-western Western Australia. However, substantial fluctuations in abundance have resulted in erratic production from year to year. A fishery based on the saucer scallop (*Amusium balloti*) is located off south and central Queensland and there is a small fishery for the same species in Shark Bay, Western Australia. An important abalone (*Haliotis* spp.) fishery has been developed since 1964 in south-east Australia with Tasmania, Victoria and South Australia providing the bulk of the catch. There is also a small abalone fishery in south-west Australia. Mussels (*Mytilus planulatus*) are harvested in Victoria, Western Australia and New South Wales. Prior to 1978 small quantities of cephalopods, mainly squid, were produced in many localities. Feasibility fishing located promising squid resources (*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 shell of the Australian species of pearl oyster (*Pinctada maxima*) is taken from various localities in the tropical waters of Australia, between Broome in Western Australia and Cairns in Queensland, for the manufacture of buttons, knife handles, etc. Live pearl shell is used for pearl culture, *Pinctada maxima* being capable of producing pearls which are the largest in the world and which command top market prices. Trochus shell is found mainly on coral reefs off the Queensland coast, although small quantities occur in Western Australia.

Whales

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

Fisheries administration and research

The Commonwealth Parliament has enacted a number of laws dealing with fisheries in Australian waters beyond territorial limits. The fisheries laws of the States and the Northern Territory apply to all kinds of fishing within the territorial sea and in inland waters. These laws require the licensing of persons and boats in the commercial fisheries and provide a range of other regulatory powers. The Commonwealth Government laws relating to fishing are the *Fisheries Act 1952*, the *Continental Shelf (Living Natural Resources) Act 1968*, the *Foreign Fishing Boats Levy Act 1981*, the *Fisheries Agreements (Payments) Act 1981*, the *Fisheries Levy Act 1984* and the *Torres Strait Fisheries Act 1984*.

Fisheries Act 1952

This Act applies to commercial fishing for swimming species, by Australians in waters extending from 3 to 200 nautical miles seaward of the territorial sea baseline of Australia and the external territories excluding the territorial sea of another country, and by foreign boats in the 200 nautical miles Australian Fishing Zone. The Australian Fishing Zone comprises waters which extend 200 nautical miles seaward of Australia's territorial sea baselines but does not include territorial seas within the accepted fishing zones of adjacent countries or waters adjacent to Australia's Antarctic Territory.

Continental Shelf (Living Natural Resources) Act 1968

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

Torres Strait Fisheries Act 1984

This Act gives effect in Australian law to the fisheries elements of the Torres Strait Treaty. The Act applies in the area of Australian jurisdiction in the Torres Strait Protected Zone and areas outside but near that zone proclaimed in respect of particular fisheries which Australia and Papua New Guinea have agreed to manage jointly under the Treaty, or which are referred to in the Treaty.

These three Acts require the holding of licences and empower the Minister to prohibit fishing activities as necessary for the conservation of resources and the management of the fisheries. The *Fisheries Act 1952* authorises the publication of management plans having the force of law in relation to particular fisheries.

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

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

Fisheries Levy Act 1984

This Act imposes a levy on prescribed classes of licences under the *Fisheries Act 1952* or the *Torres Strait Fisheries Act 1984* or on units of fishing capacity created by management plans under the first of those Acts.

Administration

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

The Commonwealth and all State Parliaments, as well as the Northern Territory House of Assembly, have enacted amendments to fishery laws for the purpose of implementing the fisheries elements of the offshore constitutional settlement adopted by the Premiers' Conference in 1979. Those amendments, which came into force on 14 February 1983, authorise the Commonwealth and one or more States to enter into a formal legal arrangement to apply a

single law (Commonwealth or State) to the management of a particular fishery from low water mark and to vest executive power under that law in:

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

The administration of the fisheries is directed to a number of objectives. The two most important are conservation and management of the living resources of the Australian Fishing Zone to ensure that they are not endangered by over exploitation; and achievement of the optimum utilisation of the living resources by the Australian fishing industry and foreign interests. Consistent with these objectives a number of controls have been introduced to prevent the depletion of the more heavily fished species 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.

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

Research

The main aim of fisheries research in Australia is to provide a background of biological, technical and economic information which will provide guidance for the efficient and rational utilisation of fisheries resources. To this end much of the research already undertaken has been directed at formulating recommendations for management of various fisheries. Research work, including feasibility fishing projects involving foreign fishing vessels, is also carried out and is expected to lead to the development of new fisheries, the expansion of under-exploited fisheries, greater economy in operations and the use of more efficient equipment and methods.

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

- (i) CSIRO Division of Fisheries Research, which has its headquarters and main laboratory at Hobart, Tas., and regional laboratories in Western Australia and Queensland (fisheries science);
- (ii) CSIRO Division of Oceanography, which has its headquarters and laboratory at Hobart, Tas.;
- (iii) CSIRO Division of Food Research, conducts research into handling, storage, processing and transportation of fish at its laboratory in Hobart, Tasmania;
- (iv) State fisheries departments (fisheries laboratories have been established in Sydney, Melbourne, Brisbane, Perth, Hobart, Darwin and Cairns); research vessels are operated by New South Wales, Victoria, Queensland, Western Australia, South Australia and Tasmania;
- (v) Australian Fisheries Service, Department of Primary Industry, Canberra (economic and management research, fishing technology, extension and education service);
- (vi) Bureau of Agricultural Economics, Canberra (economic and marketing research); and
- (vii) 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, handline; *morwong*, Danish seine, otter trawl, traps; *whiting*, handline, otter trawl, Danish seine, beach seine, gill-net; *garfish*, beach seine; *Spanish mackerel*, trolling lines; *tuna*, pole and live-bait, purse seine, trolling lines (lampara nets and purse seines are used for taking live bait for tuna); *prawns*, otter trawl, beam trawl, beach seine net; *rock lobster*, pots, traps; *scallops*, dredge, otter trawl; *abalone*, diving using hookah gear; and *pilchards*, *anchovies*, *jack mackerel* and *stripped tuna*, purse seine.

Pearls, pearl shell and trochus shell

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

Production, processing and domestic marketing of fisheries products

Value of fisheries production

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

Australian totals are not available beyond 1980-81, due to estimates for Queensland not being available.

FISHERIES: GROSS VALUE OF PRODUCTION

(\$'000)

| Year | N.S.W. | Vic. | Qld | S.A. | W.A. | Tas. | N.T. | Aust. |
|-------------|--------|--------|--------------|-----------|---------|--------|--------|---------------|
| GROSS VALUE | | | | | | | | |
| 1977-78 | 39,665 | 17,997 | (a)40,808 | (b)23,615 | 88,340 | 12,609 | 10,337 | (c)233,351 |
| 1978-79 | 42,698 | 20,025 | 58,214 | (b)29,924 | 80,233 | 14,636 | 19,576 | (c)(d)279,258 |
| 1979-80 | 58,661 | 27,696 | (e)62,789 | (b)35,438 | 85,652 | 20,463 | 16,806 | (c)(d)325,632 |
| 1980-81 | 73,048 | 33,440 | (e)(f)86,292 | (b)46,606 | 82,764 | 26,514 | 19,518 | (c)(d)386,533 |
| 1981-82 | 74,983 | 30,525 | n.a. | 52,062 | 99,254 | 32,896 | 18,392 | n.a. |
| 1982-83 | 73,896 | 31,022 | n.a. | 61,234 | 126,208 | 31,140 | 19,286 | n.a. |
| 1983-84 | 73,235 | 34,060 | n.a. | 58,863 | 141,425 | 39,133 | 20,659 | n.a. |

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

Production of selected fisheries

SELECTED FISHERIES PRODUCTS: PRODUCTION AND GROSS VALUE

1983-84

| Product | N.S.W. | Vic. | Qld | S.A. | W.A. | Tas. | N.T. | Aust. |
|----------------------|--------|--------|------|--------|---------|--------|--------|-------|
| QUANTITY (tonnes)(a) | | | | | | | | |
| Fish | 22,414 | 14,465 | n.a. | 16,800 | 17,667 | 1,390 | 1,564 | n.a. |
| Crustaceans | 3,492 | 637 | n.a. | 5,330 | 14,204 | 1,807 | 2,548 | n.a. |
| Molluscs (edible) | 8,477 | 17,258 | n.a. | 1,863 | 4,235 | 14,158 | 112 | n.a. |
| GROSS VALUE (\$'000) | | | | | | | | |
| Fish | 28,079 | 12,886 | n.a. | 18,980 | 13,412 | 2,742 | 2,584 | n.a. |
| Crustaceans | 21,810 | 4,381 | n.a. | 34,742 | 118,676 | 12,859 | 17,896 | n.a. |
| Molluscs (edible) | 23,345 | 16,793 | n.a. | 5,142 | 9,337 | 23,532 | 179 | n.a. |

(a) Estimated live weight.

Pearls, pearl shell and trochus shell**PEARL CULTURE AND PEARL AND TROCHUS SHELL FISHING OPERATIONS(a)**

(Source: Department of Primary Industry)

| | | 1981 | 1982 | 1983 |
|---|----------|---------|---------|---------|
| QUANTITY | | | | |
| Pearl and Trochus shell fishing operations— | | | | |
| Production of— | | | | |
| Pearl shell(b) | tonne | 143.0 | 135.0 | 77.0 |
| Trochus shell | tonne | n.p. | n.p. | n.p. |
| Pearl culture operations— | | | | |
| Live shell introduced | No. | 435,184 | 350,968 | 393,586 |
| | tonne | 174.0 | 192.0 | 171.2 |
| Production— | | | | |
| Round and baroque pearls | No. | 68,422 | 67,075 | 111,035 |
| | momme(c) | 50,912 | 49,305 | 74,532 |
| Half pearls | No. | 134,414 | 191,357 | 166,754 |
| Manufacturing shell | tonne | 56.0 | 42.0 | 41.9 |
| VALUE (\$'000) | | | | |
| Pearl and Trochus shell fishing operations— | | | | |
| Production of— | | | | |
| Live pearl shell | | 1,513 | 2,783 | 2,478 |
| Pearl shell | | 301 | 489 | 229 |
| Trochus shell | | n.p. | n.p. | n.p. |
| Pearl culture operations— | | | | |
| Production of— | | | | |
| Round and baroque pearls | | 15,404 | 10,555 | 12,333 |
| Half pearls | | 914 | 1,332 | 1,090 |
| Manufacturing shell | | 115 | 91 | 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 northern Australia to service the northern prawn fishery.

Rock lobsters, prawns, abalone, tuna, scallops and some fin fish 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. An increasing range of fish products, including fresh-chilled tuna, live rock lobster, abalone and sea urchin roe, are being air-freighted to export markets, particularly Japan.

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.

Domestic marketing of fisheries' products

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

Marketing arrangements for fresh fish vary. In New South Wales, fish marketing is the responsibility of the Fish Marketing Authority which operates the Metropolitan Fish Markets. In other coastal centres of New South Wales, fishermen's co-operatives may become registered as local fish markets. In Queensland until recently the Fish Board sold all production on behalf of fishermen in that State, except fish intended for export and interstate trade. However, new legislation was passed in March 1982 giving fishermen a choice of selling their catch either through the Fish Board, Fishermens' co-operatives or licensed private processors and wholesalers. In Victoria, Western Australia, South Australia and Tasmania, there is no restriction on market outlets. In Victoria, Western Australia and South 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.

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Australian Forest Resources

Timber Supply Review

IN RETROSPECT.....Year Book No 19 (1926)

1. Evolution of Scientific Forestry.—(i) In Other Lands. (a) General. It was by slow degrees only that the countries of the old world developed their forestry systems. Originally tribal common lands for feeding pigs, and hunting country open to all, the forests gradually became preserves of royal houses or of the aristocracy, the people generally being granted merely the right of pasturage. Step by step, as the value of the forests became better known, their use for the production of timber was emphasized, and usages, servitudes, and rights of entry which were opposed to the forestry interests were extinguished. Forestry is the scientific management of forests with a view to the highest sustained yield of timber and various other products.
