Chapter 17

FORESTRY

		Page No.
17.1	**Forests, Timbers and Plantations**	253
17.1.1	Forests	253
17.1.2	Timbers	253
17.1.3	Plantations	255
17.2	**Ownership and Control**	255
17.2.1	Timber Concession and Reserve Areas	256
17.3	**Forest Utilisation**	256
17.3.1	Woodpulp and Paper	256
17.3.2	Woodchips	256
17.3.3	Timber	257
17.3.4	Energy	258
17.4	**Timber Using Industries**	258
17.4.1	Paper and Particle Board	258
17.4.2	Newsprint	258
17.4.3	Woodchips	259
17.5	**Forest Management and Research**	259
17.5.1	The State Forestry Commission	259
17.5.2	CSIRO Forest Research	260
17.6	**References**	260

Chapter 17

FORESTRY

Tasmania is unique amongst Australian States in its concentration of forest resources. No other State has similar widespread conditions conducive to forest growth: a cool temperate climate and a reliable rainfall varying locally from 500 to 3 800 millimetres with relatively small seasonal variation. Although land clearing, timber exploitation and fires have left their mark, the Forestry Commission estimates that the current total forest area (including some forest of little or no commercial value) is 2 988 400 hectares or about 44 per cent of the State's total area.

17.1 FORESTS, TIMBERS AND PLANTATIONS

17.1.1 Forests

Three main vegetation types, dry sclerophyll, wet sclerophyll and mixed forest form the productive, commercially harvested native forest estate.

Dry sclerophyll forests occur where rainfall is between 500 and 1200 mm per year. One or two eucalypt species usually dominate the canopy; for example gum top stringybark or white top stringybark (*Eucalyptus delegatensis*), and white gum (*E.viminalis*) with an understory of small trees and shrubs. This forest type is commercially important in the central north and east coast regions.

Wet sclerophyll forests occur where rainfall is 1000 to 1300 mm per year, in the north east, north west and south of the State. The main canopy species include gum top stringybark, brown top stringybark (*E.obliqua*) and stringy gum or swamp gum (*E.regnans*), with a dense understory of small trees, shrubs and ferns.

Mixed forests consist of a tall eucalypt canopy with an understory of rainforest species including myrtle, sassafras, leatherwood and celery top pine. These forests occur where rainfall is more than 1200 mm per year, concentrated in wetter, more fertile areas in the west and south, with scattered pockets in the north east.

In areas of high rainfall, of about 1500 mm or more, with relatively low fire frequency, and suitable soils, temperate rainforests are found. These are characterised by the dominance of myrtle (*Nothofagus cunninghamii*), sassafras (*Atherosperma moschatum*) and leatherwood (*Eucryphia lucida*). No timber harvesting operations occur in stands of pure rainforest. Blackwood (*Acacia melanoxylon*) grows where rainforest has been disturbed in the past, principally by fires, in the north-west around Smithton.

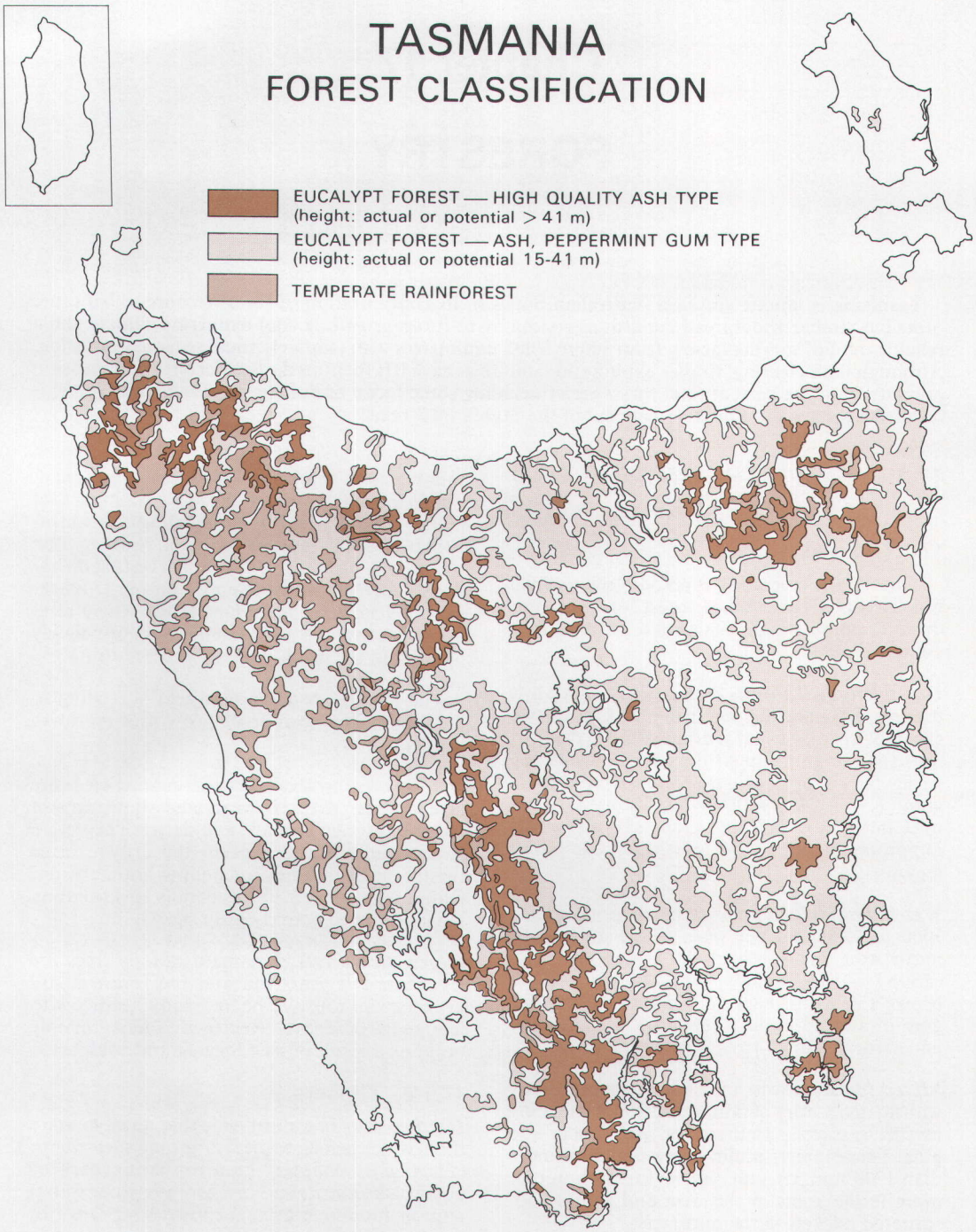
The forests are often classified according to their ages. They can be oldgrowth or regrowth forests.

Oldgrowth Forests: The main canopy trees are usually older than 110 years and show signs of old age through damage and decay. They often have hollow butts, gaps in the crown, large twisted or dead limbs, or hollow branch stubs. Oldgrowth forests are generally overmature, having stopped actively growing.

Regrowth Forests: The main canopy trees are less than 110 years old and the forest is still growing vigorously. The trees look healthy with few signs of decay. Regrowth forests mainly occur as a result of past logging and wildfires.

17.1.2 Timbers

Hardwoods: The most valuable eucalypts are those which belong to the 'ash' group, stringybark (*Eucalyptus obliqua*), gum top stringybark or alpine ash (*Eucalyptus delegatensis*) and swamp gum or mountain ash (*Eucalyptus regnans*). In the south and south-east Tasmanian blue gum (*Eucalyptus globulus*) occurs in high quality forests. In areas where the annual rainfall is


TASMANIA
FOREST CLASSIFICATION
EUCALYPT FOREST — HIGH QUALITY ASH TYPE
(height: actual or potential > 41 m)
EUCALYPT FOREST — ASH, PEPPERMINT GUM TYPE
(height: actual or potential 15-41 m)
TEMPERATE RAINFOREST

below 760 mm the more important eucalypts are black peppermint (*Eucalyptus amygdalina*), swamp or black gum (*Eucalyptus orata*), white gum (*Eucalyptus viminalis*), stringybark (*Eucalyptus obliqua*) and white peppermint (*Eucalyptus linearis*).

Tasmania has 11 tree types that are suitable for use as pulpwood, of which ten are eucalypts. The other is myrtle, a rainforest hardwood available in the north-west of the island. The eucalypts are graded by quality:

- First quality ('ashes'); stringybark, gum top stringybark, swamp gum and ironbark.
- Second quality ('gums'); white gum, blue gum and swamp or black gum.
- Third quality ('peppermints'); black peppermint, white peppermint and silver peppermint.

The gum top stringybark and stringybark account for over 60 per cent of all eucalypt logs cut for woodchipping.

Softwoods: Although Tasmania's native forests produce some very valuable softwood timber, these are very slow growing and in short supply. They include King Billy pine, Huon pine and celery top pine. For this and other reasons, attention has been given to building up another section of the total forest estate — plantations of exotic species, particularly *Pinus radiata*.

17.1.3 Plantations

Fast-grown softwood plantations have been established in State forest initially to fill an expected sawlog scarcity. In addition, these softwood plantations yield a long-fibred pulp which is a requirement of paper production. Softwood plantations cover less than 2.4 per cent of State forest area and radiata pine (*Pinus radiata*) is the principal species planted. An increasing area of native hardwood plantations has been established in recent years.

There have been two stages in the establishment of the State's softwood plantations. The first involved planting on derelict farmland which had reverted to scrub and bracken following early agricultural practices. Undertaken during the period between 1935 and 1960, its goal was to produce sawlogs in the shortest possible time to bridge an anticipated shortfall in hardwood sawlog availability in the 1980s and 1990s.

The second stage began in 1961. The continuing demand for long-fibre conifer pulpwood, to serve an expanding pulp and paper industry, saw the extension of planting into areas of low quality native forest. Radiata pine plantations now provide a large part of Australian-grown wood supplies. Large scale establishment of these plantations was commenced by State Governments early this century. In the 11 year

Logging operations in a pine plantation

period covered by the *Federal Softwood Forestry Agreement Acts* 1967, 1972 and 1976, the Commonwealth provided financial assistance to the State for an extended program of softwood plantation development. An extension to the Act in 1978 provided funds for maintenance of the plantations already established for another five years.

In 1985 Tasmanian State forest plantations comprised 36 991 hectares of softwoods and 2 484 hectares of hardwoods. Most softwood plantations are in the Fingal, Scottsdale, Devonport and Burnie districts, while hardwoods are distributed more widely.

17.2 OWNERSHIP AND CONTROL

Of the total forest area of 2 988 400 hectares, 40 per cent is in State Forest, 23 per cent is privately owned, 22 per cent is Crown Land and 13 per cent is in Crown reserves. The need for permanent reservation of land for timber production was first given statutory recognition with the *Waste Lands Act* 1881. A program of acquisition of land suitable for dedication as State forest has seen the gazetted area reach 1 555 890 hectares at 30 June, 1985.

17.1 Tenure of Forest Area ('000 ha)

Tenure	*High quality eucalypt*	*Low quality eucalypt*	*Rain forest*	*Plantations*
State forest	357.7	637.8	168.1	43.2
Forest reserves	3.7	6.9	1.2	—
Crown land	78.3	365.0	199.5	—
Crown reserves	26.8	248.5	100.4	—
HEC	8.8	47.0	4.2	—
Private property	26.3	617.2	25.3	22.5
Total	501.6	1 922.4	498.7	65.7

State forests: Tenure by the Forestry Commission under the *Forestry Act*, 1920.

Forest reserves: Areas provided for recreational, scientific, environmental and aesthetic purposes established within State forests.

Crown land: Unallocated land with tenure by the Lands Department; wood production and sale controlled by the Forestry Commission.

Crown reserves: Principally National Parks and State Reserves administered under the *National Parks and Wildlife Act* 1970.

HEC: Land vested in the Hydro-Electric Commission.

17.2.1 Timber Concession and Reserve Areas

The establishment in Tasmania of various industries using forest resources has given rise to the need for some guarantee of assured timber supplies to those industries. Therefore, certain concessions and cutting rights on Crown lands have been awarded to companies relying on forest products as their raw matrials. Cutting rights apply only to Crown land and State forest within the concession boundaries. Concession areas are those areas where a company is at present allowed to operate while reserve areas are set aside for future use. Providing that the company meets certain stipulated conditions, permission to remove timber from the reserve area may be granted by the Forestry Commission.

17.3 FOREST UTILISATION

While sawmilling of native forest timbers had become a major part of Tasmanian industry by the mid nineteenth century, in recent years pulpwood for the manufacture of papers, and woodchips for export have become equally important forest based industries in terms of the volume of timber processed.

Establishment of the woodchip export industry and the expansion of other timber-using industries has resulted in greatly increased annual timber requirements necessitating careful utilisation of existing forest resources and the development of viable reforestation schemes. Integrated forest operations seek to maximise use of the forest resource by allocating the best logs as sawlogs, a lower grade as optional sawlogs and the remaining merchantable logs as pulpwood or woodchip timber. This strategy facilitates regeneration of the forest as most of the standing trees are removed through clear-felling, decreasing competition for existing nutrients and light.

17.3.1 Woodpulp and Paper

The manufacture in Tasmania of fine writing and printing papers commenced at Burnie in 1938 following technological developments allowing hardwood fibre to be used as a prime resource. In 1941 the first newsprint mill in Australia was established at Boyer on the Derwent. A further pulp and paper mill commenced operation at Wesley Vale near Devonport in 1970 producing magazine and directory grade papers. During the past fifteen years pulpwood produced for local processing into paper has shown only a gradual increase, in contrast to the doubling of the quantity of woodchips produced. Whereas in 1972–73 woodchips and pulp locally processed was 36.2 per cent of total production, in 1984–85 it had fallen to 24.7 per cent.

17.2 Chipped, Ground and Flaked Wood Locally Processed

Year	*Tonnes (green weight)*
1972–73	793 700
1974–75	785 600
1976–77	832 000
1978–79	781 200
1980–81	1 073 600
1982–83	875 000
1984–85	900 300

17.3.2 Woodchips

Tasmanian forests have been supplying woodchips for export under licence (mainly to Japan) since 1971. In 1972–73, 1.4 million tonnes of chips were exported. By 1984–85 it was being reported that 20 000 hectares of native forest were being clear-felled annually to export about 2.7 million tonnes of woodchips.

17.3 Woodchips Exported, Tasmania

Year	*Tonnes (green weight)*
1972–73	1 397 200
1974–75	2 161 300
1976–77	2 041 100
1978–79	2 196 600
1980–81	2 354 100
1982–83	2 293 300
1984–85	2 750 400

Three companies currently hold export licences, APPM, its subsidiary Tasmanian Pulp and Forest Holdings and Forest Resources, and each were due for review by 1988.

Before renewing woodchip export licences, the Commonwealth Government required licence applicants to prepare an environmental impact statement.

This major document, the Environmental Impact Statement on Tasmanian Woodchip Exports beyond 1988, was commenced in early 1984 and was completed in June 1985 by the EIS Study Group that consisted of representatives from APPM, Forest Resources and the Forestry Commission. After a two month period of public review the final report was prepared in the form of a Supplement to the draft document. The Commonwealth Minister for Primary Industry made the final decision on the licence renewals and their conditions in December 1985 following an intensive lobbying campaign by the woodchip companies, and their critics in the conservation movement.

The Commonwealth Government granted 15 year licences to the woodchip export companies from 1988. The licence renewals have been granted with conditions that strict environmental standards must be followed and that yearly reports be prepared on activities and compliance with export licence conditions.

17.4 Material Used in Chipping, Grinding and Flaking of Wood ('000)

Year	*Logs*	*Sawmill offcuts*
1972–73	2 133.7	224.1
1974–75	2 866.3	246.4
1976–77	2 913.2	248.2
1978–79	2 935.2	263.5
1980–81	3 369.8	308.8
1982–83	3 182.0	212.3
1984–85	3 594.7	266.7

17.3.3 Timber

Sawmilling is Tasmania's oldest industry. Shortly after the colony was established in 1803, Government sawpits were in operation in Hobart. The first water powered sawmill was constructed in 1824 and by 1838 the colony was exporting around 900 m^3 (roughly 300 000 super feet) of timber annually. The first steam powered mill was established in 1844 and 22 mills were in operation by 1859.

Expansion in the industry was slow until the 1890s when amendments to the *Crown Lands Act* sparked a rapid expansion, which continued until the mid 1920s. The depression seriously affected both employment and production, with output in 1931–32 falling to 32 per cent of what it had been in 1923–24.

From the mid 1930s to the 1970s the industry continued to expand, until 1974–75, the total log usage for sawing, peeling and slicing had reached over 1 million cubic metres. This was seen as too high. To prevent the possible eventual collapse of the industry the Forestry Commission introduced reductions in the volume of sawlogs that millers could obtain from Crown forests. The first reduction of 20 per cent took place in 1977.

The reduced volume of hardwood milled was offset to some extent by a trebling in usage of

The Woodchip Export Debate

The renewal of woodchip export licences negotiated during 1985 saw a spirited debate between advocates of the industry as it has developed over the past 15 years and its critics. A substantial Environmental Impact Statement was prepared on behalf of a consortium of woodchip exporting companies and the State Forestry Commission. Public comment was invited by the Commonwealth Government, which has constitutional power to regulate international exports.

Issues canvassed in favour of the woodchip industry primarily concerned the economic value, both in terms of export earnings and in benefits dispersed widely through rural employment and payments to landowners. The loss of 5 000 jobs and $120 million in export revenue to Tasmania was predicted in the event of export licences not being renewed. The regenerative function of integrated forest harvesting was also seen as beneficial in improving the growing stock of forest, compared to previously harvested areas which had not been efficiently regenerated after timber-getting, burning or land clearing. It was also argued that better access to sawlogs would also be facilitated by integrated logging.

Opponents of the woodchip licence renewal canvassed issues concerned with economic and environmental impact effects of the industry and, more broadly, the desirability of the scale of harvesting at recent levels. Economic concerns included imputed subsidies to the industry, especially in terms of transport facilities and the costs of effective regeneration; the relationship of woodchipping to other segments of the forest based industries; and the loss of opportunity for further local industry, either in processing of woodchips into pulp or paper products or less directly through competition with the tourism and related industries. Concern was also expressed about the future competitiveness of domestic pulpwood production in view of very significant pulpwood productivity increases attained overseas. Environmental objections to the industry included inadequacy of detailed knowledge of threatened habitats and of some specific forest types and areas. The industry was also seen as potentially detrimental to the State's renowned scenic attractiveness.

17.5 Logs Used in Sawmilling and Plywood ('000 m³)

Year	*Hardwood*	*Softwood*
1972–73	1 068.7	28.3
1974–75	1 023.1	48.2
1976–77	894.8	91.7
1978–79	789.0	73.8
1980–81	807.1	185.1
1982–83	503.2	167.9
1984–85	631.4	212.9

plantation softwood logs. As well, since 1980 the volume of eucalypt used has fallen while that of blackwood, myrtle and sassafras from rain forests has increased.

17.3.4 The Forest as an Energy Source

Forests are becoming an increasingly important energy source in Tasmania. An Australian Bureau of Statistics survey in June 1985 revealed that an estimated 78 500 Tasmanian households (52 per cent of all homes) used solid fuel as their principal means of home heating. This was 19 000 more households using fuel than in 1983 when approximately 31 000 m³ of fuel wood was sold from Crown land and more than half a million cubic metres from private land.

Apart from this traditional use of forests as an energy source for home heating, steadily rising energy costs have led to many investigations into the possible use of forest residues to provide energy for industrial applications. A number of manufacturing companies have installed wood/coal burners to replace oil fired furnaces for steam generation, and investigations into the potential of wood gasification as an oil substitute are now underway.

17.4 TIMBER USING INDUSTRIES

17.4.1 Paper and Particle Board

Associated Pulp and Paper Mills, a division of North Broken Hill Ltd. manufactures paper at Burnie and particle board and paper at Wesley Vale. The Company owns 128 000 hectares of forested land and holds cutting rights over Crown land for 24 kilometres on each side of the Emu Bay railway line from the north coast to the Pieman River.

In 1970 the Company completed the first stage of its pulp and paper mill at Wesley Vale. The first paper machine installed has an annual capacity of 41 000 tonnes of magazine paper and provision has been made for the installation of three additional machines. However, expansion at Wesley Vale has been deferred due to economic conditions and the difficulty of financing the very high capital cost of the project at present. An alternative expansion project at the Burnie mill to produce bleached, softwood pulp from Company and Forestry Commission softwood plantations has been completed and in 1983 a $35 million boiler project was completed. A coating machine also operates at Wesley Vale with clay mined from the Company's clay mine at Tongannah.

17.4.2 Newsprint

Australian Newsprint Mills Limited at Boyer is one of two mills producing newsprint in Australia. Boyer is 35 kilometres from Hobart on the Derwent River.

The Boyer mill's main timber supply is drawn from the Company's forest concession which is in the upper Derwent Valley, west of the Derwent River, and extending from the Snowy Range in the south, north to Lake King William. The *Florentine Valley Paper Industry Act*, as amended, provides for a concession of 160 000 hectares, from which wood is harvested for use in the manufacture of newsprint, chemical pulpwood and in sawmill and veneer mills. The Company is responsible for all forest management activities and maintains high environmental standards in the Concession.

The Boyer mill and associated forestry activities employ over 1 500 people and transports products throughout Tasmania and the mainland. Newsprint production from the three paper

17.6 Logs Used and Timber Produced

Year	*Logs Used*					*Timber Produced*				
	Hardwoods		*Softwoods*		*Total*	*Hardwoods*		*Softwoods*		*Total*
	Eucalypts	*Rain forest*	*Plan-tation*	*Natives*		*Eucalypts*	*Rain forest*	*Plan-tation*	*Natives*	
1978–79	775.2	13.8	65.3	8.5	862.8	285.1	4.2	28.3	3.0	320.6
1979–80	768.0	12.9	150.5	10.9	942.3	283.3	4.4	63.9	3.6	355.2
1980–81	780.7	26.4	178.9	6.2	992.2	289.4	8.9	73.2	2.4	373.9
1981–82	655.6	28.5	169.0	9.6	862.6	246.4	9.1	68.3	3.4	327.2
1982–83	475.6	27.6	161.2	6.7	671.1	175.0	8.1	62.6	2.3	248.1
1983–84	585.3	20.2	167.7	5.3	778.5	219.4	6.1	62.8	1.9	290.1
1984–85	611.9	19.4	207.0	5.8	844.2	227.7	5.7	79.1	2.0	314.5

machines at Boyer was 216 000 tonnes in 1984–85. In 1978 machinery was installed to develop the manufacture of a special type of thermo-mechanical pulp from radiata pine which partly replaces costly imported Kraft chemical pulp. This pioneering project now draws pulpwood from Forestry Commission pine plantations at Scottsdale and from the Company's own plantations near Boyer.

Continuing research and development at Boyer has led to new types of paper being produced including telephone directory paper; coloured, lightweight and high-brightness paper for special uses; and bulky paper for the publishing industry.

ANM also has a half interest in a veneer mill commissioned at Boyer in 1984 for the production of sliced eucalypt veneer from high grade logs from its concession.

17.4.3 Woodchips

The plant of Tasmanian Pulp and Forest Holdings (a subsidiary of North Broken Hill Ltd) at Spring Bay, near Triabunna on the east coast, has an annual capacity of more than 813 000 tonnes of woodchips. Timber for the project comes from pulpwood concession areas extending along the Eastern Tiers over some 220 kilometres from Murdunna in the south to Eddystone Point in the north. The Company has also been granted concessions over reserve areas covering much of central Tasmania. These areas will ultimately be used provided Tasmanian Pulp and Forest Holdings Ltd meets various stipulations contained in the *Pulpwood Products Industry (Eastern and Central Tasmania) Act* 1968. In addition, the Company is permitted to obtain pulpwood from areas in the reserve set aside by the Forestry Commission for silvicultural purposes or by utilising trees removed to open the forest for economic extraction of milling-quality timber.

The Company's first woodchips were exported from the Spring Bay complex in April 1971. Over the last five years the production rate has been maintained at around 700 000 tonnes per year.

Associated Pulp and Paper Mills Ltd. and Forest Resources constructed their woodchip plants at Long Reach, near Bell Bay, on the Tamar River. APPM draws its timber supplies from Crown forest concessions, private land and sawmill waste. As well, Forest Resources currently removes pulpwood from areas of Crown forest in the north-west of the State. Annual capacity of the APPM plant is 1 065 000 tonnes of woodchips; Forest Resources 15-year export contract is for an annual 947 000 tonnes of woodchips. Both companies commenced production of woodchips in 1972; APPM at its Long Reach plant in May 1972 and Forest Resources from its portable and satellite chipping plants in mid-1972. In February 1973 the first log trains commenced using the rail extension to Long Reach giving the two companies economic access to more distant timber supplies.

17.5 FOREST MANAGEMENT AND RESEARCH

The Forestry Commission is directly responsible for the management of Tasmania's State forests. The Australian Forestry Council, formed by the Australian and State Governments, co-ordinates national programs for the production, utilisation and conservation of Australian forests. Research into a range of resource and technological aspects of the forest-based industries is undertaken by the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

17.5.1 The State Forestry Commission

The major goal of forest policy is to achieve sustained production of sawlog and pulpwood as a basis for stable forest based industry.

The major goal for the native hardwood forests has been to achieve sustainable production of sawlogs and pulpwood as the basis of a stable forest sector economy. The means to achieve this goal include:

- Dedication of suitable areas as State forest, and rationalisation of State forest boundaries.
- Sound knowledge of the forests and careful planning. The Commission's Planning and Resources Branch collects information on the forests, their distribution, timber volumes and quality, age, species, growth rate and visual quality. This information is used to prepare management plans.

  Planning is the corner stone of the concept of forest production in perpetuity, or sustainable yield, as it involves the calculation of the timber volumes available for harvesting each year against the growth potential of the forests.
- Constructing roads into forest areas that provide access for timber harvesting, research, fire protection and public recreation.
- Regenerating logged areas. In wetter forests clearfelled for sawlogs and pulpwood, the usual practice is to burn logging debris then aerially sow with eucalypt seed of the species formerly on the site. However, in drier forests where areas have been selectively logged, soil disturbance by logging machines is often sufficient to stimulate regeneration.

  In 1984–85, 4 048 ha were aerially seeded for regeneration. This figure is lower than usual as some areas were not completed in the season and will be regenerated the following year.
- Protecting the forests from harmful pests and diseases through research and monitoring,

and from wildfires through a system of early detection and swift suppression.

Plantations of softwoods and hardwoods are an intensive, high capital form of forest management that aims to produce volumes of timber quickly. As in native forests establishment and management of plantations needs careful planning, roading, protection and harvesting.

The Forestry Commission's responsibility for State forests was widened by the *Forestry Act* 1977, which empowered the Commission to promote the development and proper management of private forests. The Act provided for a Private Forestry Council to advise the Forestry Commission on private forestry and a Private Forestry Division to provide advice and assistance to forest owners and potential forest owners. Both these organisations were officially established in September 1978. The private forest estate is a major part of the State's forest resource.

17.7 Activities of the Forestry Commission, Tasmania: Summary

Particulars	*1979–80*	*1983–84*	*1984–85*
Area prepared for regen. burning (ha)	7 105	6 502	4 048
Seedlings produced ('000)	3 336	3 530	3 912
Plantations — established during year (ha)	1 527	1 421	1 688
Firebreaks — constructed (km)	110	78	107
Roads — constructed (km)	130	112	115
— improved (km)	80	10	117

17.8 Forestry Commission Revenue and Expenditure, 1984–85 ($00)

Revenue —	
Royalties	12 989
Road charges	2 373
Other	192
Total	15 554
Expenditure	
Public Forestry —	
Forestry Fund	13 012
State Loan Funds	26 263
Grants	292
Private Forestry Division —	
Consolidated Revenue	717
Loan Fund	13
Total	40 297

Source: Forestry Commission

The Commission also has a responsibility for controlling forest fires on or near State forests. In the 1984–85 season, the Commission fought 71 fires that burnt over 2 000 hectares.

17.5.2 CSIRO Forest Research

In Tasmania the CSIRO Division of Forest Research is engaged in three main projects; the mathematical modelling of forests and of tree growth, the genetic resources and physiology of commercial species, and forest diseases.

Mathematical models aim at improving knowledge of competition between trees and of yields obtainable from high quality eucalypt regrowth forest. Specific attention has been directed to the ecology of the gum-topped stringybark, an important production species, in its competition with rainforest species in the absence of fire, and problems associated with achieving efficient regeneration.

Genetic improvement of plantation conifers and eucalypts, both through seed improvement and vegetative propagation, is under investigation. More general genetic studies are of the reproductive biology and pollination mechanisms of native tree species. Growth rates and environmental factors affecting the functioning of plantation trees are also under detailed investigation.

Forest diseases, their carriers and the effect of disease on tree growth are being researched. Specific diseases include a premature needle-loss syndrome affecting exotic pines in Tasmania and dieback in several native forest species.

17.6 REFERENCES

ABS Publications Produced by the Tasmanian Office:

Sawmilling, Woodchipping, etc. Statistics (8203.6), Quarterly.

Other Publications:

Forestry Commission Tasmania, *August Report*, Tasmanian Government Printer, Hobart.

Commonwealth Department of Primary Industry, *A Balance of Values, Background to the 1985 Commonwealth Decision on New Tasmanian Woodchip Licences*, Canberra, 1985.

Tasmanian Woodchip Export Study Group, *Environmental Impact Statement on the Tasmanian Woodchip Industry Beyond 1988*, Hobart 1985.