FOREST ADMINISTRATION

IN

WESTERN AUSTRALIA

1929 - 1969

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Chapter IV continued

FORESTS DEPARTMENT OF W.A.

ADMINISTRATION AND POLICY 1929 to 1969

Preface

In 1959 the Forests Department commissioned the writing by Mr. J. Robertson M.A. of a history entitled "The Origin of Forest Administration in W.A. 1829 to 1929". Administration based on the sound foundations of the Forests Act 1918, was covered only by the final ten years of that period, during which time an active and efficient forest service had been built up.

The present treatise is designed to cover the many facets, problems and achievements of forest policy and administration during the four decades 1929-1969, each of which is characterised by a dominant theme.

1929 to 1939 - The Depression

1939 to 1949 - World War II and the Aftermath

1949 to 1959 - Recovery, Growth and Expansion

1959 to 1969 - Consolidation and Growth

In contrast to the earlier work by a trained academic historian, this present record is compiled by a practising forester whose period of service with the Forests Department coincided with the period under review. Perhaps his association has been too close for presentation of the detached viewpoint of a historian. However it is hoped that this attempt has assembled and placed on record, much material which might otherwise be buried in old files, newspapers and reports, or lost completely, as has too frequently occurred with destruction of files and records.

It is desired to acknowledge with thanks the assistance given by the Forests Department Library and Records staff in locating relevant material, and by typists for its reproduction from manuscript, sometimes of questionable legibility. In particular it is desired to thank Mr. P.H. Barrett for his skilled perusal, suggestions and checking of the drafts before the final reproduction.

As decimal currency was introduced in 1965, and metrication is in the process of replacing imperial measure at the time writing, all figures quoted for values, length, area, volume and weight have been converted from imperial to 'metric' units in this volume.

CHAPTER I

1929-1939 THE DEPRESSION AND POST-DEPRESSION YEARS

1. Introduction

The year 1929 marked the close of a decade of achievement in forestry. Buoyant conditions in the timber industry had provided adequate revenue under the Forests Act 1918 to commence the regeneration of forests then being cut. However no funds were available to overtake the vast arrears of work necessary after some 50 years of uncontrolled exploitation. Following Executive Council approval of the General Working Plan in March 1929 the Conservator stressed the fact that "the most serious problem facing the Department is the question of funds to rehabilitate the heavily cut-over forests which have supplied the big export trade in timber and forest produce during the past 70 years".*

Paradoxically the onset of the World Depression proved a blessing in disguise for forestry with two major benefits accruing from the general adversity. These were firstly the rehabilitation of some 155,800 hectares of cut-over jarrah and karri forest and secondly the reduction of the permissible intake to that prescribed in the 1929 Working Plan as necessary for the maintenance of a sustained yield.

2. The Depression and Unemployment Relief Work

The fall in 1929 and 1930 in world prices of primary products, notably wool and wheat, caused serious unemployment. It was particularly serious in Western Australia, a primary producing State which had practically no secondary industries at that time. The problems were accentuated by the vigorous immigration and land settlement policies during the decade following World War I. It is difficult for those who reached maturity in the post-war years of affluence to appreciate the conditions and poverty that prevailed in the 1930s. Producers of wool, wheat and dairy produce could barely earn sufficient income to buy essential foods. Many farmers, and new settlers particularly, walked off their properties and moved to the city where they registered for sustenance relief. In the timber industry orders rapidly decreased and from a peak production of 509,760 cubic metres in 1928 there was a steady reduction to 127,440 m3 in 1932. There was also a progressive closure of major sawmills and of 48 mills operating in 1928, seven closed in 1929 and 31 mills by 1932, leaving only 17 operating, largely on a part-time basis. Where some 800 to 1,000 sleeper hewers had operated at time of peak production, orders dwindled until only 250 were employed on part-time hewing as a relief work project, plus 200 to 300 on private property.

By 1931 the number of unemployed had grown to considerable proportions. In April of that year the Government accepted responsibility for provision of sustenance to some 17,000 men who were unemployed and who had no resources for food and clothing.x "Sustenance" payments were provided for single men on a basis of 70 cents per week, and for married men, $1.40 per week, plus 70 cents for each child up to a maximum of $4.90 per week. As relief works were organised, those in receipt of rations were given part-time employment enabling them to earn amounts rather higher than those quoted

* Annual Report, 1929

x Kessell S.L. Forestry and Unemployment Relief in Western Australia

above. Single men were permitted to earn up to $2.52 per week and married men $2 per week above the "sustenance" rate.

Forestry works being essentially long term projects were not favoured initially as relief projects, and preference was given to works of a more immediately productive nature. It was soon evident however that the problem of finding suitable work capable of absorbing large numbers of unskilled workers with a minimum of expenditure on materials, was becoming increasingly difficult. The Forests Department quickly seized this opportunity to tackle the rehabilitation of the extensive area of cut-over forest for which funds had never previously been available. A start was made on a small scale in January 1931 and by December 1932 the number employed by the Forests Department on part-time work at the rates already quoted as applying to all Government relief works, had risen to 1500, with an average number from 1933 to 1935 of 1100 men.

Single men were established in camps of 20, this being the number which could be handled effectively by one overseer and these camps were located in the less accessible forests, for example those in the far south. Married men with their higher earnings were grouped in smaller numbers of 10 or 12 and these camps were located where possible in proximity to the forest railways or other transport facilities so that married men might return to their homes for a period each month. To facilitate this the married man was permitted to work out his restricted earnings for four weeks in a continuous period although actual time of work might only extend over the first two or three weeks of the month. Tents, for which rent was charged, were provided to accommodate the men, two men to a 2.44 metres by 3.05 metres tent. In addition each man was issued with a sheet of galvanised corrugated iron 2.44 m x .61 m so that by grouping together, a small party could build a rough "galley" for cooking and eating purposes. In a number of cases married men took their families, with as many as four children to the forest, and lived under canvas, or in small 2.44 m x 3.05 m mill huts at a site by a bush tramline. Among the large number of unskilled men, the Department was fortunate in having many skilled timber workers and others accustomed to living in the South West. Some of these graduated to overseer positions and a few eventually received appointments to the field staff.

The great bulk of the work was concentrated in the more heavily cut over northern jarrah forest areas between Kirup and Mundaring with the heaviest concentration in Dwellingup Division. All the regeneration work was done on a piecework basis with areas marked out in 'coupes' along 100 metre strips. In addition a number of selected men worked in day work gangs, opening up roads, tracks and tramline formations previously used by the timber industry. These formed the basis for 'Block' and 'Compartment' subdivision, and general access. Most transport at this time was by horse and cart, the track work was by hand implements and horse, and the use of motor vehicles was at a minimum. Staff transport was on foot, by pushbike, by horse, or if travelling longer distances, by motorcycle or utility truck. Overseers travelled on foot, by horse, or on pushbikes.

It was remarkable how well so many of these men adapted to this type of work. Complaints were relatively few and the spirit generally was quite good. While fallers and sleeper hewers formed the elite of the relief workers, due to their familiarity with forest conditions, tools and work, they were well supported by sawmill employees and teamsters from the industry. Among the many men unskilled in forest work were clerks, carpenters, bricklayers, railway workers, mechanics, farmers, jockeys, blacksmiths, etc. in addition to numerous casual workers from a wide range of trades and callings. Gradually as conditions improved, various tradesmen found other employment, but a number of the relief workers found their niche in the Department and remained as resident employees, overseers and field staff. In many cases Divisions were able to retain such useful tradesmen as bush blacksmiths, carpenters and mechanics.

There were of course a few dissidents, and 'problem' men. One group of 10 sent from Perth to Manjimup, and employed at Yanmah were particularly vociferous, proclaimed themselves as 'communists' and were obviously out to disrupt work and cause discontent as far as possible. Individually they were mostly reasonable chaps, but collectively could be unpleasantly abusive and aggressive. They were placed in one camp some four miles from the main camp. It transpired they had been ringleaders in the riots in Perth in May 1931, *and after serving gaol sentences were without warning 'banished' to Manjimup. After some months there they went on strike against the conditions and returned en masse to Perth.

There were also some interesting instances of self-inflicted injury in an effort to obtain money the 'easy' way. One man claimed for a crushed little finger allegedly sustained when he fell carrying a log billet for stacking and burning. By a chance remark from the hospital matron to the D.F.O. some ten days later, it was learnt that when amputated there was lead on the bone, and it was retained in a specimen jar. Investigations by the S.G.I.O. revealed that the man had deliberately shot off his left little finger with a .22 rifle. Instead of receiving a few hundred dollars he spent three months in Fremantle gaol. Another disappointed claimant for a severed left index finger was unfortunate when inspection revealed that his axe was not sharp, and several blows had been made on the log to completely sever the digit. Yet another reported case was that of severed toes, but having removed a boot to carry out the operation the claimant omitted to cut the boot, which was found intact. A fourth man reported in camp about 9.30 a.m. one Monday with a broken arm, claiming a fall while working on his coupe. Enquiries revealed he had stayed on a nearby farm the previous day, and broken the arm by falling off a horse. He returned to his coupe the next day before coming in to report at the camp.

In retrospect it is interesting to note that in 1931 following the decision of an Arbitration Court, sitting as a 'Board', the 48 hour week was reintroduced although only a few years earlier there had been a change from the 48 to 44 hour week. This action was taken by the Forests Department to bring work in the Department in line with that of other Government Departments. About the same time there was an arbitrary cut of 20 per cent in all public service salaries.

* Bolton. A Good Country to Starve In

During 1933 the nadir of the depression appeared to pass and there was a slight but noticeable upturn in employment and in timber production activity. However there was little real amelioration until 1934, when definite improvement became evident, employment increased and 700 to 800 hewers were operating. Sawmilling was almost back to normal by 1936 with 53 mills operating on Crown timber and a further 30 small mills on private property. The latter were mainly producers of cases but also included the first of the 'sleeper mills' which were eventually to displace the hewer. There were still 800 hewers operating in 1936. The Crown Land cut now exceeded the permissible figure, and the annual report contains the warning "there is no scope for erection of further mills in our main forest region apart from certain adjustments of cutting between districts for which provision is made in Working Plans". It is noteworthy that 80 per cent of the considerable increase in production was used in W.A., largely, no doubt, to overcome the arrears of building during the years of depression.

During the ensuing two years, that is from 1936 to June '38, the general employment position steadily improved, particularly in the industries of building and timber production. There was a consequent decrease in the number of unemployment relief workers. From 1934 the Commonwealth had recognised the value of the forest work and had generously subsidised the State on a 50:50 basis. * By June 1938 the Department could report that thanks to the generous unemployment relief grants over the preceding six years the great arrears in regeneration of some 154,600 hectares of cut over jarrah and karri forest had been overtaken. Many of these relief workers had become permanent or resident forest employees. There were then 485 wages men including unemployment relief workers. A year later this had reduced to 400 wages men, including relief workers, and forest employment was fairly well stabilised. The year 1937-38 also marked the first contribution of a Federal Aid Roads Grant amounting to £12,000 ($24,000) which was also used for unemployment relief work upon forest roads.

Valuable work was also done in the karri forests where prior to 1930 there was little work or establishment south of the Blackwood River. All cut over karri country not alienated for group settlement was treated for regeneration to take advantage of burns in years of abundant seed, namely 1933, 1934, 1937 and 1938.

Other valuable contributions were the establishment of pine plantations at Margaret River and East Kirup, and expansion of planting at Big Brook (Pimelea plantation). The successful plantation establishment at East Kirup (later re-named Grimwade) where more than 100 men were out of work when the large mill closed in December 1929, was one of the most valuable contributions made in the light of further developments in Radiata planting in the South West. Substantial expansion of the older plantations in Mundaring Weir catchment and on the coastal sands near Perth also proved of very great value.

In Narrogin Division the successful results of seeding some 308 ha of mallet by 1929 paved the way for a great increase in the resource by the sowing of 4,497 ha to mallet, with the aid of unemployment funds.

* Annual Report

In addition to the area of jarrah treated for regeneration the Department could also proudly report 8,094 ha of karri regenerated; the establishment of some 4,551 ha of pine plantations; the expansion of fire control with complete protection over 354,000 ha and partial protection over a further 319,000 ha; the clearing and establishment of 3,400 kilometres of roads and 8,700 kilometres of graded or ploughed fireline; and construction of 1,395 kilometres of telephone line serving 175 houses, 15 lookout towers, 8 Divisional headquarters and a number of district headquarters. Thus it was readily apparent that the adversities of the depression led to a very substantial advance in practical forestry in W.A. In addition much valuable research work had been carried out, particularly in pine nutrition and fire control, and the foundations further strengthened for expansion during the ensuing years. However as the decade drew to a close in June 1939 the threatening clouds of war hung heavily over Europe. Timber orders declined and there was some drop in production. The future was ominously uncertain but there were few who would have predicted the vast upheaval and changes that were to occur during the ensuing decades.

3. The Timber Industry and Forest Revenue

A perusal of Robertson's "History of the Timber Industry in W.A." readily shows the many vicissitudes through which it passed from its earliest years, and the decades now under consideration were no exception to its fluctuating fortunes.

Following the peak production year of 1927-28 when some 596,000 cubic metres of sawn timber were produced, of which 206,736 cubic metres were sleepers, a fall in export orders caused reduced production in the ensuing two years. The industry then employed some 5,000 men. The calamitous drop to less than 141,600 m^3 in 1932 and 1933 led to widespread unemployment and the closing down of more than 60 per cent of the sawmills, while those remaining operative (17 on Crown forest including six run by the State), worked part-time for appreciable periods. Gradually as confidence returned and orders increased the mills re-opened and production increased from 1933 to 1938 when 404,976 m^3 were produced. However there were some changes. In 1929-30 most of the hauling was by horse teams or, in the big timber of the Warren district, by steam haulers on which the heavy steel cables were pulled out by horses or bullock teams. Many of these teams were disbanded when the mills closed and contractors sought other work. The re-opening of the mills saw the beginning of tractor haulage in 1936 and 1937 particularly at sawmills previously closed for some years as at Palgarup and Mornington (Millars) and Yornup (Bunnings).

With the recovery in the economy and the exhaustion of supplies of mature log timber on northern permits worked by old established mills, the sale of sawmilling rights was made over three areas of virgin forest in Manjimup Division designed to give permanent life to new mills. This led to the establishment of the sawmill townships of Nyamup, Quininup and Wheatley (Donnelly River) in the ensuing decade.

As Forests Department revenue was closely dependent on the prosperity of the timber industry and varied with its consumption of logs from Crown sources, there was a calamitous drop in income in 1931 and the ensuing years. The Reforestation Fund was rapidly exhausted, employees were retrenched, and many officers and timber inspectors were retrenched or offered wages employment at a lower rate. New appointments ceased and salaries were cut 20 per cent.

Furthermore, to assist the ailing industry a 20 per cent rebate was made in royalty in May 1931, and a 25 per cent rebate in inspection fees. (In 1934 there was a further rebate of 5/- (50c) per load square or 35c per m^3 for timber exported). Overseers and men still retained were placed on half time work, involving a 50 per cent cut in earnings. Following an appreciable decline in 1929, revenue was virtually halved in 1931 and further halved in 1932. An increase in Goldfields mining activity saw royalty changes instituted for mining timber but although up to one half million tonnes of firewood and mining timber were cut and utilised annually, the royalty rates were so low that they had little impact on the overall financial position.

The greater part of expenditure from 1932 was from Loan Funds for unemployment relief. The Reforestation Fund expenditure played a very minor part until the recovery of the timber industry some years later. The rebate of 20 per cent royalty continued until 31st December 1937 when it was reduced to 16 per cent and a year later to 12 per cent. Inspection fee rebates continued at 25 per cent.

An interesting development as the timber industry recovered, was the beginning of sleeper production from small sawmills fed by logs hauled by motor trucks in appropriate sleeper lengths direct from stump to mill. The mills required little capital and no snigging equipment. They were readily shifted and re-erected as bush was cut out, and could be operated by two or three men, although some larger versions employed 8 to 10 men in the mill. Their mobility of operation enabled them to work over farms and forest with extremely low yields per unit area. The first mills appear to have operated on private property in 1935-36, particularly in wandoo and eastern fringe jarrah. The first sleeper mill permit was issued on 14th of February 1936 over 7,750 acres in the east of Collie Division, followed by two in 1939 in the Busselton Division, by which time many were also operating on private property. Some 720 hewers were operating in 1938 but their numbers rapidly decreased in ensuing years as sleeper mills multiplied. Between 1935/36 and 1938/39, the percentage of hewn sleepers decreased from 21.8 per cent to 13.3 per cent. The sleeper mills could utilise a much wider range of logs than the hewer and worked for many years on land previously cut over and deemed "cut out" by hewers.

Other aspects of forest production to which reference is warranted are:

1. Piles and Poles The quantity of piles and poles supplied as recorded in "lineal feet" increased progressively and substantially throughout the decade from some 6,700 metres in 1928/29 to 96,885 metres in 1938/39. The main users were the P.M.G. Department, and the State Departments of Electricity and Gas and Public Works. There was a marked increase in the preference for, and use of wandoo in the latter five years. Long piles (over 16 metres) for bridges and harbour works were becoming progressively harder to supply from private property, and increasing supplies were made available from Crown land, on which such pile getting had previously been restricted.

2. Sheoak for barrel staves was becoming of increasing importance, and several small mills were cutting this product, some of which was supplied to a Perth cooperage firm, and some sent to Sydney.

3. The Sandalwood export trade which had operated since 1845 was severely affected, firstly by the depression in 1930, and secondly by the war in China following the Japanese invasion of 1937. Between these periods there was a partial recovery for a few years to about half the tonnage of the pre-depression years. A limited quantity of roots and butts continued to be supplied to a local firm for distillation and recovery of sandalwood oil on a reduced scale.

4. Mallet Bark exports surprisingly did not decline in value during the depression years, but their fall commenced as the general economy began to improve. This decline was to continue, and was attributable to decreasing availability, decreasing labour for stripping and ultimately in more recent years, to a decrease in world demand for tanning materials.

5. About 1935 'Industrial Extracts' commenced the commercial production of tannin extract at Belmont from wandoo wood. So successful was the venture that in 1937 a second factory was established at Boddington with 2½ times the Belmont capacity, and employing some 50 men. Raw material was obtained from trees useless for hewing or milling, and amounted to 30,600 tonnes for the year ending June 1939.

6. Firewood This forest product, in substantial use since man first used fire, has generally been available in forested regions for little more than the cost of collection. In W.A. large quantities of firewood from private sources are unrecorded, but over the decade 1929 to 1939, from recorded Crown sources, an average of some 540,000 tonnes of firewood were consumed annually. By far the greater part of this was by the gold mining industry. Indeed, without the inland forests which provided the source of power for mining for more than 50 years, the development of the Goldfields would have been a different story.

A break-up of the available figures indicates use of the following order:

Metropolitan Domestic Fuel	52,000	
Goldfields Industrial	316,000	Goldfields Use
Pumping Station - Mundaring Weir	15,000	Goldfields Use
Other Pumping Stations - Goldfields	147,000	Goldfields Use
TOTAL	530,000 tonnes	

In addition some 18,000 tons of mining timber per annum were used for underground and structural works.

As mining activity increased with economic recovery from 1936 there was a parallel increase in the consumption of firewood, mining timbers, and fuel for the pumping stations.

4. Forestry Development

(A) Native Hardwood Forest

As indicated in the previous section, despite the great decline in normal revenue, the provision of special relief funds enabled substantial progress to be made in the rehabilitation of previously exploited forest. It also enabled the Department to carry out a continuous programme of regeneration operations over the areas of State Forest subjected to annual trade cutting. Parallel with these operations were those of extension of management and fire control on a Divisional basis throughout the South West.

Until the approval of the general Working Plan in 1929, developmental operations had been governed by some 28 Working Plans for 'Minor Working Circles' each of which was a major hardwood forest 'Block' or plantation unit, with an overseer in charge. The overseer was responsible for carrying out regeneration work and fire control on his area.

By 1929, Divisional organisations had developed, with Headquarters at Mundaring Weir, Dwellingup, Collie and Kirup, each under the control of a Divisional Forest Officer. Control was exercised by the D.F.O. through his field officers to whom the overseers were responsible. Under the 'General Working Plan' logging units for each mill formed the basis of prescriptions, and the work programme was governed by the 'annual coupes', over which trade cutting, top disposal, regeneration operations and fire control were carried out.

New ground had been broken at Narrogin where good patches of mallet (E. astringens), had been reserved within 30 miles of the town, steps were being taken for their protection on account of their high tan bark value. Plans were approved for substantial extension of mallet forest by direct seeding of intermediate areas for growth as plantations. Five working circles were under development, later forming the basis of a new Division at Narrogin.

Within the main belt of prime jarrah forest, development was delayed over considerable areas of cut-over forest held under Concessions* and Leases[x], pre-dating the Forests Act by periods of 15 to 40 years. These conferred special and exclusive rights on the holders. These rights and the fact that there was very little prime forest dedicated prior to 1927, deferred action directed towards their control, protection and rehabilitation.

However, 21st December, 1929, marked the expiry of the last 'Concession'*, at Jarrahdale, and of seven 'Sawmilling Leases'[x]. A further three leases expired within the ensuing three years, and as most of the forest concerned was dedicated in 1927 to 1929, there remained no impediment to its inclusion in plans for management and protection.

(Incidentally, it was the extension of these leases and concessions by the Government in 1921 for periods of 3½ to 5½ years contrary to the firm advice of the Conservator, that led to Lane-Poole's resignation in 1921).

* & [x] Robertson J.R. - The Origin of Forestry Administration in W.A. 1829-1929

* - See P.2

[x] - See PP. 16-20 - Land Act of 1898

The expiry of the last of these leases and concessions enabled the Department to proceed with the reduction of the permissible intake as prescribed in the 1929 Working Plan. This action was facilitated by the closure of a number of sawmills during the depression, and the Department ensured that some of them did not reopen and that some which did reopen had their permissible cut drastically reduced. This also paved the way for the extension of sawmilling in the southern divisions where there were still extensive areas of virgin forest which permitted the planning of sawmill areas of such timber content as to ensure permanent life for newly established mills of prescribed intake.

Some of the sawmills in the northern jarrah forests were continued under the permit system with annual renewals, and frequently with a reduction in the annual intake as foreshadowed in the General Working Plan. Others (such as East Kirup) closed down completely and were replaced by small units of small intake to recut the forest from which the cream of the sawlogs had been removed by the large mills operating under lease.

Following the expiry of the leases and concessions there was a great extension of forest rehabilitation operations with unemployment relief funds over large areas at Jarrahdale, Mornington, Hoffman and East Kirup, and the provision of divisional headquarters at Kelmscott and Harvey. Survey and mapping was followed by the extensive opening up of a network of roads and tracks, subdivision into blocks and compartments, provision of fire towers and telephone lines and the erection of houses for permanent staff for future forest protection.

Meanwhile, south of the Blackwood Valley and in regions more remote from ports and markets, the forests had quite a different history. Pioneer graziers had settled along the Wilgarup and Warren Rivers from the 1870's, but large scale sawmilling did not commence until 1912 and 1913, when four large sawmills and three townships were established to cut over large Permits issued under the Lands Act. These were:

No.1 State Mill (Deanmill) for Sawmilling Permit 86/11

No.2 State Mill)
No.3 State Mill) At Pemberton on SMP 85/11

and Wilgarup Karri and Jarrah Coy. (Millars) on SMP 42/11 at Jardanup (later abbreviated to Jardee). Their establishment followed the extension of the W.A.G.R. line from Bridgetown to Manjimup in 1911/12.

As all forest land cut over by these mills prior to 1924 was alienated, as well as considerable areas of virgin forest, mainly for Group Settlement after World War I, only limited areas awaited silvicultural treatment by 1929. The first dedication in the Pemberton region was of some 2852 hectares known as Big Brook Block, State Forest No.10 on 4th December, 1925. No time was lost in commencing regeneration work. A house was built and nursery established, and by 1929 some 2024 ha of heavily cut over karri forest were treated and ready for a regeneration burn. An uncontrolled fire over the area in January 1930 was followed by prolific regeneration after the autumn rains.

When a Divisional Officer was posted to Manjimup in 1930 the staff consisted of one Forester and one Timber Inspector, plus an Overseer and a few men employed at Big Brook on karri regeneration. Then followed the type mapping of all cut over forest, topographic surveys, and plans for subdivision and, as in the Northern Division, the organisation of relief works for regeneration treatment, roading and general development on the three permit areas. An outstation was established at Yanmah in 1931 and others later at Channybearup and Treen Brook. With only some 7 to 8 years arrears of felling operations the employment of relief gangs was on a much smaller scale than in the northern divisions with some 50 to 60 men working in the Manjimup-Pemberton areas. However, large bodies of men were employed in the district during this period on other Government works such as the construction of main roads, access roads for group settlement areas, and the Pemberton-Northcliffe Railway. (Incidentally this railway, built 1929 to 1933, was one of several constructed as an obligation under a migration and land settlement agreement with the United Kingdom to provide rail facilities for settlers in new areas. As the only farm produce was cream, collected by motor truck, it carried virtually no produce until the advent of sleeper hewing at Northcliffe in 1936, followed some four years later by sleeper sawmilling. It remained a non-paying railway until the development of major sawmilling at Northcliffe).

Meanwhile the larger sawmills of the south remained in operation, although some worked only part-time and a reduced number of private property hewers continued to produce sleepers. As the overall employment position improved after 1934 and timber production increased, further sawmills commenced operation in 1937 at Palgarup and in 1938 Yornup, where treemarking was first introduced in the southern region.(This will be further referred to on the section on Working Plans and rationalisation of the cut).

About this time, that is 1938, a modified form of treemarking was first introduced in the karri forest at Pemberton where cutting had previously been restricted to trees with girth exceeding 274 cm g.b.h. Severe damage to remaining growing stock was common, and large trees were not infrequently directed towards immature trees to cushion their fall or provide a 'swinger' to facilitate cross cutting. Under the new marking system, trees and particularly good immature groups were marked for retention and the onus was thrown on the fallers to avoid them. By perseverance the Forester in Charge eventually obtained good co-operation from the fallers and the results were so satisfactory that the system was introduced at Millars Jardee Mill a year or so later. Standard treemarking of karri by branding for removal was not adopted until later in the next decade.

Another notable change of policy followed the disastrous fires of 1937, which swept through areas of 'tops' in cut-over karri forest which had been held for up to three years to take advantage of the abundant seed crop ripening for the 1937 summer. Prolific karri regeneration followed all the 1937 fires, but the Conservator decided that, in the absence of lookout towers and a fully developed fire control organisation, the 'tops' must be burnt annually whether or not seed was abundant.

Unfortunately, as was predicted, this resulted in a number of unstocked, or inadequately stocked areas in the ensuing years and more than a decade was to pass before control and staff were deemed adequate to restrict the burning of logged areas to periods of seed availability. Meanwhile trials of artificial sowings on freshly burnt ground had indicated the feasibility of artificial re-stocking, provided labour and seed collection costs were not prohibitive. To some extent the preservation by tree-marking of immature karri groups and retention of vigorous trees above the old 274 cm girth limit partially compensated for lack of regeneration in the non seed years, but the practice was one requiring critical review in later years.

Important factors which influenced the retention of the maximum volume of immature timber, even with B.H. girths of 300 to 350 cm were:

(a) The waste of long but small diameter crown lengths which mills tended to leave as being too small to utilise from such trees.

(b) The pressures for releases of 'cut out' land where complete clear felling and apparent devastation indicated to the layman that no return was likely from such areas for periods up to 100 years.

From 1938 therefore for some twenty years or so, there was a change from 'clear cutting' to the 'selection' system in the karri forest.

(B) Pine Plantations

Up to 1929, the area planted to pine was only some 1620 ha, some of which had been planted prior to 1919. Many failures were experienced, particularly with P. radiata in coastal sands. Experience had shown the need for higher quality soils for P. radiata. There was sufficient evidence to limit the planting on the coastal plain to P. pinaster, and restrict radiata plantings to the better soils occurring in valleys in the Darling Range. Effective radiata plantings to that time were mainly in the Mundaring Weir catchment, with small areas near Collie and Harvey.

The Big Brook Working Plan of 1925 provided for the regeneration of some 2020 ha of prime karri forest and the conversion to pine plantation of 5 sections of mixed forest aggregating some 800 ha. In these sections marri predominated with stands up to 55 metres of both pure marri and mixed marri-karri in soils on which it was anticipated P. radiata would thrive. A small programme of 20 hectares per year was planned using Pinus radiata as the main species. Following the establishment in the first section (A) by 1930 of three compartments embracing some 33 hectares, unemployment relief labour was used to fell and plant the balance of the section by 1934. This covered a further 9 compartments of some 99 hectares. Despite some very good growth in patches it was quite apparent by 1935/36 that there were considerable areas of unsatisfactory growth with numerous trees showing yellowing of the foliage, stunted needles and dieback at the tips. Nutrient and trace elements trials were instituted and it was apparent within two years that there was a striking response on some soil types to traces of zinc. However, because of high clearing costs, poor and irregular growth, severe damage from rabbits and quokkas, (unless rabbit-netted) and distance from markets, further planting was suspended and not resumed for some 20 years in the karri region.

Meanwhile throughout the South West, unemployment relief labour was employed in expanding the existing plantations on the coastal plains with P. pinaster, particularly near Perth, and on a smaller scale at Ludlow and Myalup. Plantings were also extended in the hills at Harvey and Mundaring Weir. New plantations of Pinus radiata were established on better class soils at East Kirup and Margaret River where there was considerable unemployment following the closure of East Kirup mill in the first case, and the abdndonment of group settlement holdings in the second. Despite nutrition problems on some soil types, these plantations were to prove of very great value when the trees reached marketable size some 20 to 30 years later. A great deal was learnt from them and later plantings were restricted to suitable soil types, pending further research into plant nutrition on problem soils.

By 1939, the area of effective pine plantation had increased in the decade by 3118 ha to 4737 ha of which 1400 ha were P. radiata and 3180 ha P. pinaster. The target of 405 ha per year recommended in 1929 was achieved for several years up to 1935, but thereafter was reduced to about 200 ha per year pending further nutrition studies and the correlation of crop quality with soil type based on profile examination.

5. Fire Control

(A) Organisation, Staff and Housing

By 1929 the Conservator was able to report considerable success with fire control measures developed over many relatively small areas during the previous ten years and particularly over the latter half of the decade. Of some 350,640 hectares under fire control, 20,235 ha of regenerated areas and plantation were under complete protection.

Except for a few small plantations, most of the 28 Working Circles were in jarrah forest with one in karri and one in tuart forest. Protection practice was based on:-

1. Subdivision of the forest into Working Circles or Blocks or some 4,000 to 8,000 ha bounded by roads or natural features, each with a locality name, and under the control of an overseer. Each block was subdivided into compartments comprising an average of 200 ha and surrounded by a cleared road ot track.

2. Provision of a cleared fireline or 'scraper track' around each compartment, parallel with, and 100 metres distant from its boundary. This provided an untreated 'green belt' surrounding the compartment treated for regeneration. It was the expressed intention to hold the belt "for periodical burning until such time as the young crop on the treated country is safely above the 'fire line'".*

3. An overseer who was responsible for the controlled burning around the compartments and of adjoining untreated country, and for suppression of any fires occurring during the summer months.

* Annual Report - 1929 - P7 - Forest Protection

The period of time for the young crop to "reach safely above the fire line" was not specified, but it was believed it would be some 15 years or more, after which controlled burning would be possible below the young stand without undue damage.

In plantations, provision was made for the ploughing of firebreaks within and around the plantations and for the regular controlled burning of adjacent native forest.

A different pattern was prescribed for the only Karri Working Circle, mainly that of Big Brook. Because of the density of native scrub and karri regrowth any regular burning of firebreaks around compartments was impracticable. Of the 2,920 hectares at Big Brook, regeneration treatment was prescribed for some 2,000 hectares of prime karri. Fringe blocks where marri predominated between the karri and the external boundary were to be burnt regularly until converted to pine plantation, as prescribed in the Working Plan. The central block of karri was subdivided by numerous cleared tracks into numbered compartments, each some 20 hectares in area, while the marri sections were lettered in sections of some 200 hectares.

Each overseer was provided with a house, with the shed and stables in a cleared and pastured paddock, together with a horse, spring cart, saddle, and tools etc. He attended fires on horseback with a rake, axe, waterbag, and rations. The house was desirably located on high country giving some view over the forest under his control. More frequently however, it was located on lower ground where well water could be obtained, and arable land cleared for a horse and cow paddock. Usually two houses were grouped together to serve two adjacent blocks, and the two occupants worked together, or with an employee.

Funds were too scarce for provision of any but the most essential of new houses.

It was an opportunity however for the shifting of houses at minimal cost, as practically all expenditure was on labour. Many additional houses were purchased at very low cost by acquisition from abandoned group settlement locations, particularly where they had been added to the property of an adjoining settler who was already housed.

The 'purchase' was a book debit to the Agricultural Bank. Many houses were obtained for $130 to $140, shifted and improved for a labour cost of $140 to $160 plus a small outlay for additional material to line the two back rooms and make good any deficiencies. The final cost of such houses to the Department in their new sites rarely exceeded $400.

The very great increase in road access and areas treated for regeneration by large bodies of unemployment relief labour led to major changes in organisation, methods and equipment. At Dwellingup in 1933/34 the use of water for fire suppression was first tried with mobile units of four men and a utility truck carrying some 70 gallons of water, a semi rotary pump and packsprays. So successful was this unit that more were equipped the following year

and the aim of motor transport for each centre was accepted. The policy of control from scattered houses was replaced by one of small settlements where an overseer with a gang of 4 or 5 men and motor transport could control a much larger area. After a year's trial from Dwellingup headquarters it was found that the average time from detection to arrival of men at the fire was some 40 minutes and the effectiveness on fire suppression was far greater with the improved equipment. By 1936 ten settlements were established and the progressive removal of the isolated houses to further settlements was proceeding.

It is of interest to recall the earliest water equipment provided at Big Brook after a 1931 fire. It was a horse-drawn 'Fortescue firefighter', - a 100 gallon cylindrical tank with low-down hand pump. It was used only on two occasions to extinguish burning logs at a fire edge.

(B) Parallel with these improvements was that of fire weather research at the Dwellingup Fire Weather Station established in 1933/34. By measurement of the meteorological factors affecting fire behaviour, and assessment of the daily hazard as estimated by experienced field staff on a scale from nil to ten, a technique was developed for forecasting the degree of fire hazard to be expected each day. Collaboration with the Meteorological Bureau was established, and by 1935/36 the Dwellingup forecast was being supplied daily to the National Stations for broadcasting throughout the South West.

The year 1936/37 proved a most difficult fire season with periods of severe and dangerous weather and numerous fires, some of which were disastrous. South of Bridgetown where fire towers were lacking and fire control was limited to two centres covering only some 10,000 hectares, vast areas of forest and farms were swept by fire on 'blow up' days on the 10th and 15th of February. Numerous fires occurred from settlers' paddocks, locomotives and other sources. Palgarup Mill was burnt down and the village narrowly escaped destruction from a fire which swept from the W.A.G.R. line through a mile of paddocks driven by a fierce north west wind. Jardee bush landing and log trucks were destroyed and some bush workers narrowly escaped death from a fire which had apparently been burning in virgin forest to the north west for some days or weeks before the actual 'blow up' occurred. In the Shannon River, Walpole and Nornalup districts the severity of some fires was such as to kill complete hillsides of virgin karri forest. The periodical disastrous outbreaks of fire in the lower South West could be attributed primarily to the virtually unrestricted use and occurrence of fire throughout the summer, the casual attitude of graziers and shire representatives, and the emphasis on land clearing requirements for agriculture. In this connection the following points are pertinent, with reference to the Southern forest areas. -

1. The prohibited burning periods proclaimed under the old Bush Fires Act 1904 viz:- from October 15th to the 31st of January were more applicable to the wheatbelt. Burning was thus permitted in the most dangerous months of the year, namely February and March.

2. The total lifting of a prohibited period during the era of Group Settlement clearing, in the 1920's, led to a farming population accustomed to having burning logs, stumps and clearing fires throughout the summer. Such safety requirements as were set out in the Bush Fires Act were generally ignored.

3. The long-established habit of many of the older settlers or graziers of firing the forest and coastal grazing leases when travelling between their inland properties and the coast.

4. The lack of efficient spark arresters on locomotives or failure to maintain them in good condition. Equally bad were the steam haulers used for log hauling in the forest, while every sawmill was accustomed to having burning or smouldering sawdust or wastewood dumps near its plant. Few precautions were taken to prevent fire escaping from these dumps.

5. The burning of forest by bush line construction crews, and other bush workers in advance of their operations.

6. The lack of fire towers for detection with almost complete absence of knowledge of where fires might be burning at any given time.

7. The lack of any organised rural fire brigades. It was therefore inevitable that the occurrence of 'blow up' days would produce numerous fire escapes and substantial damage.

(c) A major result of the 1937 fires was the overhaul of Bush Fires legislation and the passing of the Bush Fires Act 1937 superseding the old 1904 Act which had outlived its usefulness. Within the Forests Department a Bush Fire Control Officer was appointed and action taken to speed up extention of fire towers, telephone lines, and an accepted fire control organisation in the southern areas. Following this appointment many steps to upgrade all aspects of fire control were in train by 1939. These included:-

1. The systematic enquiry into, and collection of statistics on fire causes, and appropriate preventive action towards a reduction of fire occurrence.

2. The zoning of forest in zones A, B and C, with priority of fire suppression and increased protection in that order.

3. The development of an appreciation by Shire authorities of the importance of and the necessity for organised fire control among the farming community in forest districts.

4. Extension of pre-season controlled burning over greater areas of zones B and C as staff, funds and greater mobility permitted.

5. The extension of telephone lines and their connection to key settlers in and adjacent to the forest and the organisation of auxiliary settlers gangs, (often furnished with Departmental tools and equipment) during the fire season.

6. The increase in fire weather research with the establishment of fire weather stations at Manjimup in 1937/38 and Duncans 20 miles east of Dwellingup in 1938/39. There was also a continuing improvement in fire weather forecasting.

7. Increase in the number of mobile fire gangs, and trials with portable power pumpers with lightweight portable hose and reels. By 1939, twenty-nine Departmental vehicles were equipped for fire gang use, plus a number of private vehicles.

8. Systematic training of officers and fire gangs in fire attack methods.

With the tapering off in relief work, the emphasis in forest activity had changed by 1939 from silvicultural work to fire control. It was quite evident that without a most efficient fire control organisation much of the fruits of years of reforestation and afforestation work could be lost in a matter of days or even hours. As we have seen, the change involved abolition of the policy of maintaining isolated houses and the consequent adoption of a policy of forest settlements of 5 to 10 houses sufficient to maintain school facilities. Other changes included the continued expansion and improvement of road systems for better and faster access. The horse and cart and horse-mobile were replaced with light motor vehicles. The old three foot wide scraper tracks around treated compartments which were very cheaply cleared and scraped with a simply designed horsedrawn triangle of railway line, were widened to 3 metres to permit motor vehicle access. The scraper was replaced with a light two horse "Baby Britstand" iron-wheeled grader with a 6 foot blade - a later modification was replacement of iron wheels with pneumatic tyred wheels for use behind a light truck or tractor.

In the southern region where sandy soils or light gravel with a dense undergrowth of tea-tree (Agonis parviceps) and emu bush (Podocarpus drouyniana) were very common, conditions were quite unsuitable for scraper use and a special "emu grubber" was devised as a vast improvement on the mattock for removing the persistent woody root-stock of these species. It was a one horse unit which was most effective with a horse well trained to the job. The firelines so created and firebreaks around plantations were ploughed with a two horse twin reversible disk 'Shave' plough. To render them trafficable the two horse baby grader usually followed the work of the plough. In some localities the use of a contractor with a light rubber tyred farm tractor pulling a light grader effectively replaced the horsedrawn units. There was steady and continuous improvement in methods and equipment as years went by.

In the karri country, following the experience at Big Brook of small compartments with a close network of tracks, the pattern of subdivision was varied considerably. The larger blocks of karri forest were treated for regeneration and separated by belts of some 10 chain width or more where marri or marri-jarrah types predominated with a trafficable track on each side of such a belt. Control burning was restricted then to these marri belts and to belts adjoining private property. With their heavy annual leaf fall and lighter scrub growth, and their occurrence mainly on ridges and higher and drier soil types these marri belts would burn early in the season before fires would run in the karri types. The small 20 hectare compartments of Big Brook thus gave way to compartments of 100 to 200 hectares, and a much reduced mileage of tracks to maintain.

In the timber industry where methods had altered little during the previous decade the crawler tractor was now replacing both the horse teams and the steam haulers. The last of the large 12 horse teams hauling karri logs ceased at Deanmill in 1936/37 although for several years after that a small team of several horses was used at Jardee for pulling out the cable of the steam hauler. Horse lovers were not sorry to see horsepower in steel replacing that of the animals as the work on them was extremely arduous and many suffered injury. The magnificent spectacle of two 12-horse teams of Clydesdales in action pulling a whim bearing a very large log through forest of prime karri will never recur. Such a sight last seen between Glenoran Tower and the Donnelly River, lingers long in the memory. However apart from hauling methods and practice, the major changes in the industry were still to come in the ensuing decades. The steam haulers had been a prolific source of fires and their replacement by diesel tractors was a welcome advance.

(D) Fire Detection and Communications

By 1929 four fire towers were in operation overlooking areas of regenerated forest and plantations in the Divisions of Mundaring Weir, Dwellingup and Collie. Their efficacy for early and accurate smoke detection were well proven and thus high priority was given to their extension as a prime necessity for fire control. Top priority was given to the extension of the fire tower network at intervals of some 24 km as regeneration operations rapidly proceeded. The order of construction was:

1933/34	One tower on Mount Solus (Dwellingup/ Jarrahdale Divisions)
1934/35	Mount Keats, and Mount William in Harvey Division and Eagle Hill in the new Kelmscott Division.
1935/36	Two towers, one at Dryandra in the Narrogin Division covering the mallet country and the other at East Kirup in Kirup Division.

The East Kirup tower with a cabin at 34 metres was the first fire lookout to exceed 30.5 metres in height and one of the first structures built in Australia using metal timber connectors. It was designed by the Forest Products Division of the C.S.I.R. and its erection supervised by the engineer concerned, Mr. Ian Langlands. The site on the watershed between the Preston and the Blackwood Valleys was selected only after a long period of barometric reconnaissance and survey.

In 1936/37 four towers were built, Mount Ross, and Mornington in the Harvey Division, Yabberup Tower in Collie Division (30.5m) and Alco Tree Lookout in Manjimup Division.

Alco Tree with a cabin at 24 m was situated some 16 km north west of Manjimup and was the first of the regularly manned tree lookouts. It served well for 28 years before being replaced by a standard tower of 110 feet. It is noteworthy that when a tree lookout was first proposed for Yornup in 1934, higher authority rejected the idea as quite impracticable. Meanwhile one officer (Assistant Forester J. Watson) on his own initiative constructed in 1935/36 a lookout in a large tuart tree at Ludlow by means of a ladder attached to the bole. It was used for occasional checks on reported smokes and proved the practicability of

such a project. When late in 1936 the D.F.O. at Manjimup had a selected marri tree pegged on Alco Hill the forest coverage was so excellent that the services of Assistant Forester Watson were made available to construct a 'crow's nest', assisted by the employee who had pegged it (G. Reynolds). This, the first lookout south of the Blackwood Valley proved so effective that the 'crow's nest' was replaced by a small cabin the following year and equipped with suitable fire plan and direction finders.

Unlike the northern divisions the terrain south from Preston Valley provided no prominent hills and the higher ridges were well clothed with forest up to 40 m in height in jarrah and 70 m in karri. Topographical data was meagre and the prospects of locating suitable sites for towers at acceptable cost were not bright. Assistant Forester Watson interested himself in the problem and believed that tower sites could be evaluated by observations from selected trees on the higher ridge tops. With no experience but plenty of energy and ingenuity he had climbing spurs made by the local blacksmith at Ludlow and devised suitable climbing belts and ropes after a period of trial and error. His first major climb on a karri tree selected adjacent to cleared land on the Glenoran ridge, was so successful that a technique was developed which together with barometric reconnaissance resulted in the selection of some 12 tower sites following some 40 climbs. The work was most strenuous for the operator but resulted in an immense saving in time, man hours and cost for the Department.*

In 1937/38 towers of Forests Department design were built at Carlotta in the Kirup Division east of Nannup, and Glenoran, some 20 km west of Manjimup. Their heights of 38 m exceeded anything previously built by the Department, but were still barely adequate to overlook surrounding forest despite the logging of mature timber and felling of large unmarketable trees surrounding these towers. Meanwhile during the same year, the tree climbing operations revealed a ridge on which a massive karri of 1,065 cm girth breast high was located, having been left by the sawmill as too large to handle. When pegged to 44 m it proved an ideal lookout covering all treated karri forest and Big Brook plantation. Thus was "Big Tree" established.x In 1938/39 Kepal tower, of 38 m was built some 32 km east of Manjimup as a first step in bringing a measure of fire control to the vast area of virgin forest east of that township.

Parallel with the development of fire towers and forest settlements over this 5-year period was the construction of single wire earth return telephone lines linking towers, offices, settlements, and houses as well as a number of outlying settlers. A suitable technique for bush telephone lines was devised in 1929, based on the adaptation of Canadian practice to Western Australian hardwood forest conditions. In the ensuing years a nucleus of staff and overseers were trained and a manual issued for the use and guidance of staff in telephone line construction and maintenance. Properly constructed and with minimum maintenance these systems gave excellent service. They also proved a boon to those settlers who were connected at a time when the P.M.G. service had a very restricted distribution. Each Division was responsible for its own construction, installation and maintenance. It is pertinent here to recall that wireless communication underwent trials in 1923

* Watson J.E. - selection of fire tower sites in W.A. by Tree Climbing & observations. Australian Forestry Vol. V. p. 116 - 1940.

x Stewart D.W.R. - The Development of Tree lookouts for fire Detection in W.A. Vol VI. p. 5 - 1941.

and 1929 but the primitive equipment then available proved quite unsatisfactory. It required the lapse of some 20 years and a major war to provide the radio communication service that now operates so efficiently and is rather taken for granted throughout the South West today.

By the close of the second decade under the Forests Act, a further 405,000 ha of forest had been brought under fire protection and it could be claimed that very considerable advances had been made in the development of an efficient fire control organisation. Over 3,300 kilometres of road had been provided, plus 9,400 kilometres of trafficable fireline. Sixteen fire towers including two tree lookouts were constructed and 1,410 kilometres of telephone lines erected with a total of some 500 telephones in service. There was no room for complacency, as there still remained a million acres of prime virgin forest to be afforded a measure of fire control in the south. Considerable areas had suffered excessive damage in the past, since European settlement and particularly since the advent of "Group Settlement" with unrestricted burning. Damage was particularly severe under the periods of extreme fire danger of 1930/31/33 and 1937. It was a tribute to achievements in Western Australia that, following the disastrous Victorian fires of January, 1939, involving the death of some 76 people, the Victorian Minister for Forests with a small group visited Western Australia to investigate its fire control organisation. The W.A. developments proved quite useful as a guide to Victoria where vast sums were subsequently spent in roading its forests, providing detection and communication facilities, and developing forest and rural fire control on the soundest possible lines.

6. The Forest Estate and Working Plans

By June 1929 some 1,935,147 ha of forest land had been classified (as required by Section 19 of the Forest Act) and of this, 1,203,717 ha had been dedicated as State Forest, most of this occurring during the previous three years under the Collier government.

With a change in government in 1930, pressures for the release of forest land were again intense, despite the fact that many settlers were abandoning their holdings and those remaining under 'Group Settlement' (based on conversion of high forest to dairy farms) were in dire straits. Robertson observes "The urge for land settlement had not left James Mitchell. Profiting not from his mistakes, unrepentant of his earlier follies, he soon announced that he intended to make money available for settlement of men on the land in the South West".* One result was the alienation of a substantial area of prime forest at Walpole, and the destruction of further thousands of acres of timber. Locations were also released in heavily timbered country west of Jardee and N/W of Pemberton, one of these being the source of a disastrous 'clearing' fire which on 8th February 1933 swept through to Pemberton, and from which loss of life was narrowly averted.

In 1933 there was again a change in government, with the premier, P. Collier, again holding the portfolio of Minister for Forests. By 1939, the area classified had reached 2,770,576 ha while a further 159,011 ha had been added to State Forest under the Collier and Willcock administrations. Each year there were the usual adjustments by small additions and revocations, but in each of five years following full consideration of the classification results, major dedications were made to give net increases in State Forest as under:-

* Robertson J. - The origin of Forest Administration in .W.A 1829 - 1929

1933	50,428 ha
1935	16,687 ha
1937	13,504 ha
1938	10,105 ha
1939	68,903 ha
Total increase for the 5 years	159,627 ha

The total area of State Forest at 30/6/39 was 1,362,728 ha.

In the Annual Report for the year ending 30/6/36, the Conservator wrote "The resignation of the Hon. P. Collier M.L.A. from the Cabinet has meant the loss to the Department of a Minister who has played a very large part in shaping the forest policy of the State in the past 20 years. Mr. Collier took a keen interest in the framing of the "Forests Act 1918" which established the Department. Since 1919 he has held the portfolio of Minister for Forests in four governments covering a period of over nine years. During his various terms of office many important developments have taken place, and his sympathetic and far-seeing guidance in these matters has played a very large part in establishing forest management on a sound basis in Western Australia."

The tribute was well warranted. More than 95 per cent of the area then dedicated State Forest had been declared during his period as Minister. The stage was set for firm long term planning for continuity of the forests, and the welfare of the industries and people dependant upon them.

Prior to 1929 local Working Plans had been prepared for some sixty small 'Working Circles' for control of operations thereon. The 'Working Circle' comprised a unit of one or more 'blocks' and the prescriptions included provisions for permissible cut, silvicultural treatment, fire control etc. By 1929 these many units from Mundaring Weir in the north to Yornup, Noggerup, Ludlow and Big Brook in the south aggregated some 331,000 hectares. The average area of each Working Circle was some 6,000 hectares but they ranged in area from 1,000 to 12,000 hectares.

On 31st of August 1927 a General Working Plan (No.40) covering some 150,000 hectares, was approved by Executive Council for regulation of the cut in karri. This was followed by approval in March 1929 of a General Working Plan for jarrah, providing for yield regulation from jarrah forest over all State Forest and Crown lands in the South West. To provide for stability in the industry and sustained yield, it prescribed a reduction during the first 5 years to a cut of 709,000 cubic metres and the ensuing 5 years to 660,000 cubic metres per annum. As the average annual cut from Crown land and State Forest during the previous decade was of the order of 1,033,000 m^3 it was obvious that the prescribed reduction by about one third was quite drastic. It is most unlikely that this would have been politically possible had it not been for the profound effects of the depression. In the year ending June 1929 the cut had fallen to 914,446 m^3 and during the ensuing decade the annual cut ranged between 332,000 m^3 in 1932 and 898,800 m^3 in 1938 with a mean of 702,991 m^3.

On 28th November 1933 an addendum to the General Working Plan for jarrah was approved covering sleeper production from Crown sources which was limited to a maximum of 28,400 m^3 per year. At that time sleeper orders were again buoyant with some 700 to 800 hewers active, mostly on private property.

As previously mentioned the closure of many mills facilitated planning to restrict the cut in the heavily worked northern jarrah forest, and to increase sawmilling in the virgin forest south of the Blackwood Valley. The Timber Corporation mill at Palgarup, closed since 1929, and burnt out in February 1937 was reconstructed that year to operate on a new permit area designed to give continuous life under treemarking with an estimated period of some 30 years for the initial cut. The following year, Yornup mill destroyed by fire in 1933, was rebuilt, and recommenced operations. Palgarup was the first of many permit areas in the south designed to give permanent life and continuous employment to established communities to replace the 'cut out and get out' attitude adopted with leases and concessions in the days prior to the Forests Act.

As the General Working Plan took effect, and the scale of forest work expanded so greatly with Unemployment Relief funds, the initial Working Plans lapsed, and the term 'Working Circle' fell into disuse. The General Working Plan prescriptions were by 'logging areas' for established sawmills, and proposed new mills, and provision was made for a continuous programme of top disposal and regeneration operations as cutting proceeded on each logging area. As additional Divisional Headquarters were established, at Harvey, Narrogin, Kelmscott and Manjimup, the initial small units came under their control as had occurred in earlier years at Dwellingup, Collie and Mundaring Weir. Work programmes were reviewed and prescribed annually when estimates were prepared by each Division. Procedures had been stabilised and practices set out in the Foresters Manual issued in 1927 for the guidance of field staff. Changes or modifications of procedure were covered by the issue of special circulars amending appropriate sections of the manual from time to time, until revised versions of the Manual were issued, in due course.

A close check was kept on the operations of sawmilling under permit. As the permits were renewed annually the cutting areas were subject to check or amendment by the Divisional Officer concerned. He also supervised treemarking standards to ensure their compliance with current policy and specifications.

After 10 years of operation and implementation of the initial plan, the first revision of the General Working Plan for Jarrah was approved by Executive Council in 1939. The prescribed permissible annual cut was retained at the level of 660,000 m^3, this being considered a sustained yield basis which would operate until such time as more detailed assessment and knowledge of growth rates warranted a variation of that figure.

An expressed reason for this restriction was the serious deficiency in middle age classes in the growing stock of the forest. It was most gratifying that the aims of the 1929 Working Plan had been achieved and a long continued period of relative stability in forest industry was anticipated.

7. Research and Investigation

Although no major forest research organisation existed during this decade, valuable research was done to solve practical problems encountered in the field. Much of this was empirical research by individual divisional officers, while more intensive and systematic investigation, particularly in pine establishment and nutrition was organised by the Assistant Conservator, in various localities. Examples of investigations carried out were:

1. Pine establishment experiments and pine nutrition research carried out at many centres in nurseries and plantations both for Pinus pinaster and Pinus radiata under the direction of the Assistant Conservator (Mr. T.N. Stoate) ably assisted by many officers and in particular by Forester D. Perry with Pinus pinaster.

2. Soil investigations, survey and classification by J. O'Donnell who had undergone special soil training at the Waite Institute in Adealide after graduating in both Agriculture and Forestry.

3. Timber and seasoning studies and the development of grading rules for both jarrah and karri by the Utilisation Officer (F. Gregson) in collaboration with R.F. Turnbull of the Forest Products Division of the Council for Scientific and Industrial Research. (Both were W.A. engineering graduates who spent one year at the Australian Forestry School to obtain some training and background in forestry.) The grading rules were published by the Standards Association of Australia, and were the first such rules issued for Australian timber. They formed the basis of future timber inspection in Western Australia.

4. Studies by officers of the utilisation branch with field officers, and W.A. Government Railway engineers on locomotive and ashpan design and spark arrester equipment which resulted in a great improvement in design and performance and some reduction in fires from both bush locomotives in the timber industry and W.A.G.R. locomotives, when subjected to frequent inspections.

5. Fire weather research and development of fire control equipment, principally at Dwellingup under the Divisional Forest Officer (W.R. Wallace).

6. Fence post preservation tests with the collaboration of the Division of Forest Products of C.S.I.R. at Pemberton and Wickepin.

7. Studies of rots in jarrah and the causative fungi by N. Tamblyn, a West Australian science graduate who later left the Forests Department to join the Division of Forest Products of the C.S.I.R. where he subsequently became Chief of the Division of Wood Preservation. This work was of great value in subsequent development of jarrah specifications.

8. Studies of jarrah forest types, soils, crown development and growth. These were largely carried out in the Dwellingup and Harvey Divisions.

9. Studies of the flowering and development of seed in the karri forest of the south on which depended the successful regeneration of this species.

In all, much valuable work was achieved with very limited resources and staff. Many individuals of both the professional and field staff showed considerable ingenuity in developing the equipment and methods and overcoming problems that arose from time to time under a great range of conditions. Some of this pioneering work, such as that

in fire weather research and in pine nutrition received both Australia-wide and world-wide recognition, respectively.

8. Staff and Training

With the onset of the depression the apprentice system which had operated for some 12 years terminated and the Ludlow School closed. Although the wastage rate at the school had been high, those who completed the course and stayed with the Department proved invaluable as field officers in later years when occupying senior positions.

Recruiting for professional staff virtually ceased also, although two students then at Canberra completed their courses in 1929 and 1930 respectively. During the next eight years only three W.A. students graduated in Forestry, one (J. d'Espeissis) leaving after one year, for service in Papua and later Fiji with the Colonial Forest Service, and another (H. Gloe) being killed in Australia's first major civil air disaster in Victoria.

In departing from the Foresters' well known objective of a 'normal series of age gradations' the hiatus in staff recruitment and training was to prove a serious embarrassment in later years. However the Department was fortunate in recruiting from the depressed timber industry some very good men for field staff, whose sound experience compensated in some respects for their lack of formal training. More than ten years were to elapse before any attempt was again made to train young men for forestry work in the general field staff.

CHAPTER II

1939-1949 - WAR AND ITS AFTERMATH

1. Some Salient Features of the Decade

On September 3rd, 1939, just 20 years after the peace was signed following "the war to end all wars", Winston Churchill announced that Great Britain was again at war with Germany. Australia was quick to confirm its support for the Mother Country. How this would affect Australia, so remote from the battlefields of Europe, was yet to be determined. Thinking tended to be on the lines of 1914-1918 experience, and the full impact of air power, modern weapons and scientific developments was not fully appreciated or foreseen. Even less apparent were the economic, political and sociological changes to follow.

During the first year or so there was little to disturb our way of life. A Forestry Company including many local volunteers was recruited from Australia and sailed for France early in 1940 to produce timber for Allied forces in Europe. France fell while it was on the water and the forces were diverted to the United Kingdom. (Some two years later with the Japanese threat from the north the company returned to Papua New Guinea where it set up saw-milling units to produce timber for Army purposes.) At home, production was not seriously affected and deliveries not unduly delayed. A decline in the building trade was offset by requirements for Army hutments and defence works.

With the increasing tempo of war in 1941 and Japan's entry in October that year, many changes occurred. Service enlistments drained off considerable manpower, while those remaining were under direction insofar as their occupation was concerned. Timber control for both war and civil needs was introduced throughout Australia with firm direction of production and distribution of supplies. Sandalwood export and overseas timber exports ceased. Rationing of liquid fuel severely restricted mobility and its use was conserved for essential purposes. This led to large scale production of charcoal for use in gas producers to power road vehicles.

By 1943 manpower within the timber industry had been reduced by 1,000 men and production had fallen. Sawmills were unable to work to capacity and some were closed. Forests Department activities were reduced to a maintenance basis and forest employees almost halved in number. To maintain war production the Forests Department gave urgent assistance to the sawmilling industry from time to time with labour for felling, millwork, tramline construction and survey. It also undertook such unusual works as production of bean sticks and the cutting of 'willow' for canes for the blind school, as a substitute for canes that were normally imported.

Of great importance was the production of firewood for the metropolitan area, particularly for Government institutions such as hospitals and schools. It became a major operation and was largely carried out under Departmental direction by the Civil Aliens Corps and later by Prisoners of War. Interned aliens were located in camps in the northern jarrah forest, and in addition to firewood cutting, were seasonally employed in such diverse jobs as potato digging, fruit picking and tobacco picking.

Women were also used to augment the labour force and Army co-operation was received in fire control, while assistance was rendered to the Air Force by forest personnel in the Volunteer Air Observer Corps.

When the end of the war was in sight, planning was instituted for resettlement and re-employment of service personnel involving questions of land use, rural resettlement, forest development, timber production and marketing, etc., Then followed the real problems involving the re-establishment of the many thousands who were demobilised, and the additional thousands of displaced persons migrating from war-torn Europe. There was a desperate shortage of all building and construction materials, especially iron for roofing and steel for structural work and for general building requirements. Bricks and tiles were also in very short supply.

Within the timber industry the winds of change were also blowing. During the war, bush workers had declined to camp in the bush any longer. They were driven to work daily, and the bush camps which had been a feature of the industry for 50 years, ceased to exist. There was a desperate shortage of fallers, and power saws were beginning to replace hand felling tools, while diesel log trucks were beginning to replace the bush tramline and locomotive for log extraction from the bush to the major sawmills. More powerful tractors were appearing with such aids as logging arches and "sulkies". Hewers previously numbering 1,000 to 1,500 men were almost entirely replaced by the small sleeper mills.

The brief references in the foregoing paragraphs are covered in greater detail below insofar as forestry administration, policy and activities are concerned.

2. Timber Control, Production and Forest Revenue

Following the outbreak of war and at the instigation of the Commonwealth, committees in each State prepared statements on the timber position in their respective States. These appeared to receive little attention at the time, but a year later because of the urgent and increasing demand of munitions, 'timber panels' were set up in each State for consultation and Mr. I.H. Boas, Chief of the Division of Forest Products of the C.S.I.R., was appointed Assistant Timber Controller.

At a meeting in Perth on 23rd October, 1940,* Mr. Boas explained that with the enormous increase in defence demands, serious trouble was likely and big timber users would require some kind of organisation for production and use of timber. Enormous sums of money were being wasted, and demands were being made by munitions people for timber ridiculously high in specification and often wrong in types. Australian timbers would have to replace much timber formerly imported. South Australia and New South Wales could not supply their own requirements.

As Western Australia was self-sufficient and was a net timber exporter, there was little call on the local panel over the next six or seven months, other than to advise and to comment on particular specifications referred to it and maintain liaison with the Sawmillers Association. The Conservator, Mr. Kessell, was Chairman of the local panel. However, by May 1941 the Commonwealth Department of Supply and Development was experiencing additional and more widespread timber problems. A minute from the Secretary stated "the stage has been

* F.D. File 1221/40, p.12.

reached when we must have an officer with timber, forestry, and administrative experience who can devote his full time to planning and co-ordinating our timber needs throughout Australia."

With the consent of the W.A. Government, Mr. S.L. Kessell was seconded to the Commonwealth in May 1941 with the title of "Controller of Timber" and was replaced as chairman of the panel in W.A. by the Deputy Conservator, Mr. T.N. Stoate. As the volume of work grew in 1942/43, the Assistant Conservator, Mr. A.C. Shedley, was seconded to the Ministry of Munitions as Deputy Timber Controller for Western Australia, and the "Advisory Panel" became redundant, although close liaison was maintained with the Sawmillers Association. The prime purpose of "timber control" was the planning and co-ordination of timber supplies chiefly for defence works but it was realised this would also involve certain control of civilian supplies.

Meanwhile, timber production had increased from 324,000 m^3 in 1939/40 to 338,000 m^3 in 1940/41. Thereafter an appreciable loss of manpower resulted from enlistments and production in 1941/42 fell to 294,000 m^3. Although further enlistments were stopped by declaring sawmilling and associated operations of forestry a "Protected Undertaking", this step was rather too late to arrest the very large drop in production. Even with this protection, management seemed reluctant to oppose the loss of younger men who strongly desired to join the services and there were further losses before the declaration became fully effective. In the following year production fell by some 10 per cent to 259,000 m^3 followed by three years with the low average of 245,000 m^3. This was about 38 percent below the 1937/38 figure. Factors contributing to the production decline were no doubt the further losses of men on account of age, accident, etc., and the very great difficulty of obtaining steel and parts for the maintenance of mill machinery and equipment.

In an effort to assist in the maintenance of essential production, the Forests Department undertook many emergency tasks using part of its limited labour force for felling of sawlogs, working in some sawmills and carrying out line surveys for construction of mill log tramlines.

Within the first year or so of hostilities, stocks of seasoned timber were depleted throughout Australia and were very close to exhaustion. Drying kilns were required to speed up the seasoning process and during the ensuing two years batteries of kilns were erected at several mills, notably Nyamup, Pemberton and Deanmill. These gradually facilitated the ability to meet the strong and continuing demand for seasoned timber.

With wartime demands and the lack of adequate transport, plywood became virtually unprocurable in Western Australia and this led to action by entrepreneurs backed by the W.A. Government to develop a local plywood industry based on karri. The State's first plywood mill opened in 1943/44 drawing its logs from the State mills at Pemberton and Deanmill. These were supplemented by small quantities produced by the Forests Department in an endeavour to maintain a sufficient intake. Sample truck-lots of other species such as blackbutt, bullich, marri and jarrah were also supplied for trial peeling. Until 1948, karri logs were the basis of the industry, supplemented from 1946 with a small quantity of the larger pine logs from Mundaring Weir plantation. From 1948 the importation of peeler logs from Borneo led to a considerable increase in the quantity of plywood produced in Western Australia. There was also an increasing supply of

veneer and plywood imported from the Eastern States after 1946, as interstate transport again became practicable.

With the cessation of hostilities in late 1945, "timber control" as part of the war organisation of industry, ceased on 31/12/45. However, the Commonwealth continued to exercise control over the distribution of timber through the Forestry and Timber Bureau, whose functions were extended to include timber planning for the Commonwealth. Exports from Australia were subject to license requiring Commonwealth approval, and local production surplus to the requirements of Western Australia was directed to South Australia, Victoria and the Commonwealth. The main requirements at that time were building and industrial timbers, railway sleepers, and crossarms. Very small token exports were permitted to former overseas markets, which it was hoped would be regained as scheduled new mills came into production and boosted the total availability of W.A. timbers.

After three years the position of Deputy Timber Controller was abolished and Mr. A.C. Shedley, representing the Conservator of Forests, became chairman of a "Sawmillers Advisory Committee" (which had been appointed during the war) to consider and recommend details in connection with particular orders. This Committee continued to deal with :-

(a) Applications from South Australian merchants and consumers,

(b) Distribution of Eastern States orders among sawmillers according to their production capacity,

(c) Allocation of shipping space,

(d) Allocation of sleeper orders among sawmillers.

With the very great pressures for timber for housing, reconstruction generally and special industry requirements such as fruit cases, this form of control was to continue for more than 10 years. Implications will be further discussed in the 1949/59 chapter.

As already discussed, timber production in Western Australia had declined substantially during the war years through lack of manpower. By 1946 the industry was in poor shape to meet the demands made upon it by the disorganised civil economy. The work force had been further eroded by age and casualties and contrary to expectations, few of the demobilised servicemen were returning to their former employment in the industry. More attractive opportunities were occurring with the many avenues provided for retraining under the various rehabilitation programmes. With the close of the timber control office which had ensured the supply of essential tools and equipment to the industry, this function now became one for hardware merchants through normal trade channels. Sawmillers reported that the shortage of plant and equipment for essential maintenance and construction was more acute than at any time during the war.

In anticipation of timber demand, milling rights were sold in 1945 and permits issued over five extensive areas in the south designed to give long or permanent life to major sawmill units. These were to be located at Boyup Brook, Palgarup, Tone River, Shannon River and Northcliffe. Abundant labour was envisaged, and under the revised Working Plan of the same year a lift in production was forecast from 245,000 m^3 to 354,000 m^3 including that from privat e property. However,

progress was interminably slow and frustrating delays in construction occurred with labour and material shortages. Even on the three permits issued in 1939 full production had been reached at only one centre (Nyamup), and that was by 1942. Useful production was maintained throughout the war from the augmented Yornup plant until the new Donnelly mill could be constructed and operated in 1951. However, the third unit at Quininup was under construction with a small crew from 1940 until 1950 and only commenced production in 1951. It is of interest that 24 sleeper mills were operating in 1945, while hewing of sleepers was steadily declining. *

A notable feature of the post-war period was the fairly rapid increase in the number of small mills, particularly those in or close to the metropolitan area and the major south west towns, all drawing their supplies from private property by motor truck. They attracted key men such as benchmen and fallers from major sawmills in the forest by the offer of higher remuneration and better social amenities, thus further adding to the problems of the larger producers in the forest areas. Being free of the high costs of housing and road and rail construction, these mills had lower overhead costs. while proximity to market gave a ready sale for all produce including firewood from mill waste. They were often able to supply builders direct at less than standard list prices but all such deliveries were "green off saw" while seasoned timber was scarce and only available from the major sawmilling firms.

In the five years ending June 1945 to June 1949, the proportion of production coming from private property rose steadily, the per cent figures being 16.5, 20.4, 26.7, 29.0 and 34.4.

Salvation came with the direction of migrant "displaced persons" from Europe, to the sawmilling industry and large numbers of these men were engaged on sawmill construction and operation bringing the new mills into production. But for the invaluable contribution of these "New Australians" it is doubtful if some of the units would ever have reached the production stage. However, most of this labour was unskilled in timber work and had to be trained on site. The more competent performers and those with other skills sought other employment as soon as possible in or near the city and there was a continual turnover of labour at the more remote country sawmills.

Despite the increasing number of small sawmills, production volume was slow to recover and the sawn output in the three years 1946/47 to 1948/49 was 282,000 m^3, 296,000 m^3 and 297,000 m^3 respectively. The loss of one major sawmill by fire in 1949 was a serious blow. The relatively minor contributions of the many small units to the total State production is well illustrated by the fact that 234 mills in 1948/49 produced 297,000 m^3 sawn, or 10 per cent less than the 331,000 m^3 produced by 120 mills in 1937/38! It was not until 1950/51, more than five years after the war ended, that some of the large mills on new permit areas came into operation, and production passed the anticipated figure of 354,000 m^3 for the year.

During these years of low production and high demand, pressures from varied interests were many and the office of Co-ordinator of Timber Supplies was no sinecure. One nagging problem was the supply of cases and crates for the fruit and vegetable trade, particularly dump cases for apple export. In 1946 case production was 10 per cent of total production, but with the great swing to building construction, the emphasis was on building scantling, production of which was much

* Bednall B.H. - Sleeper Sawmilling in W.A. Vol IX p.61 - 1945

more profitable. Case production was not attractive to the sawmiller. The subject was high on the agenda at every fruitgrowers' conference. The major sawmillers collaborated by producing a quota of cases where practicable but it was deemed necessary to import cases to the extent of 530,000 dumps for the 1947 apple crop, although more than half of these were carried over to the next season. The imported case cost twice that of the local product, leading to the approval by the Prices Commissioner of a substantial price increase, but there was still a reluctance to cut fruit cases. It became necessary for the Department to advertise the sale of cutting rights over several small permit areas for fruit case production only. Following acquisition of such rights by small local sawmills little time elapsed before operators were seeking to produce a proportion of scantling and sleepers, and there were frequent pressures to relax the terms of the permit. For many years major mills, particularly those cutting karri were required to produce a quota of fruit cases, as part of their allocation.

Piles and poles were in fairly constant demand throughout the decade but it was interesting to note a substantial increase in the lineal footage during the two years 1941 to 1943. Apparently much of this was on account of poles required for wheat storage bins throughout the wheat growing areas. In addition many long karri poles with lengths from 27.4 m. to 33.5 m. were produced for defence purposes such as wireless masts.

The formation of the State Electricity Commission in 1946 led to a strong demand from 1948 for long (20 metre) poles for transmission lines and 10.7 metre poles for "distribution" lines with lesser numbers of intermediate length. As contractor supplies were insufficient in the early stages, many were supplied direct by Departmental labour.

Forest Revenue normally is closely related to log royalties and for the three years 1939/1942 the gross revenue was fairly stable between $302,000 and $322,000. Royalty rebates of 20 per cent on sawlogs, which had originated as an industry relief measure in May 1931 were gradually reduced from 1937 to 4 per cent in 1941 before final abolition in June 1942. Despite the decrease in sawmilling activity over the next three years there was a pronounced upward trend in revenue with gross figures of $380,000, $454,000 and $530,000 respectively, due in a large measure to firewood production and sales to metropolitan woodyards, industries, and Government institutions. As described under the next section, this was from the labour output of the Civil Aliens Corps and prisoners of war camps in addition to Forests Department employees. Following the disbandment of the Civil Aliens Corps at the end of 1945, and of the prisoners of war camps the following year, production was still necessary by Forests Department labour to ensure supplies for the metropolitan area until sufficient private contractors were able to meet the demands.

With limited revenue and staff, all forest work was restricted to a maintenance basis and further development had to await the termination of the war. In 1945/46 the Treasury ceased the practice of deducting from Consolidated Revenue the interest and sinking fund on loans before allocating 3/5ths of the revenue to the Reforestation Fund. This coincided with the last year of substantial firewood sales. The Department continued to supply the firewood requirements of the

Goldfields water supply pumping stations at Mundaring Weir for a further few years. While revenue was still disappointingly low, a revival in the sandalwood trade made welcome contributions of $187,000 and $174,000 in 1946/47 and 1947/48 respectively. The decade ended financially on a disappointing note with a gross revenue down by $124,000 to $476,000 due mainly to a fall in sandalwood revenue in the last year. There was also a reduction in Crown log intake consequent on the loss of mills by fire although an increase in private property cutting maintained the overall sawn output for the year.

High hopes of a rapidly expanding post-war production had been frustrated for four years by a crippling shortage of steel, machinery, plant, and labour for sawmill construction, maintenance and operation. It was the critical shortage of iron and steel that led the Government of the day to develop the Charcoal Iron Industry at Wundowie.

Timber production was still some 20 per cent below the pre-war figure and seven large new mills had still to come into production. Experienced fallers had been difficult to recruit and the industry was turning to power tools for felling in the form of both circular saws and chain saws powered by petrol-driven engines. Petrol-driven drag saws which had been used for many years for crosscutting the big karri logs were now being modified and adapted for felling. Trials of chain saws were far from satisfactory at this stage, but the ensuing decade was to witness vast improvements in this equipment, leading to its universal adoption. Meanwhile the power circular saws such as the Schulstad, Dennis, and Hargan mounted on two pneumatic-tyred wheels were ousting the axe and saw in the more open jarrah and wandoo forest where mobility was fairly easy. They were in full use at Wundowie in 1948 and at a number of sleeper mills on the eastern fringe of the jarrah belt. As design improved they were gradually adapted for felling bigger timber in the main jarrah belt.

The whole decade 1939/1949 was fraught with problems, difficulties and frustration for all concerned with the timber industry, but there were visions of a rosy future, full of promise, with the prospect of seven large sawmills scheduled to come into production, and buoyant markets, awaiting their output.

3. Manpower Control and Forestry Activities 1939-1949

For the first year Departmental operations were fairly normal, but during the second year there was an appreciable loss of staff and employees to war service from both the Forests Department and the timber industries. The second Forestry Company was formed and left for overseas service.

Meanwhile in 1939/40 Divisional offices had been built at Manjimup and Pemberton and with the provision of three staff houses at the latter town, the district of Pemberton was accorded Divisional status in 1940/41. District offices and settlements were also established at Yornup and Nyamup and a commencement was made with Pimelea settlement as isolated houses were transferred there in continuance of the policy of abolishing the one and two house establishments. An office and house were also established at Boddington for supervision of wandoo cutting for tannin extract which had become an industry of considerable value, with a high log intake.

During 1941 the impact of war was becoming increasingly evident and dictating the course of events in Australia. War-time needs and labour shortages required the placing of normal Departmental operations on a maintenance basis. Fire control, despite a depleted staff, was a first priority. Treemarking, top disposal and regeneration operations associated with the annual cutting were continued as far as the labour force permitted, while local assessment and surveys were continued as officers were available for such work. Following reduced plantings in 1940 and 1941 further pine planting and pruning were suspended. An active part was played in investigations into charcoal production and use of producer gas.

The timber and forest industries were declared a "protected undertaking", and under manpower direction such labour as remained was obliged to continue in this protected industry. During the preceding long and dry summer it had been necessary to call on the army for assistance and on three occasions large bodies of army personnel were engaged in fire suppression. This liaison was to continue and increase with the army assisting both in controlled burning and in fire fighting.

The progressive loss of manpower necessitated the Forests Department providing assistance in a variety of activities which were not its normal function. For example in the 1942 winter, Perth faced an acute shortage of firewood following a depletion in the ranks of normal suppliers. It was only the foresight of the Department that enabled it to relieve the position by supplying some 714 tonnes weekly from stocks accumulated as a special project during the previous summer.

At the outbreak of war many civil aliens were interned by the Commonwealth and placed under the control of the Allied Works Council. As early as 22nd September, 1940, some of these men were employed by the Forests Department on firewood cutting to maintain the production of essential supplies. Following a conference attended by the Deputy Director or Manpower in Western Australia, the Director of Agriculture and the Conservator of Forests, a formal request was submitted to the Director of Manpower on the 26th January, 1943, for the formation of a pool of alien labour of up to 300 persons with the object of carrying out firewood cutting, and seasonal work such as potato digging, flax growing, fruit picking, etc. The proposals were approved with appropriate details of conditions and payments, to be under the control of the Conservator of Forests.*

Camps, each under the control of a forest officer, were established with prefabricated "Livingstone" huts at Mundaring Weir, Jarrahdale, Inglehope, Gnangara and North Dandalup. Those at the two latter places were classed as "permanent". Mundaring Weir and Inglehope were obliged to close through lack of sufficient men. Another permanent camp was later established at Karnet. Despite the many problems associated with the control and use of the many unskilled and often unwilling workers on these projects, the maintenance of firewood supplies for Perth and Fremantle from 1943 to 1945 was a very worthwhile and necessary contribution. Production by the Department and the Civil Aliens Corps amounted to some 81,600 tonnes in 1942/43. In the following year some 76,500 tonnes were distributed, of which 15,300 tonnes went to the Mundaring Weir pumping station for the Goldfields Water Supply.

* F.D. File 1104/43

The Civil Aliens Corps reached a maximum of 260 men but with sickness, absenteeism and transfer to other works, the average number employed was closer to 160. The Corps was also employed digging potatoes from Cookernup to Kirup, Lowden and Donnybrook in 1943 and 1944, and one group assisted with bush line construction for No.1 State Mill when log supplies were threatened by lack of suitable labour.

Towards the end of 1944 the C.A.C. was disbanded, but under "Manpower" direction the men became employees of the Forests Department with no change in their occupation until the termination of the war in September 1945 when they were free to choose their employment.

Prisoners of War were established in a camp near Jarrahdale in September 1944 and the following month a prisoner of war hostel (Italian) was opened at Marrinup under the control of the Department of the Army. Some 100 to 150 P.O.W.'s from these camps were employed on firewood cutting up to 1946. Stocks accumulated from this source were utilised even as late as 1947 when supplies from firewood contractors were still quite inadequate for the city and the pumping stations of the Goldfields Water Supply. Jarrah firewood was railed as far as Cunderdin for this essential use.

Supplementary labour from unusual sources was also used on a limited scale for intermittent work. Some examples of these were as follows:-

1. Employment of women from forest settlements or nearby farms for fire lookout duty and for controlled burning.

2. Farmers in or adjacent to the forest were used for controlled burning work and were picked up for fire fighting.

3. Groups of secondary school boys in the long vacation were used for controlled burning and fire tower duties. Of some 16 to 20 boys so employed and encamped at Manjimup in two successive years, several are now senior executives in Perth.

Some unusual demands met by the Department were:

1. Cutting and supplying some 685,000 bean sticks from peppermint, paperbark and young karri regeneration to enable growers to produce beans for canning for U.S. forces then in Australia.

2. Cutting and supplying to the Blind School for basket work some 35,000 canes, two metres in length from "West Australian willow", as a substitute for imported canes which were quite unprocurable.

3. The supply of 20 metre karri masts, and also "knees" for wooden vessels built at Fremantle for use in northern Australian waters.

4. The growing of vegetable seeds at Hamel nursery for the Commonwealth Vegetable Seeds Committee.

Following Japan's entry into the war in October 1941, her rapid and victorious advances and the bombing of Darwin, Broome, Derby and Port Hedland in the early months of 1942, the outlook was bleak indeed. It appeared that the more southerly ports would be similarly treated and the possibility of invasion could not be discounted. Many men in reserved

occupations, chafing under the restrictions, were anxious to join the services and make a more direct contribution to defence.

The Volunteer Defence Corps had established battalions of men in the city and around the coast at the ports from Geraldton to Albany. They were composed of World War I veterans and younger men in manpowered employment, all of whom received training in the use of weapons, explosives, and the elements of guerrilla warfare. In April 1942 the ominous Japanese threat was so close, that the decision was made to recruit two battalions of able-bodied men in the south west from the reserved occupations of timber, forestry and agriculture. Thus were formed the No.12 (Jarrah) Battalion with headquarters at Kelmscott and No.14 (Karri) Battalion with headquarters at Manjimup. This was of considerable psychological value in lifting the morale of local residents when at last there was a real feeling that they were in a position to play a part in home defence. An excellent "esprit de corps" developed between sawmillers, foresters, timber workers, farmers and townsfolk and there was a keen spirit of rivalry between battalions in rifle shooting, field exercises, etc., as well as between companies and platoons. New contacts were made and there was a most useful intermingling of people with a new common interest where little had previously existed. Quite apart from the military side the understanding and mutual respect that developed between the many men from the timber industry, the Department and the farming community was a side effect of considerable value which lasted long after the termination of the war.

Tales of some of the exploits are legion. Just how there were no serious accidents during some of the realistic exercises will never be known. There were certainly some "close calls". Forests Department staff with ranks from Major (battalion commander) to private, played a prominent part in the organisation, recruitment, administration and training of these battalions. A nucleus of six regular army personnel was based at each battalion headquarters with an adjutant in charge.

The Forests Department also collaborated with the Volunteer Air Observer Corps and fire towermen operated as additional observers reporting plane movements during the summer period when towers were manned. By simultaneous observation of bearings and telephone communication between them, two towers could plot a plane's movement in daylight with reasonable accuracy and the information was passed on from tower to tower and to the R.A.A.F. Quite a useful contribution to the observer network was thus made over some 1,620,000 hectares of forest country in the south west region of the State.

Reciprocal assistance was given by the R.A.A.F. reporting fires during training and observational flights.

Following cessation of hostilities it was anticipated that within the next year or so the Forests Department would be in a position to resume its normal functions on an expanded scale. However such was not to be. In fact the supply of labour and materials remained as difficult as ever for the next four years. The problems of the post-war years will be covered more fully in the ensuing section.

4. Planning - Post-War Reconstruction

As early as March 1943, despite the exigencies of war, evidence was being taken throughout Australia by the Rural Reconstruction Commission preparatory to planning for rural post-war development. It had been appointed by Mr. J.B. Chifley, then Minister of State for Post War Reconstruction, on the 25th February, 1943.

Although the Commission and its 10 reports were primarily concerned with agriculture, it took evidence from forest authorities in Australia and apparently appreciated the value of forests and forestry. This is apparent from the several references made in the first, second and third reports. xx Evidence was given in Melbourne in March 1943 by the W.A. Conservator, Mr. S.L. Kessell, and in Perth later that month by the Acting Conservator, Mr. T.N. Stoate.* The Commission also spent some days visiting forest areas and works of the Department in this State. Although it did not submit its intended report on forestry, it did recognise in several references the value of Australia's forests, past errors in land alienation and the imperative need for the preservation and development of the remaining forest areas. It also recommended the formation in each State of a Land Utilisation Authority consisting of the heads of Departments of Agriculture, Forests, Lands and Surveys and Water Supply for co-ordination of policy on matters of alienation of land, forest development water resources and erosion control, etc.,

It was sincerely hoped, particularly by foresters, that there would be no repetition of the tragic ventures of the 1920's when millions of dollars were spent and an immense waste of a national asset occurred in the conversion of prime high forest into poor agricultural properties. The reports of the Commission strengthened these hopes. Nevertheless there were strong pressures in Western Australia for land settlement in jarrah forest south of the Blackwood River and east of Karridale group settlement and at Rocky Gully east of the Frankland River. These areas were outside the main zone of prime jarrah and karri, but they did carry useful forests required at least for some decades for the timber needs of the State. Furthermore, there were local pressures for agricultural development of forest in the districts of Busselton, Bridgetown and Pemberton.

In February 1946 the Department received advice that the Land Settlement authorities had bulldozers available and were desirous of commencing land clearing. The land south of the Blackwood River was considered suitable, and action was requested to remove marketable timber from the areas concerned. Consequently two areas totalling 4,500 ha some 13 km east of Karridale were advertised in March and sawmilling rights sold by auction, in April, leading to the establishment of two sleeper mills. (Bunnings, and Thomas).

By 1948 three mills were cutting in this locality, but only a few hundred of the thousands of hectares required for land settlement had been cut over. Meanwhile attention switched to the Rocky Gully-Denbarker areas where two small mills had operated for several years. The land settlement authorities had adopted a policy of purchase of existing holdings that were available and deemed suitable, and this tended to ease the pressures on timbered Crown land. In June

xx Reports 1, 2 and 3 of the Rural Reconstruction Commission.

* F.D. File 270/43

1948 the Conservator pointed out the problems and difficulties of any large scale timber removal and the inevitable timber losses that would be incurred with any major settlement scheme within the main forest belt. He suggested a concentration on areas devoid of marketable timber such as Mount Manypeaks and Esperance.*

Following many discussions over the ensuing 15 months, Cabinet decided in September 1949 that settlement would proceed at Rocky Gully but desired to reserve areas where "substantial quantities of millable timber worth sawmilling operations are situated." Although losses of timber were inevitable in large scale settlement, these had to be accepted as the main forest belt had been preserved and the least damage would occur by restricting clearing to areas east of Rocky Gully and eventually extending well beyond the forested lands towards Mount Manypeaks. The South Blackwood proposals did not proceed.

Within the Department, proposals for post war employment of the large numbers expected from demobilisation were in train as early as 1944. As arrears of regeneration work had been overtaken in the previous decade, the emphasis was now on fire control, involving improved protection, communications and rapid transport to move suppression forces to reported fires in minimal time. This involved a continuation of concentrating the labour force into settlements and the provision of good access roads for rapid movement to all points of the forest from these residential centres. As a high proportion of damaging fires originated outside the forest boundaries, a sound system of external firebreaks was required incorporating at least one good trafficable road parallel with the boundaries. A minute of 12th October, 1944, states "it is anticipated that the largest single item in postwar proposals will be expenditure on roads, tracks and firelines".ø

Divisions submitted plans covering more than 8,045 km of road made up ot 1,176 km of arterial road, 2,300 km of sub-arterial road and 4,827 km of tracks and firelines. In considering specifications four types of road were defined, namely:-

1. Heavy haulage roads
2. Main arterial roads
3. Sub-arterial roads
4. Forest tracks and firelines

Specifications for selection and construction of each type were prepared and circulated to field staff and standard diagrams were prepared for bridges and culverts. Several major routes were surveyed and pegged ready for construction. It was appreciated that special funds would be required to fully implement the programme and that "heavy haulage" roads would probably require to be built by the Main Roads Department where it could be shown that traffic could warrant such construction. It was also anticipated that much of the cost of types (1) and (2) would be recouped by a reduction in haulage costs of forest produce and therefore with appropriate higher royalties. The forecast that heavy haulage roads might facilitate log extraction and replace tramway logging in the future was one that proved correct. During the next few years

* F.D. File 449/47, p.74.

ø F.D. File 549/44, p.38.

major timber companies constructed their own high quality roads from bush to sawmill for log haulage by large petrol and diesel trucks, thus supplementing the road network as planned by the Department.

However, factors that the re-employment planning did not foresee were the social and technological changes that were to eventuate. Plans were made for camps and facilities at selected localities throughout the forests and for stocks of hand tools for major works. With the many avenues open for rehabilitation and training in trades for ex-servicemen, few were prepared to return to the forest work or the arduous labour of the timber industry. The press-button age had arrived. No longer were men prepared to wield the axe and saw, the pick and shovel or mattock and crowbar, when far more work could be achieved with little exertion by pressing buttons and moving wheels or levers while seated on machines. No longer would they camp in remote areas while jobs were abundant in and near the cities and towns.

In common with the timber industry, the Department found that labour and staff were most difficult to recruit. In fact, as soon as manpower restrictions were lifted, there was an exodus of both labour and staff, by resignation, to more attractive or more lucrative employment. The one attraction that could be offered was that of low rental housing, during a period when houses were in very great demand. However, efforts to expand housing were frustrated by inability to get either material or labour for their construction while there was such a tremendous demand for homes in the city and towns. Eventually progress was made only by purchasing housing material in bulk and having houses built by small local contractors, or, in some cases, as sufficient stocks were accumulated, by Departmental labour with building experience. Delays of up to 12 months occurred in obtaining such essential requirements as bricks, roofing iron, joinery, flooring, stoves, doors, etc. Once the stage was reached when stocks of material were on hand and other orders in process of being filled, it was possible to attract the small builder who himself had been frustrated by his inability to obtain essential supplies for his own continuous and regular work. With such men it was also possible to proceed with the shifting of many isolated houses to more attractive towns or settlements and build concomitant sheds, garages, workshops, gantries, etc. at each headquarters.

Despite these problems, the main project of roading was proceeded with as far as resources permitted and when specific projects for main arterial roads were submitted to the Main Roads Department, seeking special grants, they were approved. Although grants had been made for general road construction and maintenance since 1938, on a fairly restricted scale, the first grant for a specific major road was made in 1948 for a link from Yanmah via Donnelly mill site to the Nannup-Bridgetown road. This provided a good 58 km route from Manjimup to Nannup where previously an 82 km trip via Bridgetown was necessary. The second major grant was for the Balingup-Noggerup road via the plantation settlement of Grimwade which provided that settlement with good road access to the nearest town of Balingup, and for disposal of the large volumes of pine which were subsequently to be cut at that centre.

"Through roads" of this type were not only of great value to the Department but soon carried an increasing volume of public traffic. Many of them could be called "intershire" roads as they traversed two or three shires linking roads of good quality at either end from one shire to another through

a major belt of forest. They were thus very desirable roads but so located that no single shire had previously felt justified in spending ratepayers' money on their development.

Annual requests and grants became a recognised feature of forest road development and increasing sums were made available in ensuing years as the Main Roads Department recognised the value of the work and the standard of road provided. Main Roads Department engineers collaborated with technical advice whenever it was sought for specific problems such as major bridge proposals or those of gradient in difficult localities.

The provision of these grants became an important factor in enabling the Department to extend its fire control operations over extensive areas of virgin forest, not previously covered, between Margaret River and the Frankland River.

5. Fire Control

As previously indicated, the highest priority was now accorded to all aspects of fire control. With large regenerated areas of hardwood forest and nearly 5,270 ha of pine plantation to protect, the emphasis was on improved methods and performance in all phases; - controlled burning, fire protection, detection, communication, suppression, equipment and methods. With reduced staff and labour, use had to be made of auxiliary forces employing women, mill and bush workers, farmers and schoolboys to implement the desired measures. Heavy equipment in the form of power pumpers from air raid precaution authorities became available for the first time. After the cessation of hostilities, surplus army trucks from 15 cwt. to 5 tons, and surplus radio equipment from the services, gave promise of revolutionising transport and communications.

A. Presuppression

Fire prevention measures adopted included:-

(a) Improved communication with adjoining settlers, with personal interviews, early in the season, where possible, for discussion of their own burning proposals, and to encourage the formation of bush fire brigades.

(b) From 1939/40 some increased control over hunters by restricting their license to carry firearms in State Forest to the period 1st April to 15th December in any one year.

(c) Controlled burning of firebreak belts and extensive areas of both virgin and marginal forest on a rotational basis where roading was sufficiently advanced to allow this sectional burning with a reasonable degree of safety and control.

(d) Demonstrations, at country centres and at the Royal Show, of the latest fire fighting equipment and methods.

The Australia-wide proclamation of Fire Prevention Week, first instituted in 1945, was an appropriate time for these activities which were combined with radio talks and the issue of pamphlets, posters, etc. to schools and local

authorities. With regard to (a) above, the Rural Fire Prevention Advisory Committee was formed in 1939/40 under the Minister for Lands. An ex-Forester, Mr. J.C. Watson, was seconded from the Kings Park Board as an advisory officer to contact and liaise with local authorities and brief them on the requirements of the Bush Fires Act.

B. Detection facilities were steadily increased by provision of more lookout towers, particularly low cost tree lookouts erected by Departmental staff in the south. These, in order of construction, are listed below.

1939/40, Grevillea Tower of 42.7 metres, the tallest wooden structure then erected by the Department, was some 16 km. east of Yornup.

1940/41, Diamond Tree Lookout, some 10 km. south of Manjimup. This involved construction of a 6 metre tower in the top of a karri tree to give a floor height of some 55 metres. The same year a temporary lookout was erected in a small karri tree at Pemberton headquarters at a height of 37 metres.

1941/42, Gardner Tree Lookout, some 16 km south west of Pemberton was erected with a floor height of 58 metres. This gave a commanding view over an extensive area of coastal country fringing the main forest belt. Most of this was under coastal grazing lease and had been the source of many fires over a long period.

Further reconnaissance of tower sites continued and after the war a further series were erected, again using Departmental staff and labour. Contractors could not be obtained for these projects while there existed such a strong city demand for tradesmen.

In 1946-47 two fire lookouts were constructed, one in the northern jarrah forest and the other, Gloucester Tree, at Pemberton. The latter, the State's tallest lookout, was established with a cabin floor some 60 metres above ground level. When it was manned that summer the tree at Pemberton headquarters fell into disuse.

In 1947/48 a tower of 33.5 metres was erected at Dicksons, some 30 km south of Nannup on the scarp and about 2 km. east of the Nannup-Pemberton Road. It overlooked the "sunklands" from which large fires of unknown origin had periodically swept into the prime forest on the scarp under severe weather conditions, with north west to west winds. It was most effective in combating this source of trouble in the ensuing years.

In 1948/49 another 33.5 metre tower was erected at Kelson* south of Kirup, overlooking the "sunklands" to the west as well as prime jarrah forest surrounding it.

The construction of these towers virtually completed the network from Mundaring in the north, to Pemberton in the south. However, there still remained large expanses of virgin forest in the "sunklands" and between Pemberton and Walpole, requiring detection facilities for the extension of fire control over good forest areas.

* A hybrid name from Assistant Forester Jack Watson and Arthur Kelly, District Forester at Kirup.

C. Fire Causes

Sound statistical data on fire causes was a prerequisite for effective planning for both prevention and suppression of fires. While data was being steadily accumulated and many causes were quite obvious, there remained a considerable number of "unknown" causes until there were sufficient lookouts to pinpoint fires as they started, and the ability to reach the source of the outbreak without delay.

Throughout the decade, bush locomotives and the escape of settlers fires together accounted for about one third of the fires attended. With the addition of fires from W.A.G.R. locomotives, these three sources accounted for half the fires, while the balance were attributed to some 17 other causes. Planning for the three known causes of high frequency usually ensured their early suppression and confinement to small areas in recognised localities. However damage could occur from a string of fires lit by incendiarists or stockmen in poorly roaded forest of high inflammability in severe weather. With adequate tower coverage and the close co-operation of police aided by trackers, it was often possible to locate the offender, and a few convictions with severe penalties had a salutory effect. In the 1947/48 summer for the first time, a blacktracker was stationed full-time with the police at Nannup for prompt availability.

Statistics clearly showed that nearly all fires attended were from human activity. The number of lightning fires was rare at less than 1 per cent and these were usually during or prior to rain and readily suppressed with no damage. One notable exception occurred in the long dry season of 1943/44 where there was a record high number of 517 fires, of which 22 were from dry lightning storms in severe weather. Army personnel were called in to help cope with the many outbreaks.

D. Communications

The well proven system of forest telephone earth return lines continued to give sound and reliable service, but in severe weather, gang work was limited to proximity to these lines or to temporary lines of two or three miles linked to the system. Telephone call boys were stationed at bush phones to contact the overseer if he was required. The mileage of line was extended annually to link up new fire towers, but otherwise there was little change in the system until after the war.

In 1945/46 some preliminary field tests were made using radio communication equipment lent by the R.A.A.F. with a view to its possible introduction to supplement the telephone system. In the following year the inauguration of a Radio Branch and the appointment of the first Radio Control Officer (Mr. C.A. Pinkus) led to one of the most important developments in fire control in this State. His technical competence and wide experience as a squadron leader in charge of a communications network in the R.A.A.F. was to prove invaluable.

Using army disposals equipment, tests with four fixed stations and mobile units on trucks, clearly showed the following advantages:-

1. Fire fighting units could work miles from the nearest telephone.

2. Communications could be made directly from the fire.

3. Direction and redirection of gangs could be speeded up.

4. In case of winter breakdown of telephone lines (which was not uncommon), radio could be used for divisional and district communication and organisation.

The following year radio was extended to the southern divisions and the annual report enthusiastically states:

> "Radio telephony is unquestionably the greatest advance in fire control in this State since the introduction of power pumpers."

Great improvements were made by Radio Branch with modification of the disposal units obtained at low cost from the Services. In the light of the great advances made in later years in designing and building its own sets and later still, by purchase of sophisticated VHF equipment, the communications as provided by Radio Branch in 1948 were relatively primitive.

By the end of the decade in June 1949 nearly all fire fighting vehicles had been equipped with mobile sets, 54 of which were in operation with 16 fixed control stations. At this stage they lacked complete mobility as it was necessary to halt a vehicle and run out a fixed length of aerial before calling up a fixed station. However, radio was there to stay and despite limitations imposed by the equipment then available, these were to be overcome with the rapid technological advances of the ensuing years.

E. Fire Suppression Equipment and Methods

Outstanding features of the decade were:

1. The numerical deficiency of Forests Department staff and labour requiring the employment of many emergency services.

2. The development of heavier transport units with power pumpers and water-carrying equipment giving the ability to place larger volumes of water on fires in minimal time.

3. The development of mechanical means of fireline preparation, such as the use of tractors and bulldozers.

In 1939/40 some 1-ton trucks were purchased for trial as more suitable units to carry an adequate load of men, water and equipment for fire attack, but thereafter wartime needs severely restricted transport acquisition. The Department was fortunate in being able also to acquire a number of five-ton trucks for the firewood carting and in summer these were made available from time to time as supplementary transport for fire control work. In 1941 the army was called on for assistance on three occasions. This involved not only the provision of men, but also their own transport and facilities to feed them at the fire front. The Department provided the necessary tools, of which the fire rake was probably the most effective, and sufficient staff to direct the activities of the army personnel. The valued co-operation of the army

meant that its practical assistance was available for the next four years. It participated in controlled burning operations under Departmental direction as well as emergency fire fighting. Men from the Civil Aliens Corps were also used in emergency, their transport being by 5-ton firewood trucks. Sawmillers co-operated by provision of emergency gangs, both of bush workers and mill workers, when so required. Some of the sleeper mills provided very effective gangs utilising all their own men with their own tools and trucks. They proved to be men who rapidly adapted to this type of work, and they formed most useful self-contained units which required only direction by a trained and experienced officer.

By 1942/43 the State was receiving equipment for air raid precautions (A.R.P.) and a Jupiter trailer pump was loaned to the Department for trial at Pemberton. It consisted of a "Ford 10" four-cylinder motor coupled to a rotary pump mounted on a light trailer capable of being towed by a light vehicle. It carried a length of armoured suction hose and a supply of 1½ inch output canvas hose with nozzle. The trials were promising, particularly in mopping up operations where the extinguishing of burning trees with water was far more rapid and effective than felling such trees with hand tools.

The following year more trailer pumps were made available and 600 gallon tanks were used for the first time for water carrying. The 5-ton firewood trucks were invaluable in summer for transport of men, water supplies and equipment. In the Southern Divisions heavy trucks were hired when necessary from carriers, sawmills and contractors, as heavy Departmental vehicles were not then available. Three large "Mack" fire engines supplied by the Commonwealth, and not required by the A.R.P. authorities, were made available to the Department, and after fitting with 800 gallon tanks they proved most valuable units where roads were adequate to carry them. They were used very effectively in tackling some sawmill fires, and one also saved a store, post office, and other nearby buildings.

At the end of the war many more trailer pumpers became available including the larger ones powered with 6-cylinder Chevrolet or Chrysler engines. In addition to action at forest fires, the provision of so many pumpers with water-carrying equipment enabled the Department to make some valuable saves of sawmills, houses, farms and property other than State Forest.

Early in 1940 the first bulldozer was seen in operation in the timber industry where Bunnings were clearing a tramline from Manjimup to their new millsite at Nyamup. Its performance in rapid line clearing was viewed with some envy by Departmental officers, but such equipment was certainly not then available to the Forests Department. In 1942 at a large fire in virgin forest west of the Donnelly River, a number of emergency gangs were operating including a local pole getter who had been hired together with his old truck and a light tractor which he used for snigging and loading poles. In this type of country fireline clearing in advance of a fire usually involved the chipping of "spade" breaks as well as raking, because the scrub density limited the use of the fire rake. The light tractor was used for the first time dragging a log to clear a fireline and was assisted by a small gang clearing debris ahead and improving the trail behind the tractor. At 6 a.m. that morning the D.F.O. was present with the Acting Conservator and the latter became so

interested in the machine's performance that he became completely involved. At tea break some two hours later the tractor driver enquired of the D.F.O. "Who's the old bloke you have swamping there? He's a damn good worker." Quite a tribute to the enthusiasm of the Acting Conservator!

A gratifying result of that morning's work was the approval for, and purchase of, the Department's first bulldozer; a D4 Caterpillar machine with a locally-made blade manually operated by wheel and cable. Despite the strenuous work involved in this operation it was the pride and joy of the first operator trained to its use. The machine maintenance was 100 per cent, his operator skill of a high degree and he lived and slept with the 'dozer, camping out throughout the year. It was his "status symbol". No Rolls Royce owner was more proud of his vehicle than this driver was of his bulldozer.

This machine did invaluable work with a long record of track clearing, and fire fighting, working long hours both on the fire perimeter and in preparation of lines for back firing. For its transport, a 5-ton International truck was made available in summer from a Departmental firewood operation. The driver and his swamper became very skilled in loading and unloading the machine on two long 30 centimetres by 15 centimetres karri baulks fitted with steel ends which hooked on the back of the truck tray. After loading, the ramps were pushed on, one each side of the bulldozer. Each was the length of the tray, about 4.5 metres. With these portable loading and unloading ramps the outfit was highly mobile, rendering the unit invaluable at many fires over the next ten years. It is unlikely that the loading methods would receive the approval of today's safety officers.

The war's end also brought a great change in transport facilities. Many ex-army trucks were purchased, ranging from the 4 x 2 and 4 x 4 "blitz buggies", of nominal 15 cwt. capacity, to five-ton trucks, both two-wheel and four-wheel drives. A few six-wheel drive trucks were also purchased for fitting with tanks as large volume water carriers. Heavy duty fire trucks were developed with power pumpers and 600 gallon tanks mounted on the 5-ton army Ford and Chevrolet trucks.

The acquisition of so much "used" motorised equipment required provision of servicing facilities. One or more mechanics became fully employed at each divisional headquarters and small servicing workshops grew at Dwellingup, Collie, Manjimup and Ludlow. These were the forerunners of major workshops which were to develop as all departmental operations became mechanised. Despite the continued difficulties of obtaining adequate tools and spare parts, the mechanics showed considerable skill and ingenuity in keeping most of this equipment in operation.

F. Throughout the decade progress was made in fire weather research and weather forecasting. With the establishment of Pemberton headquarters in 1940/41, the fire weather station was transferred from Manjimup to Pemberton. For security reasons the broadcasting of fire hazard forecasts was suspended from 1941 until the end of the war in 1945, when it was resumed by the national stations. However, within the Department the forecast was passed by Departmental telephone daily at 7.45 a.m. and 4 p.m. from Dwellingup to Pemberton via each division so that all divisions and fire towers were informed.

G. A review of the decade's achievements reveals substantial headway had been made in all aspects of fire control

work. Despite the shortage of staff and the use of makeshift equipment and organisation, there had been a progressive change in equipment and methods with the introduction of pumpers and the use of water to a far greater extent. Some very difficult seasons were encountered and there were some severe fires and heavy losses, particularly in "zone B" (mostly virgin forest), but "zone A" losses were held to an acceptable minimum. In 1944/45 the Department suffered its greatest loss in pine plantations when fires occurred in and virtually destroyed the two plantations of Pardelup and Boranup, involving the loss of some 165 hectares of pine. This provided a very good illustration of the difficulty or virtual impossibility of protecting small isolated plantations remote from resident forest staff and where facilities for early and effective fire attack were lacking. As the stands were young, the major loss was the fruit of much experimental work in pine nutrition on inferior soils at these two sites.

In the annual report of 1947 the Conservator stressed that the extension of fire control over large areas of forest in the extreme south west was of vital importance to future timber supplies and would only be possible by a substantial programme of development of roads, lookout towers and telephone lines. In 1948 he further stressed that this was one of two major problems facing the Department, and "could only be met by financial assistance over a planned period, substantially above the normal income derived from revenue". In a later chapter it will be seen how this requirement was met over the ensuing decades, largely aided by special F.A.R.G. funds for roading of forest in the far south, and facilitated by the extension of new sawmilling activity into these areas of virgin forest.

6. Assessment and Survey - Forest Areas - and Working Plans

Survey and Assessment over the decade were limited to such work as could be covered by the restricted staff in each Division.

A survey for sleeper milling in the Southern Divisions was completed over some 12,140 hectares in 1941/42. Type mapping was carried out over some 8,000 hectares of jarrah forest and considerable areas of coastal sandplain in anticipation of postwar resumption of pine planting. Land south of Pardelup was also investigated by field surveys to determine its potential for softwood plantation. (It was subsequently used for war service land settlement.) The traversing of newly cleared roads and tracks was kept up-to-date as far as possible but no special survey or topographic teams were employed on this work.

Local assessments carried out once or more per quarter as a check on treemarking standards for each permit, were in later years supplemented by an assessment on permanently pegged and established lines. It was intended that these would form permanent line plots, not only to record timber remaining after trade cutting, but also for periodic remeasurement for accumulation of growth data. From 1942 onwards, lines were established in each permit area and progressively extended as cutting progressed. The assessments were done by the local district officer concerned under direct control, and often with the assistance of, the D.F.O. In the northern districts from about 1947 a small permanent team was employed full time on this work. Initially trees were tagged with numbered copper tags, using 3-inch copper nails to attach them to each

tree. Trees were recorded for half chain on either side of the 5 chain band thus giving one acre for each ten chains. With lines spaced at half mile intervals this gave a 2½ per cent assessment, but it was quite obvious that this intensity could not be maintained if the lines were to be remeasured in the future. At a later stage the use of copper tags was abandoned and individual trees were located by co-ordinates, these being the distance along the line and the offset distance of each tree from the line right or left.

In 1944/45 for the first time, air photos were used for assessment of metropolitan plantations prior to the commencement of thinnings at Gnangara. The following year forest type classification was attempted from stereoscopic examination of aerial photographs in the lower south west. This was a prelude to much wider use of air photos for forest mapping.

There was little increase in the area of dedicated forest over the period, but the usual annual additions and excisions of small areas were made. The net increase over the ten years to June 1949 was 14,450 hectares of which 10,314 hectares were added in 1943/44 to State Forest south east of Nannup. The total area of State Forest at 30th June, 1949, was 1,377,379 hectares.

As previously mentioned the General Working Plan of 1929 was revised in 1939 with no increase in the permissible intake of 660,000 cubic metres. In 1945 it was decided to control the sawmilling of all hardwood species on State Forest and Crown Land under one General Working Plan, with the exception that separate Working Plans would control conditions of the small sleeper and case mills where most of the production was coming from Crown Land other than State Forest. The 1945 Plan provided for a reduction in the cut of the heavily exploited northern jarrah forests and an increase in the southern virgin forests where several large new mills were scheduled to come into production.

Although much data had been accumulated there was a definite need for a complete reassessment of indigenous forest and remeasurement of growth rates before the next revision of the Working Plan in 1956. This project was to be undertaken in the ensuing decade greatly aided by the development of "air photo interpretation" and sampling techniques. By 1949 some new apparatus had been obtained and work in A.P.I. was making considerable progress under the guidance of a senior officer in Drafting Branch, Mr. A.J. Burrell, who had studied the subject in the United Kingdom while on long service leave. A suitable technique had been developed for eucalypt forests and it was also anticipated that topographic surveys which were in arrears, would in future be largely replaced by air photo work. This expectation was fully realised as work progressed.

With Forests Department representation on the State Mapping Committee, the Department prepared and submitted to that body a Photo Working Plan of future requirements for inclusion in the general State programme of aerial photography. This representation and close liaison with this committee was to be of immeasurable benefit in the future in maintaining a mapping programme of the forest areas of the south west.

With the anticipation of a resumption of pine planting on a larger scale, a General Working Plan for Pine Planting was drafted in 1949, but its implementation was of course dependent on an adequate allocation of loan funds.

Perhaps the most important development in survey, assessment and mapping was the laying of sound foundations for the application of aerial photography to this branch of Departmental activity. Substantial changes and benefits were to follow in the ensuing years.

7. Research, Investigation and Utilisation

Apart from minor investigations by field officers, research by an organised group of staff virtually ceased during the decade. Attention was given only to such problems as could be handled by administrative staff. On a restricted scale studies still continued in jarrah silviculture, soils, pine establishment and nutrition.

In 1947 plans were made for revival of research and an arrangement for co-operation of the Commonwealth Forestry and Timber Bureau by assisting to man a laboratory then under construction at Dwellingup. This was well established by 1949. Of more immediate concern were the subjects of fire weather research, problems of fire control, and utilisation investigations to meet wartime needs.

The utilisation branch early undertook studies on the burning, cracking and grading of charcoal, the need for which was foreseen as a source of producer gas substituting for expected wartime shortages of petrol. Other activities included collection and collation of data on wartime timber supplies, the use of substitute timbers for special purposes and associated problems. Assistance was given to industry in kiln design, construction, and operation, for production of seasoned timber, and with kiln design for charcoal production. Technical advice was also given to many inquirers on many subjects.

Work on by-products of distillation of various timbers was carried out by the Government Analyst from samples supplied by the Forests Department. From 1946 to 1949 there was an increased interest in the use of marri with production of small quantities of sawn marri for both cases and scantling. During these years when supply could not fully meet demand the utilisation officer was closely associated with the co-ordinator of timber supplies. He also found time for a revision of the grading rules and their publication as a Departmental bulletin in 1949.

An interesting development for reduction of waste and increased sawn recovery was the installation in 1948/49 of stepped grate furnaces to burn sawdust for power at one of the larger sawmills. This was to prove so satisfactory that many major mills were destined to follow this practice in ensuing years.

In the same year, with the co-operation of the Division of Forest Products, a mill study was made of a jarrah sawmill. This entailed a detailed examination of production, conversion methods and rates. Some local officers were trained in these methods and it was the forerunner of a number of such studies carried out in later years.

Despite the lack of an organised research group the output of valuable research results was surprisingly high and the establishment of a laboratory at Dwellingup was a hopeful pointer towards better progress in the future of research.

8. Staff

Frequent reference has been made to the shortage of staff during the 1939/49 period and this was particularly serious in the post-war years. With the closure of the Ludlow school in 1929 and the extremely low recruitment over the next 18 years, the loss of personnel to the services, and the progressive loss by age and resignations, the position was indeed parlous by 1946/47. The ranks of professional officers were halved. Experienced clerical officers of head office were lost by retirement and transfer and experienced field officers by retirement and resignations. Most of the professional staff who resigned were experienced and valuable officers whose abilities enabled them to fill more lucrative or attractive positions elsewhere while several other officers were on loan to various other organisations for periods ranging from months to one or two years.

It is of interest to record in more detail this attrition of staff, particularly after the lifting of manpower restrictions at the end of the war. Of 20 graduate staff in 1939, five were lost during the war years and six more within the ensuing two years. In 1939/40 three were released for war service, namely G.W. Nunn, D.F.O. and also a former graduate of Duntroon Military College. He rejoined the Department in 1943/44 but was again absent on leave for two years from May 1946 with United Nations Relief and Rehabilitation in China. W.D. Sharp, A.D.F.O., enlisted in the Air Force and was reported missing as a flying officer believed killed in North Africa. W.G. Chandler, A.D.F.O., went overseas with the Second Forestry Company, rejoined the staff in 1946 and resigned in May that year for a position as Forest Officer with the State Electricity Commission of Victoria. (He later joined Australian Paper Manufacturers.) Three more men left in 1940/41. Mr. A.D. Helms, Research Officer, resigned on 12th September, 1940, to take a position as Research Officer with the Commonwealth in Tasmania. He later took a position as lecturer at the Australian Forestry School. Mr. J.H. Harding, Research Officer, and a graduate of Jervis Bay Naval College, rejoined the navy on 14th May, 1941. Mr. S.L. Kessell, Conservator of Forests since 1923, was seconded to the Department of Munitions of the Commonwealth as Timber Controller and left for Melbourne on the 8th May, 1941. After the cessation of hostilities he resigned in December 1945 to accept a post as managing director to Australian Newsprint Mills in Tasmania. In early 1945, J. O'Donnell who had made valuable contributions over the previous 8 years as the first Fire Control Officer, resigned to take up the position of Assistant Conservator in Tasmania. In May 1946 Mr. A.C. Harris, D.F.O., resigned to take up a position with the new Charcoal Iron Industry at Wundowie where he later became the general manager. (He was to return to the Department as Conservator some 7½ years later.) In 1947 on 14th January, Mr. B.H. Bednall, D.F.O., and acting Assistant Conservator, resigned to take up the position of Conservator of Forests in South Australia. In the same year on the 13th May Mr. C.D. Hamilton, A.D.F.O. resigned to accept the position of lecturer at the Australian Forestry School, Canberra. Prior to this, W. Lockhart, D.F.O., had withdrawn from the staff for reasons of health and died on the 21st November, 1948.

The position was further aggravated by the diversion of some residual staff to special duties, or on loan outside the State. Mr. A.C. Shedley, Assistant Conservator was

seconded in 1942/43 to the Ministry of Munitions as Deputy Timber Controller for W.A. In 1944/45 Mr. F.E. Gregson, Utilisation Officer was seconded to assist Mr. Shedley. In 1948 he was granted 12 months leave without pay and subsequently resigned from the Department to take over the position of Executive Officer of the Associated Sawmillers and Timber Merchants Association.

Although the office of Timber Control closed at the end of the war in 1945, much of the time of the above two officers was occupied by matters concerning the post-war supply and distribution of timber for the next 7 to 8 years. Following the resignation of Mr. Kessell, Mr. T.N. Stoate was appointed Conservator of Forests on the 1st February, 1946. Mr. Shedley represented the Conservator as chairman of a Timber Advisory Committee acting as a liaison between the sawmillers and the Commonwealth Forestry & Timber Bureau. He became senior Assistant Conservator on the 1st July, 1947, and subsequently used the title of Co-ordinator of Timber Supplies when dealing with timber supply matters. In 1946 Mr. P.H. Barrett was absent for a year on loan to the Australian Forestry School as a lecturer on Forest Engineering, while both Messrs. Wallace and Milesi were absent for periods to lecture on fire control in Canberra.

The only officer recruited during this period was Mr. J.C. Meachem who graduated in 1942 from the Australian Forestry School, served in the Air Force with distinction (D.F.C.) and was appointed A.D.F.O. in October 1945. Mr. J.H. Harding also returned after service in the Navy to research duties.

There was also considerable deterioration with regard to the position among the field staff. In the 1939-1945 period there were six enlistments for military service, six retirements, two deaths, and five resignations for a total loss of 19. The appointment of 13 new men, many of them with little experience and training in forestry, was very limited compensation for the loss of 19 experienced officers. In the ensuing four years there were eight retirements and ten resignations, a total of 18 losses. Seven of these resignations were immediately after the war. Again, there was a recruitment of 16 men but these were all relatively inexperienced.

The retirement of the older experienced foresters and the resignation of able active men to more lucrative vocations after the war created a loss of expertise that was not readily replaced, as many of the new appointees lacked adequate experience and training. The more senior field positions were ably filled by many of the Ludlow graduates who exemplified the value of their early training and years of service. However, the adequate training and supervision of the new recruits was a very real problem for the reduced numbers of trained staff who already continued to bear a heavy workload.

Clerical staff at head office was depleted by a high proportion of enlistments of the younger men necessitating the employment of many girls. However, much more serious was the loss during and after the war of a number of senior officers, many of whom had been in the Department for two or more decades. Mr. J.O. Aspinall who had been assistant to the Clerk in Charge of Registration since 1921, joined

Mr. S.L. Kessell in Melbourne in July 1941 on timber control work. He resigned in 1946 to take up a position in the Commonwealth Public Service. Mr. V. Telfer who had been the Clerk in Charge of Registrations since 22nd April 1920 and was gazetted Registrar in 1936 transferred to the Workers Homes Board and State Housing Commission as Assistant Secretary on 25th February, 1947. The following year Mr. H.A. Williamson, Record Clerk, died on the 22nd July after nearly 30 years' service. Later the same year Mr. C.M.F. Hill, Chief Clerk, retired after nearly 30 years' service in the Department.

One resignation of considerable significance was that in 1943/44 of Mr. H.E. Graham from the Drafting Branch, following his election to the Legislative Assembly. Some nine years later he returned to take an active interest in the Department as Minister for Forests, a post he held for a period of six fruitful years from 1953 to 1959.

The loss of so many experienced and competent public servants was a severe blow to the Departmental administration in this crucial post-war period. The "rump" of senior officers carried a very heavy workload for ten years or so before the inflow of young graduates commencing in 1949 with the appointment of Messrs. Eastman and Hatch was able to give appreciable relief.

A welcome re-appointment in 1948 was that of Mr. J.L. d'Espeissis as D.F.O., who had resigned in 1935 and spent more than 10 years in the Colonial Forest Service in Fiji. He resigned in mid-1951 after relieving Senior D.F.O. D. Stewart for more than 12 months during the latter's absence overseas on study leave under the Grimwade Prize in 1950/51.

It had also become quite apparent that a resumption of recruitment and training of young men for field officers in the general grades was very necessary if adequate field staff was to be provided for the future. The ensuing decade was to see a major advance in the staff position, both general and professional with sufficient professional staff forthcoming, not only to strengthen field administration, but also to form the nucleus of a research group destined to become a strong branch of the Department.

CHAPTER III

1949-59 - RECOVERY AND EXPANSION

1. Introductory Review

As previously recorded, the recovery of the timber and forest industries from the aftermath of the war, was frustratingly slow, due to the inability to attract manpower to these rural occupations and the chronic shortage of essential materials and equipment for sawmill construction and production. A further year was to elapse before large new sawmills began to produce the increasing quantities of timber so desperately required for housing and industry, not only in Western Australia, but also for the Eastern States, particularly South Australia. Thereafter, despite manpower problems, sawn timber output rapidly increased to reach an all time peak in 1955/56 - more than double that of 1945/46 and 83 per cent greater than that of 1948/49. Although 'Timber Control' as a war measure ceased in 1945, a modified form continued by Commonwealth control of export licenses, until the arrears of housing were overtaken in 1956. Control was lifted in July 1957.

Parallel with this recovery in timber production was that of Forests Department revenue and in its general activities. A Royal Commission of enquiry into forestry and the timber industry in 1951 afforded a timely opportunity for a review of past performance and an appraisal of future needs. The recommendations of the Commission provided useful guidelines for subsequent action and development. In 1953 there was a change in government and in the administrative head, the Conservator of Forests.

With industry recovery, royalty adjustments and greatly increased forest revenue, many changes occurred, and increased activity was substantial in housing, provision of amenities, forest dedication, roading, fire control, pine planting and pine utilisation. Stocktaking, assessment, survey and mapping were revolutionised by the use of air photos and development of air photo interpretation techniques, giving improved data with a great reduction in time, effort and cost. Heavy plant and equipment and adequate motor transport was acquired with the necessary provision of workshops and staff to maintain them. The nucleus of a sound Research Branch was established and the Utilisation Branch was reconstituted.

The tremendous lift in wool prices in 1950/51, the increase in prices generally for farm produce, and Australia's pursuit of a vigorous immigration policy gave the economy a boost that made the decade one of extraordinary growth and expansion. The timber industry, then second only in value to wool and wheat, played an important and active role during this period, while the consequent increased revenue enabled the Forests Department to embark on a period of unprecedented growth and development.

2. The Timber Industry and Forest Revenue

As previously indicated, the recovery of the timber industry after the war was extremely slow. It was plagued with a shortage of men and materials, serious loss of key men to numerous new small mills, (61 being within 25 miles of Perth) and a high turnover of available labour. These factors delayed for some four to five years the planned large scale output of six major sawmills which were to operate in the virgin forests of the southern region. Further years were to elapse before these mills were in full production, and the loss by fire of several large sawmills contributed to the deficit in timber products.

Despite the proliferation of small sawmills, mostly operating on private property with limited log resources, the increased volume production was small in relation to the number of new mills as the following figures well illustrate. In the three years 1945/46 to 1948/49, the number of sawmills increased by 78 per cent from 128 to 228, but the output of sawn timber increased only by 18 per cent over the same period. In 1949/50 the position was little better. Three large new mills (Shannon, Donnelly and Quininup) commenced operation, but three other mills were lost by fire, including Jarrahdale and Jarrahwood. There was no pronounced increase in sawn timber output until 1950/51 when a 15 per cent increase coincided with operation of new mills at Boyup Brook and Northcliffe. In the three years 1950/51 to 1952/53 inclusive, the output increased by 57 per cent to a record 480,732 cubic metres of sawn timber, with an all time high number of 306 sawmills operating. During the ensuing three years despite a 10 per cent reduction in sawmill numbers from 306 to 274 (as small mills exhausted their private property log resources), there was a further increase of 13 per cent in sawn output in 1955/56 to an all time high of 544,310 cubic metres. The impact of the large new mills in the south was increasingly evident as they overcame their problems and attained full production.

By 1956 peak production had passed and the housing lag was overtaken. Demand from South Australia decreased. The industry was again seeking increased export orders which had been limited since World War II by Commonwealth control through export licenses and public pressures for restriction of exports while the local demand was high and urgent. Timber control was finally lifted in July 1957. Meanwhile stocks were accumulating and production dropped by some 8% to 502,758 cubic metres in 1958/59.

In 1957, the Conservator reporting on 'export policy'* was quite critical of the delay in lifting controls. West Australia had suffered a major loss of its export trade, with direction of its production to the east, especially to South Australia. When imports of American softwood and south-east Asian timbers became readily available, there was no reciprocity from the east to maintain the trade with West Australia; and the industry in this State was left in a weak bargaining position. It had, in fact, lost a number of its traditional markets during the years of high Australian demand.

Failure to attract manpower in the postwar years led to many changes in the industry to meet the changing social conditions.

Mill settlements were rendered more attractive by provision of improved housing, electricity supply, good reticulated water supply, workers' licensed clubs and in some cases playing fields, and swimming pools.

In the forest mechanised felling advanced with improvements in the chain saw and one faller could do the work of 4 to 6 hand fallers. Logging equipment improved and the conversion from locomotive hauling by rail to motor truck haulage by road was completed.

There was much improvement of sawmill design and equipment to reduce the labour requirements and render the work less arduous with greater mechanisation. Many large steam-powered mills installed sawdust burning furnaces for power, thus avoiding use of sawn timber for fuel and leading to improved sawn recovery. As the State Electricity Commission power grid spread, mills began to convert to electric power where it was available.

* Annual Report - 1956/57 P.8

Handling of timber from the mill and in the yard was revolutionised by means of conveyors, "green chains", fork lifts, mobile cranes and gantries. It was largely the improved living and working conditions that eventually enabled the major sawmills to attract and retain an adequate labour force and play a dominant role in meeting the State's vital timber requirements.

The plywood industry underwent substantial expansion with the importation of peeler logs, mainly from Borneo to provide up to 80 per cent of its intake. It continued to draw supplies of karri peeler logs in varying quantities, supplemented by small volumes of selected pine logs from the older plantations at Mundaring Weir and Harvey. Demand for local logs fluctuated with availability of imported logs, and was particularly strong when delays occurred in deliveries of the latter.

While the average annual volume of karri peelers was some 2880 m^3 the use of imported logs steadily increased from 2000 m^3 in 1949/50 to 14,000 m^3 in 1958/59. Parallel with this growth, but on a much smaller scale, was the steady increase in local peeler logs of radiata pine from 248 m^3 in 1949/50 to 2,535 m^3 in 1957/58.

The State Sawmills had been virtually the sole suppliers of karri peelers since the industry commenced operations, but in 1956 it was found necessary to draw a quota of logs from every major karri permit holder to meet the needs of the industry.

Minor Forest Products

Piles and poles production throughout the decade continued with minor fluctuations at an average of some 220,500 lineal metres per annum, of which about 45 per cent were from Crown land and 55 per cent from private property. The chief buyers were the P.M.G. Department and the State Electricity Commission.

The State Electricity Commission was very active during this decade, seeking jarrah poles. Large quantities of 10.7 metre "distribution" poles were purchased annually while long 17 metre poles with a minimum crown diameter of 20 cm were sought for "transmission" lines. As long private property poles became exhausted, many were supplied as "thinnings" from State Forest to maintain an essential State service.

Mallet bark production continued on a small scale of up to 1000 tonnes per annum, mostly from private property.

Firewood - From such records as are available, it appears that total consumption of wood as a fuel did not vary much during the decade, ranging from 730,000 to 800,000 tonnes per annum. As statistics for private property are lacking, portion of this usage is based on estimates only. However, some notable changes occurred in the Goldfields over this period, with the use of coal, and later diesel fuel. Wood fuel consumption for mining use in the Goldfields was only 41,000 tonnes in 1958/59 as compared to 210,000 tonnes in 1948/49, and some 400,000 tonnes at its peak in the 1930's.

Sawdust, as a fuel partially displacing solid wood, increased to more than 100,000 tonnes per year with its use at major sawmills in the south, and by a number of factories in Perth, to which it was carted from mills up to 80 kilometres distant. Firewood for the Goldfields Water Supply

pumping stations also decreased, as they were converted to electric power, the first conversion being Nos. 1 and 2 stations at Mundaring Weir in 1953/54.

Domestic firewood increased from about one third in 1949/49 to one half in 1958/59 of the total estimated firewood consumption, the figures for the latter year being:

Domestic forewood	394,000 tonnes
Industries	313,000
Pumping Stations	26,000
Mining	41,000
Total	774,000 tonnes

As the Forests Department derives most of its revenue from log sales, (royalties), its well-being and activities are closely bound to the prosperity of the timber industry. With the rapidly increasing production from 1950/51 and periodic revision of royalty rates the Department entered an era of unprecedented activity and progress. Gross revenue rose from $476,714 in 1948/49 to $2,450,746 in 1958/59 of which some 65 per cent was from log royalties. A major revision of royalties and the royalty structure was made in 1954/55 to reduce anomalies that had developed over the years and achieve more realistic rates which had lagged behind rising inflation-caused costs and prices.

Royalties were also reviewed for poles and piles and other forest produce generally in an effort to maintain relative values during this period of progressive inflation and consequent price rises. A visit by the Conservator to the main sandalwood buyers at Singapore and Hong Kong, in October 1956, resulted in improved prices which appreciably increased revenue from that commodity.

Following the considerable fall in demand for housing timbers after 1956, the industry was successful in obtaining sleeper orders which assisted in maintaining a fairly high level of production. However it is fairly certain that the 1956 peak of sawn hardwood production will never again be reached in Western Australia.

It was a source of satisfaction to know that after some 90 years of exploitation the forests of the South West which had contributed so much to the growth and development of W.A. had still been able to meet the great post-war demands made upon them.

Under wise management they would continue to meet a high proportion of the State's future needs of forest products, but it was increasingly obvious that increasing population would require supplementary sources of wood from man-made plantations.

3. The Royal Commission 1951

A landmark in the history of the Forests Department was the appointment of a Royal Commission in 1951 to inquire into and report on aspects of Forests and the Timber Industry in Western Australia. It was the first such inquiry since that of 1922, which followed the resignation of the Conservator, Mr. C.E. Lane-Poole in July, 1921.*

* Robertson - P. 96 et seq. and Report of Royal Commission Forestry 1922.

The circumstances leading to the appointment of the Royal Commission are of considerable interest and outlined as follows.

With great public pressures for increased housing, and the apparent failure of the timber industry to meet these needs insofar as timber was concerned, (for framing, roof supports, flooring and joinery), the Minister for Forests and Housing found himself in a difficult position. As Minister for Housing, he was obliged to pursue every means to obtain an increased output of houses. For reasons previously outlined, the industry which drew its raw material from the forests under the Minister's control, was unable to meet increasingly urgent demands made upon it.

In June 1950 representatives of the Kauri Timber Company approached the Minister seeking the granting of a further Permit for their existing Nannup mill, the life of which was estimated at 10 to 12 years.* This Company with its head office in Melbourne, had been operating in Western Australia for several decades, but exported most of its production and contributed little to the local market. Sensing an opportunity to bargain for more timber for local trade, the Minister entered into negotiations, and the directors of the Company undertook among other things to erect a sawmill at Nannup and sell the whole output therefrom on the Metropolitan market, in return for a Sawmilling Permit over the "Milyeanup area" south west of Nannup. Such a proposal would, of course, have violated the provisions of the Forests Act, which required the sale of such rights by auction or tender. On 31st July 1950 the Conservator was instructed to call tenders for the area concerned, at what was considered a fair upset royalty of ten shillings per load, (approximately 70 cents per cubic metre), and with four specified conditions covering mill erection, production, and disposal of output.

Seven tenders were received, of which five were higher than that of the Kauri Timber Coy., the highest being 15/6 per load, (i.e. approximately $1.08 per m^3). The Crown Law Department advised against acceptance of the tender of the Kauri Timber Company. A Cabinet-appointed sub-committee decided to return deposits to tenderers, and indicate that no tenders were being accepted at that time. It also decided that an agreement be drawn up and subject to ratification by the Directors of the Kauri Timber Company the whole matter then be placed before Parliament, where members could decide whether acceptance of the lower tender, with the special agreement, would yield advantages which would outweigh the loss of revenue from non-acceptance of the highest tender. If so, special legislation would be necessary to legalise the agreement.

The Kauri Timber Company Limited Agreement Bill was duly presented to Parliament, and at the second reading on 7th November 1950, the Bill was referred to a Select Committee on the motion of Mr. F.J.S. Wise, a former premier. The Select Committee, comprised of five members of each house, and chaired by Mr. Wise, met on ten occasions and took evidence from 17 witnesses, including the Conservator, the Assistant Conservator and Co-ordinator of Timber Supplies, the Minister for Forests, and twelve executives in the timber industry. Its report, tabled in the Legislative Assembly on 28th November, 1950, ø made nine recommendations, including:

* Kauri Timber Company Agreement Bill - Evidence before Parliamentary Select Committee, 1950.

ø Report of the Select Committee on the Kauri Timber Company Bill.

1. That the Bill be not proceeded with.

2. That no tender be accepted in connection with the Milyeanup area, and

3. That it is desirable immediately to appoint a Royal Commission to inquire into and report upon every phase of forestry and timber activities, and timber trading in Western Australia.

On 7th December, 1950, the Premier announced that as recommended, a Royal Commission would be appointed and on 28th March, 1951, the Conservator was advised that Executive Council had approved the appointment of Mr. G.J. Rodger, Director General of the Commonwealth Forestry and Timber Bureau. His inquiries commenced on 10th May, 1951, forty eight witnesses were examined on oath, and various forest centres were visited. Inquiries concluded on 19th October, 1951, the report was submitted on 14th December, 1951, and released by the Minister on the 23rd January, 1952.≋

This report was a comprehensive document of sixty one printed foolscap pages, covering the ten terms of reference. It reviewed almost all the main activities of the Forests Department, as well as Forest legislation and relevant facets of the timber industry. It concluded with some 69 recommendations under the ten headings of the terms of reference. Much use had been made of Departmental records, and considerable evidence was given by eight senior officers of the Forests Department. The preparation of this evidence, and the searching inquiries of the Commission led to a report which was to form valuable guidelines for the policy and objectives of the Department for the future, and particularly for the next decade. Generally, it confirmed the practices and policies followed by the Department over the years. It recognised the great difficulties under which it had operated, with deficiencies in finance and staff numbers, and it presented recommendations to the Government which were welcomed by Departmental officers as a sound contribution towards future forest administration.

While the Conservator could take early action to implement some of the recommendations, others were the subject of references to the Minister for approval.

Perusal of files* reveals a series of recommendations submitted to the Minister for Forests in this connection but no evidence of any reply to these minutes was apparent. Possibly this was due to his pre-occupation with housing matters and a forthcoming election. The Conservator appears to have suffered other frustrations with rejection of areas sought for pine planting, loss of staff, and inability to secure justice for his staff in the 1951 reclassification. A note bordering on despair is detectable in a submission of 15th January 1953 shortly before expiry of his term of appointment, to the Minister. Faced with drastic losses of senior staff (10 officers between 1946 and 1950), inability to recruit suitable personnel under the lowered status of the 1951 reclassification, and failure to obtain satisfaction from the Public Service Commissioner, the Conservator offered the suggestion that "a lawyer of at least K.C. status should

≋ Report of the Royal Commission on Forestry and the timber industry.

* File F.D. 214/F2 pp 38 to 42

review the rank, status and salaries as desired by the Conservator on the one hand, and as altered by the Public Service Commissioner on the other." (The minute implied this had been done without reference to or discussion with the Conservator).

Following the change of Government on 23rd February, 1953, another series of minutes with recommendations were submitted to the new Minister, but no immediate action resulted. It was not until after the change in the administrative head in October 1953 as outlined in the next section, that staff injustices were removed, and vigorous steps approved for implementation of all but a few minor items of the Royal Commission recommendations.

4. Administration

The statutory seven year term of appointment of Mr. Stoate as Conservator expired at the end of January 1953. An election was imminent and no immediate action was taken to fill the position. A few weeks later an election resulted in a change to a Labour government under a new premier, Mr. A.R.G. Hawke. Mr. Stoate, who during the year was awarded the degree of Doctor of Science of the Adelaide University, continued to carry on in an 'acting' capacity, pending an appointment by the new cabinet. The new Minister for Forests, Mr. H.E. Graham, had a particular interest in, and was better acquainted than most of his colleagues with the Forests Department, having served for some years in its drafting branch, prior to entering politics.

Early in June, 1953, in order to remove marketable timber from land urgently required for War Service Land Settlement, nine areas in the far south were advertised for sale of sawmilling rights. These were located near Tone River, Shannon River, Rocky Gully, Frankland River and Nannup.

One week later they were withdrawn from sale. Apparently a number of sawmillers had submitted objections to the new Minister on the grounds that two weeks was insufficient notice for the advertising of such diverse and extensive areas and that some of the conditions were not acceptable.

Following these complaints the Minister appointed an advisory committee to examine the position and report to him. It consisted of Mr. A.C. Harris, Chairman of Wundowie Charcoal Iron Board, and a former Divisional Forest Officer; Mr. F. Gregson, Executive Officer of A.S.T.M., and former Utilisation Officer of the Forests Department; and Mr. Hayes, an accountant representing the small sawmilling interests.

The outcome of this committee's report, and its discussions with the acting Conservator was that tenders for two of the areas were re-called on 10th September with a four week period to the closing date, and a third area was approved for sale. Three areas were to be further investigated and three to be withheld.*

Meanwhile, cabinet decided to call for applications for the position of Conservator of Forests on an Australia-wide basis. This resulted in the selection of Mr. A.C. Harris for the position, and he took office on 19th October 1953, after nearly 7½ years valuable experience in industry outside the Department.

* File 612/53 - P. 71

Dr. Stoate completed the writing up of a report on the research work of the Forests Department, which had been under his personal direction for some 20 years, until 16th February 1954, when he commenced long service leave prior to his retirement. His 32 years with the Department was a period of great personal activity during which he carried a very heavy work load, particularly during the last 10 years or so when professional staff was so greatly reduced.

Working with very limited resources, his contributions to forestry research were most valuable and substantial, and in the field of pine nutrition particularly, his work was of world wide significance. Among other things it enabled both West and South Australia to grow economic plantations of pines on extensive areas where previously attempted plantings resulted only in failure. (A senior South Australian forester asserted that his contribution when on loan to that State in 1939-40 was worth $2 million to that State). It is of interest that for the next 20 years, after his retirement, he was most active in forestry matters in New Zealand, Canada, and the U.S.A. In 1973 he still held a chair in forestry, as a professor at the University of Washington, Seattle, where he had spent many years and continued to devote his energies to the profession he so deeply loved.

Under the enthusiastic direction of the new Conservator, Mr. A.C. Harris, with sympathetic ministerial support, and with the augmented income from the increasing activity of the timber industry, great impetus was given to the development of forestry and active steps taken to implement the recommendations of the Royal Commission.

Staff was augmented by appointment not only of W.A. graduates, but also graduates from the Eastern States and overseas, when suitable applicants were available. With more young graduates available some senior field officers were transferred to Head Office and the Conservator held regular conferences with his senior officers on policy matters.

Early attention was given to salaries and reclassification of both professional and field staff, who had been poorly treated in this regard in the preceding few years and in the 1951 reclassification. Status and salaries had lagged sadly below those of comparable officers in other branches of the Public Service, and in Eastern States forest services.

A vigorous policy of recruitment was pursued for both general and professional staff and modifications made to place on a sounder and more systematic basis the recruitment and training of young men from 16 to 19 years for careers on the permanent field staff. A comprehensive and long overdue reappraisal of royalties was undertaken in 1954/55, bringing the Department revenues to a satisfactory level. The many activities will be covered in more detail under the headings which follow.

5. The Forest Estate and Land Utilisation Committee

In November 1950, at a meeting of Australian Heads of Forestry Services, the Resources Division of the Forestry and Timber Bureau submitted proposals for conducting a national forest inventory. This was followed by an interstate conference of technical officers in February 1951 which reached agreement on methods and definitions.+ Prior to this each State had its own system and methods while map scales and projections varied from State to State. A primary aim now was to attain a degree of uniformity, giving statistical data which would be comparable for each State. A definition of

+ National Forest Industry - 1951 - Division of Forest Resources F. & T.B.

forest inventory was adopted for this purpose and the use of one mile to an inch map sheets on the transverse mercator projection as used by the military authorities was also adopted. A combination of aerial survey, photo interpretation and ground sampling was proposed.

West Australia was already making good progress in this direction when the Royal Commission enquiries were proceeding in 1951. Among the fifteen recommendations on 'forest resources' made by the Royal Commissioner, the first three stressed the need for continuous stocktaking, the dedication as State Forest of all Crown lands carrying milling timber of good quality or required for other purposes, and the appointment of a Committee consisting of the Conservator, the Chairman of the Land Settlement Board, the Director of Agriculture, and the Surveyor General, to make recommendations on the desirable land use where any doubt existed.

After 12 months delay, the McLarty cabinet appointed a "Land Utilisation Committee" which held its inaugural meeting on 9th February 1953, (just ten days before the elections which were to defeat the government). It was apparently attended by the Assistant Conservator, and it recommended to the Minister, the appointment of two more members, viz. the Soil Conservation Commissioner and an Economic Research Officer from the Treasury.

On 26th February 1953 in a minute to the new Minister, the Conservator advised that he had not been informed of the recently appointed L.U.C. and that a Land Settlement Co-ordination Committee set up in 1943 by the Willcock Government, was still operative. It consisted of the Conservator, the Director of Agriculture and the Surveyor General. Its chief activity had been to decide matters of land use in connection with post war settlement schemes for agriculture. The last recorded meeting of the L.S.C.C. was on 20th August 1953* when consideration was given to a number of areas from Kent River in the east to Rosa Brook in the west.

The Land Utilisation Committee as appointed by the McLarty Government does not appear to have met again until after Mr. Harris took office as Conservator. As reconstituted, it then comprised the Conservator of Forests, the Principal Assistant Hydraulic Engineer, the Director of Agriculture, the Commissioner of Soil Conservation, a Treasury economics officer, and the Surveyor General who was elected chairman. This committee of men well qualified in their various fields to consider the impact and implications of the many possible uses of forest lands, held its first of many meetings on 11th November 1953. With the latest available information from aerial surveys, field assessment, agricultural development, water supply proposals, and soil salinity problems, etc., it made decisions on the future use of substantial areas of Crown lands involving the dedication of some 205,535 hectares of State Forest, and the allocation of considerable areas for agriculture and other purposes. The total area of State Forest by 30th June, 1959 had increased to 1,751,179 ha, leaving only relatively small areas of forested Crown land for further consideration.

On 2nd April, 1959 the Brand Government replaced the Hawke Government which was defeated at the polls after six years of office. It had been a most fruitful period for forestry.

* File 1076/62 pp 3,4.

To implement a proclaimed electoral undertaking, the new cabinet appointed a Crown Lands Tribunal in October 1959 to enquire into the question of 'sparsely timbered Crown land' and make recommendations to the Minister. The Land Utilisation Committee remained in existence, and its secretary acted as secretary to the new Tribunal,* but it appears that no further meetings of the former committee were held. For political reasons the government of the day evidently preferred the reports of an advisory committee comprised of one qualified surveyor, of wide experience as chairman, and two so-called 'practical' men representing forestry and agriculture respectively, to the recommendations of a highly qualified group of senior officers with specialised knowledge of land use in its various forms. The activities of this Tribunal, and decisions stemming therefrom are considered in Chapter IV.

6. Staff, Housing and Amenities

The most serious deficiency facing the Forests Department was the lack of professional staff which had decreased from twenty, pre-war, to ten in 1947 and numbered only thirteen at June 1949. With the low status accorded professional officers prior to 1954, few post-war graduates were forthcoming. As opportunity offered, appointments were made of suitable graduates from both the Eastern and overseas, particularly after the upgrading by the reclassification of January 1954. By 1956 the number had more than doubled to twenty nine and despite some retirements and resignations, stood at thirty one in June 1959. For the first time since its creation the Forests Department employed sufficient qualified staff to meet administrative requirements, and maintain necessary activities in the specialised fields of assessment, working plans, soil surveys, and research.

Past work in these fields had been sporadic, and frequently interrupted by staff losses. With a stable staff position, and a regular programme of annual selection, recruitment and training, it had been possible not only to allocate men to specialised work and establish the nucleus of a sound research organisation, but to make provision for substantial future growth.

Losses of experienced senior staff were minimal during this decade. Mr. A.C. Shedley, retired on 20th April, 1956 after 32 years of valuable service, the last 28 of which were as Assistant Conservator. Throughout the critical war years he acted as Deputy Timber Controller in Western Australia for the Commonwealth. He continued for some nine years thereafter as Co-ordinator of Timber Supplies, during which period he had close liaison with the timber industry, which held him in high regard.

In January 1955, Mr. G.E. Brockway, with more than 30 years experience in the Department (including ten years in the semi arid Goldfields region) was seconded to the Commonwealth Government for two years in Pakistan on an arid area Forestry Assistance project under the Colombo Plan. In 1955/56 Mr. Harding, biometrician in research branch, resigned to take up a research position with the South Australian Woods and Forests Department. Three young officers resigned in 1958/59, two of whom joined the staff of sawmilling organisations and the third, went to the Commonwealth Forest Research Institute.

* File 1214/59 - Minute of 17/11/59

A notable tribute to the Western Australian staff was the selection of two professional officers as successful applicants for the Russell Grimwade Prize, which gave them the opportunity for a year's study of forestry in the United Kingdom and Europe at the Imperial Forestry Institute, Oxford, under the aegis of the Commonwealth Forestry and Timber Bureau. These were Mr. D.W.R. Stewart in 1950/51 and Mr. W. H. Eastman in 1957/58. It is noteworthy that of some ten such awards to 1957 throughout Australia, three had been made to Western Australia, the first being to Mr. T.N. Stoate in 1930/31.

General field staff by 1949 had declined in numbers with retirements and post-war resignations, to ninety five men. As was the case in the timber industry very few experienced men were attracted to the forest service, although an occasional man was recruited from the industry and a few of the more able overseers were promoted to staff.

During these difficult years the value of the Ludlow school training in the 1920's under the 'apprenticeship' scheme was very evident. Ludlow men had risen more rapidly through the ranks, were occupying positions of considerable responsibility, and were invaluable in maintaining the efficiency of field operations under trying and frustrating circumstances. Unfortunately they were few in number.

Recognising both the current and long term need for field staff with a sound basic training, a modest start was made in 1949 with a group of eight selected youths for practical training under nominated local officers, in the districts in which they lived. This was continued for several years but few suitable recruits were offering. Greatly improved conditions following the reclassification of 1st January, 1954, made it possible to appoint a training officer and recruit twenty youths for a two-year course embracing both lectures and practical field work in 1954-55. Accommodation and school facilities were established at Dwellingup for the formal part of the course, and for field work the students were camped at other centres at Gnangara, Grimwade and Pemberton to cover a wide range of conditions in the forests and plantations of the State. Wastage both during and after the course was appreciable, but there was no doubt about the value of the training for those who completed the course. In 1956/57 a study indicated the need for an annual accretion of eight trainees for the next decade but because of withdrawals and resignations, this figure was rarely attained. However, the training scheme was firmly established, with a regular annual enrolment of successful applicants.

Field officers increased by eleven from ninety five in 1952 to one hundred and six in 1956, and by a further twenty seven in the three years to 1959, as the impact of the training scheme took effect.

Most of the retirements were those of the older experienced timber men, the great majority of whom joined the Department in the early 1920's. On 7th September, 1956, Mr. L.N. Weston, reached retiring age, and the Department lost the services of the last of the group of World War I veterans who had played such an important role in the development of forest practice in Western Australia. He had

joined the staff in 1920, the last twenty years of his service being in the senior positions, first of Senior Timber Inspector, and latterly as District Forester and Chief Timber Inspector. In these positions he played an important role in timber preservation, sleeper durability studies, and the application of grading rules in timber inspection.

Housing continued to be an important factor in attracting staff, and every effort was made to overcome the housing lag. An average of thirty new houses per year were added for the first eight years, and the 1956/57 annual report noted that the housing deficiency had been overcome and future houses would only be required for future growth. Eighteen houses were added during the next two years, giving a total of 457, or more than double the number of 209 houses held at June 1949. Some houses of improved and modern design were erected for senior officers, this being the first departure from the old standard designs of the pre-war era. Improvements included what would have been then classed as luxuries, but are now current essentials such as slow-burning wood stoves, hot water systems, internal toilets and septic systems, fly screens for all doors and windows, stainless steel sinks and proper plumbing and drainage.

For the first five years, attempts were made to bring the larger settlements to a minimum of ten houses, to support a school and warrant the installation of a lighting plant and reticulated water supplies. These were regarded as essential for retention of labour at such centres. However, it was becoming more obvious each year, that with the economic prosperity prevailing, fewer people were prepared to live in the relatively isolated settlements; labour turnover was substantial, and many houses were vacant. A policy was adopted of moving the smaller forest settlements and in later years, the larger settlements to the larger towns, such as Jarrahdale, Dwellingup, Harvey, Collie, Manjimup, Pemberton and Nannup. The exceptions applied to those settlements at major sawmill towns such as Donnelly, Tone River, Quininup and Northcliffe, where the combined population had reasonable facilities. The provision of licensed workers' clubs and electricity supply at such centres gave improved social facilities which were an added attraction to the employees.

Relatively isolated forest settlements were still retained at the pine plantations, being regarded as vital for fire control where valuable assets were at stake. They included Gnangara, Mundaring Weir, Grimwade, Myalup, Willcock, Keenan and Pimelea, and the mallet centre at Dryandra which fell into the same category. A few isolated settlements in hardwood forests still remained such as at Heartlea, Tallanalla, Dickson's, Yornup, Jarrahwood and Gleneagle.

Conditions were ameliorated by a policy of improvements at each centre providing, over a period of several years, for all houses, septic systems, reticulated water, lighting plants, proper sinks and drainage, garages, and at many settlements, recreation halls. A rental policy of graded rents, with minimal charges in the less attractive localities and maximum rental in the larger towns, was firmly in operation.

As the basic wage had doubled between 1950 and 1957, a general review and upgrading of house rents was made by the Rents Board (as provided in the Industrial Agreement) in 1957, following comprehensive field inspection and discussions. The chairman, Mr. V. Fyfe, a former Surveyor-

General and valuer, expressed admiration for the standard of housing and facilities provided for the modest rents charged.

The progressive change from isolated houses and small settlements of the pre-war years to centralised housing was made possible by the greatly improved road network, and universal change to motor transport enabling rapid access to fires and work areas throughout most of the protected forest. With the improved amenities and facilities, staff and labour had reached a fairly high degree of stability by 1959.

Other building activity included provision of more District and Divisional offices, workshops and garages. New Divisional offices were provided for the new Divisions created at Nannup and Shannon River (1957). Working Plan offices were built at Manjimup (1954) and Harvey (1959). By June 1959 it is recorded that the Department had 442 houses, 49 offices and 13 Divisional workshops. In 1954/55 a general store was built at Collier Plantation, Como, to which Stores Branch was transferred from the greatly overcrowded accommodation in the basement of Treasury Building. The Como office was built in 1955/56, thus further relieving the great pressure and cramped conditions at Head Office on the fourth floor of Treasury Building. To it was transferred the Utilisation Branch, Metropolitan District Office, Plant and Maintenance Branch, Seed Store, and Fire Control Branch.

7. Forest Engineering - Mechanisation - Plant, Equipment and Methods.

Forestry involves considerable work in the field of engineering, including construction and maintenance of roads and bridges, and land clearing for plantations. In Western Australia it also involves some departmental felling, logging and sawmilling, construction of houses and other buildings and maintenance of plant.

As previously indicated, mechanisation of forest operations really commenced during the previous decade when a considerable amount of surplus army equipment was acquired. This was mostly trucks of various types and capacities ranging from 15 cwt. two and four wheel drive utility vehicles for gang transport, to heavy five ton trucks including many four wheel drive and some larger six wheel drive vehicles. Various types of trailer-mounted pumpers were also obtained from Air Raid Protection organisations. To maintain this plant, several Divisional officers had set up Divisional workshops, meagrely equipped, and staffed by a mechanic with or without one or two assistants, e.g. at Dwellingup, Collie, Manjimup, Ludlow and Gnangara.

With increasing revenue available from 1950 onwards more new plant was purchased annually, in addition to more used Army plant, and many of the old units were replaced. An increasing demand was placed on workshop facilities in each Division to service the plant, which now included power circular saws, chainsaws, lighting plants and pumps for water supplies and small sawmill power units and machinery.

With the development of a substantial vehicle fleet, and facilities for plant and vehicle maintenance, the appointment was made early in 1955 of a Plant and Maintenance Engineer to control and supervise all plant and maintenance matters, and thus relieve forest officers of considerable detailed work for which they were not trained.

At June 1955 the Department owned 339 units of vehicle and plant valued at $500,000, plus fixed plant valued at $300,000. There were five regional workshops capable of carrying out major repairs, on vehicles and heavy plant, a further six Divisional workshops and 18 district garages for minor regular servicing of vehicles. During the next four years the fleet and plant generally was progressively updated by replacement of many old war-time units with new vehicles, and an assistant maintenance engineer appointed. Many more new units were added, including motor vehicles, water supply and lighting plants and power saws of many types.

Additional tools and equipment were provided for the garages and workshops to bring them to a high order of efficiency. With boom conditions prevailing, difficulties were encountered in attracting sufficient good mechanics to country areas, but provision of low rental houses helped in this respect. The Department also accepted apprentices to the limit of its capacity to use and train them. The major regional workshops were capable not only of major repairs to heavy plant, but also of fabrication and modification to plant to suit local conditions or special jobs.

Departmental operations were almost completely mechanised by 1959 and the use of hand tools was at a minimum. Road clearing and construction was by bulldozers, power saws, front end loaders, and power graders. Planting was done by planting machines were terrain permitted, but there was still a measure of hand planting on steep or rocky slopes. Felling and crosscutting logs was by power saw, and pine logging by crane trucks, developed and fitted out in departmental workshops. Fire fighting and controlled burning were still mainly hand operations, but greatly aided by improved motor transport, power pumpers, bulldozers for fireline clearing, and chain saws for felling burning trees.

Aided both by Federal Aid Road Grants for specific roads and a general annual grant for development of roads in the virgin forests of the far south, there was a substantial increase in the forest road network both in mileage and in road quality. In addition, with the conversion from rail to road haulage, by all major sawmills, high quality logging roads were being constructed to serve each mill from its current logging area and these were being extended annually as fellings proceeded. By June 1959, forest access was well advanced with some 24,448 km of trafficable roads, tracks, and firelines, and extension of the system was steadily proceeding. Particular attention was given to roading the 349,580 hectares added to State Forest during the regime of the Hawke Government.

8. Fire Control

A principal objective of this decade, was the extension of fire control to the considerable areas of virgin forest to the East of Manjimup down to Walpole and the "sunklands" between Margaret River and Nannup. This involved a large roading programme, more fire towers and telephone lines, and the establishment of settlements at the new sawmill centres of Quininup, Shannon River, Tone River and Northcliffe. Forest settlements were also established at Dicksons and Willcock on the east and northern fringes respectively of the "sunklands" forests.

The change of administration in 1953 led to some change in policy, with greater emphasis on 'controlled' and 'prescribed' burning, with particular reference to the northern jarrah forest where considerable areas of regenerated forest had been under complete protection for periods up to 20 years. The resulting accumulation of litter presented an extensive area with a high degree of hazard, because of which the burning of firebreak strips became a slow, costly and hazardous operation.

Following a very severe summer in 1948/49, with 527 fires attended, the decade opened with a long hot and dry season which produced some disastrous fires and a much greater area than usual was burnt over by uncontrolled outbreaks. In January 1950, locomotive fires in dangerous weather during the prohibited season swept through a large area of regenerated forest in Dwellingup Division, mainly in Plavins Block.

Later, commencing Sunday March 12th 1951, very real trouble was experienced from the break away of numerous farmers' clearing fires, in the southern region. Extensive areas of prime forest were burnt over and the numerous outbreaks sorely taxed the limited resources of the Department. Large expenditure was incurred in fire suppression. With continued dry weather, outbreaks continued for more than a month. Of 569 fires attended for the season 242, or more than 50 per cent entered the forests from private property or were suppressed in private property, and 95 were started by locomotives. It was probably the worst season since 1937.

Within the limits of staff and finance every effort was made to expand the area of protection, and improve equipment and methods. Towers were erected at Mt. Burnside in 1951/52, Beard Tree and Boorara Tree lookouts were completed in 1952/53 in addition to the erection of George Tower in the South East of Dwellingup Division, covering the eastern private property boundaries and a fifth tower in 1953/54. Mount Frankland and Granite Peak lookouts were established in 1954/55, Collier Tower to cover metropolitan plantations in 1957/58, and towers near Willcock plantation and Gnangara plantation in 1958/59. Ten lookouts were thus added to the network during the decade. By June 1954 some 930,000 ha were under fire protection, with controlled burning, top disposal and advance burning covering some 169,000 ha or 18 per cent of the protected area for that year.

The 1953 change in administration brought some rethinking of the overall fire control problems. Even greater emphasis was placed on the pre-suppression measures of controlled burning. With memories of Plavins fire in mind, and the great difficulty and cost involved in burning firebreak strips around long protected compartments, first priority was given to the reduction of hazard by burning these compartments under very mild conditions. It involved night burning in warmer weather, in addition to that possible by day in early spring and late autumn. Older foresters experienced in such operations were appointed to train and supervise younger staff with little experience in this skilled work. In 1955, successful burns were also carried out in 25 year old karri regrowth at Big Brook near Pemberton, which had been under complete protection since its establishment in 1930. There was a sharp reduction in length of firebreaks burnt annually from more than 2,000 kilometres to some 650 kilometres. The burning of firebreaks around forest and plantation boundaries

continued, but the burning of internal firebreaks around hardwood compartments and blocks was replaced by an increased programme of prescribed burning of large areas. From an average of 80,000 ha per annum in the two years to June 1953, the area burnt doubled to an average of 161,000 ha per annum during the next six years to June 1959. During the same period the area under protection increased from 809,000 ha to 1,425,000 ha.

From the above figures, it will be noted that even with increased staff, employees, and equipment the annual area burnt under control increased only from 10 per cent to 11.3 per cent of the area under protection due to the large area protected and the limitations of suitable burning weather. At this rate it implied only a decrease from a 10 year rotation to a 9 year burning rotation if all the forest was to be covered by regular burning. As will be seen in the next decade, this problem remained insoluble until there was a revolutionary change with the development of techniques for aerial ignition of large areas under suitable prescribed weather conditions.

However, control was well maintained by giving priority of regular burning to areas of higher risk near railways, private property boundaries and public roads. Except for the occasional fire from hunters or lightning, the forest areas remote from human activity were at relatively low risk.

Throughout this period there was a steady improvement in equipment, transport and communications. Old vehicles were replaced by new trucks with better planned layout for water carrying, tools, power pumpers, hoses and reels. Assistance was given beyond forest property, and some valuable saves were made of sawmills, houses and other buildings and property under private ownership in or near the forests.

For the first time since the inception of the Department there was a major tragedy when four employees were trapped and killed by fire following a breakaway under dangerous unpredicted weather conditions in Nannup District just after Xmas 1957.

This resulted in closer examination of safety measures and precautions as applied to fire fighting operations, with a view to avoiding any repetition of such a calamity. Western Australia had been singularly fortunate over the years in avoiding loss of life in bush fires, when compared with some of the tragedies in the Eastern States.

Communication was improved by a complete overhaul of the telephone system and the installation of new switchboards at Divisional and District offices. Radio communication was extended to more vehicles, and technical improvements made. Its extension to an officer's vehicle at Kalgoorlie resulted in the saving of a life in that region.

Fire weather forecasting pioneered by the Forests Department and invaluable in the organisation of forest work, was extended by the weather bureau in 1951/52 to the whole wheatbelt region, thus covering the whole South West agricultural area within the 10" isohyet. This was designed to assist farmers, and rural fire authorities with fire control in the respective areas for which they were responsible under the Bush Fires Act.

9. Plantations and Pine Utilisation

After the war-caused hiatus, this decade brought a resumption of pine planting, a review of plantation policy and a substantial increase in pine utilisation as markets were sought for thinnings from the older plantations.

Following the cessation of planting in the war years, a special grant of $60,000 in 1948/49 enabled a start to be made on clearing for planting, and tending earlier plantings. However, actual pine planting was not resumed until 1949/50 when 152 hectares were established, of which all but 23 hectares at Grimwade were P. pinaster. The total areas then established were 1300 hectares of P. radiata, 3865 of P. pinaster (a ratio of one to three in favour of pinaster) and 144 hectares of other species, with a total net area of 5309 hectares.

As the afforestation programme had always been dependent on loan funds, the provision of regular funds with some assurance of continuity was of paramount importance. The planting of any prescribed area involved from two to four years work in subdivision, clearing, cultivation, raising of nursery stock and planting. Wide fluctuation in the allocation of funds could seriously effect the programme and lead to considerable waste in effort and money. This was well exemplified in the first four years of the decade when loan funds for afforestation were:

1949/59	$227,194
1950/51	$314,176
1951/52	$ 30,172
1952/53	$144,510
1953/54	$103,576

The sudden increase in loan funds four and five-fold for the two years following the modest allocation of $60,000 in 1948/49, together with the fact that it had to be spent within the financial year, induced some expenditure open to the criticism of being unwise and wasteful.

Some of the generous allocations were utilised for overdue pruning in young plantations, and some on clearing for planting as extensions to existing plantations on proven soils. However, as mentioned in Section 3, the Conservator had failed in his requests for many areas sought for the economic establishment of plantations.* Considerable expenditure was, therefore, incurred in bulldozing extensive areas of poorly timbered jarrah forest on unproven soils for the establishment of Willcock plantation, to be managed from the existing Ludlow settlement. It had to be regarded as something of a gamble, anticipating that an economic crop of P. pinaster could be raised with the adoption of suitable fertiliser treatment where the need was indicated by continuing research in pine nutrition.

Just as operations were geared for a large scale increase, the loan allocation fell to $30,172 in 1951/52, that is, less than one tenth that of the previous year. Increases to $144,000 and $103,000 in the ensuing two years were adequate only to maintain and extend existing plantations on a modest scale, including 194 hectares at Willcock. Further clearing at Willcock was suspended, leaving an extensive area of bulldozing, which although burnt once, was littered with debris and regenerating to jarrah coppice and native scrub.

* See evidence tendered to Royal Commission 1951

With the change in administration in 1953 there was a complete review of plantation policy. At June 1954, the total plantings consisted of some 7695 hectares of which only 1398 hectares or 18 per cent were P. radiata and 6105 were P. pinaster. The areas of suitable loamy soils deemed necessary for P. radiata in valleys of the Darling Range, were few and small in area, so that larger scale post-war plantings had been made only of P. pinaster, concentrating on the coastal plain in proximity to the main market of Perth.

It was shown that:

(1) Radiata growth and yields on selected soils were such that it could be grown and marketed profitably anywhere in the South West.

(2) Pinaster with about one third the volume increment of radiata was likely to be unprofitable unless within 80 kilometres or so of the large metropolitan market.

For the proposed target of 97,200 hectares of plantation, known areas of soil suitable for radiata pine, and under Departmental control amounted to only 2268 hectares.*

Following the review of plantation experience and results over the previous 30 years, the following policy decisions were made:

1. An intensive effort would be pursued by field staff for the location of soils suitable for radiata throughout the area of State Forest. All possible areas would be investigated by soil survey and suitable soils demarcated. Consideration would be given to purchase of suitable alienated land whenever available at a reasonable price. Planting would be concentrated on P. radiata to the extent that suitable soils were available.

2. Large scale expansion of P. pinaster planting would be limited to areas within 80 to 95 kilometres of the Metropolitan market and steps taken to secure as large an area as possible on the sandy coastal plain for this purpose.

3. Planting would be of the order of 405 hectares per annum for one or two years - the target adopted two decades earlier - with subsequent expansion to the Working Plan prescription of 810 hectares per year, depending on loan funds available.

With increasing volumes of thinnings being marketed, a strong demand for P. radiata, and the good prices received from the limited areas of older plantings at Mundaring Weir, Harvey, Grimwade and Margaret River, it was obvious that concentration on this species was a sound investment. In January 1956, the revision of the Pine Working Plan was approved by Executive Council. Provision of loan funds, which reached $216,000 in 1954/55 and was stabilised at $200,000 annually for the ensuing four years, enabled the Department to expand its programme systematically and achieve the Working Plan target of 810 hectares per year for the four years to 1960 when the next revision was due. Actually, with steadily rising costs in the inflationary economy,

* Minutes of staff meeting 1/11/54.

it was necessary to utilise a proportion of Reforestation Fund monies to supplement loan funds in order to maintain this desirable level of new plantings, and essential maintenance of existing plantations.

The results of the search for land suitable for P. radiata exceeded expectations. Worthwhile areas were located in State Forest in the valleys of the Harvey, Collie and Murray rivers, and at Grimwade on the upper reaches of Balingup Brook. Much suitable land in these valleys had long been alienated, and some of this was obtained by repurchase. The greatest windfall was the substantial area that became available in the Blackwood Valley between Nannup and Balingup, where, because of steep slopes, bracken persistence, rabbit infestation and poor returns, farmers were only too willing to sell at a modest price. Most of these properties were poorly developed agriculturally but had great potential for Pinus radiata. The first purchase made was on 2nd November 1954 of location 1278, a part-cleared block of 324 hectares on which prime jarrah trees were retained when early ring-barking destroyed most of the forest on the bracken covered slopes. The modest price of $4.00 per acre was more than offset by sale of the remaining timber for sawmilling, prior to clearing for planting.

By June 1959, 6,794 hectares had been purchased, mostly in the Blackwood Valley. Further purchases were to continue for a long period, adding substantially to the State's softwood potential, and the Blackwood Valley gave promise of becoming the State's major area of radiata plantation. Plantings commenced at Nannup in 1956.

By June 1959, the net area planted to pines was 10,608 hectares, that is more than double the 5,157 hectares under pines a decade earlier. Of this, 2,900 hectares were P. radiata, more than double the area under that species five years earlier. Most of this had been planted over the previous three years when radiata plantings exceeded pinaster plantings for the same period for the first time.

In 1958/59, the Department was successful in obtaining for pinaster plantings, the dedication as State Forest of 61,965 hectares of coastal plain north of Gnangara to the Moore River, to which the Land Utilisation Committee had agreed in 1956/57.* This was the major area sought by the previous Conservator, and rejected by the Under Secretary for Lands in 1950. By 1955/56 fifty two pine plots, ranging from one to one hundred acres had been established in this tract between Lake Pinjar and Lancelin to test the land for pine growth. The number was increased to 77 plots the following year.

An important decision for more efficient production of planting stock was that of closing many of the small nurseries and distributing stock from a few nurseries large enough to warrant mechanisation, closer supervision and employment of a full-time nurseryman during the peak periods of activity. In the earlier days of limited transport facilities a small nursery was established at each plantation. Major nurseries were now limited to Gnangara (pinaster), Hamel, Collie and Grimwade. (At a later stage, a large nursery at Nannup was to replace the latter two nurseries).

* Annual Reports 1957 and 1959.

An essential prelude to this expansion of planting was an active programme of soil survey, selection and demarcation, and the analysis of numerous soil samples. A number of younger officers were trained in soil survey work to expand and maintain it several years in advance of the planting programme at each centre, so that land purchase, subdivision, clearing, cultivation, and all essential preliminaries could be carried out prior to the scheduled planting. In addition, the practical testing of sites on the coastal sands north of Lake Pinjar was continued by fertiliser trials on many of the 72 experimental plots covering all soil types over the full range of the area.

Throughout the decade there was a steady annual increase in the volume of pine logs produced, with a corresponding increase in revenue. While much of this came from small pinaster thinnings for Metropolitan case mills, the major proportion was from the small area of the earlier radiata plantings, (only 1400 ha in 1949) which also yielded a much higher price per unit volume because of greater log size. With the advantage of proximity to Perth - only 40 to 50 kilometres - Mundaring Weir plantation, commenced in 1922, produced both a greater volume and a much greater net return than any other centre.

Annual pine log production increased nearly fourfold during the decade, from 9,544 m^3 to 35,617 m^3, (over bark). In fact during the latter five years, 1954 to 1959, the volume produced (158,602 m^3) - greatly exceeded all pine harvested up to 1954 (128,602 m^3). Revenue from pine sales was rapidly approaching the amount of annual loan funds. The larger sawlogs were of high value, and of still greater value were the limited numbers of selected logs delivered to the plywood industry.

Although there was a strong and increasing demand in the metropolitan area for pine logs (especially for radiata), high freights precluded sales from plantations more than 160 kilometres or so, from Perth. As early as 1930 a small pine mill operated on thinnings at Mundaring Weir. It squared and air-dried baulks for supply in increasing quantity to the City Case Factory at Perth, and this operation still continued in the 1950's.

At the more distant plantations, where the older compartments were long overdue for thinning, pine milling was undertaken by the Department and the sawn produce railed to trade buyers in Perth. Small mills were erected at Gnangara and Ludlow in 1947/48 to utilise pinaster thinnings, and at Grimwade in 1949/50, Keenan, 1952 and Harvey, 1955, for radiata thinnings. As sales increased a second bench was added at Grimwade. Because of the increasing demand of small metropolitan mills for case logs, the Gnangara mill was closed in 1954/55.

An experienced sawmiller, Mr. B.J. Ryan, was appointed in 1951 at Busselton to supervise the technical side of mill construction and production.

By June 1959 pine logs were being supplied to 13 sawmills and case factories, two plywood factories, and four departmental mills. Plantations of 5463 ha within 65 kilometres of Perth gave employment to 105 Departmental men and 210 employees in sawmills, case and plywood factories. Local pine was coming in to its own. P. radiata in particular was

finding higher grade uses as plywood, boards, furniture, etc., while P. pinaster was absorbed in growing quantities in the case, box and packaging trade. Pinaster was also used in Forests Department houses and offices as flooring, lining and weatherboards to demonstrate its suitability for general use.

Other diverse outlets for pine were as Christmas trees, small logs for woodwool production, and long raft poles for artificial pearl culture at Kuri Bay in the North West.

Mallet Plantations

Mallet plantations, established by spot sowing of seed on felled and cleared areas in the Narrogin district occupied a nett area of 7,106 hectares at June 1949. Unlike pine afforestation, sowings had continued on a limited scale during the war, extending the major areas established in the 1930's.

From 1949 to 1959, sowings continued at a modest scale, adding a further 582 ha to give a total of 7689 hectares. During this decade, thinning of young mallet stands which had been commenced in 1946/47 was continued, yielding small quantities of tan bark, and supplying some mining timbers to the Murchison goldfields for lagging and firing sticks. There was still a moderate demand for mallet bark, but some 85 per cent or more was coming from private property. To improve the return from mallet bark the Department designed and installed a chipper at Dryandra where the bark was chipped, bagged, and sold in that form thus giving a better nett return to the Department and additional remunerative work to the employees in the field.

10. Assessment, Survey Mapping and Working Plans

The most significant development of the decade was that of aerial photography covering the forest areas and the use of air photos for map productions, not only of topographic features, but of forest types, stand densities and conditions of stands both for native hardwood and exotic softwood. Techniques were developed for accurate interpretation of air photos to delineate these features and to select representative lines or areas for field assessment as a basis for detailed inventory on the ground. This permitted a great reduction in the per cent of the forest assessed, with a consequent saving in time and cost; and, it was believed, greater accuracy in statistics obtained for Working Plan purposes.

Assessment was continued sporadically on the old basis along 'permanent lines' for a further four years before major changes were made. In 1950/51 the Department was represented at a conference on "Forest Inventory" convened by the Forestry and Timber Bureau at Canberra to recommend methods to be followed in a National Forest Inventory. In the same year, although considerable date was compiled for the Royal Commission, it was realised that knowledge of the extent of the forest resource was far from adequate and a great deal more inventory work would be required for more effective forest management and particularly for revision of the General Working Plan due in 1954/55.

In 1947/48 some preliminary work was done in collaboration with the Forestry and Timber Bureau, which produced a type map using R.A.A.F. photos of mixed jarrah, marri and karri forest between Quininup and the Frankland River. Although the photos were not very good and the scale too small to show types to advantage, the results were promising.

In 1947 with Cabinet approval the State Mapping Committee was formed* with representatives thereon of seven government departments including the Forests Department, whose delegate was the Chief Draftsman. In 1949, slotted template equipment was purchased and a multiscope plotter obtained from the U.S.A.

The programme of aerial photography was submitted annually for approval of the committee, and the photos at the required scale were then purchased from the Department of Lands and Surveys which controlled all aerial photography for the mapping requirements of all departments in the State.

Under the guidance of the Management Officer, Mr. G. W. Nunn (who was a licensed surveyor as well as a forestry graduate) complete re-mapping of the forest was commenced using air photos.

A surveyor appointed in February 1955 was employed on theodolite surveys of major forest roads where existing cadastral surveys did not provide sufficient ground controls.

A new system of forest inventory was developed, complying in essentials, with the requirements of the national forests inventory, and a series of assessment teams carried out the detailed field work on lines pre-selected from type maps to cover all delineated forest types.

As it was found almost impossible to recruit men to camp in the forest on this type of work, the teams were provided with motor transport, mobile camps, caravans and such amenities as refrigeration and lighting. This was a far cry from the primitive conditions of the old classification camps. With more young graduates recruited to staff, some were directed to control the work of several assessment gangs.

To speed the work, photo interpretation and the compilation of assessment data were decentralised by establishing Working Plan Offices at Manjimup (early 1954), and Dwellingup (1955/56), personnel from the latter being moved to Harvey in 1958/59 when a new Working Plan Office was built at that centre. This enabled easy and frequent field checking of types and close collaboration between the interpreters and the field officers concerned.

From 1954, particular attention was paid to areas of forested Crown land and Working Plans branch provided a great deal of essential information for consideration by the Land Utilisation Committee on which to base its decisions as to areas for dedication as State Forest or allocation for alternative use.

* Lands File 3640/47

During a conference in Western Australia of the National Mapping Council in April 1956, a demonstration was arranged at the Working Plans Office at Manjimup, of the methods used in surveys, assessment and air photo interpretation mapping. The Council commented enthusiastically on the "very comprehensive and efficient system in operation".

Largely because of inadequate space in Head Office, some decentralisation of routine drafting was arranged at the Manjimup and Harvey Working Plan offices in 1959.

A notable feature of the National Inventory was that it included in addition to marketable timber, the volumes of non-marketable trees of marketable species and those of non-marketable species such as marri. This was to prove invaluable a decade later when interest was shown in the potential volume available in the forests for utilisation as wood chips for pulpwood, without encroaching on normal supplies required for the maintenance of the sawmilling industry.

By June 1959 air photo mapping had covered some 3,268,755 hectares, great progress had been made with the National Forest Inventory, and considerable areas had been added to State Forest by decisions of the Land Utilisation Committee. There still remained some 303,000 hectares of Crown land requiring intensive appraisal of which 101,000 hectares were deemed suitable for permanent forest use, when the change of government occurred on 2nd April 1959.

The General Working Plan for Jarrah, Karri and Wandoo (No. 79) was the subject of a comprehensive revision which received Executive Council approval in January 1956. On the basis of improved data, utilisation of lower grade logs, closer control of utilisation in the bush and undercutting in the previous decade, the permissible annual cut was increased to 1,274,000 m^3 of sawlogs per annum for the ensuing ten years. This was a substantial increase above that of 1945, which permitted a total cut of only 991,000 m^3. This revised figure included also Crown timber reserved on alienated land.

In connection with the pine afforestation programme, air photo mosaics proved most valuable and formed the basis of site quality assessment of all plantations in 1956/57, using standards and criteria developed in the extensive plantations in South Australia.

The work of ground assessment crews was related to the site qualities, and the A.P.I. work proved valuable in subsequent yield calculations and determinations of volumes available from thinning at various prescriptions.

The value of air photo maps was not limited to the State Forest and plantations. They gave also a comprehensive picture of land use conditions in the South West and ready information on private property and its degree of development, not previously available. This was particularly useful in many ways, including fire control planning and considerations of applications for land alienation.

11. Forest Research & Arboriculture

Up to 1953 research was under the direct control of the Conservator who had long been interested in research and was the driving force behind many projects. He formed the nucleus of a Research Branch with permanent staff at the Dwellingup station, and appointed a biometrician with assistants at Head Office. In addition part-time research by various field officers was directed by him, particularly in pine establishment and nutrition problems at Ludlow, Gnangara and other pine centres. Some science graduates were also employed for short periods on particular lines of work but none of these stayed for long.

In 1951 a new bulletin "Nutrition of the Pine" by the Conservator, Mr. Stoate was issued by the Forestry and Timber Bureau.* Studies continued in this field, in chemical weeding of nurseries, grafting, surface soil fauna, and the nutrient cycle in forests. At the Dwellingup Research Station, established with laboratory facilities in 1948, research was pursued into jarrah disorders and growth problems by one officer and an assistant, as well as continuing on fire weather. Later the addition of a silvicultural officer led to studies in litter accumulation and decomposition, litter zoology, jarrah dieback, soil and plant nutrition and growth studies. With lack of staff, few new projects were initiated from 1949 to 1953.

It was during this period that the Commonwealth Sirex Wasp Committee was appointed by the Prime Minister and an interstate enquiry conducted in 1952 resulting in closer inspection of all softwood imported into Australia. No trace of Sirex occurrence on the Australian mainland was found at that time, but live wasps had been found in softwood imports from Balkan countries on a number of occasions in the Eastern States, requiring action by the quarantine authorities.≋

The bark beetle (Ips grandicollis) was first reported in Collier plantation in August 1952 and investigation showed its presence in all metropolitan plantations in 1953. In the same year, a research station building was completed at Gnangara and a study commenced to correlate 'site' with pine qualities and disorders.

With the steady increase in graduate appointments from 1953, it was possible to add three young professional officers to the small research team in 1954/55. The following year thinning plots were established and silvicultural investigations in the karri forest commenced, followed by the appointment of a silvicultural officer in 1957 for studies in karri seed fall and litter fall. This was the first step towards a new research station in the southern region.

From 1954 research became the subject of a small committee and control was assumed by Mr. W.R. Wallace, who himself had been a pioneer in fire research at Dwellingup from the early nineteen thirties. It could be said that this expanding group of officers and assistants constituted the first real Research Branch. Although there was some interchange of staff from research to administration, and vice versa, a number of the officers remained full time on research only.

* Nutrition of the Pine - T.N. Stoate

≋ Report of "Sirex Committee" 1952

In 1957, following his return from two years in Pakistan after secondment to the Commonwealth as an adviser on arid area forestry for the World Food and Agriculture Organisation, Mr. G.E. Brockway assumed control of the Research Branch. He also controlled the arboricultural work of the Department and took a particular interest in following up his earlier work of arboreta establishment throughout the wheatbelt for demonstration of the growth possibilities of dry country species, particularly eucalypts. As early as 1945/46 he had established a small nursery at Kalgoorlie for raising dry-country eucalypts from locally collected seed and from which plants were distributed to farms and public bodies in the wheatbelt. As the demand continued to grow, the nursery was shifted to Dryandra in the Narrogin district in 1954/55 where more staff were available to facilitate the raising and distribution of stock on a greater scale. With buoyant conditions in agriculture, demand and sales continued to increase. Meanwhile Hamel nursery concentrated on a wider range of stock for higher rainfall areas and pine stock for the softwood plantations. Several additional dry area arboreta were established.

Also, in 1957, in addition to an officer on research in karri silviculture, research staff was appointed at Wanneroo to investigate silvicultural problems with pinaster pine.

By June 1959 additional research projects undertaken included comprehensive trials to establish P. radiata in conjunction with the C.S.I.R.O., on laterites, where all previous radiata plantings had failed. Tree breeding, the effect of fire on forest soils, and forest nursery studies were also commenced.

The small but permanent Research Branch was now well established, and the foundation prepared for the substantial growth and consolidation destined to occur during the ensuing decade. With a regular flow of graduates becoming available as a result of the firm recruitment policy adopted some four years earlier, the future of the Research Branch seemed assured.

12. Utilisation

With the resignation in 1948 of the Utilisation Officer there was no special activity in this field.

In 1955/56 the old 'Grading Rules' committee was revived under the new title of W.A. Joint Timber Committee, primarily to consider standard specifications submitted for comment by the Timber Committee of the Standards Association in Sydney. It was chaired initially by the Conservator and later by his nominee (Mr. Stewart). The other members represented the sawmillers and timber industry, architects, Public Works Department, W.A. Government Railways, the Master Builders Association and the State Housing Commission.

On 15th October, 1956, Mr. H.C. Wickett, who held both engineering and forestry qualifications and had sawmilling experience, was appointed Utilisation Officer. This revival of a Utilisation Branch was particularly desirable with the greatly increased activity in Departmental sawmilling, particularly of pine. In addition to four pine mills, small hardwood mills were cutting tuart at Ludlow and jarrah at Dwellingup, while a saw bench did some intermittent cutting of wandoo at Dryandra.

Some matters receiving attention up to June 1959, included design for sawmill extension at Wundowie, strength tests of W.A. timbers by the Division of Forests Products, high pressure (1000 p.s.i.) impregnation of karri with preservatives, fence post preservation tests, blue stain prevention in pine, marine borer tests at Kwinana and Port Hedland, testing of W.A. timbers for pulping and reviewing of grading rules. The Branch also undertook some drafting and prepared specifications for building design to relieve the pressure on the Drafting Branch, which was severely cramped for space on the Fourth Floor of the old Treasury Building. It also resumed the function of handling the many enquiries on timber received from both the industry and the general public.

13. Miscellaneous Considerations

1. Library. Until 1955, the library received no mention in the annual reports. In June 1954 a full time librarian was appointed and in the following year, with some technical and clerical assistance, the classification of the library under the Oxford Decimal System for Forestry was well advanced.

In September 1954 a monthly accession list was inaugurated and circulated to field officers and interested persons. As it listed all new publications and periodicals and indexed articles of interest, much greater use was made of the library. The following year it moved to better accommodation with more congenial conditions, although still cramped. In 1956/57 talks were given to technical staff and a "Manual of Library Practice" prepared, which also served as a model for some other government departments.

The improved facilities led to the annual issue of more than 4,000 loans and the answering of up to 1,000 queries. By 1959 the classified catalogue had increased to 12,500 cards. Despite very cramped conditions, the department was well served by the library facilities.

Following a world tour by Mr. Ford Robertson, Director of the Commonwealth Forestry Bureau at Oxford, he discussed in his report, forest libraries of the British Commonwealth, in which he paid a fine tribute to that of Western Australia, when he wrote:-

"Very varying levels of performance were noted from the antiquated and quite inadequate to the truly efficient and up to date. In this respect I must award a blue riband to the first class little unit organised at Perth, Western Australia, by Miss Leila Roberts, which is giving that Forests Department quite exceptional documentary service, and could stand as a model for any other, particularly in the intelligent way it uses the 'abstracts'".

After that unsolicited bouquet, any further comment would be superfluous.

2. The Tree Society*, was formed from a public meeting in September 1956. Its formation received every encouragement from the Minister for Forests, who desired it should receive maximum support as the department was lacking in publicity media. Its main aims were education and publicity relating to trees, the preservation of trees and flora generally and the replanting of tree-denuded areas.

* F.D. File 403/56

Following its request for aid, a departmental field officer District Forester, J. Thomson, was seconded as "Secretary-Organiser" and the Department provided a secretarial establishment until the Society could support itself. A State-wide "Festival of Trees" week culminated on Arbor Day in 1957/58 when a spectacular feature was the delivery of the large 100 tonne, 32.3 metres, karri log by Bunning Bros. from Donnelly River to Kings Park.

Many branches were formed both around the city and in country centres, the Society's aim being a branch in each area of local government.

3. Conferences. During the decade, several forestry conferences were held which were of considerable significance. On 5th December 1949, the eighth Australian Forestry Conference, called by the Prime Minister, assembled in Perth by invitation of the State Government. It was the first such conference since the seventh was held some 25 years earlier in 1924, and it was opened by Mr. David Brand, then Minister for Forests, and destined to commence some ten years later his record term of 12 years in office as Premier of W.A., Following the opening session in Perth, visits were made to forest areas in the South West where two sessions were held at Dwellingup and two at Pemberton before returning to Perth on Sunday, 11th December, for two final sessions.

Twenty three technical papers were presented to the Conference of which twelve were prepared by ten officers of the Forests Department of W.A. Eleven resolutions were passed, perusal of which indicates the trend of forest thinking in Australia at that time.* They were concerned particularly with Australia's timber requirements, the need for more forest dedication, better fire control, more funds, co-ordinated and accelerated softwood afforestation programmes and establishment of a Forest Research Institute. Resolution No.10 commended "the sound management practice and efficient fire protection system in operation on portion of the State Forests" in W.A., and No. 11 recommended similar conferences at regular intervals in the future.

The Ninth Australian Forestry Conference was held at Coff's Harbour, New South Wales in September 1953, and was attended by the Conservator from W.A. little more than a month before he vacated office. It reviewed the progress made towards achieving the objectives of the 1949 Conference.

The Seventh British Commonwealth Forestry Conference was held in Australia and New Zealand from 26th August to 10th October 1957, with a series of sessions in the Eastern States and New Zealand attended by the Conservator and his Management Officer. The only previous such conference in Australia was in 1928. Although no sessions were held in the West, a pre-sessional tour of two weeks by many delegates in the forest, plantation and goldfield areas proved most stimulating for both the visitors and local staff.

The Tenth Australian Forestry Conference held at Tumut, a pine plantation centre in New South Wales in May 1959 was attended by the Conservator and two senior officers. These opportunities for interchange of professional experience, for grappling with forestry problems of mutual concern, and for debating future avenues of endeavour were most valuable for forestry in Australia. They led inevitably to

* Report of the proceedings of the Australian Forestry Conference Perth, December 1949.

closer co-ordination and collaboration between the States and in the ensuing decade, to the formation of the Australian Forestry Council and a national forest policy.

In addition to the conferences mention must be made of the Eucalyptus Study Tour of Australia in 1953, financed partly by funds of the Food and Agriculture Organisation of the United Nations, and partly by member nations. A party of 26 delegates from 18 nations, together with F.A.O. officials, visited the high forests of the South West, the mallet areas near Narrogin and the dry country eucalypts of the Goldfields over a period of one week. It was a stimulating experience for the many members of local staff who participated in the visit and discussions with the visitors. It also indicated the tremendous interest in eucalypt species in many parts of the world remote from their natural habitats.

CHAPTER IV

1959-1969 CONSOLIDATION AND GROWTH

1. Preview

This decade was characterised by a burgeoning economy and a political stability conferred by the record period in office of the Brand Government for the twelve years 1959 to 1971. It was also a record for the longest serving Minister for Forests, (Mr. Stewart Bovell) under whom the same Conservator continued to serve for the ten years to 30th June 1969.

The timber industry enjoyed reasonable prosperity despite continuing inflation, some fluctuations in demand, competition from imports and competition by other materials for a share of its traditional markets. This was particularly evident in housing, long regarded as a barometer of the industry's prosperity, where a higher proportion of flat construction meant much greater use of bricks and concrete, in place of wood. Aluminium became a serious competitor of wooden joinery. Having a high labour content, the timber industry was more vulnerable to inflationary wage pressures than its manufacturing competitors.

However the wood-using industries fought back with new products, improved technology, and the search for new markets.

Some of the outstanding features of the decade and their impact on forest administration are listed as follows:

1. The disastrous fire season of 1960/61 and the consequent Royal Commision on Bush Fires in W.A. The serious losses in the Dwellingup lightning fires in January 1961 led to a reappraisal of fire control policy, staffing and techniques, and in particular to the development of V.H.F. radio communication covering the whole forest areas.

2. The strong and continuing growth of the research branch and its effectiveness in tackling the many and varied problems requiring solution.

3. The development of aerial ignition as a means of carrying out extensive burning in the minimum of suitable time under prescribed conditions.

4. The research break-through in jarrah "dieback" which had defied solution for more than 30 years. Following the isolation of the root pathogen, Phytophthora cinnamomi, this was shown to be the causative agent of the disease. Elucidation of this fact led to active pursuit of further research with a view to devising control methods to restrict and minimise its spread.

5. The expansion of the tree-breeding programme for both P. pinaster and P. radiata, involving for the former species the posting of an officer in Portugal for two years, where he selected 'plus' trees and despatched scion material by air for grafting to local stock.

6. The installation of timber preservation plants for the three purposes of

   (a) very high pressure impregnation of karri,

   (b) sapwood impregnation of hardwood poles, and

   (c) impregnation of local softwood both as 'rounds' for posts and rails, and as sawn timber.

7. The development of a particle board industry based on small diameter pine logs and the use of plywood mill waste.

8. The formation in 1964 of the Australian Forestry Council and its Standing Committee.

9. The passing in 1967 of the Softwood Forestry Agreement Act, whereby the Commonwealth recognised and gave financial support to the need for increased Australian softwood plantings by the States, with a view to making the nation more nearly self-sufficient in timber and wood products in the future.

10. Consideration for a wood chip industry based on the large available volumes of marri in the south, supplemented by mill and forest waste, and the granting of rights to a local firm to proceed with the project. It was regarded as a prelude to the ultimate establishment of a pulp industry in W.A.

2. Forest Policy

While the broad lines of forest policy remained unchanged during the decade, they were influenced by significant policy decisions on forestry matters made in both State and Federal spheres, as outlined below:-

A. In Western Australia

1. High priority was given to the development of a strong research branch and provision of the requisite buildings, facilities and equipment to enable it to attack the more urgent problems. Support was also given to officers of proven capacity who sought to improve their experience, training and qualifications at appropriate institutions both overseas and in Australia.

2. The disastrous Dwellingup fire of January 1961 led to intensification of fire research and diversion of personnel and resources for that purpose. It was also decided to convert the main radio communication system for fire control to "very high frequency" (V.H.F.) and to seek improved methods of controlled burning.

3. The rapid and widespread extension of the jarrah "dieback" disease during the previous decade demanded a major attack by more intensive research, to determine the cause, and develop control measures.

B. In the Commonwealth Sphere

1. An event of major political importance to forestry in Australia, was Cabinet agreement to the formation of the Australian Forestry Council as a national advisory body on forestry matters.

This was largely the outcome of a recommendation from the heads of the State and Commonwealth forest services following several years of consideration in which the proposals were strongly supported by the West Australian Conservator. Although the decision was announced in May 1962, the Council was not created until July 1964. It was supported by a Standing Committee comprised of heads of services and some senior Commonwealth public servants. ("Heads of Services" conferences had been held annually since 1947 when the first meeting was initiated by the Director General of the Forestry and Timber Bureau for discussion of forest policy matters of National and State concern. For 17 years these had provided a valuable forum for interchange of information between States and the development of a national outlook on forestry and forest products.)

2. After several years of discussion and negotiation, in which the State heads of services participated as members of the Board of Higher Forestry Education, it was decided to close the old "Australian Forestry School" which had served so well since 1926, and transfer its functions to the new Australian National University as a Department of Forestry under its own Professor of Forestry. This was effected for the 1965 academic year. Provision was made for post graduate study leading to higher degrees.

3. Acting on the recommendation of the Australian Forestry Council, the Commonwealth parliament passed the Softwood Forestry Agreement Act on 9th May, 1967. This was a landmark in Commonwealth support for forestry in the States. It made provision for financial assistance to enable the States to expand substantially their rates of planting, in an effort to meet the future national needs. For Western Australia it meant a doubling of the rate from 1214 hectares to 2428 hectares per year, which if maintained would enable it to reach the target of 97,127 hectares by the year 2000 A.D.

These State and Commonwealth decisions had a considerable influence on the course of Forests Department activities throughout the decade, as will become apparent in the discussions that ensue.

3. The Timber Industry - and Forest Revenue

As the principal user of forest products, and thus the major contributor to forest revenue, the timber industry and its efficiency, prosperity and progress are of vital concern to the Forests Department. Despite the relative prosperity and growth of the economy, the industry was not without its problems, largely the result of increasing competition from other materials, continuing inflation, and rising wages in an industry with an unusually high labour content.

After the years of peak sawn production - 544,000 m^3 in 1956 - and peak log intake - 1,537,000 m^3 in 1959 - there was a decrease in both log intake and sawn production over the ensuing decade. Production fluctuated between 433,000 m^3 and 492,000 m^3, being below average for the first five years and above average for the later four years when substantial sleeper orders were obtained. Local consumption was steady at some 287,000 to 306,000 m^3 for the first five years, rising by some 20 to 27 per cent over the latter five years to a range of 366,000 to 417,000 m^3 which included a large volume of sleepers. There was a corresponding decline in exports, which dwindled from 30 to 35 per cent of production to about 20 per cent, of which about two thirds went to the Eastern

States and one third overseas.

Imports of sawn timber which had shown a gradual but irregular increase over the first eight years, suddenly doubled in 1968 and 1969, with Malaysia as the main competitor. From less than 6,500 m^3 in 1959, imports of sawn tropical hardwoods for general purpose use reached 31,000 m^3 by 1968/69, causing considerable concern to the local sawmilling industry.

The number of sawmills steadily decreased from 265 to 191 due mainly to the closure of small mills as private property log supplies became exhausted, and production from this source declined from 25 to 12 per cent of the annual total.

Many of these were small mills in or near the metropolitan area. There was often political pressure to provide logs from Crown sources to keep particular mills in production. Closures would have been greater, but for two factors, namely:

(i) The salvage of logs by independent hauliers operating under license both on "die-back" areas and from some cut over permit areas, and removing marked trees left by the permit holder. Salvage operations which commenced in 1954 had grown to sizable proportions yielding considerable quantities of logs which were sold by the hauling contractors direct to small sawmills.

(ii) The salvage of logs from the Dwellingup fire of 1961.

By far the greater volume came from "die-back" areas in the Kelmscott, Dwellingup and Harvey Divisions. The salvage operation was to continue throughout the decade, and extend in ensuing years with the adoption of a firm policy of clear felling die-back affected forest. Over the decade, production from Crown land and State Forest remained remarkably steady but tended to increase during the latter five years, balancing the decrease in production from private property. With regard to species, there was a marked fall in jarrah log intake in 1969. Wandoo production decreased over the decade to one third of the 1959 figure, while pine log production increased almost threefold over the same period. Marri production increased with the construction of a marri sawmill which commenced operation in 1968.

The loss of some traditional markets to concrete, bricks, aluminium and imported timbers, was largely counterbalanced by substantial increases in sleeper production from 1965 to 1969 for the standard gauge railway extension Kalgoorlie to Kwinana and for the iron ore railways in the North-West linking newly developed ports to mines at Mt. Goldsworthy, Mt. Tom Price (Hamersley Iron Co.) and Mt. Whaleback (Mt. Newman Co.). A valuable export order was that completed for the Hedjaz railway in the Middle East in 1967.

The timber industry actively proceeded with improvements in sawmill design, equipment and mechanisation. Many more sawmills were converted to S.E.C. power, and some band re-saws installed.

There was also a tendency to locate mills in larger towns or the city rather than the forest, to obtain a more stable labour supply, avoid the cost of providing houses for employees and avoid the risk from forest fires. For example after the Dwellingup fire which destroyed some forest sawmills, Millars abandoned Nanga Millsite and built at Yarloop. The Railway mill burnt later at Banksiadale was rebuilt at Dwellingup. Whittakers built a major sawmill at Kewdale, closed two smaller mills and drew logs from three permit 1961?

areas direct to the Metropolitan area. Hawker Siddeley Building Supplies closed Shannon Mill and hauled the logs to Pemberton for conversion. Bunnings scrapped the old Lyall's mill and rebuilt in Collie.

In the bush, chain saws of improved design appeared and large rubber-tyred logging tractors, including articulated types, were introduced for hauling and loading.

There were also some major changes of ownership within the industry. One of the three largest sawmill and timber organisations was the State Building Supplies which until recent years had operated under the name of State Sawmills since its creation in 1911/12. It had pioneered large scale karri production in the Warren District with No.1 State Mill (Deanmill) some 4 miles west of Manjimup and No's 2 and 3 State Mills at Pemberton, and operated several jarrah mills in the northern jarrah forests.

In 1961, the Government arranged its sale and that of the Banksiadale "Railway Mill" to the very large British-based firm of Hawker-Siddeley, which continued to operate the mills under the name of Hawker-Siddeley Building Supplies, after fifty years as a State industrial and trading concern.

The large Melbourne-based firm of Kauri Timber Company which owned two large and several minor sawmills in W.A., sold its West Australian assets to existing local sawmilling firms. The large Northcliffe mill and permit was acquired by Bunnings, and the Nannup mill and permit by Douglas Jones, which itself was taken over by a British firm, the Borneo Timber Company. There was hope that these moves would introduce new capital and markets, and perhaps improved methods and results. It cannot be said these hopes were fully realised, or that any appreciable benefit accrued to the State or the timber industry.

Hardwood product development included "Glulam" laminated beams and arches, gang-nailed trusses for roof supports, "Slim-line" joinery, end-matched flooring, finger-jointed flooring and moulding, water-proofed packaging of flooring for export, and multiply, termite and rot-proofed plywood flooring.

In the field of packaging, considerable ground was lost to fibre-board cartons replacing hardwood cases and crates, especially in the fruit export trade. After the great battle in the post-war years to induce sawmillers to produce fruit cases, and the efforts of the major karri sawmillers who had installed efficient case production units, the industry now fought a losing battle as cartons largely replaced the karri apple export case. By 1969 barely 10 per cent of export apples were in cases.

The softwood case industry also lost ground to the wood fibre carton, but still held an important place for a great variety of packaging requirements. A most valuable new industry was that of particle board production from small pine thinnings, (see "pine utilisation" section, 9, p.108.

Pile and pole production was the subject of considerable change during the decade, due to the advent of a timber preservation plant for sapwood impregnation of hardwood poles, and to decreasing availability of long poles from private property.

From the earliest days of settlement in W.A. jarrah and wandoo poles had been used in increasing quantities with no treatment, or with only a butt brushing treatment with creosote, or tar. The main users were the P.M.G. Department for telephone and telegraph lines, and later electricity authorities for distribution of electric power. By 1960, based on its Victorian experience of sapwood impregnated non-durable poles, the P.M.G. Department was seeking some 10,000 poles per year for similar treatment in W.A. A plant was installed by the British firm of Hicksons at Picton near Bunbury and stocks of poles obtained for air drying prior to treatment. It was soon found that marri suffered less degrade in drying than jarrah and that its sapwood was readily amenable to impregnation. Within two or three years it became the favoured pole timber and soon replaced jarrah for general pole use by the P.M.G. Department.

Meanwhile the S.E.C. was requiring increasing quantities of both 17 metre transmission poles and 11 metre distribution poles, for which purposes it still desired untreated jarrah. Long transmission poles were becoming scarcer and more difficult to procure, and foresters believed that this created an opportunity to utilise the more readily available karri, provided it was amenable to preservative treatment. Difficulties were experienced in drying karri poles without degrade in the form of deep cracking and checking, despite careful and systematic investigations by both the C.S.I.R.O. and the Forests Department.

Eventually it was found that effective treatment could be given by the "boultonising" process which required no pre-drying and was used on the green poles.

There was thus a major swing by the P.M.G. Department from jarrah to treated marri while the S.E.C. was persuaded tentatively to accept a limited number of treated karri poles.

Figures for pole procurement over the decade reveal great annual fluctuations with decreasing quantities from private property, while the yield from State Forest steadily increased. The records are of linear measure only and not in pole numbers. Prior to 1960, records indicate some 213,000 metres to 240,000 metres of poles per annum, more or less equally supplied from Crown Lands and Private Property. Over the next five years this gradually increased to 302,000 metres per year of which five sixths were from Crown Land and State Forest. In 1968/69 the quantity of 765,000 metres was almost double that of the previous year, the supply from Crown Land and State Forest being more than eight times that from Private Property.

The trend was clear. Private property had been well cut out for jarrah poles of 11 metres and over, and practically all poles over that length were produced from State lands. However, most of the P.M.G. poles of marri (from 4.5 metres to 9 metres) were produced from private property being re-cut for that species. The trend had been obvious some 10 years earlier when it was deemed necessary to lift restrictions on pole getting in State Forest to meet the essential requirements of the S.E.C. Poles for electric power had become an item of major importance in the State's economy, and the long term needs were a significant factor to be considered in forest management and planning.

The general prosperity and relative stability of the timber industry was reflected in the stability of Departmental revenue. Periodic increases in royalties, (1961 and 1966), prices, loan funds and Federal Aid Road Grants enabled the Department not only to cope with the progressive inflation, but also to extend its development in roading, fire control and softwood planting and effect improvements in equipment and methods.

Between 1959 and 1969 gross revenue from royalties, sales, etc. almost doubled from $2,450,746 to $4,654,406. If figures for loan funds and Federal Aid Road Grants are added, the total gross revenue more than doubled from $2,802,746 to $5,864,406. Loan funds for pine afforestation doubled from $200,000 to $400,000 plus, in 1969, an additional $600,000 under the Commonwealth Softwood Forestry Agreement Act while the F.A.R. grant increased from $152,000 to $210,000.

The significance of such adequate funds will be self-evident from consideration of the many developments, innovations and achievements of the decade as outlined in this chapter.

Another matter of considerable significance was the formation in 1966 of a "Consultative Committee" representing at high level the two interests of the timber industry and the Forests Department. This was the outcome of a meeting convened by the Conservator on 3rd May, 1966, at the Institute of Forest Research and Protection auditorium at Como to discuss matters of concern to the industry. It was attended by 13 Crown land sawmillers and seven senior officers of the Forests Department. The meeting went a considerable way towards allaying many fears and suspicions of the industry, for which due gratitude was expressed by the sawmillers. In order to promote and maintain better liaison, and interchange of information, the chairman of the "Associated Sawmillers and Timber Merchants" suggested that a standing committee of three or four men from the industry and the Forests Department should meet regularly, with alternating chairmen. To this the Conservator agreed, while stressing quite clearly that although policy matters could be discussed and viewpoints fully presented, the committee could in no way dictate policy.

The committee was duly formed and held its first meeting on 13th May, 1966, at which four men from A.S.T.M. and four from the Forests Department attended, with the Secretary of the A.S.T.M. acting as committee secretary. Regular meetings and interchange of information from that date made a substantial contribution towards better relationships and mutual understanding of the problems and viewpoints of the two organisations concerned.

4. The Forest Estate, and the Crown Lands Tribunal

Following the change of Government in 1959 the Land Utilisation Committee ceased to meet and, as indicated in Chapter III, Cabinet appointed in October 1959 a "Crown Land Tribunal" to advise the Minister for Lands and Forests on the future use of "sparsely timbered Crown lands" within the higher rainfall region of the South West.

With the boom conditions prevailing and capital available for investment, pressures for release of low priced "unimproved" Crown land had increased considerably. Despite the fact that many poorly developed properties were on the market, undeveloped land was sought both by farmers and business and professional men as an appreciating asset on which developmental expenditure was tax deductible.

As at June 1959 the Forests Department had prepared proposals covering 364,918 ha of timbered Crown land and the State Land Utilisation Committee had already recommended 17,600 ha for dedication as State Forest, 27,374 ha for Timber Reserve under the Forests Act and 30,353 for temporary reserves pending further investigation. A further 171,315 ha were considered unsuitable for forestry and available for release. There still remained some 303,525 ha for consideration by the Crown Land Tribunal but inspections indicated that only about one-third was suitable for permanent forest.

Over the ensuing 10 years the Crown Land Tribunal examined numerous areas of Crown land requested on the one hand for reservation as State Forest or Timber Reserve and, on the other, for alienation for agricultural or other purposes. As a result of its recommendations and Ministerial decisions considerable areas of timbered land were released for alienation, very few of which were opposed by the Department. In some cases the Forests Department opposition led to reconsideration, with deferment of action, or acceptance of the Conservator's recommendation. On the other hand, in the majority of the Departmental requests, the Tribunal supported the case for forestry and during the decade a further 53,592 ha were added to State Forest to give a total area of 1,803,495 ha by June 1969. In addition, a further 19,367 hectares of repurchased freehold land was held in the name of the Conservator of Forests, mostly for pine plantation purposes.

Some of the land releases approved before the removal of all marketable timber, were considered premature by the Forests Department. For example, some 18,000 ha east of the Tone River and covered by the first interim report of the Tribunal, was released, although the Department pointed out that it carried a considerable volume of sleeper timber, much of which could be lost by early bulldozing. At the same time, attention was drawn to the dangers of increased salinity in the Tone and Warren rivers and the Minister was advised that careful consideration should be given before alienation of this land, but this advice apparently went unheeded.*

The validity of the warning became apparent less than ten years later when one of the new landholders on this area repeatedly applied for additional land from a nearby forest reserve because, after clearing his block, it was subject to flooding and a broad section showed the effect of salt rise. Needless to say, his applications were refused.

By the time the Second Interim Report was issued, covering Crown lands in the Collie River Catchment, the Tribunal had taken cognisance of the recommendations of the Water Purity Committee and Senior Soils Research Officer of the Department of Agriculture, in addition to those of the Forests Department, relating to increased stream salinity from land clearing for agriculture. It strongly recommended against any further alienations in the Wellington dam catchment area.**

The work of the Tribunal was to continue for further years but it was apparent that any future additions to forest estate would be relatively insignificant and probably insufficient to compensate for revocations for various purposes, so that the gross area of permanent State Forest was unlikely to be much in excess of 1,825,000 hectares.

* F.D. File 373/62, pp. 1 to 7.

** F.D. File 1304/62, p. 129

5. Forest Management

A. Working Plans, Assessment and Mapping

The many projects pursued in the spheres of both hardwood forests and softwood plantations reflected the increasing activity of Management branch, with its increase in trained staff and the decentralisation of its activities based on Working Plan offices at Manjimup and Harvey. The main projects were:-

1. The completion of the National Forest Inventory and provision of up-to-date statements for the British Commonwealth Forestry Conferences in East Africa in 1962 and in India 1968.

2. Continuation of forest inventory for Working Plan revisions in 1960, 1965, and 1970. As prescribed in Working Plan No. 79 of 1955, the 1960 revision (No. 81) was duly completed, but not submitted for ratification for two main reasons. There were objections by some major companies to proposals to rationalise some sawmill permit boundaries and there were complications and uncertainty arising from the proposed sale of State Building Supplies, a major permit holder.

   Working Plan No. 83 was then prepared in 1966, but its formal ratification was also deferred. This plan was reviewed and up-dated in draft form in 1970 as No. 85 but its submission was again delayed, pending a study of the report by the "Economic Study Group on the Australian Timber Industry", and a review of rapid changes then taking place in the established timber industry.

   It was not until February 1972 (some 6 years after the due date) that Working Plan No. 85 received Executive Council approval, to remain in force until the next revision by 31st December, 1976.

3. Hardwood inventories for special purposes were made for:

   (a) Crown timber on alienated land.

   (b) Pulpwood resources within 50 miles of Pemberton, with emphasis on marri. This was in connection with negotiations then proceeding with Australian Paper Manufacturers for a possible pulp mill.

   (c) Firewood resources within 50 miles of Augusta in connection with the Scott River iron pelleting proposals based on Flinders Bay.

   (d) Mining timber in Collie Division for the Collie coal mine requirements.

4. The complete air photo examination and the mapping therefrom of jarrah forest affected by "dieback".

5. Site quality mapping of pine plantations and a softwood inventory of all pine. This included the introduction in 1969 of a new inventory system based on temporary 'variable radius' plots.

6. The development of computer processing of all inventory and growth plot data. This involved the training of specialist officers in computer programming and data processing and it led to the formation of a specialist management research section.

7. Establishment in both hardwood and pine forests of permanent increment plots for regular periodic remeasurement over intervals of several years, from which the data would be subject to computer processing.

8. Production by the Management research section of volume tables for both jarrah and karri. Volume tables within set utilisation classes (chipwood, case logs, saw logs, veneer logs, etc.) were also prepared for both pinaster and radiata pine.

With improved and refined techniques and employment of specialist officers with higher training, supported by trained field teams, management branch was in a position to provide more accurate data over a much wider field embracing the whole area of dedicated forest as well as all softwood plantation areas. The development of this section over the decade was of major importance in planning of future exploitation and yield regulation.

In map production, substantial advances were made by the drafting branch. From up-to-date aerial photographs revised sets of lithographs were prepared and additional lithos issued for areas not previously covered. Total coverage was now achieved for the whole of State Forest.

In 1960, the first three-colour litho was produced. By 1964 several lithos were issued as four-colour productions giving improved legibility and showing the forests of karri and wandoo. In 1969 six-colour sheets were produced for Collie and Muja on which all private property was shown by a green overlay.

The purchase in 1965 of a Wild B8 Aviograph stereoplotter was a major advance in photogrammetry, enabling the drawing of map detail direct from air photos. It was also possible to produce accurate contour maps, subject to the running of accurate levelling lines in the field for vertical control. Contour maps produced for the steeper plantation country as typified in the Blackwood, Collie, Harvey and Murray river valleys were of very great value in planning plantation roads and subdivision.

In addition to the normal production of base sheets and "80" lithos, a series of maps were produced for the expanded planting programme and a further series covering the whole northern jarrah forest, delineating areas affected by jarrah dieback.

B. Forest Engineering

Throughout the decade, road construction proceeded steadily, with the aid of F.A.R.G. funds at an average rate of some 480 km per year. These were largely of "sub-arterial" standard, but included also some "arterial" roads and some "forest tracks".

With the pronounced increase in broadcast prescribed burning and the reduction in burning of firebreak strips, many of the lesser tracks and firelines had outlived their usefulness and their maintenance ceased. Therefore, although some 4,800 kilometres of road construction were completed, the total length of forest road recorded was about the same in 1969 as it was ten years earlier, namely some 27,000 km. In other words, about 4,800 kilometres of lesser tracks and firelines were abandoned. Maintenance was limited to roads in general use and those required for the current annual burning programme, amounting to a total of some 8,000 km annually.

New road construction was mainly directed to the more recently dedicated forest in the far south, and to new pine plantation subdivisions. By 1969 the whole forest area was reasonably well provided with road access, with a skeleton network only in the virgin forests, where further subdivision would occur as logging roads were progressively constructed for exploitation.

During this period some road construction was also done as a recoupable project for other authorities such as the National Parks Board to provide access as a necessary first step towards fire control in park territory. Two examples were the Walpole National Park and the Warren National Park south of Pemberton.

A new departure was the construction by the Department of airstrips to facilitate the use of aircraft for reconnaissance and for controlled burning by 'aerial ignition'. The first airstrip constructed in State Forest was near the Nornalup Road between Shannon River and Walpole in 1965. In 1967, on the initiative of the Forests Department and with the combined effort of local authorities, sawmill companies and contractors, an airstrip to serve Manjimup and Bridgetown was established about mid-way between the two towns and north-west of Wilgarup siding. As aircraft use for forest purposes increased, further strips were established at suitable strategic points.

Other aspects of forest engineering receive mention under the section on Utilisation.

C. Housing and Building Construction

Over the decade, housing was increased by only 57 from 442 to 499, an average increase of less than 6 per year. These were houses of modern design for staff and included ten prefabricated "transportable houses" which required only to be hauled to the site, set up on stumps, and connected to water supply, S.E.C. mains and septic tanks.

In addition 12 houses were purchased in townships or on farms bought for pine afforestation, offsetting the seven houses destroyed in the Dwellingup fire. Old cottages of low value were sold or demolished.

Installation of septic systems for all houses was completed following provision of a town water supply at Nannup about 1962, and a garage was provided for practically every house.

The transfer of settlements to townships involved the shifting of many houses which were renovated and upgraded with modern facilities. The major moves included Gleneagle houses to Jarrahdale, Tallanalla settlement to Harvey, Hoffman houses to Hamel, Willcock to Ludlow, Shannon River to Walpole, Barlee and Willow Spring houses to Nannup and Lewana and Heartlea settlement to Manjimup.

Substantial improvements in office accommodation were made by provision of eight new offices, including a new regional office at Manjimup, divisional offices at Busselton, Dwellingup and Kelmscott, and district offices at Jarrahdale and Hamel, while extensions were made to divisional offices at Harvey and Nannup.

A significant milestone was the completion at Como in the delightful setting of Collier plantation of the Institute of Forest Research and Protection which was officially opened by the Premier in April 1966. This was followed by new research buildings at Manjimup in 1968 and Dwellingup in 1969.

Other building activities included a new radio workshop in Collier plantation (1963), seven new fire towers, two new sawmills (to cut hardwood at Dwellingup and pine at Margaret River) and huts, gantries and workshops at various district and divisional headquarters. Considerable activity was concentrated at Dwellingup replacing the many structures destroyed by the 1961 fire.

The 31st May, 1961, was a 'red letter' day for Head Office staff when after more than 40 years in the old Treasury Building, Head Office transferred to the third and fourth floors of the new Rural and Industries Bank. Conditions had become extremely cramped in the old quarters, and the transfer to spacious, well lighted and air-conditions premises was a very welcome move.

D. Plant and Equipment

At June 1959, some 45 men at 17 workshops were employed for the maintenance of a fleet of 452 vehicles of various types including tractors, loaders, jib cranes and graders as well as trucks and utilities. In addition they serviced 172 stationary engines and 127 power saws.

The following year an Assistant Maintenance Engineer was appointed at Manjimup. Because of the difficulty in retaining mechanics at rural centres, and the Government desire to train as many apprentices as possible, the Departmental workshops employed apprentices to the limit of their capacity. By 1969, of 65 workshop employees, 20 were apprentices. Many completed their training during the ten year period and those who elected to stay with the Department were a welcome addition for stability in workshop staff.

The development of a sound and well equipped workshop organisation during the previous decade, now paid off. In addition to plant maintenance, the larger workshops undertook considerable fabrication work. Collie was the nominated centre for specialisation in fire control equipment, pumpers, and developmental work. Both Manjimup and Gnangara produced equipment designed for special purposes. Some of the items fabricated were: sawmill equipment, jib cranes, tractor canopies, steel tanks, hose reels, fireline ploughs (fitted to front end of tractors), tree rakes, logging jinkers, a pine seedling lifter, a nursery seeding machine, boom equipment for application of chemical sprays, planting machines,

a lining out machine, a portable flame thrower and a mobile machine for lifting, sorting and packing pine plants from the nursery. Considerable ingenuity was shown by some field officers in suggesting or designing equipment and by workshop personnel in developing the ideas for practical application.

There was no substantial addition to plant during the decade, in fact the reverse applied and there was some reduction in vehicles after a close study of requirements. Adequate funds enabled the Department to purchase new and dispose of obsolete vehicles and plant and so maintain efficient equipment to a high standard.

6. Forest Protection

A. Fire Protection

(i) The most significant feature of the decade was the very severe fire season of the 1960/61 summer, following a relatively dry winter and spring with a high rainfall deficit. It culminated in the Dwellingup fire disaster during a week of dangerous fire weather from 17th to 25th January when a series of lightning strikes on two successive evenings set numerous fires in the tinder-dry forests. Two further periods of dangerous weather and serious fires occurred from 8th to 15th February and 1st to 3rd of March.

The story of the Dwellingup fire is well recorded in the Annual Report, 1961* and in the report of the Royal Commission+ which enquired into bush fires of the 1960/61 summer. Briefly, after weeks of hot dry weather, on a 'dangerous' day on 19th January with a temperature of 104°F, a series of lightning strikes occurred between 5.30 and 6.00 p.m. dispersed over some 20,000 hectares of State Forest within 15 to 32 kilometres of Dwellingup. Six fires were reported that evening and a further four between 5.15 a.m. and 1.15 p.m. the following day. Strikes also occurred in Gleneagle and Harvey Divisions.

Gangs were promptly despatched and most fires were held, but by the time the tenth fire erupted, about 1.15 p.m. on 20th January in century temperatures with an easterly wind, all gangs were committed. It was out of control before emergency forces could launch an attack, and made a run of six kilometres by 6 p.m. throwing spot fires ahead. That night a further series of lightning strikes occurred in Dwellingup, Collie and Harvey Divisions, thus requiring retention of forces in the two latter divisions which could otherwise have assisted at Dwellingup.

Despite reinforcements from southern divisions, timber industry personnel and farmers, there were insufficient resources over the next few days to contain the numerous outbreaks which eventually linked into one vast burn with an extremely long and irregular perimeter. With "dangerous" weather again on Tuesday 24th, a temperature of 106°F. and freshening wind from the north and north-west, many breakaways occurred and units were recalled to Dwellingup for regrouping.

The wind had dropped towards evening and with a fire front two miles north of the town, forces were deployed on threatened flanks and throughout the village although no immediate danger was then apparent. About 8 p.m. winds of gale force from the north showered burning debris on Dwellingup long before the ground fire reached the town

* Annual Report 1960/61

\+ Report of the Royal Commission upon the Bush Fires of December 1960, and January, February and March 1961 in W.A.

perimeter. Numerous fires were set both in the open and to buildings. Women and children were quickly assembled in bare open spaces.

To quote one report, when the town was engulfed, "much heroic work was done in saving what was saved. It is to the great credit of all personnel that throughout the terrifying experience on the night of January 24th, there was no panic and not a single casualty."*.

The Dwellingup fires covered 146,200 hectares, destroyed 132 dwellings, a hospital, two sawmills, two service stations, three general stores, offices, outbuildings and 74 motor vehicles to a total value of some $2 million.

During the second period of high fire hazard, between 8th and 15th February, lightning strikes accounted for most of the 11 fires in the Pemberton and Shannon River Divisions.

The Third dangerous period occurred in early March, the most damaging fire originating from a bush locomotive in Brockman block, south-east of Pemberton.

In addition to lightning fires, 23 fires occurred from December to March on Crown land mostly held under cattle grazing leases on the coastal strip between the Warren and Gardner Rivers. During the 1960/61 season, more than 50 fires occurred in Pemberton Division alone. Of some 44,600 hectares burnt, about 15,000 hectares were in State Forest, and the remainder either private property or Crown land under lease.

Elsewhere in the South West, many fires caused serious losses to agricultural properties particularly in the Karridale district of the Augusta-Margaret River shire.

As a result of the many damaging rural fire outbreaks, property losses, accusations, allegations and claims, the Government decided to appoint a Royal Commission "to enquire into and report upon Bush Fires of December 1960 and January, February and March 1961 in Western Australia". Mr. G.J. Rodger was appointed Royal Commissioner on 27th April, 1961 and commenced hearings in Perth on 1st May 1961, which continued until 19th August, 1961. Sworn evidence was taken over 23 days from 116 witnesses, of which 54 were examined in Perth, and the remainder at four rural centres. They represented a wide variety of interests, including shires, government departments and instrumentalities, farmers organisations, forest industries, as well as many private individuals.

The Commissioner's 66 page report not only covered the detail of many fires but also dealt with "The measures necessary or desirable to prevent and control such fires and to protect life and property in the future," and set out "the basic requirements for an effective State Fire Emergency Organisation". It made 27 recommendations, seven of which referred to the Forests Department, while the remainder concerned the Bush Fires Board, Bush Fires legislation, and various aspects relating to rural fire control.

This enquiry was a landmark in bush fire control in this State. It led to an overhaul of the Bush Fire Act, and the structure and functions of the Bush Fires Board and Bush Fires Brigades. Recommendations applicable to the Forests

* Annual Report 1960/61
Report of the Royal Commission on Bush Fires in W.A. 1961.

Department included the need to intensify research into the technical and practical aspects of fire control, to extend the practice of controlled burning and to improve the efficiency of fire gangs and equipment, including radio communication. It also recommended more staff be directed to planning and co-ordination to meet emergency conditions with labour and equipment, using auxiliary sources of manpower for both controlled burning and firefighting.

Meanwhile, the Forests Department had not been idle in self-examination and in taking steps to improve fire control organisation and performance. A senior officer was appointed "Fire Operations Officer" and more staff were employed on fire research.

Because of the high degree of interference to High Frequency (H.F.) radio communication during periods of atmospheric electrical disturbance which often coincided with high fire hazard, it was decided to investigate the use of very high frequency (V.H.F.) transmission. During electrical storms H.F. communication had been found almost unworkable.

(ii) Communications

Even before the issue of the report, tests for V.H.F. communication were commenced, with very promising results. During the following year, 1961/62, 20 V.H.F. sets were installed, and in the ensuing year a further 16 sets and five repeater stations were added. The results exceeded all expectations and the following great advantages were reported:

1. A simple aerial needing little maintenance.
2. No tuning controls - any person can operate.
3. Steady signals by day and night.
4. Electrical interference minimised.
5. Atmospheric interference extremely slight.
6. Equipment transistorised giving very good battery economy. Sets could thus be left switched on for listening out.
7. It could be used from a vehicle in motion.

This was a tremendous advance. Additional units and repeater stations were added annually. The latter were usually located on hilltops where lookout towers were established.

The H.F. system was still retained for inter-divisional communication.

By 1969 radio sets in operation were listed as:-

	V.H.F.	H.F.	Single Side Band	M.F.
Mobile Units	153	3		
Fixed Stations	18	13 A.M.	1	
Units on Fire Towers	2			
Repeater Stations	18			
Hand portable sets		14		
M.V. radio beacons (for aircraft use)				8
Totals	191	30	1	8

Hand held "walkie-talkie" units were first tried in 1964/65 for use around fires, and in plantations and the following fire season were carried by senior staff when in the large southern plantations.

In 1965/66 V.H.F. was installed in aircraft used for aerial ignition when controlled burning. Remote controlled equipment was installed at the new Institute of Research and Protection to allow controlling officers to communicate with the field via Radio Branch.

Despite these great advances, the old earth return telephone lines connecting fire towers, offices and houses still formed the main channels of Divisional communication. As the advent of S.E.C. power lines caused considerable interference in settlements it was necessary to convert the settlement and incoming lines to metallic circuits, connecting to the earth return lines by transformer outside the towns beyond the influence of power lines. In some cases it was necessary to hire P.M.G. lines. Old telephones were replaced with modern and more efficient instruments and offices provided with specially designed switchboards.

When floods in the Harvey-Bunbury area disrupted all P.M.G. communications in the winter of 1964, the radio network of the Forests Department maintained the only communication with Perth. Reports on the position at Harvey and Stirling dams, where rapidly rising waters posed a major threat to the town of Harvey, were relayed every 15 minutes.

In 1968/69, because of the increasing cost of telephone line construction and maintenance, trials were made with radio telephone installations in Kelmscott division linking Kelmscott divisional office with Como, Jarrahdale, and the towers at Mt. Dale and Mt. Solus. This innovation was to prove most successful and led to extension of its application in other localities, including two fire towers remote from telephone lines.

In its 20 years of operation, the Radio Branch had acquitted itself with distinction, kept pace with rapidly changing developments, and maintained excellent communication facilities for the Forests Department field operations.

(iii) Controlled Burning for Hazard Reduction

During the decade 1959 to 1969, the area under fire control increased by 29 per cent (414,407 ha) from 1,423,789 ha to 1,835,196 ha. With the manpower and facilities available, it was rarely found possible to cover by controlled burning and top disposal burns more than 10% to 15% of the total area under acceptable conditions in any one year. "Acceptable conditions" depended on the type of forest, period since last burnt, degree of litter accumulation, topography, and weather conditions. Fire research had largely determined the significance of the various factors affecting fire behaviour in the jarrah forest and tables were produced which set out the prescribed weather conditions required to produce an acceptable burn under given forest conditions. Suitable days were few and the problem was to ignite, burn and control extensive areas within the limited period of suitable conditions.

It was suggested that this might be possible by the use of aircraft dropping incendiary devices to a pre-determined pattern over areas prescribed for burning. Accordingly, in collaboration with the C.S.I.R.O., experiments were commenced

in the summer of 1965/66. The results were encouraging enough for repetition of the trials the ensuing summer, with some modification and improvement of equipment and methods. They resulted in the burning of 76,000 ha by aerial ignition. A real breakthrough was achieved in the 1967/68 summer when nearly 25 per cent of the total forest area was burnt, of which 181,420 ha or about 40 per cent was ignited from the air. With refinements of technique, aerial ignition became standard practice and, together with burning by ground gangs, enabled the Department to cover nearly one quarter of its forest annually with controlled fire. This was a world first in achievement and the practice and techniques were adopted in ensuing years in some of the Eastern States and overseas countries.

(iv) Fire Occurrence and Cause

Meanwhile the incidence of fires attended in summer showed little tendency to decrease, although the number fluctuated each year, ranging from 463 in 1961/62 to a low of 231 in 1962/63. The same range of causes was evident with escapes from settlers' fires consistently heading the list at from 20 to 25 per cent of fires attended. With the disuse of bush locomotives for logging and the conversion from steam to diesel locos by the W.A.G.R., fires from these sources which had previously been of high occurrence, had now reached insignificant proportions.

Except for the disastrous year of 1961, and a few large fires in 1962 when lightning strikes were again a major cause, the annual area burnt by uncontrolled fires was in the low range of 1,452 to 8,682 hectares.

Of increasing concern were the many fires occurring in pine plantations, particularly in and near the metropolitan area, where they were usually deliberately lit, often by children. Although the area of pine had more than doubled to some 24,000 hectares in the ten years to June 1969, the area burnt by uncontrolled fire amounted to only 187 ha or less than one per cent. Of this, 49 ha and 95 ha were burnt by two large fires respectively in 1962 and 1965. The many other outbreaks had generally been held to very small areas before complete suppression.

Following detailed investigations and trial fires under various conditions by the fire research team, a policy of hazard reduction by prescribed burning in metropolitan pine plantations was adopted in 1968. It was largely responsible for the good results in the ensuing summer, when from 38 fires lit in or near metropolitan plantations, the total area burnt was less than seven hectares before complete suppression was achieved.

The ability to prescribe for successful hazard reduction in the plantations of P. pinaster led to trial burning by the fire research team in plantations of P. radiata. Although a more fire sensitive species, initial results encouraged the belief that this practice may be successfully applied, particularly in the older stands, under carefully specified and controlled conditions.

The extension of fire control over an additional 414,000 hectares, including some 13,000 hectares of pine plantation, required a considerable length of additional roads and tracks for subdivision and access and more fire towers for effective detection coverage. In all, 12 more

fire towers were erected, two being in Dwellingup division to replace towers destroyed in the 1961 fire, one a 60 metre steel tower to replace the karri "Beard Tree" lookout, and one a television tower on Mt. Lennard in Collie Division on which the Department obtained fire detection facilities. For two towers remote from existing telephone lines, communication by V.H.F. radio was provided, this being considerably cheaper and more effective than the building of new telephone lines.

Other developments of note up to 1969 were:-

1. Trials with the use of fire retardants and the adoption of diammonium phosphate for use in tankers at pine plantation centres.

2. Intensification of fire gang training and the introduction of annual competitions between gangs in four northern divisions.

3. The remodelling of the tanker fleet as dual purpose vehicles for carrying personnel as well as a water load and pump equipment. This permitted a reduction in the total vehicle requirements and ensured greater use of the capital invested in the vehicle fleet.

Despite the severe setback of the Dwellingup holocaust (or perhaps in part, because of it) the advances in fire control and protection through research and improvement of techniques can be viewed with a degree of satisfaction. The protected area had been increased substantially to embrace the whole of State Forest. Except for 1961, fire losses had been reduced to a low level. Liaison with bush fire brigade organisations had improved and the outlook generally was one of greater confidence in maintaining effective fire control in the forests of the South West.

B Protection from Other Injurious Agencies

(a) Injurious Insects

(i) The Sirex Wasp which was the subject of a Commonwealth enquiry in 1952, was reported present near Melbourne early in 1962 with several infestations attacking trees of P. radiata. After an officer of the W.A. Forests Department visited Victoria to gain first hand information, a thorough search failed to reveal its presence in Western Australia. However, it was detected in timber on more than one ship at Fremantle where quarantine authorities took appropriate action for its destruction by fumigation.

A Sirex Committee formed by the Commonwealth and States to combat, control and, if possible, exterminate Sirex in Victoria was supported financially by Western Australia. Much valuable research was done, natural predators were imported and liberated, and great efforts made to contain the infestation, but with limited success. It would now appear the insect is in Victoria to stay, but its spread and depredations can be limited by the application of hygiene and control methods. Rigid quarantine was still maintained to prevent its introduction to South Australia and Western Australia.

(ii) Jarrah Leaf Miner. Severe outbreaks of jarrah leaf miner to the east of Manjimup between the Tone and Perup Rivers in 1966/67 caused considerable concern. The insect was also more active over a wide area as far east and south as Albany. A survey was made by the C.S.I.R.O. which has since had entomologists working full time on this insect. After several years of severe attack, probably due to some

imbalance in natural control factors, the annual infestation appeared to dwindle and become of no great significance some 3 or 4 years later. Prior to the heavy infestation in Manjimup district the insect had caused little concern in the main commercial jarrah forests, although it had been well in evidence on the coastal plain for the past 40 to 50 years.

(b) Storm Damage

Injurious agencies against which protective measures cannot be taken are those of unusual and extreme weather conditions such as abnormal storm and tempest.

In this connection it is worth recording the results of a tornado which occurred in Collie Division on 6th April, 1960. Commencing about one mile west and three miles north of Wellington dam wall, it swept in an east-south-east direction for some seventeen miles through State Forest into alienated land, cutting a swathe from 10 to 30 chains in width.

The result was awesome. The winds must have been of extremely high velocity as hardly a tree crown remained. Jarrah and marri of all sizes were either uprooted or had their crowns twisted off. The path of the tornado passed south of Collie and just north of Lyall's mill. Had it struck Collie, it would doubtless have been a "national disaster" but as no townships or settlements suffered, it received little publicity. East of the forest it passed through farm lands where it faded out leaving evidence of its dying fury where patches of timbered land were in its path. A salvage operation was mounted to recover all marketable timber.

Earlier known instances of comparable wind violence occurred in Manjimup Division in early September 1942 and in the Wuraming district in 1929 where hewers salvaged sleepers from a long strip of severely damaged forest. In the former case, a row of 14 pine trees from 60 to 90 cms D.B.H. were either uprooted or had their stems screwed and twisted off. All were demolished. Numerous trees littered the roads north, east and south of Manjimup, the cyclone having skirted the town. Evidence of comparable early damage was noted in a strip of mixed forest east of Quininup. Here a sapling-pole stand of marri and jarrah occupied the site, while the ground was littered with the remains of large uprooted trees, probably struck by a tornado some 30 to 40 years previously.

(c) Fungi

The one disease of major significance on which much attention was focussed in the nineteen sixties was that of the so-called "jarrah die-back".

The occurrence of patches of dead and dying jarrah had been noted around the heads of some gullies since the first report near Karragullen in 1921. Small areas were reported up to 80 kilometres further south in 1928, and one patch seen by the writer some miles north of Huntley in 1929.

By 1948 the extension and multiplication of these areas gave cause for grave concern and a research laboratory was opened at Dwellingup with the Commonwealth Forestry and Timber Bureau collaborating. From 1948 to 1955 investigations focussed on nutrition, site studies, description of symptoms and the mapping of its occurrence, which by this time had spread as far south as Bridgetown. All pathological work yielded negative results.

During the period 1954 to 1959 most effort was spent in recording its occurrence and in salvaging timber from affected areas.

In 1959 more intensive research was initiated and a local officer working on this problem was appointed as a Commonwealth Research Officer at Dwellingup. Investigations on drought, salt, toxic nutrients, and fire history were negative, but all evidence pointed to the hypothesis of an undiscovered root pathogen. Comparable disorders in the U.S.A. and in New Zealand had been associated with the fungus Phytophthora cinnamomi, but this had never been isolated in Western Australia and all attempts to isolate it had failed.

In 1964, a "break through" occurred when the fungus was isolated from diseased soil at the Waite Agricultural Research Institute in South Australia. Their technique led in 1965 to the isolation in Western Australia of Phytophthora cinnamomi which was then shown to be consistently associated with dying patches of jarrah. In the following year it was shown that the fungus was pathogenic to a wide range of associated native plant species in the forest and that it could be readily spread by movement of logging and roading equipment.

A great upsurge of activity then followed. In 1965 the Commonwealth Forest Research Institute established a new Regional Station at Kelmscott and a second Research Officer was appointed in 1967. The two Commonwealth officers concentrated on research into basic aspects of the fungus. Forests Department staff investigated field and ecological aspects of control and made environmental studies. In addition to overall mapping of affected areas, provision was made for mapping the rate of spread. At Como, the screening of resistant tree species was undertaken. A graduate research fellowship was offered, and taken up at the A.N.U. in Canberra, and funds were provided for post graduate research at the Botany School of the W.A. University. From 1966 six full-time research officers were engaged on the dieback problem in the Forests Department.

Detailed mapping of dieback affected forest from up to date air photos was commenced in 1965, and by 1969 had covered some 730,000 hectares indicating:

(a) Area severely affected:	13,770 ha = 1.9%
(b) Less severely affected:	23,490 ha = 3.2%
Total area affected:	37,260 ha = 5.1%

In May 1968, in conjunction with the Commonwealth Forest Research Institute, two world authorities on Phytophthora cinnamomi were brought to W.A. as consultants. They were Professor Zentmeyer of the University of California and Professor Newhook of the University of Auckland, New Zealand. They commented favourably on past and current work on the pathogen, and suggested avenues for further research.*

Although the old areas of disease occurrence had exhibited a slow rate of increase, it was now quite apparent that the rapid spread over the recent 20 years or so had been unwittingly caused by the post-war mechanisation of logging and road-making operations, with the consequent transfer of infected soil on tractors, trucks and graders, etc. from infected areas. The timber industry, Forests Department, and road-making authorities must all have played a major role in the distribution of the pathogen.

* Reports by Dr. Zentmeyer and Professor Newhook. 1968

With the co-operation of the timber industry, local authorities, and forest users generally, action was taken to improve forest hygiene and disease control. A system of logging priorities was prepared, extraction restricted to specified routes and conditions prescribed to avoid conveyance of soil from infected to clean areas. Seminars were held and literature distributed to ensure that all parties concerned were fully informed.

Where in 1965 there were some dire predictions that the future of the jarrah forest was doomed, there was now both hope and confidence that the disease could be arrested and its spread minimised by the application of intelligent control measures based on knowledge from continued research and experience.

7. Forest Research

A Organisation of Research

As indicated in the previous chapter, research in jarrah silviculture, commenced at Dwellingup in 1948 was well established by 1959 and the nucleus of two research stations had been established at Manjimup and Wanneroo for silvicultural research into karri and pinaster pine respectively. In 1959 the Commonwealth Forestry and Timber Bureau which shared in the support of the Dwellingup station, appointed a Research Officer at that centre.

Research for the next few years was directed to projects under the four main headings of jarrah silviculture, karri silviculture, pine silviculture and soils, with a certain amount of overlap between soils on the one hand and plant nutrition of the species concerned. Fire weather research was a continuing project.

Following the Dwellingup fire, in which unfortunately, many of the established field plots for silvicultural studies were lost, there was a surge of activity towards research into fire behaviour which was to have a marked influence on controlled burning operations. Research activity grew steadily as more professional staff became available, but they worked with limited accommodation and facilities. The one laboratory at Dwellingup had miraculously escaped the fire when houses and buildings nearby were destroyed, but it was inadequate for the expanding needs. A new stimulus was provided by the opening of the spacious and well equipped Institute of Forest Research and Protection building at Como in April 1966, followed by new research buildings at Manjimup in 1968 and Dwellingup in 1969.

An enlightened policy towards the granting of study leave enabled several officers to engage in post-graduate study outside the State for varying periods between 1960 and 1969.

By 1967, five officers had achieved "Masters" degrees. One was conferred by the University of W.A., one by Sydney University, and three obtained at different universities in the U.S.A. A sixth officer, Dr. Hopkins, received a Ph.D. degree from Melbourne University after completing studies under a Research Fellowship awarded by the Australian Paper Manufacturers. In addition, research branch had graduates both from Australian and overseas universities, giving a most desirable blend of diversity in training and experience. In 1968, research personnel comprised 12 professional officers, one senior field officer and 25 technical assistants under Dr. Hopkins as Superintendent of Research with headquarters in the new Como building.

An indication of the rapid growth of the research organisation and its dominant role from 1964, is found in a perusal of the annual reports of the Department. Where it was previously covered by three or four pages, from 8 to 13 pages were devoted to its activities for each of the 5 years 1965 to 1969 inclusive.

While volumes could be written on the many projects and results of research over this decade, it is not possible in this brief record to do more than list some of the lines of research undertaken. For more detail the reader is referred to the many Departmental reports and publications emanating from research officers during this period.

B Jarrah Silviculture - based on Dwellingup

Jarrah regeneration studies.
Artificial establishment.
Nutrition trials.
Flowering and seed production cycle.
Thinning studies.
Regrowth - development and tending.
Coppice control by chemical means.

After the loss of many plots in the Dwellingup fire, work was concentrated on thinning studies and coppice control, to inhibit the development of coppice from stumps left or trees killed as a thinning operation in pole stands. After many trials of materials and methods, an effective technique was developed by 1965 and employed on a commercial scale in 1966 for thinning of jarrah pole stands by injections of "Tordon" into notches cut into the bole at waist level. This made possible the effective thinning of large areas at a small fraction of the cost of felling and treating the stumps, and it led to treatment of extensive areas of good pole growth as an economic operation.

By 1966/67, following the breakthrough in dieback research, the emphasis changed to rehabilitation of dieback sites, including species trials, establishment trials, nutrition, and environmental studies.

C Karri Silviculture

Studies of karri flowering and seeding cycles.
Regeneration studies.
Enrichment planting of blackwood (Acacia melanoxylon).
Ash bed effects.
Thinning of karri regrowth - plot trials.
Forecasting and measurement of seed crops and seed fall.
Trade cutting methods and alternatives.
Chemical control of scrub on roads and firebreaks.
Cull felling studies.
Fire damage studies.
Nutrient Trials.
Chemical thinning of young regeneration.
Tree establishment of exotic species on treeless flats in the karri zone.
Studies of "millable" marri in marri predominant stands.
Artificial establishment by seeding or planting.
Assessment of regeneration stocking.

Some of the more important results achieved were:

(1) The ability to predict availability of seed, and demarcate areas likely to require artificial restocking after the top disposal and regeneration burn.

(2) The use of "wilding" transplants as a cheap and effective method of restocking blank areas.

(3) The decision to revert to the uniform system for regeneration of karri by clear felling with retention of seed trees, and the recovery of logs from seed trees after regeneration was established. This system had operated very effectively from 1925 to 1937 in regenerating more than 7000 hectares in Big Brook, Treen Brook and Channybearup blocks, after which there had been a change to a selection system.

D. Pine Silviculture (mainly P. pinaster based on Wanneroo)

Selection of elite trees of P. pinaster for tree breeding.

Vegetative propagation trials.

Studies in variation of Pinaster.

Seed treatment for stimulation of germination.

Nutrition trials.

Establishment of scion orchard and seed orchards.

Soil moisture investigations.

Nursery studies.

In conjunction with the CSIRO, the establishment and nutrition of P. Radiata on laterite soils.

Pollen storage.

Timber tests of young pinaster by the Division of Forest Products, CSIRO.

Search for elite trees of P. radiata.

The major project was that of tree breeding to improve the quality of P. pinaster and establish a seed source from trees of selected quality. A commencement was made in 1957. It was established that the Leiria strain of seed from Portugal yielded results superior to those of any other strain tried in W.A., but elite or "plus" trees with the desired characteristics were rare and difficult to locate in local plantations. In 1963 Senior Forester Perry, with long experience in pinaster, was sent to Portugal for two years to select "plus" trees and despatch scion material by air to Perth for grafting on to local stocks. He also collected half-sib seed from these elite trees. The work was supported by other Australian States and aroused world-wide interest. By 1965 seed orchards were established, and additional plantings made in the ensuing years.

At the receiving end problems were encountered and overcome. In addition to handling, grafting and tending the incoming material, staff carried out :-

progeny testing trials,

provenance trials,

pathology investigations,

stand tending and thinning studies,

growth studies,

investigation of potential planting country,

correlation of site quality with native vegetation,

trial plantings on a wide range of sites,

investigation of nursery problems,

scrub control.

In 1967 some work was commenced on P. radiata in the southern plantations by a research officer based initially at Collie and later at Manjimup. Prior to this some tree breeding had also been commenced with P. radiata using material from elite trees in South Australia and New Zealand for grafting to local stocks in addition to scions from local "plus" trees. The older plantations were searched for elite trees at Mundaring Weir, Harvey, Grimwade and Keenan. A radiata seed orchard was established at the former tobacco research station west of Manjimup which had been purchased by the Forests Department some years after the collapse of the tobacco industry.

E. Soils Research

This involved work both in native hardwood forests and pine plantation soils. Some of the projects involved :-

The effects of fire intensity on soils.

The effect of litter accumulation.

The problems with nursery soils.

Pot cultures in soils from both pinaster and radiata plantations.

Soil investigations in wheatbelt arboreta.

Analyses for phosphorus in pine plantation soils.

Investigation of leachates in jarrah forest soils.

Soils and ash-bed effects.

Soil fertility studies.

Numerous analyses, particularly for phosphorus content of samples from all areas proposed and investigated for radiata pine planting.

In 1962, Dr. Leyton, a world authority on tree nutrition from the Commonwealth Forestry Institute at Oxford, visited Australia and discussed soils and pine nutrition problems with local senior officers. He was brought out by the CSIRO Division of Soils to advise on the co-operative project of pine establishment on laterites.

Until 1962 the soil chemical work was done at the Dwellingup laboratory. In that year the laboratory was transferred to Perth and operated in temporary quarters until established in the new Como research building in 1966. It also carried out numerous foliar analyses in addition to soil analyses.

In 1967, Senior Research Officer Hatch who had run the laboratory since its inception, spentfour months at the Rubber Research Institute in Malaya under a Churchill Fellowship, where he studied problems of plant nutrition.

F. Fire Research

Research on fire behaviour was commenced at Dwellingup in 1963 largely as the result of discussions with and on the recommendations of the Royal Commissioner into Bushfires 1961 and his technical adviser, Mr. McArthur of the Commonwealth Forestry and Timber Bureau.

The studies were directed towards fire behaviour under varying conditions of weather, fuel, temperature, relative humidity, topography, slope, wind velocity etc. In the first year some 150 experimental burns were carried out, - 50 in spring and 100 in autumn. Factors affecting rates of spread of the head fire were measured.

Assessments were made of the degree of damage from fires of different intensity.

Following the death of two employees who lost their direction and were engulfed by a flare up in heavy scrub in relatively mild weather in 1962, a simple direction finder was devised and issued for use by gangs engaged in prescribed burning.

After 200 more experimental burns in 1963/64, a draft 'controlled burning guide' was prepared for officers and overseers, tested the next summer and its use generally adopted for the northern jarrah forests.

In 1965 similar investigations were extended to the karri region, based on Manjimup and during the 1965/66 season prescribed burning by aerial ignition was under investigation jointly with CSIRO personnel.

Other extensions of fire research included :-

The effect of fire on growth and damage in jarrah pole stands.

The effect on crown scorch and recovery of jarrah saplings.

The effect of trial fires in 13 year old pinaster plantations.

The effect of mild fire on karri poles.

The effect of scrub density and species on fire behaviour.

As more and more data was accumulated from trial fires, prescribed burns and uncontrolled fires, practise was modified and operations undertaken with greater confidence based on increased knowledge. By 1969, prescribed burning by aerial ignition was part of the regular annual programme, largely solving the problem of covering sufficient area annually under safe prescribed conditions. It was a 'world first' which was to be adopted by some of the eastern states and overseas countries.

Furthermore, fire was now accepted for hazard reduction in pinaster plantations under prescribed mild conditions, and conditions for its safe use in radiata plantations was under investigation.

Fire research was paying dividends.

8. Forest Utilisation

Forest utilisation will be considered from two aspects, namely, A. Changes within the hardwood using industry, and B. Activities of the Utilisation Branch of the Forests Department.

(Pine Utilisation is considered under the general section covering pine plantations.)

A. Utilisation in the Timber Industry

Severe competition and loss of markets to other materials induced re-appraisals by the industry with a view to improving its methods, reducing costs, developing improved products and seeking new markets.

Some of these innovations and activities were :-

(i) The re-introduction of wood preservation plants to give longer life for wood in certain uses. An open tank arsenic treatment had been used effectively for karri sleepers, as a termiticide by State Sawmills when producing sleepers for the Trans-Australian railway, prior to its opening in 1917. Under the name "powellising" it was used intermittently for orders until the late nineteen twenties, but in the higher rainfall areas it was ineffective against fungal attack. About 1930, following successful laboratory tests, using the sodium fluoride as a fungicide in addition to arsenic, the "fluorising" process was used intermittently. However, sleepers so treated failed in field tests in the wetter localities due primarily to failure to get adequate penetration of the preservative, and the process was discontinued.

More than 20 years later the Division of Forest Products of the CSIRO developed high pressure impregnation of eucalypts in a pilot plant at the very high pressure of 1000 pounds per square inch.* In 1960, State Building Supplies installed at Pemberton the first commercial high pressure plant for creosote impregnation of karri at 1000 p.s.i.* - the world's first plant to operate at such high pressure. Its purpose primarily was increased durability of cross-arms for which karri was admirably suited on account of its strength properties and availability.

The successful operation of this plant led to the adoption of karri as one of Australia's main cross-arm timbers, The plant was also used for treating trial parcels of both marri and karri sleepers for installation in test sections of line.

In 1960/61 two more wood preservation plants were operating at 200 p.s.i.⊗ one at Picton for sapwood impregnation of eucalypts poles and round pine with copper-chrome-arsenic salts. Later the Picton plant also used C.C.A. salts both for pole treatments and round pine posts and rails.

The plant at Picton had its genesis from the decision of the P.M.G. Department to use preservative treated poles in Western Australia, following its successful experience in the eastern states with non-durable poles which had been treated by impregnating the sapwood with creosote or other preservative chemicals.

Although discussions with the Conservator occurred in December 1958 on nebulous proposals from C.H. Innes & Co. of Melbourne, no firm steps were taken until Bunnings tender for treated poles was accepted by the Commonwealth in 1959/60 and the firm sub-contracted to the international firm of Hicksons to carry out the preservation treatment.

As mentioned in Section 3, p 82 referring to pole and pile production, treated marri soon displaced jarrah and wandoo as the main pole for P.M.G. lines, while treated karri supplemented the long jarrah poles for the high tension transmission lines of the State Electricity Commission.

Once firmly established Hicksons ventured into the field of pine post preservation, drawing thinnings from southern plantations, mainly Ludlow and Myalup. Treated fence posts were carted as far as Esperance, but sales varied greatly with fluctuations in agricultural prosperity. Competition for the Esperance market also appeared from South Australian treated posts.

* = 6890 kilopascals

⊗ = 1378 kilopascals

The Perth-based plant which initiated pine preservation treatment was on a small scale until Bunnings moved to Kewdale installed a larger plant and embarked on a promotion campaign. With very limited supplies available from metropolitan plantations, the firm in later years drew supplies from its own private plantations.

(ii) Sawmill improvements continued with many major mills converting to electric power. Several large mills installed band-saw headrigs, and a number of band re-saws were also installed for improved and faster cutting with reduced manpower. One adverse effect was the tendency towards increased forest and mill waste with attempts to upgrade the product by being more selective. Mill recovery per cent which had been high in periods of strong demand, decreased at a number of mills. When large orders of large dimension sleepers were completed there was a swing to increased scantling production in excess of demand. Quantities accumulated, and lower grade scantlings were difficult to quit. With a decrease in sleeper orders and exhaustion of much private property forest, many sleeper mills closed down. They had done a very effective job in recovering a great volume of timber from land in process of clearing and crown land not required for permanent forest with a low yield per unit area.

(iii) In October 1962 for the first time the 'Austis' Conference was held in West Australia, at Bunbury when 140 delegates attended from all states. Sessions over several days and visits to a range of sawmill, logging and forest operations provided a stimulating interchange of ideas with local timber men and forest officers. About this time the first introduction of rubber tyred logging units was made, paving the way for a general swing from tracked to rubber tyred units over the next few years.

(iv) In 1960/61 a "Timber Industry Safety Committee" was formed chaired by the Utilisation Officer of the Forests Department. Meetings were held several times a year at irregular intervals and selected foremen and staff attended safety courses arranged by the National Safety Council. By 1968/69 statistics showed that only one major firm had achieved an outstanding reduction in accident rates, whereas there was a slight improvement only in four other major firms. Bunnings Sawmills had shown what could be done by development of interest and action from the top down, and the employment of a trained safety officer.

(v) To handle and prepare the very large numbers of sleepers for the iron ore companies of the north-west, a central yard was established at Bunbury in 1965/66 for adzing, boring and bundling all sleepers which were than handled from the yards to ships and to sites in the north in bundles of 25. This was a big improvement on individual handling, and also furnished an opportunity for re-inspection and rejection of any sleepers which developed excessive seasoning faults.

Export sleeper orders were small and intermittent. The last large order, after some years of negotiation, was that for more than one million sleepers for Jordan for the Hedjaz railway.

(vi) In 1966/67, an enquiry from Japan for hardwood chips for wood-pulp led to feasibility studies of available marri, forest waste and sawmill waste. In December several firms displayed interest in developing the industry. 1967, in response to the government's call for proposals, six were received by February 1968. Four were eliminated, before June and before a final decision was made, the Commonwealth Government announced on September 26th, its intention to control the export ofwood chip, logs or billets for paper pulp production.

On October 2nd, 1968 Bunnings Timber Holdings were granted the sole rights to proceed with proposals for this new industry and this firm together with the W.A. Chip and Pulp Company signed an agreement on 28th June, 1969 with the W.A. government to establish the industry, with Bunbury as the export harbour.

Since C.E. Lane-Poole first arranged with Mr. I.H. Boas for research into paper making possibilities with local eucalypts in 1919, it had been the dream of foresters that a local pulp industry would be established on utilisation of the vast quantity of wood material for which no current demand existed. The advent of a wood chip industry now appeared to be a first step toward its fulfilment.

(vii) The introduction of end matched flooring in the previous decade was followed by the finger jointing of timber for flooring, and mouldings. This permitted the utilisation of 'shorts' and the docking and elimination of defects, to present only a high grade product.

(viii) The further development of "glulam" laminated beams. Earlier production using karri had encountered problems in connection with glue failures. Using local pine and resorcinol glues, successful glulam production was launched in the late 1960's.

(ix) The development and manufacture of gang nailed roof trusses was another successful venture developed and expanded during this period.

(x) The development by the plywood industry of flooring squares, proofed against water, termites and fungi.

(xi) The production of 'portable' houses for use particularly at mining townships, and rural areas. Some were purchased and installed at forest settlements with every satisfaction.

B. Among Utilisation Branch activities which were many and diverse the following indicate the range.

(1) From wood samples of six species supplied from W.A. the Division of Forest Products at CSIRO carried out mechanical tests on both green and dry (to 12% m/c) small clear specimens and published up to date results.

(ii) Prior seasoning of karri poles for preservative impregnation of sapwood had presented problems on account of deep checking and cracking. Trials and investigations were carried out both locally and by the D.F.P. in Melbourne on poles supplied from W.A.

Failure to achieve satisfactory results were eventually overcome by changing the process and treating the poles green, by the "Boultonising process". Close collaboration was maintained with the D.F.P. and Hicksons preservation operations.

(iii) Design work was carried out for such items as,

(a) nailed wooden trusses of simple design suitable for farm sheds with spans up to 52 foot. Some were utilised in Forest Department Buildings.

(b) Houses, buildings and lookout towers.

(c) Sawmills and sawmill equipment.

(d) Wood and sawdust burners.

(iv) Investigations of clear finishes on wood by trials in the open. None were found really satisfactory for external use, although the best had a life up to three years.

(v) Marine borer tests for resistance to attack of both creosoted and copper-chrome-arsenic impregnated pine and hardwood, in conjunction with the D.F.P.,

(6) Tests of timber for durability of 'fill' in cooling towers. P. radiata impregnated with copper-chrome-arsenic salts was found superior to all others, including the long established and durable redwood.

(vii) Inspection of durability tests (long term) of sleepers and fence posts.

(viii) The W.A. Joint Timber Committee, chaired by the Utilisation Officer reviewed a number of timber grading rules of the Standard Association for both native timbers and pine. Many were firally accepted and published.

(ix) Mining timber tests were carried out on 'rounds' with a view to rounds replacing much of the split timber for mines at Collie.

(x) Answering the numerous enquiries of industry and the public on utilisation matters.

(9) Pine Plantations

A. Pine Afforestation

The consolidation and steady increase in the pine planting programme over the decade was a source for great satisfaction, particularly as nearly half the plantings were of P. radiata. The total planted area more than doubled, This was only made possible by the continuing purchase of suitable land as both properties and funds became available.

Because of objections by some small vocal groups in southern electorates to the policy of land purchase for pine planting, the Minister for Forests in 1960 prescribed conditions which did not facilitate the process of land acquisition. These were:-

> That negotiations could not proceed unless and until the property concerned had been advertised for sale on the open market.
>
> That the Forests Department must not outbid a genuine private offer, to secure a property.
>
> That the Forests Department must not initiate negotiations for purchase. The property must be <u>offered</u> by the vendor.
>
> The Forests Department must ensure that any offer made was fair value to the State.

While the first three of these restrictions were somewhat disadvantageous they did ensure that anyone genuinely seeking farmland had every opportunity to purchase and they silenced one source of adverse criticism.

Despite these limitations there were always more properties on offer than there were funds available. In the ten years to June 1969, a further 25 properties comprising 4547 hectares were acquired, nearly two thirds of the area being in the Blackwood valley where prices ranged from $17 per ha. for undeveloped land to $152 per ha. for fully cleared pasture land.

(From 1969 to 1973, with the aid of S.F.A. Act funds, a further nine properties in the Blackwood Valley embracing 4,900 ha, mostly well developed, were bought for prices ranging from $42 to $196 per hectare.)

The planting rate of 810 hectares per year was gradually increased as techniques improved and unit costs held or reduced. Mechanisation increased, tractor rakes reduced manual work in clearing, planting machines operated wherever terrain and conditions permitted, while mechanical lifting machines and chemical weeding sprays reduced hand work in nurseries. Thanks also to increased loan allocations at two year intervals offsetting increasing wage rates, the annual planting rate exceeded 1250 hectares by 1965.

With the passing of the Commonwealth Softwood Forestry Agreement Act in 1967, which made financial provision for the States to increase the softwood resources at a much faster rate, the West Australian planting rate was doubled to 2430 hectares per annum. By 1969 this rate was virtually achieved, loan funds over the three years to June 1969 having been $400,000 per year, or double the allocations of 1960 and 1961. However, despite the steady increase in loan funds, it was still necessary to supplement them by substantial annual amounts from the Reforestation Fund in order to maintain the planting rate, tending and protection of the asset.

B. Tending Plantations.

Exclusive of road and firebreak maintenance, the three main items of tending were scrub control in newly planted areas, pruning, and thinning. The scrub and hardwood coppice control problems which had been of considerable concern in some plantations were overcome by the use of hormone sprays following considerable research and trial over some years. Where possible, the operations were mechanised and done by tractor-mounted sprays with tank and pump. In difficult terrain knapsack sprays were used until in some localities aerial spraying was adopted successfully. However, despite careful control problems were encountered with spray drift some years later (in 1971) and aerial spraying was suspended.

Every effort was made to overtake pruning arrears and maintain schedules up to date to ensure that the knotty core of selected final crop trees was of minimal size. First low prunings were made earlier - as early as four or five years in some radiata stands - followed by second prunings a few years later of selected stems up to 100 per acre. The time of pruning was governed by stem diameter of the selected trees rather than by their age. Much of this work was done on a contract or piecework basis to the mutual advantage of the worker with increased earnings and of the department, in achieving more rapid coverage of the areas concerned.

Thinning was by far the most important tending operation, and being carried out only on a commercial basis, it provided nearly all the log output of the plantations. It ranged from first thinnings in stands 10 to 15 years of age, yielding small diameter produce for chipwood, posts or case logs, to fourth thinnings in stands 30 to 40 years old yielding sawlogs and peeler logs (see pine utilisation).

Clear fellings were limited to very small areas annually, including some of the early plantings at Mundaring Weir, and poor strains of P. pinaster elsewhere for replacement by better strains or another species.

C. Pine Utilisation.

By 1960, the use of local pine for many purposes was well established, and the demand, particularly for the larger and better quality logs, frequently exceeded the supply. The largest single users were the metropolitan case mills, which however had a widely fluctuating demand, depending on seasonal orders. They were the main users of pinaster, but eagerly sought the preferred logs of radiata which, although sold at higher prices, had to be rationed to buyers. There was a steady and growing demand for the sawn output of the Departmental mills cutting P. radiata in the southern plantations, both for general purpose use, and case production. The larger logs of good quality were eagerly sought for peelers by the two plywood firms.

The case industry was prosperous and growing, as pinecases were rapidly displacing local hardwood for general case purposes, and the sale of pinelogs showed a steady annual increase. In 1960, three of the case companies merged and constructed a large modern well equipped case factory at Osborne Park which drew most of its logs from Mundaring Weir plantation as well as some pinaster from metropolitan plantations. By 1963 the output from metropolitan plantations was inadequate to meet the Company's requirements and it opened a subsidiary plant in Busselton, squaring and air-drying baulks from logs drawn from plantations within 40 to 50 mile radius. Still the voracious appetite of the case mills was unsatisfied and the Forests Department also embarked on the squaring and supplying of case baulks from Harvey, Grimwade and Ludlow.

Towards the latter end of the decade, the pine case was meeting strong competition from cartons imported from the Eastern States and the demand for case logs levelled off. By 1970, the subsidiary plant ceased operations and closed down.

Prior to this, two new pine using industries had entered the field, namely those of particle board and wood preservation.

The first proposals discussed in September 1960 for particle board involved the use of ply-mill waste plus radiata thinnings to the extent of 5700 m^3 rising to 11400 m^3 within a few years and to 57,000 m^3 in the long term. The firm was informed that practically all pine over 10 cm. diameter was committed to the case industry for at least the next 10 years and the only pine available was pinaster (then unproven for particle board) logs under 10 cm. diameter. By 1962 the Company had installed a plant at Victoria Park and was engaged in tests that showed promise. It was mid 1964 before commercial production commenced and the plant was officially opened on 28th August, proposing to utilise some 14,000 m^3 per year, when in full production, after which a second plant of double this capacity would be established. Only three years later, in 1967, a modern highly automated plant was opened at Kewdale and soon became the major producer.

This undertaking was of great importance as a project capable of utilising large quantities of small pine thinnings. Initially they were delivered to the plant at little more than the cost of supply, so that royalty was nominal, or even negative. It was hoped that once soundly established, the industry would not only prosper in converting this small material to a valuable product, but would also make a worthwhile contribution to revenue in purchasing the raw material. At least it was meeting the cost of the thinning operation.

With some recession in the case industry, and a resistance to the smaller pinaster case logs, large logs up to 5" diameter became available for particle board, with an appropriate increase in price giving a reasonable royalty return. By the end of the decade the pressure for increasing supplies of P. pinaster had transferred from the case industry to the expanding particle board industry, which consumed more than half the pinaster log output. Shortly thereafter, its appetite outgrew the available pinaster and action was taken to supplement its intake with P. radiata thinnings from the southern plantations.

Meanwhile from 1960/61 the wood preservation industry became established at Picton and Perth. It was seeking to promote the use of treated pine fence posts and rails, offering another useful outlet for small dimension material, but one which encroached on the sawlog diameter range for strainer posts. Abundant material was available for the southern plant, but just as sales were developing, they collapsed with the rural recession of 1962/63. In view of the commitments to the metropolitan case industry and the proposed particle board industry, supplies for posts and rails were limited to 1,400 m^3 per year for Bunnings metropolitan plant. In fact, the Company never attained this figure from State plantations and in later years drew pine logs from its own private plantings some 90 to 100 km from Perth.

In the 10 years to June 1969, the pine plantations had not only doubled in area, but were yielding three times as much produce as in 1959, the log production in 1968/69 amounting to 79, 617 m^3 (U.B.) Important minor uses of pine were for woodwool, both for packaging and as a fill in cement wall and ceiling sheets, and as long poles for rafts for suspension of oysters at the Kuri Bay pearl culture centre.

A break-up of pine use by per cent of log volume for 1968/69 is shown in the following table:

Category	P. radiata per cent	P. pinaster per cent	Total per cent
Sawlogs	42.9	18.7	61.6
Particle Board Logs	3.3	27.7	31.0
Peeler Logs	3.9		3.9
Fence Posts	.7	2.1	2.8
"Woodwool" logs		.5	.5
Poles (various)		.1	.1
	50.8	49.1	99.9 *

* Taken to nearest tenth of 1 per cent.

Local pine constituted 7.1 per cent of the total of all log production from Crown Land and State Forest as compared to 3.18 per cent in 1959. The sawm timber of P. radiata was in strong demand for a wide variety of purposes, and the larger logs from the older stand were yielding a high quality product, the best of which was selected for such uses as "glulam" beams. Pine was now a significant factor in the State's wood economy and it was evident that its importance and quality would rapidly increase as the post war (post 1949) plantings approached maturity. From 1980, production would rise at an increasingly fast rate.

Local pine was at last coming into its own and the value of softwood plantings achieving much wider public recognition.

10. STAFF

An important and well merited appointment in 1961 was that of Mr. W.R. Wallace to the position of Deputy Conservator. This post had not been filled since 1946 when it was vacated by Mr. T.N. Stoate on his appointment as Conservator, although the Assistant Conservator, Mr. Shedley, had always "acted" in the absence of his permanent head until his retirement in 1956. Therefore,for the five years 1956 to 1961 there was no "second in command". On the retirement of Mr. Harris on 30th June, 1969, Mr. Wallace succeeded him as Conservator of Forests.

The overall staff position improved considerably over the decade, with the major increases being in the ranks of professional officers and technical staff enabling a large proportion of these two groups to be directed to research. To bring under management the increased area of State Forest, and handle the expanding pine planting and harvesting programme, the field staff also was gradually increased, thanks to the small but steady flow of youths passing out from the forest trainee school. In addition the recruitment of overseas foresters to both the professional and general staff brought a valuable leaven of trained and experienced men into the service. It was rendered possible through contacts made by the Conservator, when with the Deputy Conservator he attended the eight Commonwealth Forestry Conference in East Africa in 1962 - that is shortly before these colonies were granted their independence.

Professional Staff

In the professional ranks, the loss of 19 officers through resignations, retirements and deaths was more than counterbalanced by the appointments of 39 men, giving a net gain of 20 with a total strength of 52 at 30th June, 1969. The new appointments were mostly young Western Australian graduates supplemented by others from the Eastern States, United Kingdom and South Africa, as well as a few experienced men from the Colonial Forest Service in East Africa.

Among the staff losses, special mention must be made of five senior officers, four of whom retired, and one who died some six months before his retirement was due. All five were among the last group of graduates from the School of Forestry at Adelaide University, and had spent almost the whole of their careers in this State, although two of them were originally South Australians.

Mr. G.W. Nunn, who retired on 25th October, 1963, bore the remarkable distinction of qualifying in three professions. Graduating from Duntroon Military College in 1918 (too late for service in World War I), he was posted to India where he served for several years in the Army. With severe post-war cuts in defence expenditure, he elected to resign when he returned to Australia and qualified as a licensed surveyor. While doing survey work and reconnaissance for the Forests Department in 1925, he became interested in Forestry by Professor Jolly whom he met on a visit from Adelaide University. Nominated to the newly formed Australian Forestry School in 1926, he was one of the few original students who did one year at Adelaide pending establishment of the new School at Canberra, where he completed the course in 1927 and was awarded the Diploma in Forestry and later the B.Sc.(For.). He will long be remembered as a colourful and forceful character and outstanding forester who made valuable contributions to the forestry profession.

Mr. G.E. Brockway, who retired in December 1965, was the first West Australian-born officer to graduate in forestry, having attended the University of Adelaide and completed the course in December 1921. He commenced service with the Forests Department in 1922 and while posted to Kalgoorlie from 1940 to 1949, became a specialist in and authority on dry country species. This led to his secondment as a consultant to the governments of N.S.W. (for plantings at Broken Hill) and the Commonwealth for plantings at Woomera and later for loan to the Pakistan Government for two years in 1955/56.

The establishment at Kalgoorlie of a nursery for dry area species, (later transferred to Narrogin), their distribution throughout the wheatbelt, and the establishment of many wheatbelt arboreta, serve as living memorials to his work. His name is also commemorated in Eucalyptus Brockwayi which he found as a new species near Norseman in 1940.

Mr. A.J. Milesi was, with Mr. Nunn, one of the foundation members of the Australian Forestry school, spending the first year at Adelaide in 1926 under Professor Jolly (after two years at University of W.A.) and 1927 at Canberra under Mr. C.E. Lane-Poole as School Principal. He joined the Department in 1928. He spent some 17 years at Narrogin where he was responsible for the establishment of most of the mallet plantations before being appointed Fire Control Officer. His influence was apparent in important amendments to the Bush Fires Act in 1949 and he was a Foundation member of the Bush Fires Board (1955) where he played an important part in formulating policy and setting up its organisation. Throughout this period, he was closely involved with changes in fire control policy organisation and equipment in the Forests Department. He retired on 30th September, 1968 after 40 year's service with the Department.

Mr. A.C. Harris from South Australia joined the staff of the Forests Department on 26th January, 1926, following a short period with the Woods and Forests Department of that State. After 20 years' service, of which 18 years were as D.F.O., he resigned in June, 1946, to take the post of wood procurement officer for the Wood Distillation and Charcoal Iron industry then in course of establishment. In his contributions to development in the industry, his ability and capacity were recognised when he was appointed General Manager at Wundowie a few years later.

On 19th October, 1953, he was appointed Conservator of Forests, a post which he held until his retirement on 30th June, 1969. His appointment coincided with the post-war resurgence of the timber industry. His dynamic leadership gave a new impetus to policy and development and under his guidance very substantial progress was made in forestry activities. The area of State Forest was substantially increased, that of softwood plantations more than trebled to some 24,000 hectares, staff and training were augmented and improved and a strong research branch formed. Major advances were made in controlled burning with prescribed conditions based on fire research and in tree breeding following the posting of an officer to Portugal for two years selecting material from elite trees. In every way, the sixteen years under his direction was a most fruitful period for forestry in W.A.

Mr. D.R. Moore, another South Australian and a contemporary of Mr. Harris, also joined the Forests Department in January 1926 after two years with the Woods and Forests Department of his home State. He was posted to Collie where he was later appointed D.F.O. and spent some 24 years in

control of that division. This was followed by a period at Harvey and following Mr. Nunn's retirement he was promoted to Superintendent, (of Plantations). Unfortunately, his death occurred in October, just six months before his scheduled retirement at which time he was Chief of Division of Plantations.

The net gain of 20 professional officers during the ten years enabled the Department to strengthen its specialist activities and in particular to build up a very strong research team. A potent nucleus was formed by some six officers who obtained higher degrees and a seventh who joined the service from Papua-New Guinea. Further graduates were directed to research as they became available until some twenty were so employed at June 1969.

Technical Staff

The great emphasis in research involved a considerable increase in both technical officers and technical assistants. From sixteen in 1959 (including those in mechanical plant and communications) the number increased to 33 by 1964 and more than 50 by 1969, most of whom were associated with the various research projects.

Field Staff

Increased numbers were required to cope with the extension of management over increased areas of State Forest and the expansion of the softwood programme. Recruitment of more than 100 men was mainly from the ranks of young trainees who completed the two year course run by the Department, but others were selected from wages staff and a few recruited from the timber industry. In addition some valuable accessions to staff were gained from British trained foresters from the Colonial Forest Services in the former East African states of Kenya, Tanganyika and Nyasaland.

Most of the new appointments were replacements for the loss of some 60 men by resignations, retirements and deaths. Noteworthy among these were eight of the early apprentices who trained in the field and at the Ludlow Forestry School. Two Senior Foresters, Messrs. Perry and Clover, recruited in 1917, had more than 50 years' service; two more, District Foresters Ross and Thompson, recruited in 1918, retired aged 60; while four officers, Senior Foresters Kinsella (1918) and Rutherford (1925), District Forester Mullumby (1925) and Senior Timber Inspector Kelly (1925) died while in the service.

All these men made valuable contributions to forestry in Western Australia, those of Senior Forester Perry in Pinus pinaster research, and Senior Timber Inspector Kelly as head of the timber inspection service, being outstanding.

Head Office Staff

The most important change was the transfer in May 1961 of the Accounts Branch to the Forests Department when the move was made to more commodious offices in the new R. & I. Bank building. Prior to this it had been a branch of the Lands Department Accounts Branch. With the appointment of an accountant and a sub-accountant and installed in new premises, it became the Accounts Branch, Forests Department.

Apart from the addition of the 20 persons in this branch, there was practically no change in numbers of Head Office clerical staff. Drafting staff which had been under-manned for some time, was brought up to strength during the decade from 15 to about 20, plus cadets ranging from 3 to 5 in number. The work of the branch was greatly facilitated by the move to spacious well lighted rooms, and provision of new equipment.

Forest Employees

The employment level remained reasonably stable with a large proportion being resident in departmental houses. However, there was a big turnover of casual and seasonal labour, so that the number of wages employees fluctuated around a mean of some 600, the minimum (539) and maximum (666) being recorded in the two years of 1960 and 1961 respectively.

Staff Training

To keep field staff up to date with new or improved practices, methods and equipment, many "in-service" training schools were held for groups ranging from overseers upwards. The range of courses was wide and almost every year one of the subjects was some aspect of fire control.

Conferences and discussion groups of D.F.O.'s, A.D.F.O.'s and Research Officers were also held from time to time to ensure that they were kept fully informed on new or amended developments in policy, practice, equipment and procedures.

For the training of professional officers, there was a change in 1967 involving the discontinuance of State Government Forestry scholarships and their replacement by Forestry Cadetships granted through the office of the Public Service Commissioner. The course still involved two years at W.A. University followed by two years at the School of Forestry at Canberra which was taken over from the beginning of 1965 bythe Australian National University becoming the Department of Forestry in that institution. In 1969 the course was amended to one year at the local State University followed by three years at the A.N.U.,

It is appropriate to record here that in competition with all States three students from W.A. achieved the honour of being awarded the Schlich medal given for the most promising student in the course in both theory and practical work in their respective years. These were :-

in 1962	-	Mr. Frank Batini
1967	-	Mr. Noel Ashcroft
1968	-	Mr. G. Heberle

Mention has already been made in the Research Section of the awards to Messrs. E. Hopkins and A. Hatch of research scholarships.

The trainee course for lads aged 16 to 18 for field and technical staff was continued successfully and despite the annual wastage, produced many very promising and capable young officers. In 1967 the course underwent further modifications and the name was changed to the Forest Field Cadet Course. A further innovation in 1969 was the use of the Education Department facilities for the first nine months of the course when the lads underwent training in general and forestry subjects at Mount Lawley Technical College. This was followed by courses of lectures and practical work based at the School at Dwellingup before appointment of the successful students as Forest Guards after their two years of initial training.

11. Miscellaneous Considerations

A. Conferences - Interstate and Overseas

Following the appointment of a Deputy Conservator in 1961, much of the Conservator's time was occupied with meetings and conferences both in Australia and overseas. More attention was directed towards forestry in the national and international scene and the broader issues insofar as they affected Western Australia. Close liaison was maintained with The Commonwealth Forestry and Timber Bureau and the Division of Forest Products of the CSIRO.

Regular meetings of the "Heads of Services" led to the formation in 1964 of the Australian Forestry Council and its Standing Committee, the latter requiring several interstate meetings annually. The Council met in each State in rotation. Other matters requiring interstate attention were the National Sirex Wasp Committee, the New Zealand-Australia Free Trade Agreement, and the "Aus.T.I.S." (Australian Timber Industry stabilisation) conferences held by the timber industry interests of Australia.

Attendance at International Conferences served to keep W.A. in touch with the latest developments in thought and practice in the forestry world. A list of conferences attended gives an indication of the broad field of forestry interest during this period.

1960

The 5th World Forestry Conferences, under the auspices of the Food and Agriculture Organisation at Seattle, Washington, U.S.A. The emphasis was on multiple use of forests, particularly public use for recreation purposes.

1962

The 8th British Commonwealth Forestry Conference in Nairobi, Kenya, with sessions and forest tours in the adjoining East African States of Tanganyika and Uganda. It was attended also by the Deputy Conservator, with 72 delegates from 21 Commonwealth countries.

The Aus.T.I.S. Conference was held in W.A. for the first time in October 1962.

1963 to 1965

The formation of the Australian Forestry Council and Standing Committee involving many meetings including a Council meeting at Bulolo in New Guinea.

1966

The 6th World Forestry Conference held by the F.A.O. in June at Madrid, with forest tours in Spain and Portugal. This was of particular interest to W.A. with its extensive plantations of P. pinaster with seed from Portugal for some 30 years and its recent collection of material from elite trees for a tree breeding programme.

The 6th All Australian Timber Congress in Queensland in September.

1967

In April, the F.A.O. World Symposium on Man-Made Forests, and Row Plantations, held at Canberra. It was attend-

ed by 171 delegates from 51 countries. A series of pre-conference tours enable delegates to visit areas of special interest, one group spending a week inspecting the forests in the South West of W.A. and in the Goldfields.

In September, the Conservator visited Japan to study the paper and pulp industry and the possibilities of wood chip exports from W.A.

1968

In January, the 9th Commonwealth Forestry Conference at New Delhi, India.

In September, the "Aus.T.I.S." Conference at Lismore, New South Wales.

(In October, the 5th Triennial Conference of the Institute of Foresters of Australia was held at Perth, chaired by the Conservator as President.)

1969

In February, the New Zealand Forest Development Conference at Wellington, New Zealand, which provided much of value for W.A. plantation policy.

In March the "Appita" (Australian Pulp and Paper Industry Technical Association) Conference at Burnie, Tasmania.

In June, a meeting of the Plywood Association of Australia at Canberra.

B. Minor Forest Produce.

(i) Sandalwood

The history of the sandalwood trade has been well documented by Mr. John Robertson who effectively covered the period from 1845, the first year of sandalwood export, to 1957* From thousands of tonnes per year from 1859 to 1937 exports dwindled to hundreds of tonnes with the advent of the Sino-Japanese war in 1938 and virtually ceased by 1943 during World War II. The trade was revived in the post war years at a level of hundreds of tonnes annually. Although the quantities were relatively small, the price per tonne was so increased as to yield a good return and sandalwood revenue was a very welcome addition to the total revenue of the Forests Department.

In the decade under review, exports averaged about 615 tonnes per year, ranging from 478 in 1963 to 730 tonnes in 1966. Annual deliveries from sandalwood-pullers fluctuated more widely from 430 to 1229 tonnes with an average of 757 tonnes. Up to 1967, an average of 100 tonnes per year of roots and butts severed from the logs at the Fremantle depot were delivered to oil distillers, but the quantities gradually diminished during the eight years and no deliveries were made in the two years to June 1969. Over the eight years, an average of 3675 kilograms of oil was distilled annually which was exported interstate and overseas. It appeared that world markets for sandalwood oil were decreasing and its distillation in W.A. was likely to cease. It was a far cry from the 59,730 kg of oil exported in the record year of 1929/30. The advent of antibiotics during World War II led to a very great decrease in its use for medicinal purposes.

* The Government Regulation of the Sandalwood Industry of Western Australia - A Brief History, by John R. Robertson.

(ii) Brown Mallet (Euc. astringens)

The establishment of some 7800 hectares of brown mallet plantation in the Narrogin district between 1928 and 1962, (most of the plantings being before World War II) was based on the high demand and good returns expected for mallet bark as a high quality tanning material. However, with a pronounced fall in world demand it became apparent during the decade that economic prospects for mallet bark were decidedly poor in the foreseeable future.

During the nine years to June 1968, an average of 116 tonnes of mallet bark per annum was produced, chipped, bagged and sold departmentally from the thinnings of young plantations, while a further 194 tonnes were produced from other sources. However, there was a steady decline from more than 500 tonnes in 1960 to 111 tonnes in 1967, and production ceased in 1969.

Over the decade, there was a gradual transition in the objects of management of the mallet plantations and associated reserves, the greater part of which lay in Dryandra State Forest. Surrounded as it was by a vast extent of alienated land, most of which was cleared for agricultural pursuits, Dryandra State Forest provided a protected haven for native fauna which had all but disappeared from the agricultural areas following the destruction of the natural habitat. With the fire protection afforded the mallet forest, involving the regular rotational burning of firebreaks and non-mallet areas, the native fauna had thrived and the forest had become well known by zoologists and conservationists as a fauna reserve of very great value.

The emphasis changed from mallet bark production to management for fauna conservation and steps were taken to rewrite appropriate Working Plans. Meanwhile, this did not obscure sight of the fact that mallet was a timber with intrinsic properties of great shock resistance giving it a special valu for tool handles. In the long term the forest would be managed for fauna and timber with the possibility of a resurgence of demand for its tan bark. A small tool handle factory was operating at Narrogin, drawing most of its log supplies from the few small remaining sources of larger trees on private property. As these dwindled, supplies would no doubt be supplemented from State resources.

Dryandra State Forest was the first of many areas of State Forest to be recognised as having a special value for fauna conservation as well as forest conservation.

(iii) Mining Timber and Firewood

Mining timber (exclusive of sawn produce from saw-mills) decreased during the decade. From the inland forests supplying the Goldfields, there was a steady decrease in production from 14,000 to less than 8,000 tonnes. Other mining timber, mainly for coal mining at Collie fell by more than 75 per cent between June 1959 and June 1962, with the greatest fall in 1961/62. (Presumably this was because of a big increase in open cut mining.) It remained fairly steady at the 1961/62 level between 5000 and 6000 tonnes annually for the ensuing seven years.

Firewood consumption remained at a stable level over the period, ranging from 700,000 to 750,000 tonnes. These figures are very approximate. About half the quantity is supported by statistical returns, and the remainder is based on an estimate of fuel wood used for domestic purposes, for which no records are available.

Mining in State Forest

Mining at Collie for coal and Greenbushes for tin, was well established prior to the passing of the Forests Act 1918, and subsequently the surrounding forest lands were dedicated State Forest. There was practically no other mining of consequence in the high forests of the South West.

Extraction of coal from deep mines was not injurious to the forests. In fact, one of the objects of forest management was production of timber for use in the mines. However, intermittent tin mining by open cut methods at Greenbushes involved the destruction of both forest and soil, leaving unsightly scars in its wake. The same was true on a small scale of the many gravel pits worked for road building material.

The overriding powers of the outdated Mining Act of 1904, written primarily to cover the earlier years of gold mining, coupled with the marked increase of mining activity in the nineteen sixties, presented a grave threat to the forest estate. The frantic pegging of mineral claims in the goldfields and inland areas extended to the south-west where numerous individuals and companies were assiduously engaged in pegging areas in State Forests, reserves, national parks, private land and beaches.

By agreement, applications for mineral claims in State Forest were referred by the Mines Department to the Conservator who generally approved them subject to conditions designed to safeguard the roads and communication network and the forest from damage by fire. The conditions also included compensation for loss of forest, restoration and re-soiling of the mined site, disposal of debris and such other matters as were deemed desirable in the circumstances.

As early as 1956, the Conservator had concluded satisfactory agreements with companies for the mining of mineral sands in the Ludlow plantation on State Forests, and for extraction of mineral sands from some lower grade jarrah forest east of Ludlow. However, in view of the devastation caused by tin mining at Greenbushes, mineral claims for tin in prime forest north of Donnelly Mill were strongly opposed.

In August 1960 three small mineral leases for bauxite, each of 18 hectares, were approved in Dwellingup and Jarrahdale Divisions, with incorporation of safeguarding clauses and shipments of bauxite were made to Tasmania for its evaluation for aluminium production.

Less than a year later, in July 1961, an agreement was concluded between the State of W.A. and "Western Aluminium N.L." which provided inter alia that the Company would establish an alumina refinery by a given date and the State would grant a mineral lease over an area delineated on a plan as a "Temporary Reserve," (1604H).

The temporary Reserve covered a very extensive area both on the coastal plain and the Darling Range Plateau. The company proceeded with rapid development. Later, the "temporary reserve" was designated "mineral Lease 1 S.A." and included most of the prime jarrah forest from Collie northwards covering some 704,234 hectares. The Company formed with "Alcoa" of the U.S.A. a new company, "Alcoa (Australia)".

In 1963 the first plant was opened at Kwinana and operations commenced on the mining of bauxite at Jarrahdale in prime jarrah forest. In reply to questions in Parliament, it was intimated that only 10 to 15 ha. of forest would be mined annually. However, it later transpired that this applied to the operation of the first unit at the refinery. As more

units were added, the areas required annually doubled and quadrupled. By 1969 some 120 ha were being cleared for annual mining, plus additional areas for roads and working facilities. Plans were laid for a second plant of much greater capacity at Pinjarra, drawing bauxite from State Forest to the east in Dwellingup division.

The alarming feature, however, was not only the ever increasing needs of this important industry but the fact that more than half the State Forest area was held under some form of mining claim or tenement. For half a century the State Forests had been safeguarded by the requirement that the consent of both houses of Parliament was necessary before dedication could be revoked and the land used for other purposes. Similar protection was now needed from open-cut mining which was possible under the over-riding provisions of an obsolete Mining Act prepared in the days of deep mining for rare minerals.

For fifty years a constant battle had been waged to prevent the destruction of prime forest for agricultural pursuits, and secure its dedication as a permanent asset. It now appeared that a second campaign must be waged to preserve it from unwarranted mining activity and safeguard the jarrah forest from the unwitting spread of disease by interests inimical to forestry.

The concern in 1969 of both Government Departments and thoughtful citizens over many aspects of the mining boom and speculation was to lead the following year to an inquiry into the Mining Act with far reaching results. Foresters, conservationists, and a large body of the general public looked forward to an outcome which would ensure a more rational approach to mining and the use of our natural resources, particularly our forests and water catchments. Concern for the future environment was assuming much greater importance both in Australia and in overseas countries, and this was destined to have a considerable impact on thought and developments in Western Australia.

WHAT HAPPENED!!!

The end of this historical review of the forty year period from 1929 to 1969 coincides with the conclusion of a half century of forestry following the proclamation of the Forests Act in January 1919. The occasion was marked by the issue of a special well illustrated supplement to the 1969 annual Report, which provides a most useful summary of the fifty years.*

While much of interest has of necessity been omitted in this treatise, an attempt has been made to include the salient features in the progressively changing scene. The period ends on a note of change. A better informed public is evincing increased concern over the use of the nation's natural assets and resources. There is increasing concern over the environment in which they and their descendants will live, and over its possible degradation by improper use. There is concern over the conservation of flora and fauna, the preservation of our beaches and recreation areas, over industries that pollute the atmosphere, earth or waters, and over those that reap much but give little to the country that supports them.

The public is becoming cognisant of the value of the State's limited forests, not only for their products, but also for the role they play in conservation of water, maintenance of water quality, preservation of fauna, and provision for public recreation. Those charged with their administration must not only be constantly aware of public attitude, but take active steps to ensure that the public is well informed on matters relating to forest management and conservation with all its ramifications.

* "50 Years of Forestry in W.A." - Supplement to the 1969 Annual Report of the Forests Department

ADDENDUM

The Holyoake Logging Project

This addendum is added to rectify the omission in section 2 of Chapter 3 of an innovation which was of considerable importance to the Forests Department and became known as the Holyoake Logging Project.*

For several years the Department had operated a small sawmill at Dwellingup for experimental sawing and production from substandard logs not sought by the industry, die-back trees, and marri. Its produce was a useful contribution in the post-war years. Following problems in 1954 with the quality and irregularity of supplies from its logging contractor to No. 5 State Sawmill at Holyoake, negotiations between the Conservator and the General Manager of State Sawmills resulted in the Forests Department contracting to supply logs to the mill at Holyoake for a trial period of six months from January 1955.

So successful were the operations for both parties that the arrangements were continued for an extended period, and are still in operation. The advantages to the Department were substantial, and included better bush control, better road location and maintenance, a sound knowledge of and improved methods in felling and hauling operations, and a detailed knowledge of logging costs structure. The first hand knowledge of both logging and milling costs was of considerable value when royalty reappraisals were under consideration.

A further advantage was the ready availability of additional men and equipment for firefighting in summer. State Sawmills received the benefit of a more stable log supply, an emergency stock pile, and after two years' experience, a reduction in the contract price. The venture proved well worth while for both parties.

* Beggs, B.J.- The Holyoake Logging Project.

APPENDIX

Ministries and Conservators following the proclamation in January 1919 of the Forests Act 1918.

DATES	MINISTRY	MINISTER FOR FORESTS	CONSERVATOR OF FORESTS
17/4/19-17/5/19	H.P. Colebatch	K.C. Robinson	C.E. Lane-Poole
17/5/19-16/4/24	J. Mitchell	J. Scaddan	C.E. Lane-Poole (resignation to 5/7/21, actual finish 22/10/21)
			S.L. Kessell (from 23/10/21)
16/4/24-24/4/30	P. Collier	P. Collier	S.L. Kessell
24/4/30-24/4/33	J. Mitchell	J. Scaddan	S.L. Kessell
24/4/33-20/8/36	P. Collier	P. Collier	S.L. Kessell
20/8/36-31/7/45	J.C. Willcock	J.C. Willcock	S.L. Kessell (seconded to Cwlth 8/5/41)
			(T.N. Stoate Acting C/F)
31/7/45-1/4/47	F.J.S. Wise	A.A.M. Coverley	S.L. Kessell (resigned Dec'45)
			T.N. Stoate (apptd. Feb'46)
1/4/47-5/1/48	D.R. McLarty	D.R. McLarty	T.N. Stoate
5/1/48-7/10/49	D.R. McLarty	R. McDonald	T.N. Stoate
7/10/49-6/4/50	D.R. McLarty	D. Brand	T.N. Stoate
26/7/50-23/2/53	D.R. McLarty	G. Wild	T.N. Stoate
23/2/53-2/4/59	A.R.G. Hawke	H.E. Graham	T.N. Stoate (to 18 Oct'53)
			A.C. Harris from 19 Oct'53)
2/4/59-3/3/71	D. Brand	W.S. Bovell	A.C. Harris to 30/6/69
			W.R. Wallace from 1/7/69
3/3/71-11/10/71	J.T. Tonkin	T.D. Evans	W.R. Wallace
12/10/71-12/1/72	J.T. Tonkin	H.D. Evans	W.R. Wallace to 12/1/72
12/1/72-15/7/72	J.T. Tonkin	H.D. Evans	D.W.R. Stewart 13/1/72-15/7/72
16/7/72-30/3/74	J.T. Tonkin	H.D. Evans	B.J. Beggs from 16/7/72

REFERENCES

Bolton, G. 1972 - A Fine Country to Starve In.

Annual Reports - Forests Department 1919 to 1969.

Annual Report - First Decennial Report 1919-1929.

Annual Report - 1968/69 Supplement "Fifty Years of Forestry in W.A."

Bednall, B.H. 1945 - Sleeper Sawmilling in Western Australia, Australian Forestry, p.p. 61-65.

Beggs, B.J. 1967 - Report on the Holyoake Logging Project.

Kessell, S.L. 1934 - Forestry and Unemployment Relief in Western Australia, Empire Forestry Journal Vol.13 No.1.

Newhook, F.J. 1968 - Report on visit to Western Australian Jarrah Dieback Area, 28th April - 4th May, 1968.

Robertson, J.R. 1958 - The Government Regulation of the Sandalwood Industry in Western Australia, a brief History.

Robertson, J.R. 1956 - A History of the Timber Industry of Western Australia. (Thesis for Honours degree in History in the Faculty of Arts, U.W.A.)

Robertson, J.R. 1959 - The Origins of Forestry Administration in W.A.

Stoate, T.N. 1950 - Nutrition of the Pine - F. & T.B. Bulletin No. 30

Serventy Vincent 1970 - Dryandra - The Story of an Australian Forest.

Zentmyer, G.A. 1968 - Report on Jarrah Dieback problem in Western Australia.

Forests Department - Annual Reports 1919 to 1969 including "First Decennial Report" 1919-1929 and "50 Years of Forestry in W.A." 1969.

Forest Department files.

Forest Department Working Plans.

Parliamentary Debates - Select Committee Report on the Kauri Timber Company Bill.

Report of the Royal Commission on Forests and Timber in the State of Western Australia, 1951.

Report of the Royal Commission on Bush Fires of December 1960, and January, February and March 1961 in Western Australia, 1961.

Report of the Special Committee on Whether Quarantine Precautions being taken against Sirex Wood Wasp should be intensified, maintained or relaxed - 1951.

Reports No's 1, 2 and 3 of the Rural Reconstruction Commission, 1944.