

1922.

WESTERN AUSTRALIA.

REPORT

OF

ROYAL COMMISSION ON FORESTRY

1922.

Presented to both Houses of Parliament by His Excellency's Command.

[SECOND SESSION OF THE ELEVENTH PARLIAMENT.]

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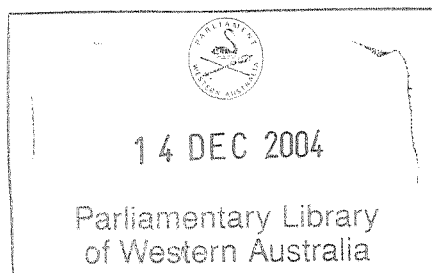
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ROYAL COMMISSION.

GEORGE THE FIFTH, by the Grace of God of the United Kingdom of Great Britain and Ireland, and of the British Dominions beyond the Seas, King, Defender of the Faith, Emperor of India.

To our Trusty and Well-beloved—

William George Pickering, Esq., M.L.A.,
Henry Willoughby Mann, Esq., M.L.A., and
Peter Laurence O'Loughlen, Esq., M.L.A.

Greeting:

KNOW Ye that We do by these Our Letters Patent, issued in Our Name by Our Governor in and over the State of Western Australia, in the Commonwealth of Australia, acting with the advice of the Executive Council, appoint you to be Commissioners to inquire into and report upon:—

- (1.) The financial provisions of "The Forests Act, 1918," and the operation thereof, and
- (2.) The administration of the said Act generally.

And We appoint you the said William George Pickering to be Chairman.

And We require you to report as soon as possible to our Governor in and over the said State of Western Australia the result of your inquiries into the matters entrusted to you by these Our Letters Patent, which We declare to be a Royal Commission to which "The Royal Commissioners' Powers Act, 1902," applies.

Witness Our Right Trusty and Well-beloved Sir Francis Alexander Newdegate, Knight Commander of the Most Distinguished Order of St. Michael and St. George, Governor in and over the State of Western Australia and its Dependencies in the Commonwealth of Australia, this eighteenth day of January, in the year of Our Lord One thousand nine hundred and twenty-two.

(Signed) F. A. NEWDEGATE.

GOD SAVE THE KING !!!

REPORT OF ROYAL COMMISSION ON FORESTRY.

To His Excellency Sir Francis Alexander Newdegate, Knight Commander of the Most Distinguished Order of St. Michael and St. George, Governor in and over the State of Western Australia and its dependencies in the Commonwealth of Australia.

Your Excellency,

1. The Royal Commission on Forestry was issued by Your Excellency on the 18th day of January, 1922, empowering the Commissioners to inquire into and report upon the financial provisions of "The Forests Act, 1918," and the operation thereof, and the administration of the said Act generally.

2. On receipt of the Commission the Chairman waited upon the Solicitor General to obtain an expression of opinion from him as to the scope of inquiry embraced in its terms. The Commission was the outcome of a notice of motion by Mr. W. G. Pickering, M.L.A., to the following effect:—

That a select committee be appointed to inquire into:—1. The working of "The Forests Act of 1918" generally. 2. The financial clauses of the Act and their operation. 3. The extensions of Millars' Timber and Trading Company's leases and concessions, and to report with recommendations to the House.

3. On perusing *Hansard*, page 1010, of 28th September, 1921, it will be seen that on the motion of the Premier, the original motion by Mr. Pickering was amended by substituting the words "A Royal Commission" for "A Select Committee," and although it may be inferred from the opening remarks of the Premier that he had in mind some other amendment, still no mention of that amendment was made. The Solicitor General advised the Chairman that the Commission was framed as it appeared by direction of the Premier, and that the Premier upon having his attention drawn to the motion of the inquiry into the extension of Millars' Timber and Trading Company's concessions and leases had stated that the terms of the Commission covered all that was necessary to effect such inquiry. This is subsequently borne out by the statement made by the Solicitor General when he appeared before the Royal Commission on 3rd July, 1922. The Chairman having received this interpretation prepared a scheme for the inquiry which he deemed necessary to conform with its terms (a copy of which is attached) and this scheme was submitted by the Chairman for the consideration of his brother Commissioners. Mr. O'Loughlin made some protest as to the scope of the inquiry as set forth. In view of the interpretation of the scope of the Commission, your Commissioners deemed it necessary that a thorough investigation of the operations of the Forestry Department entailed a comprehensive inspection of the forest country of the State over which such operations might be deemed to extend. This was the more necessary in view of the fact that the financial aspect of the inquiry was entirely dependent upon the preceding questions. In the early stages of the inquiry Mr. O'Loughlin was in the Eastern States. The undertaking of the inspection of the forest country was delayed until his

return. In the meantime advantage was taken of the presence in the State of the Ex-Conservator of Forests—Mr. C. E. Lane-Poole—to examine him on various phases of forestry policy, etc., during his tenure of office. His evidence is attached, from which it will be seen that he deals at great length with the extension of Millars' Timber and Trading Company's concessions and leases, with the financial aspect, with the administration of the Act, and with the broad principles upon which he considered forestry should be conducted in this State, the evidence being heard by Messrs. Pickering and Mann, Ms.L.A. The Commission then proceeded on a tour of inspection through a considerable portion of the jarrah belt, visiting the following mills and traversing the mill lines to the various bush landings:—Dwellingup, Holyoake, Marrinup, Nanga Brook, Yarloop, Mornington Mills and the bush country, Jarrahwood, Ellis Creek, Nannup, Greenbushes Timber Corporation and Whittaker's Mill, where the Cheney Spark Nullifier was inspected; thence to Jarrahdale and Trees Limited, evidence being taken at Nannup, Dwellingup, and Greenbushes.

4. During March an invitation from the Minister for Forests in Queensland was received for the Commission to attend the Forestry Conference to be held in Brisbane, which the Chairman decided to accept, his fellow Commissioners disagreeing. In view of the nature of the evidence tendered which, with the exception of Mr. Lane-Poole's, was from witnesses who dealt mainly with the subject from the point of view which is termed practical, and which pointed, in the main, to a contradiction of the premises advanced by the Ex-Conservator as essential to forestry conservation, the Chairman thought it necessary to attend this conference where the foresters of Australia were assembled together with the responsible Ministers, more especially as there was only a limited expert knowledge available in this State. The report of the proceedings of the conference has been made available to the members of the State Parliament. Whilst in the East, apart from the valuable information the Chairman was able to obtain from the conference, he had the opportunity afforded him of inspecting the State Forest at Imbil in Queensland, where reafforestation of hoop and Bunya pine is being successfully carried on. He was also given every opportunity by the Chief Commissioner of New South Wales of traversing the forests lying between Grafton and Taree, which illustrated their methods of treatment and their experiment with pine plantations at Tuncurry which is being carried out by prison labour. The Chairman also inspected their forest country and head office systems. On proceeding to Victoria the Minister for Forests, Sir Alexander Peacock, K.C.M.G., arranged for the

Chairman to be afforded every opportunity of investigating the operations of the department, in the forests and in the head office. The Chairman made a careful examination of the office routine, and was taken through a considerable portion of forest country from Warburton, Woodside, Thornton, and back through the Black Spur, a trip which enabled him to judge the extensive operations and results from treatment, which gave every indication of splendid regeneration. Then from Melbourne to Mt. Macedon, where pine plantations in different stages of development were inspected, some of which had already been marketed, the results being entirely satisfactory. At Mt. Macedon Nursery experiments with the *pinus ponderosa* and the Oregon pine yielded surprising results, the trees having attained to very satisfactory proportions and liberally regenerated. He then journeyed from Mt. Macedon to Creswick, at which place the Forestry School, plantations, and nursery illustrated the excellent work being carried out by the department. In South Australia the Hon. G. Ritchie, Minister for Lands and Forests, instructed that every facility should be afforded the Chairman within the limited time available for the inspection of the plantations and office routine of that State. The Conservator of Forests, Mr. Walter Gill, conducted the Chairman through some of the plantations at Mt. Lofty and Bundaleer Forest, where excellent examples of commercial plantations of several varieties of conifers were seen.

MILLARS' EXTENSIONS.

5. According to the interpretation by the Solicitor General of the scope of the Commission, the Commission has no power to make any recommendations to the Government as to the section under which the extension of leases and concessions shall be granted (see Questions Nos. 4516-7-8 of Evidence). It finds that the choice of the two sections rested in the first place with the Government as stated by the Solicitor General (see Questions Nos. 4487 and 4495 of Evidence), and that the Conservator strenuously advocated the extension under Subsection (ii.) of Section 6, but that notwithstanding his opposition to extension under No. (i.)—(and that the Government, according to the evidence of the Solicitor General—No. 4496—has power to adopt No. (ii.))—the question of extension under No. (ii.) was not adopted by the Government; that Millars', after discussion with the Ex-Conservator in London, and subsequently by correspondence in Western Australia, elected to have such extensions made under No. (i.). The whole of Millars' leases and concessions are affected by this decision.

6. Notwithstanding the qualified statement of the Solicitor General as to the extent of the powers of the Royal Commission with regard to recommending the course to be adopted, it would appear from a minute on the file by the Minister for Forests that the action was stayed pending the result of Mr. Pickering's motion, from which might be inferred that the Minister conceived that this responsibility would rest with the Commission. Bordering on this subject is the question of regulations, and from the statement made by the Solicitor General it would appear that the power to regulate only extended in so far as restricting the cutting of immature timber is concerned, and even this would appear to be doubtful regarding concessions. In view of this and the limited area of prime jarrah country, the Commis-

sion is of opinion that any concession made should have been under the section which would have ensured to the State the utmost control in the interests thereof. (Mr. Mann dissents with this finding, for the reason that the statutory time having elapsed the Government had no option.) The Commission is of opinion that the main factors that weighed with Millars in the decision as to which section they would desire to come under for extension, were (1) the uncertainty as to the royalty which would be levied, (2) the natural desire to escape regulations which would interfere with the working of their leases and concessions, and (3) the necessity for consulting their debenture holders, and obtaining their approval to the change in tenure. It would appear from the file that in the earlier stages, if the Conservator had been prepared to concede a fixed royalty for the period of extension, some basis for compromise might have been arrived at, and also that he anticipated the Government's adoption of his recommendation. The Commission is of opinion that the system of concessions and leases is not in the best interests of the State, and would recommend that all future methods of exploiting the forests should be on the permit basis.

ADMINISTRATION OF THE ACT.

7. The administration of the Act and the financial aspects are, in a large measure, inseparable, as every feature of administration carries with it some financial obligation. If the Government means, by the financial aspect, the question as to whether a fixed portion of the revenue accruing from the business of forestry should cease to be the method under which its transactions are conducted, then your Commission is of opinion, after careful investigation of the systems in operation in the Eastern States, and from the views expressed at the Brisbane conference, that the safest course for the successful conduct of a forest conservation policy is to adhere to some system which ensures to the department controlling it a fixed amount for an enduring period. It has been conclusively demonstrated that no system of forestry can be efficiently conducted except only when it is spread over a period of years and carried out on a determined plan, the nature of which involves a continuous policy. This policy embraces several phases of work which apply, in the main, to fire protection, regeneration, reforestation, and afforestation, and when due consideration is given to the lengthy period essential to the growth of the various timbers upon which the department operates, it is obvious that no connected policy can be carried out without due provision of funds. In New South Wales the amount devoted is 50 per cent. of gross revenue, to which are added administrative costs and loan moneys for afforestation. The revenue accruing from forestry in New South Wales in 1921 amounted to £190,748, ensuring to the department a considerable sum per annum, but the actual expenditure amounted to £104,782. In Queensland, Victoria, and South Australia it is by grant. The total revenue from all sources for Queensland in their 1921 report is shown as £246,269, whilst the gross expenditure totalled £189,455. The revenue for South Australia for 1921 was £23,872, whilst the expenditure was £33,923, the Legislative provision being £35,878. The position in Victoria is that a fixed sum of £40,000 is credited to the forestry fund each year by the Treasury, together with half of any gross revenue obtained over £80,000, which re-

sulted in 1921 in a total revenue of £138,582, and an expenditure of £127,308. From the foregoing it will be seen that notwithstanding the apparent advantage of a three-fifths allocation of the net revenue, the revenue and expenditure in Western Australia was less than in any State with the exception only of South Australia, where expenditure and revenue is mainly in connection with afforestation and the sale of exotics. The conference at Brisbane was requested by the Minister to assist his Government in the framing of a Bill by way of suggestions, and the final recommendation took the form of the adoption of the principles contained in the Western Australian Act, in which it is set forth that three-fifths of the nett proceeds should be allocated for forestry purposes, the Minister being in entire accord with this suggestion, as evidenced by report of the proceedings. Taking into consideration all the circumstances, the Commission cannot recommend any reduction in the proportion allocated from revenue for forestry, more especially when it is considered that on the major portion of the prime timber country Millars' Timber and Trading Co., Ltd., as concessionaires and leaseholders, are only paying a nominal rent or royalty which does not nearly approach the value of the standing timber if sold by tender, and also the freedom from control by the Forestry Department enjoyed by this company over such areas as embraced in the Canning and Jarrahdale concessions which, according to the opinions expressed by the Crown Law Department, cannot be controlled in a forestry sense. The position at the expiry of these concessions must inevitably be such as to involve the State in considerable expenditure in restoring those forests to a condition which will ultimately be a benefit to posterity. It is conceivable that a considerable period will elapse before any appreciable revenue can be looked for from these areas. In view of these circumstances, it would appear highly probable that within the next decade or two the revenue from forests will shrink very considerably, in which case it will be necessary that the amount available should be supplemented from consolidated revenue or loan funds. In the meantime it is the opinion of the Commission that all moneys allocated under the Forests Act should be devoted to the purpose of sound forest conservation. Commercial principles must be adopted as a basis for all forestry operations. It is therefore obvious that if this business is to be carried on successfully the Forestry Department must be in a position to deal on equal terms with its clients, and that to ensure the continuance of forestry it is essential that a sufficient proportion of its revenue should be devoted for its perpetuation. Whilst in Victoria considerable attention has been devoted in the past to getting as much revenue as possible out of the forests, in Western Australia not even this much can be said. The royalty of our timber is much lower than that of any other State of the Commonwealth. We, however, resemble Victoria (as in fact do most of the other States) in that of inadequate provision of funds for protective silvicultural reafforestation purposes.

FINANCE.

8. Inquiry into the avenues of expenditure under the Forests Act shows that they lie mainly in the giving effect to the measures necessary to ensure regeneration of indigenous timbers, and the expenditure to date in that direction is mainly in the Mun-

daring area, the Collie area, and the tuart area at Ludlow. The two former deal mainly with jarrah, but in both is combined an experiment of afforestation of conifers. In Mundaring we find that the first completely organised scheme of fire protection has been installed; this comprises lookouts—one at Gungah and one at Mt. Dale—separated by about 18 miles, which are equipped with tables, telephones, and heliographs. Each station has also a small hut for the accommodation of lookout man and in which are stored the necessary instruments, plans, signal apparatus, etc. The system was tested and found to be efficient. The telephone connection enables the lookout officer to communicate at different points where fire-guards and others can be advised. In addition to this a road has been constructed which encircles the weir and a considerable area of forest country. Beyond the road are certain sections which are protected by fire-breaks. The total cost of this work, including road, firebreaks, and lookouts is approximately £16,000, made up as follows:—

	£
Firebreaks	1,026
Lookout towers	703
Telephone lines	731
Road	14,000

Prior to the installation of this system the district was fire swept and no regeneration of any value was in evidence, approximately 33 per cent. being destroyed annually. Subsequent to its installation the percentage of country burned is 1.4, and evidence of generous regeneration was to be seen all over the area traversed. Although severely damaged by fire it gave positive proof of the possibilities of satisfactory results from fire protection and general silvicultural work which is in course of adoption by the department.

9. The blemish on Mundaring is the road constructed by the Forests Department round the watershed. It is 18 miles long and cost nearly £14,000. The justification advanced for this road is that it serves as a firebreak, and also enables the officers to arrive quickly at the scene of a fire. Another reason advanced is that it was required by woodcutters who are supplying the pumping station. The latter make their own tracks, and are to-day utilising about two miles out of the 18. The revenue derived is infinitesimal. We can only describe this expenditure as a reckless waste of public money. Had an advisory board been in existence this work would never have been authorised. We can only express the hope that in future administration such a serious blunder will not be repeated. The fact, however, that road-making is part of the forest work must not be lost sight of. This phase of work is only entered upon when a road is to be of direct service to the forest, that is to say, to enable logs to be removed from the forest, and other work of a similar nature which could only be effected by such means of communication. This is the practice in Queensland, New South Wales, and Victoria, where most of the log hauling is done by means of horse and bullock transport over considerable distances. In the case under review there appears to be no justification for the expenditure as a forestry measure. Roads of this nature should not be embodied in a general scheme of fire protection. The other expenditure at Mundaring consists of firebreaks, nurseries for growing pines for plantations, and the preparation of country for pine planting. It would appear that a less expensive and probably equally effective

system of firebreaks is being adopted, to wit, the burning of strips under control without preliminary clearing. In the Collie area the expenditure has been mainly in firebreaks which, generally speaking, have been on either side of roads or tracks, and in an arboretum, which has been used as a temporary nursery for the raising of pines for planting in local plantations. A considerable area of country is being experimented with in various pines and certain eucalypts. The result of the fire protection afforded is evident, the regeneration being satisfactory. A system of cutting in the face has been initiated, and from a careful inspection of the timber cut it is evident that had these saplings been left, no good results would have been obtained. It appears that the requirements for mining purposes will be most extensive, and the only possible way of meeting the demand will be by the production of a generous growth of coppice and regeneration. The Commission is therefore of opinion that the system initiated at Collie is sound. It is necessary to supplement, by every possible means, the supply of mining timber. It is therefore advisable that *pinus pinaster* should be tested as a mining timber under mining conditions. If experiments in pine cultivation prove successful, the thinnings of this timber should help towards relieving a certain shortage.

The Commission recommends an extension of the area at Collie to be reserved for mining timber purposes. This does not mean that the area reserved is used exclusively for mining supplies, as much of the timber unsuitable for such purpose is either milled or hewn, and the revenue reverts to the Forestry Department, therefore in recommending an extension of the area for mining purposes it is not intended that such area should be depleted for that purpose alone.

TUART AREA.

10. The expenditure in the tuart area lies mainly in fencing, firebreaks, mill with all necessary appurtenances, and Forestry School. Evidence shows that, consequent upon the provision of fire protection and the control of grazing, regeneration in tuart is taking place. It would appear that the system of fire protection and restricted grazing is essential, and the outlay on the tuart area in this direction would not appear to have been excessive. The mill has cost £10,000; this covers quarters for staff and workmen and railway communication from Wonnerup to mill (£2,000). Evidence shows that the output of this mill is absorbed almost entirely by the Railway Department, the residue of unsuitable dimensions being stacked for utilisation by a turning plant, the provision of which would involve an additional outlay of £2,000. This mill was installed for the utilisation of over-matured timber, which otherwise could only have been destroyed. The contention is that by the provision of a turning plant, the mill can be kept permanently going, guaranteeing this work at a profit. The Commission is not satisfied that markets are available for these by-products, and considers that before further expenditure is incurred, proper investigation in that direction should be made. If the mill could be worked without loss to the State, the purpose for which it was erected would be justified. The loss to date on this mill is £1,416.

11. The Commission took evidence from Mr. Ernest Wilson, who has entered into an agreement with the Forestry Department for the installation of

a subsidiary plant for turning purposes. This gentleman is satisfied that the market offering for the material available will absorb all the timber other than that required for first-class purposes, i.e., railway requirements. The prices which this gentleman is prepared to pay for his timber supplies are such as appear to be, from his evidence, entirely satisfactory to him and to the department. He is hopeful that avenues other than those that already exist for the disposal of his manufactured articles will speedily arise, in addition to which he has already considerable prospect of contracts with the Federal Government for supplying the requirements to which this timber is admirably suited, in which case there would appear to be no anxiety as to the market for the timber which would otherwise be wasted. In view of this fact, and from the evidence given by the officials of the Railway Department of their ability to absorb all the first-class tuart suited to their purposes, the position of the timber mill at Wonnerup should be one of profit, but the initial cost has been too great, and in consequence it is more difficult on that account to make the mill pay; it is, however, serving a good purpose in utilising tuart that would otherwise go to waste. The State Sawmills or Railway Department should be given an opportunity of taking this mill over, to be worked in accordance with the policy of the Forestry Department, but if this is not possible the Commission then recommends a further trial for another year under present conditions.

FIRE PROTECTION.

12. A considerable amount of evidence has been taken by the Commission on this question, and a diversity of opinion has been expressed. In the main, the evidence of forest experts points to the fact that regeneration of indigenous timbers is impossible without adequate fire protection. The argument of creeping fires, which has been advanced by many witnesses, is only advanced as a prevention against uncontrollable conflagrations, but on a careful examination of the forest, which up to date has been devastated by fire without control, it is evident that no generous regeneration can be obtained under this neglect of forestry methods. The evidence of trained foresters on this subject given to the Commission, and which is contained in the report of the Brisbane conference, shows that a proper system of fire control is vital to forest conservation. The nature of that control is, in a large measure, dependent upon the money available. The utilisation of roads, tracks, and breaks burned at the right season of the year appears to be the cheapest form of fire protection, and this system prevails in New South Wales and Victoria in application to the indigenous forests, and this is the system which has been adopted in this State and should be continued. It might well be supplemented, as funds become available, by a system of fire lookouts such as has been provided at Mundaring, as it is obvious that in the early detection of a fire lies the best prospect of its extinction. The Commission is of opinion that the system of fire control is one that should be extended systematically, and not done in a haphazard manner, as it is better to adequately protect a small area than a large area indifferently. It is of opinion that where fire protection is not in practice, the system of creeping fires under proper control should be adopted, and the tops burnt in the proper season of the year to prevent the fast travelling fires.

13. In the case of plantations it is absolutely necessary that adequate external and compartment breaks should be provided and maintained. This is the system in vogue in New South Wales, Victoria, and South Australia. Even with adequate external firebreaks, immunity from fire is not perfect; it is therefore essential that the plantations should be divided into compartments by subsidiary breaks. An interesting result of adequate fire protection presents itself at Hamel, where, in a plantation of under 20 years' growth, are found associated jarrah, pinus pinaster, the aleppo pine, and wattle; the regeneration of the pines being remarkable.

14. To this section particularly belongs the recommendation of the adoption of the most approved spark arrester or nullifier during seasons of the year when fires from sparks are possible. Under the heading of spark arresters some recommendation is made. It is interesting to note that in Washington, U.S.A., special Acts have been passed dealing with the question of fire protection, and this phase is one that is obligatory. It is also laid down that printed notices should be posted, warning people against setting fire to the forest under penalties, and even a penalty for the obliteration or interference with notices. Your Commission would like to commend the officer in charge of the Collie section for his action in placing notices in every prominent position, calling upon the people to protect the forest from fire. From reports which your Commission has perused, from all parts of the world, the question of fire protection is the foundation for all forestry operations, and unless the vital principle of this particular phase of forestry can be given effect to, it is impossible to conceive that any great benefits can accrue from the expenditure of State funds in forestry conservation.

EXOTICS.

15. The Commission made a careful examination of the pine plantation at Ludlow, which is an excellent example of what should not be done. In juxtaposition we found pinus insignis dying and pinus pinaster in robust growth. This experiment has been a costly one for the State, but as it has proved the possibility of growing a pine which has been of such inestimable value to France, namely, the pinus pinaster, the money spent has not been entirely wasted. The pinus insignis is in course of removal from Ludlow and the pinus pinaster planted in its place. The growth to date warrants the Commission in the belief that this area will be an asset of considerable value to the State. This costly failure was due to the fact that the department at that time was without professional advice. The Hamel plantation illustrates very clearly the vital importance of adequate drainage and suitable soil to the growth of pinus insignis. Portion of the pinus insignis plantation, which is only 17 years old, has a very fine stand (but a considerable portion is a failure), and the same excellent growth in the pinaster is to be observed. Your Commission is therefore of opinion that, on the type of country which has been experimented with, the pinus pinaster can and should be grown to fulfil the requirements of the State. In this connection the Commission visited an area to the north of Perth known as Gnanagara Lake, on which experiments are being carried out. The situation is admirable, inasmuch as one of the essentials to successful pine culture is the close proximity of a market for the thinnings. If it can be shown that

this country, which is valueless for any other purpose, can be advantageously used for the growing of the pinus pinaster, a system of extensive planting should be undertaken. When the policy of fire protection reaches a stage of development which would warrant experiment, advantage might be taken of the illustration of the successful growth of conifers associated with jarrah, as at Hamel. The Commission recommends that experiments should be made with other conifers, with a view to ascertaining their suitability in other soils than our coastal regions. It is interesting to note that in New South Wales and Victoria, where the pinus insignis has been planted in country somewhat similar to that of the Ludlow plantation, it has given evidence of failure; whilst the pinus pinaster is more or less holding its own with the different types planted in association therewith.

GOLDFIELDS FIREWOOD AND MINING TIMBER SUPPLIES.

16. In view of the intimate association with mining of the firewood and timber supply and of the report made by the Royal Commission in 1904 on this subject, your Commission deemed it expedient to make inquiry into this important matter. Previous to the visit to Kalgoorlie by the Commission they had been approached by the Kalgoorlie-Boulder Firewood Company suggesting that there were certain matters which that company would like to bring under the notice of the Commission, and offering every facility for making proper inquiry. The Commission visited Kalgoorlie and took evidence at the Kalgoorlie and Boulder Town Halls, the Coolgardie Road Board offices, and at W. R. Hall's Tanning Extract Company's works. The Commission visited the country environing Kalgoorlie to inspect regeneration and regrowth; visited the tanning works at Coolgardie; traversed the systems of the Kalgoorlie and Boulder Firewood Company, and the W.A. Goldfields Firewood Company, Ltd., and were afforded every facility by the companies interested to make such inquiry as the Commission deemed necessary. The evidence taken and the inspection made have enabled your Commissioners to obtain a very clear view as to the position of the firewood and mining timber supplies available and the prospects of regrowth and regeneration. The position generally is that the nearest firewood supplies are distant from 40 to 50 miles from the centre of mining operations; the companies having operated in all directions, other than South, to the limit of their profitable operations, which has been stated by both companies as being approximately 100 miles. The opinion expressed by the management of both companies is that the timber supplies in sight at current prices will provide the necessary material for approximately a further 25 years. The position as to coppice growth is, if anything, better than that of regeneration by seedlings. Evidence has been given the Commission that second cuttings have been made for firewood purposes over cut-over areas. Regrowth and regeneration generally are most marked where the soil is of the better quality. Whilst the evidence does not hold out great promise of extensive regeneration, much of the evidence that was given in this direction was from inexperienced witnesses. Some of the witnesses gave evidence as to generous regeneration and regrowth which it was not possible for your Commission to inspect. The unfortunate position of the forests on the goldfields is that no attempt has been made by the Forestry Department to introduce the

necessary provisions for effective control. This is due to the fact that there is little revenue accruing from the operations of the timber companies, thus making the position difficult for the department, which finds such large avenues for expenditure in districts which lend themselves more generously and with better results to the State. Another important factor which has operated against the inauguration of any scheme of conservation is the pessimism which obtains in the mining industry, a pessimism with which your Commission is not in accord. Whilst it is true that the Golden Mile has developed to that stage when the question of the extraction of gold to profit is a pressing one, by the developments which are taking place and which hold some promise, your Commission feels that the position is not such as to warrant the neglect of reasonable care. Your Commission took the opportunity in connection with the forests reserves for certain fields to visit the Gibraltar area, and was much struck by the new development of the Lloyd George Mine, which has a lode of 20 feet wide carrying 15 dwts. at depth of 100 feet. The consensus of opinion of the Government's advisers is that the life of the mines under more economic conditions will be continued for a very considerable period, and that the prospects of developments in other directions are most encouraging. The vital importance of firewood and mining timber to the industry is too obvious to need comment, but unless this community can be supplied at a price not exceeding that already paid and preferably lower, the difficulty of treating ore will be considerably enhanced.

17. The question as to the method of charges levied by the Forestry Department on timber companies and cutters is one fraught with difficulty, because any increase in such charges would inevitably be passed on to the mining industry. The system in vogue has resulted practically in the cutter having charge of the position and prejudices the supply of mining timber, where evidence goes to show that large quantities are simply cut and used for firewood purposes. At the present time the mining timber is supplied by contractors working mainly in conjunction with the firewood companies, which companies convey mining timber from the bush over their tramway systems. Owing to the separate interests operating there is a certain percentage of waste of valuable timber which should be overcome. This position is accentuated in many instances by the attitude of the cutters, the interests of the company being naturally to get every available stick of timber from the country operated over. Generally speaking the plant and management of the firewood companies leave little to be desired. Your Commission was struck by the various uses to which the salmon gum was put by the Western Australian Goldfields Firewood Supply Company, on whose system it is being used for sleepers and certain portions of truck construction, the life of the sleepers being, it is stated, up to eight years. The question of the continuance of the reserve system is one of a pressing nature so far as the individual areas are concerned. Witnesses at Coolgardie condemned most strongly the making available of the Kununalling Forest Reserve. The Kununalling area has been operated on by the W.A. Goldfields Firewood Company to a considerable extent, permission being granted to enable that company to maintain its supplies to the mines, and its men in active employment. The granting of this permission appears to have been inevitable under

the circumstances, but should not be conceded for any longer period than is necessary to enable that company to extend its system to the area through which its lines can operate. From personal inspection your Commission is of opinion that such should take place about the date of the presentation of this report; the Gibraltar and Gnarlbine reserves should be kept for that field, and it is disposed to recommend that an extension of the area in a Westerly direction should be made in view of the satisfactory developments that are taking place thereon. So far as Feysville Reserve is concerned, the Celebration Mine and the Kalgoorlie-Boulder Firewood Company, Ltd., are both seeking to operate thereon, the mine because it is the nearest available forest, and the company to obtain its loco. supplies to enable it to run the return journey from Lakeside to its sphere of operations, thus saving extra cost entailed in railing firewood from the nearest area to Lakeside. The Celebration Mine is at present getting its supplies from the Hampton Plains area, which belongs to the Hampton Plains Company, and which company previously sold its timber to the firewood company, thus neglecting the precautions for provision for the local field which is the present policy of the Mines and Forestry Departments. The firewood company in view of the anticipated development on Hampton Plains laid their lines to suit the developments. In view of the difficult grades entailed by this course, the advisability to change the route is under consideration. This would seriously inconvenience the Hampton plains mines, and it occurs to the Commission that it might be advisable, as a condition for their retention of the existing route, to grant them certain cutting areas for firewood supplies over the Feysville reserve. By this means the water supplies would be maintained to the Hampton Plains, and the Hampton Plains mines could obtain their firewood and mining supplies at a price which compares more than favourably with that paid by the Golden Mile.

18. With regard to the St. Ives reserves: From the developments which appear to be taking place in this area, your Commission cannot recommend any encroachment on that forest which is accessible to the field. In the consideration of applications for cutting rights and tramway permits, it is important that some regard should be had to the direction of the route, to conform, as nearly as possible, with mining development.

FOREST PRODUCTS RESEARCH.

19. From the evidence it would appear that the first step taken in this connection was in 1919-20 and has been continued up to the present, the total cost to the State being £4,154: the major portion of which, namely, £3,326, has been spent by the State on kiln drying experiments. The evidence submitted by the Officer-in-Charge (Mr. R. A. Fowler, B.Sc., A.I.C.) is of a most informative nature and is attached to this report. In the Commission's opinion the outlay in this connection has been fully justified, as the kiln drying experiments have led to the establishment of this business on an extensive scale by Millars' Timber and Trading Co., Ltd., who, we are informed, purpose increasing their plant 100 per cent. The advantage of kiln seasoning over air drying for the higher grade timber work, i.e., joinery and furniture, has been clearly demonstrated, and must ultimately go far towards creating an increased demand, more especially for jarrah, for these pur-

poses. The experiments on karri are almost complete and promise equally satisfactory results. Experiments are also being conducted in air seasoning. Very little, at the moment, is known as to the best conditions under which satisfactory results can be obtained by this process. The Institute of Science and Industry have in view the inauguration of a comprehensive series of observations in a number of places in the State upon timber stacked out under scientific conditions during the various seasons. Since all data will be recorded accurately and the condition of the timber frequently examined, the results should be of permanent value and should show the best conditions for the air drying of timber suitable for any of its varied uses. The whole scheme is similar to one just commenced in the United States of America.

POWELLISING WOOD PROCESS.

20. Experiments have been conducted in connection with this process which have demonstrated its effectiveness in certain directions. Further research, however, appears to be necessary to prove whether or not better results can be obtained and other salts than the arsenious oxide, at present used, may be found more economical and as effective; also whether a wider application of the principles underlying the process can be made available.

TANNIN.

21. Good work has been done with the marri kino, which has been effectively experimented with so that the colour is removed and the insolubility overcome by which a very valuable tanning agent has been made available, and for which a patent has been applied. The advantage of marri kino over other tannings is that the extraction can be made without detriment to the tree, and experiments are being made with a view to increasing the flow of the kino, or, alternatively, to discover a means for excluding the parasite, by which means a valuable timber will be made available for market purposes. The tanning experiments have gone far to illustrate the value of our various shrubs and barks for this purpose, the karri bark having been demonstrated to possess tannin properties of considerable value, to the extent of 15 to 20 per cent. It imparts a good light colour, and produces soft leather. The tanning agent possesses the quality of quick penetration. Inquiries from Vancouver, British Columbia, have been received by the Institute of Science and Industries as to whether this tannin is being manufactured commercially. The acacias on the goldfields possess tannin of commercial value, and a company has been formed which is operating at Coolgardie. Approximately £5,000 has been invested in this business, and the company is proceeding to issue shares with a view to extending its operations for the extraction of tannin for supply to the trade. Your Commission inspected the works and were much impressed by the possibilities that the acacia promised in the direction of tannin and by-products. The Commission took evidence *in situ* and inspected the results of the application of the tannin to various skins and were favourably impressed by the quality and colour of the product. The tan barks from the North-West appear worthy of investigation by the laboratory.

22. No evidence was forthcoming regarding the available supplies of mallet bark, but it would appear that this commodity is nearly exhausted. Thousands

of trees have been rung, and little regrowth is noticeable, and in many cases land was taken up under Conditional Purchase conditions only to be abandoned when the bark was stripped. Certainly the Forest Department exercised little control, and the State revenue did not benefit to the extent it should. Valuable tannic properties are found in our barks, and apart from the Coolgardie venture, a company proposes to operate on the karri bark at Pemberton. A working arrangement has been entered into between the company and the State Sawmills for the utilisation of the bark.

WOOD PULP.

23. The wood pulp for paper-making has been successfully experimented with through the generosity of the newspaper companies of Western Australia. Experiments have been carried to that stage when semi-commercial tests have been undertaken by the Federal Government. It is interesting to note that the karri regrowth is the best of the Western Australian timbers, and second on the list of the Australian timbers, and if the semi-commercial experiments demonstrate this to be a commercial proposition, it will present an easy avenue for the utilisation of the thinnings of our karri regeneration and coppice growth. The laboratory is experimenting in leaf-oils, wood oils, colours, resins, drugs and dyes, the result of which might lead to business of considerable value to this State. Experiments have been made in wood distillation, and sufficiently good results obtained to indicate the big possibilities that lie in the development of a type of small plant that can deal commercially with wood waste in its various forms.

24. In the opinion of your Commission no policy of forestry control would be complete without a Forests Products Laboratory, and this is borne out by the evidence submitted above. Credit must be given to the late Conservator—Mr. C. E. Lane-Poole—for the introduction of methods which have led to the establishment of the Forests Products Laboratory in this State, and from which much ultimate good will result. Further to this, considerable experiments have been made by the Rowley Forests' Product Company in connection with blackboy. The Commission took the opportunity of inspecting the extensive works in East Perth. The main product obtained therefrom is acetate of lime, which commands a very high price when reduced to its final product—acetic acid—this being worth £200 a ton. In the process of extraction several products of minor value become available, such for instance as formalin, wood spirit, preservatives for timber, various oils, tar and pitch, the nature and use of which are still the subject of experiment. Experiments have also been made with the zamia palm but have not yet been carried to a commercial basis.

JARRAH.

25. This timber, which forms the main forest product of Western Australia, is, like all other timbers, a rapidly diminishing quantity. To get an insight into the true position, your Commission traversed a considerable portion of Millars' Timber and Trading Company's scenes of operations—visiting their mills and bush landings, and fallers, also similar works in connection with the Kauri Timber Company, Limited, operating in the neighbourhood of Nannup. In the course of the tour, the Commission traversed the

country cut over in the earlier operations of the company and up to the present time. Careful attention was paid to the regeneration and regrowth which has taken place over the cut-over areas, the results in the main being most disappointing. It must be borne in mind that no attempt at control by the Forestry Department has been made in these areas beyond the prevention of cutting of trees of immature growth and the collecting of revenue. Seeing that this area has been subjected to uncontrolled bush fires of every description, it would appear that the process of firing the bush is one which will ultimately end in the extinction of our valuable jarrah forests. In view of the fact that the major part of the jarrah forests are in the possession of Millars' Timber and Trading Company, and that their possession has been extended for a considerable period, the Commission can only recommend that steps be taken, if possible, to acquire the leases and concessions as they fall due with a view of commencing forestry treatment at the earliest date practicable. It cannot recommend any further extension on the lines of Section 6, Subsection (b) (i).

Evidence shows that the consumption per annum of our jarrah in relation to the growth is as follows:—800,000 loads cut to 250,000 loads increment. This is last year's figures, but it will be obvious that every year the position becomes worse. It is therefore obvious that immediate steps must be taken to make available for forestry control those areas which have been agreed upon by the Lands and Forestry Departments. Evidence shows that there is no reason why this approval should be withheld. The State of Western Australia is the one which has made the least permanent dedication of any of the States of the Commonwealth, the figures for which are as follows:—

New South Wales—Permanent dedication, 5,254,165 acres; timber reserves, 1,518,597 acres.
Queensland—Permanent dedication and timber reserves, 4,196,798 acres.
Victoria—Permanent dedication, 3,405,163 acres; timber reserves, 757,410 acres.
Western Australia—Permanent dedication, 45,000 acres.

26. The question of what may be done by the introduction of exotics in our jarrah forests is aptly illustrated by an experimental plot at Hamel, where jarrah and pinus pinaster were sown together, the result being a prolific growth of jarrah and pinaster, the pinaster having already generously regenerated. Seeds from the aleppo pine have also been carried into this plantation, as also golden wattle, and the result is that in addition to the top storey of jarrah, a prolific lower storey of the timbers mentioned is taking place, whilst a considerable amount of humus is being deposited on the floor of this plantation. Of course these conditions would be absolutely impossible if the plot were not fire protected.

27. Your Commission noticed that in the process of falling, several valuable poles were destroyed. It appeared to be an argument in favour of the Department indicating the falling of such poles prior to the heavier falling, because any injury happening to such poles means the loss of a valuable tree. For a State of the magnitude of Western Australia, unrestricted exportation of prime jarrah would not appear to be a desideratum to be aimed at. It appears that the time is not far distant when, in order to secure adequate supplies for its own requirements, the State will

be obliged to impose some restriction on the exportation of timber similar to that which was adopted some years ago in Victoria. In another section your Commission has dealt with the world's supplies, and no report upon the timbers of this State could be considered without reference thereto.

28. From evidence it would appear that there is a possibility that this State may yet be in a position when it will need to restrict uncontrolled exportation with a view to ensuring our future requirements. It appears to your Commission the wrong policy to allow expediency to intervene between present needs and future requirements. The revenue at present resulting from forest operations is not in any way excessive in view of the cost of care needed for regeneration, and with the diminishing crop must come diminishing revenue, and the State bereft of revenue from its forests will be confronted with the necessity of providing funds for reafforestation from consolidated revenue or loan funds. The present position of the timber trade cannot fairly be taken as a basis for deduction as, owing to the abnormal state of Europe and the effect that exchange rates have in different countries, it has led to the flooding of the Eastern markets with soft-woods from America, the Baltic and British Columbia, to the serious detriment of our local timbers. More particularly is this noticeable in the case of British Columbia, as timber from that country has a preferential tariff. Your Commissioners think, however, that this is only a temporary feature of the timber trade and its supplies, and that with a more settled policy in Europe and Asia the position will be entirely changed.

KARRI.

29. Your Commission inspected the karri forest at Pemberton, Denmark, Nornalup, and Karridale, and were impressed by the magnificence of the timber and its prolific growth, ranging from trees which would yield 50 to 60 loads, to saplings of great promise. The generous regeneration of cut-over country was also a marked feature. The Commission inspected the mills and the powellising plant, and was struck with the high-grade timber which resulted from milling operations. An interim report on the subject of the area environing Pemberton has been made by Commissioners Mann and O'Loughlen, and submitted. The Chairman was absent in the Eastern States at this time and telegraphed to the Acting Premier his objection to the alienation of the country under consideration for the purpose of settlement. In the large majority of cases settlement at Denmark has been both protracted and costly, and it will be some time, owing to the difficulties to be encountered, before success can be obtained. On holdings which had been vacated the coppice growth and regeneration were more than remarkable, and in the country which had been cut over by Millars' and where fires had been infrequent, the regeneration was excellent. The outstanding feature so far as the Denmark and Nornalup area is concerned would appear to be that this timber grows more or less in belts with intervening country of mixed karri and redgum, some of stunted jarrah, and a considerable area of what is known as the bottle-brush country. Your Commission cannot recommend the alienation of any pure karri country for agriculture or other purposes, and in view of the fact that the area is so limited, being estimated at 100,000 acres, it should not be necessary to use country, which produces such a valuable asset, for any

other purpose. Where uncontrolled fire has raged in karri country, the same serious results have followed in its train. Your Commission is therefore of opinion that a proper system of fire control should be established throughout the karri country at the earliest date practicable; that the Department adopt similar methods to those employed at Collie, and the co-operation of group and other settlers be sought in protecting the forests from fire.

REGENERATION OF KARRI.

30. Whilst at Karridale the Commission had an opportunity of inspecting the karri regeneration which has been under observation by the Forestry Department. The Department consider the regeneration is making excellent growth. Records show that without attention karri forest cut over 20 years ago is now showing a second growth, approximately 150 trees to the acre, averaging 12 inches diameter at 80 feet height, representing a volume of 2,600 cubic feet per acre or an annual increment of 130 cubic feet. This result is small when compared with the growth of the plantations of South Africa, where the annual increment per acre is between 400 and 500 cubic feet.

31. Karri as a structural timber is unsurpassed. This has been borne out in evidence by various witnesses, including Mr. R. A. Fowler of the Forests Products Laboratory. The ex-Conservator of Forests—Mr. C. E. Lane-Poole—did much to bring into notice the high value of this timber for superstructural work. Experiments have recently been made in kiln drying, and have almost reached finality. By this treatment the value of the timber, for other purposes than those for which it is at present used, will be demonstrated. Prejudice has hitherto been shown towards karri for use other than for structural purposes on account of its tendency to dry-rot and proneness to attack from white ants. Weight for weight our karri is equal, if not superior, to oregon and other imported timbers, which are used for structural purposes, and which are also subject to the same defect if applied for purposes which bring the timber in contact with the earth, which prejudice, so far as karri is concerned, is gradually being overcome by the use of the powellising process.

REDGUM (*E. CALOPHYLLA*).

32. This timber grows generally in association with other timbers, and is widely spread. Owing to the gum, through which it gets its name, its use commercially is greatly restricted. The gum under the title of "kino" is, however, of considerable value, and the question of its development is under chemical examination. It finds its uses in a restricted sense in fruit cases, and in a small measure has been used for axe and other handles, shafts, etc. A tree free from gum is of considerable value for many purposes, and when polished is not without beauty. Generally speaking the country where this timber grows densely is of considerable value for agriculture. Under the heading of Forests Products Laboratory the question of its uses as a tanning agent has been fully dealt with.

WANDOO (*E. REDUNCA*).

33. The habitat of this tree is widely spread. Little forest of any value remains in the possession of the State. The largest area of virgin country is situate on the Eastern fringe of the jarrah country.

It is a timber of considerable value for wheelwright work, being mainly used for naves, felloes, and is preferred by some wheelwrights to tuart. Tuart and wandoo are undoubtedly two of the best timbers we have in this State for such purposes, and in view of the fact that the tuart forest has a very limited area, it would appear advisable that some steps should be taken to perpetuate the growth of wandoo. Its durability is beyond question, and it is of handsome appearance when polished. It would be a wise step for the Forestry Department to acquire an area of this country to ensure in perpetuity a supply of timber which serves such useful purposes.

SANDALWOOD (*SANTALUM CYGNORUM*).

34. This timber had its habitat over a very wide area of this State, but owing to its commercial value has become practically extinct within the reach of handling to profit. Its value lies mainly in its demand in China, and in the oil which is extracted therefrom. Experiments have been and are being made for its reforestation. Unfortunately the earlier experiments were destroyed by settlement, and the later ones are too recent to afford any reliable data. Sandalwood is a parasite, and has to be grown in association with hosts. The cutting of this timber for marketing purposes has been practically uncontrolled, and the State has never realised its fair proportion of export value. The firms mainly operating in sandalwood have been more or less intimately associated with Chinese and Singapore firms, and have only been interested in the margin between export value and price realised by sales in the East. The result of such operations has been disastrous to the State and to the industry. The position so far as it is ascertainable, is that the market is over-supplied with the consequent reduction in local values. If the State desires to perpetuate this valuable industry, it appears to your Commission that the whole method of dealing with sandalwood will need to be changed. The control of the industry should be vested in the Forestry Department. This Department could then handle the export sandalwood up to such stage as the Government deemed expedient, ensuring sandalwood cutters the maximum value for their labours, and to the State its just share of the profits which accrue therefrom. The history of sandalwood is much too extensive to be dealt with in this report, but the conclusion arrived at seems to be such as would arise from impartial consideration of its history and in the best interests of the State.

SHEOAK (*CASUARINA FRASERIANA*).

35. This timber whilst growing generally throughout the forests appears to find its chief habitat in the environment of Albany. The Commission made an examination of portions of this area, and found that fire was bringing about its destruction and extermination. Evidence showed that fires were of frequent occurrence. It was stated that the best timber was obtained from the burnt trees, which leads to the inference that thoroughly dried timber was the most suitable for the best class of work. In Albany there are two small mills engaged in the milling of this timber for casks, furniture, and fruit cases. It was stated that for the purpose of making casks this timber was one of the best in Australia, and this is borne out by the fact that quite a reasonable quantity of material in the form of staves was exported to the Eastern States. Mr. Steele, the owner of one of

these mills has improved the process for bending the staves, thereby reducing the loss to a minimum. Prior to this considerable loss through breakages occurred which adversely affected the exportation of sheoak for this purpose. A considerable quantity is used for higher grade furniture, mantelpieces, etc. The difficulty lies mainly in securing boards of marketable width, probably due to the fact that the major portion of the tree is destroyed by fire. The question of the reservation of a sufficient area is one of considerable importance, and your Commission recommends that as large an area as practicable should be permanently dedicated at the earliest date possible. The most serious enemy of this valuable timber, as indeed all the timbers of this State, is fire, and the absolute lack of regeneration except for one year's growth is strong evidence in support of this contention. The fact of regeneration existing, even of so tender an age, is indicative that by the exclusion of fire from the forests, good regeneration would result. The foliage of the sheoak is of such a nature that, were the areas fire-protected, it would result in a forest floor somewhat similar to the conifers which return a considerable amount of humus to the soil. The timber inspected in the yards was of a high quality, and it seems that the utilisation of sheoak for fruit cases is waste of a timber so highly valuable for higher grade work.

RIVER BANKSIA (*BANKSIA VERTICILLATA*).

36. This very valuable timber appears to be dying out. Your Commission noted this in every district through which it passed where the banksia grows. The dying out of this timber was most noticeable about the date of the 1917 flood. There is also a parasite known as the "Girdler," which operates beneath the bark, and has the same effect upon the tree as ringbarking. It is desirable that investigation should be made as early as possible, with a view, if possible, of assuring the regeneration of this very valuable timber, whose uses are mainly for high grade work, such as furniture, mantelpieces, internal fittings, panelling, etc., in house, railway, and tramcar construction. The available supplies of this timber are restricted, the area in which it grows being mainly confined to water-courses. Doubtless the effect of fire on the regeneration of this tree is just as serious as in the case of all other indigenous timbers, and whilst uncontrolled fire ravages our forests there would appear to be small hope of its generous regeneration.

MORRELL.

37. This timber is being rapidly destroyed by settlement. It is undoubtedly possessed of considerable beauty, and in evidence is stated to be the best timber known in Western Australia for spokes for carriage wheels, the main timber used by local manufacturers being the ironbark from New South Wales. Doubtless there are many purposes to which morrell could be put with advantage, but if for no other purpose than the above it appears advisable that steps should be taken for the conservation of a limited area.

FALSE ACACIA (*ROBINIA PSEUD-ACACIA*).

38. From evidence of the value of false acacia for axe and other handles, the Commission recommend that patches of this species should be planted, as it has been shown to be a finer timber than the hickory.

TINGLE TINGLE.

Red (*E. Jacksoni*), Yellow (*E. Guilfoylei*).

39. The habitat of this timber is in the South-West corner of the State, in the immediate vicinity of Nornalup. The area over which it is found is approximately 5,000 to 6,000 acres. It grows in association with karri and the timbers common to the karri-forest, and to a height of from 100 to 150 feet, and, when marketable, averages seven loads to the tree. Your Commission regrets that there are no reliable figures available on which to enable them to compute the loadage per acre. Very little appears to be known about this timber. In appearance the red variety resembles the karri and jarrah. Experiments with tingle tingle in bridge construction have been made at the Frankland River, but sufficient time has not elapsed to demonstrate its suitability for this purpose. It has every indication of being a timber of considerable value, and as it grows in association with karri steps should be taken to place it under the same conservation scheme as that timber. It is desirable that experiments should be made with tingle tingle to demonstrate the purposes for which it is best suited. In view of possible railway construction through the tingle tingle area, it will be necessary for the Forest Department to have a thorough inquiry as to the value of this timber before submitting it for sawmilling purposes.

WILLOWS.

40. The Commission recommends the Department to seek the co-operation of land holders in the planting of willows on all streams. Settlers on the Murray, New South Wales, and the contributing streams find it is not only a scenic charm, but a valuable fodder in time of drought.

WORLD TIMBER SUPPLIES.

41. In dealing with the question of the world's timber supplies it would be well to review the position from the State onwards. The evidence received from sawmillers and the expert officers of the Forestry Department goes to indicate that the period to which this State can look forward for a sufficient supply for local consumption and export at the existing rate of cutting, does not exceed 25 years. This, however, cannot be accepted as a true estimate of the period to which this country can look forward to satisfy its own demands. The natural increase of population, which is being fast accelerated by an extensive scheme of immigration, should increase the population of this State during that period very considerably. The local consumption, notwithstanding all the substitutes for timber, is on the increase, and it can be readily foreseen that the time when this State will be confronted with the problem of finding its own timber is not remote. In South Australia there is practically no indigenous timber, and the operations of the Forestry Department have been practically confined to the afforestation of available country with conifers mainly of the *pinus pinaster* and *pinus insignis* varieties. The process is one which entails considerable expenditure, but it has been demonstrated to be one that can be undertaken with certainty of profit, the profit per acre for a term of years being indicated in the report of the Brisbane Conference, 1922. In Victoria the accessible forest has been thoroughly exploited, and although a considerable area still remains, it lies in more or less inaccessible situations. The Govern-

ment of that State has permanently dedicated 3,405,163 acres, and has timber reserves of 757,410 acres, a considerable area of which is under forest treatment. It is also especially gifted by nature with country eminently suited to forest purposes, and has several timbers which regenerate liberally. In addition to this, extensive plantations have been made of the *Pinus insignis* and other conifers, and, owing to situation and climate, such pines as the *ponderosa* and *oregon* not only thrive well but regenerate liberally.

42. In New South Wales the position is somewhat akin to Victoria, except that the area under forest treatment is larger and more advanced. It has a permanent dedication of State Forest of 5,254,165 acres and timber reserves of 1,518,597 acres. This State once possessed a most valuable timber in its cedar, which has become practically extinct. It is now engaged in the establishment of conifer plantations in situations suited to the various varieties.

43. Queensland has State Forests and timber reserves totalling 4,196,798 acres. It has practically cut out its cedar and has made serious inroads into its hoop and bunya pines. Although Queensland is a country richly endowed with scrub timbers, they are, in a large measure, inaccessible. That State is experimenting on reforestation with its bunya and hoop pines, and with exotic conifers.

44. The position, therefore, so far as Australia is concerned, is not one which holds out much promise, and this position has been recognised fully by the Governments in the Commonwealth. Queensland has, at length, decided upon the inauguration of an up-to-date forest policy, which, under the present Government, will embrace sawmilling operations. The Chairman of your Commission whilst at the Conference in Brisbane brought under the notice of the Chairman of that Conference—Hon. H. Coyne, Minister for Lands and Forests—the Forest Act of Western Australia and, with the exception of the war-time clause, which extends certain privileges to Millars' Timber and Trading Co., the Act met with so much approval as to be suggested as a basis of the new Queensland Forest Act.

45. When turning to America one is confronted with the absolute necessity for forest conservation. The mill-owners of the Pacific North-West assert that supplies will last from 20 to 40 years, which, in the life of a nation, is an insignificant period. At a recent Congressional meeting at Washington, March 1922, attended by prominent lumbermen and foresters from every part of the United States, testimony was unanimous that that country is rapidly approaching a timber shortage, and that whatever measures of relief are possible must be taken promptly. One of the most appalling enemies of the forests of America and Canada is fire. The Chief of the Forest Service stated that that country had 80,000,000 acres of idle unproductive forest land due to this source. So far as Europe is concerned, with the exception of Scandinavia and Russia, there is no country which is exporting timber. On the contrary, it can be with certainty averred that most of the European countries are importing timber. To both Asia and Africa Australia has been exporting sleepers for some years past. So far as your Commission can ascertain, Siberia would appear to be one of the few countries that may have timber for export. There are in addition

tion to the above, areas in the Philippines and Borneo containing a certain amount of timber of many varieties. From the foregoing, therefore, it will be readily seen that the question of making provision for our present and future requirements is one of vital urgency. Leading foresters in the Eastern States consider that the regeneration of the forests of this State presents features of grave difficulty; the most promising is that of our karri belt. When it is remembered that the prospect of importations from other countries is becoming daily more remote, it must be realised that every effort to conserve as large an area as possible of the country of this State, most suitable for rapid regeneration, should be made. In South Australia considerable expenditure has been incurred in connection with afforestation of eucalypts from other States. The Chairman had an opportunity of seeing the result of such experiments and gained little encouragement from his inspection. In view of this it should be obvious to a country which has original timbers of value that, as early as possible, precaution should be taken to give effect to a generous policy.

46. So far as Canada is concerned, vast inroads have already been made into its timber resources, and in certain localities the end is clearly in sight. Canada has intimated that it proposes to use its timber resources at home. In Central and South America, and in equatorial Africa, the value of timbers, apart from the great cost of procurement, is a doubtful quantity. The Commission think it worth while to quote the following extract from an article appearing in the American "Review of Reviews" of 22nd July, 1922, by Philip W. Ayres:—

Throughout the Eastern mountains the valleys have been cut out and timber on the highest slopes disappears as by magic. Shall we save a million a year at Washington for the sake of economy and at the same time lose a billion a year in timber wasted, soils destroyed, vast powers and electric powers upon which our welfare depends increasingly lost for all time? Shall navigation in all our rivers be hindered by sandbars, agriculture ruined by stormy overflows on valuable meadow land as in South Carolina, great cities like Pittsburgh and Cincinnati menaced by floods? Foresters give notice to the people of this country that their day of comfortable security is at an end. Delay is inadmissible. Will Congress and the States respond? Only if the American people insist that action be taken.

KILN DRYING.

47. With regard to kiln drying, the Commission inspected the kilns at Crawley (experimental), at Millars' Joinery Works, Perth, and their battery of kilns at Yarloop. The outstanding feature is that of its effectiveness, but this is detracted from by the excessive overhead cost at Yarloop, which could be effectively spread over twice the plant at present in operation; also the method of loading and unloading kilns, which method could be considerably improved by providing trucks suitable for the purpose and by loading and unloading outside the kilns. At Warburton, in Victoria, this is the method in vogue, and until this process, which involves traverse rails for receipt and delivery of trucks, was instituted, the same excessive cost unduly handicapped the process. The result on the timber treated at Warburton is so eminently satisfactory that timber, which would otherwise be wasted, is dried and used for furniture, dowels, etc.

48. Further to the foregoing your Commission, appreciating the value of kiln drying as an adjunct to our timber industry, asked the Forest Products Laboratory to furnish an estimate of a commercial kiln, that is to say, a kiln of a capacity which would turn out seasoned timber at the minimum of cost. The report is attached hereto. It is interesting to note in that report that an increase in the size of the battery and the capacity of kilns is essential with a view to the reduction of all overhead costs; that the system of loading is entirely changed by substituting for the present method of loading and unloading into kiln the transfer of truck system, whilst advantage has been taken of the result of experiments to bring the whole system up to date. The table attached shows that the cost per cubic foot ranges, for jarrah one inch to 3 inches, from .92 pence to 1.78d. per foot super.; whilst one inch karri is treated at a cost of 1.21d. In view of the increased value resulting from this method of treating our timbers your Commission feels that no report would be complete without a recommendation in this regard.

SECONDARY INDUSTRIES ALLIED TO FORESTRY.

49. In view of the statements made on the file dealing with the extension of the concessions and leases by the General Manager of Millars' Timber and Trading Company, Ltd., your Commission felt it incumbent upon it to make an inspection of the various mills throughout the State and the timber yards and joinery works of the various companies, and also the State works operating in and around Perth. So far as the mills are concerned they compare more than favourably with the mills in the Eastern States. There is undoubtedly a considerable amount of waste taking place on all the mills, but there appears to be a genuine effort amongst mill-owners to cut as economically as possible, and to utilise the timber to the limit of profit. As a matter of fact, the large stocks of milled timber held by some of the firms must be a considerable asset. The last stage of cutting would appear to be laths, and the building trade should be strongly recommended to utilise the jarrah laths to the fullest extent possible so as to assist the mills in the eradication of waste. The timber yards and joinery works of Millars, which are equipped with a dry kiln, and which firm also has the advantage of their battery of kilns at Yarloop, appear to take the premier place, so far as joinery is concerned. The work that this firm turns out is full of merit. It is satisfactory to note that such a large proportion of the joinery work turned out by the Lord Street shops is made of our native timbers. Some of the imported timbers stocked, which have been through the air-drying process, compare most unfavourably with that which has been kiln dried. Associated with Millars' joinery works are extensive flooring plants which turn out large quantities of high-grade jarrah flooring. Architects should be recommended to utilise a lower grade of flooring in warehouses, stores, etc., using only the first grade for the best class of work. This recommendation might also apply to scantlings, where minor defects would not prejudice the use of this timber, except in a position where extra strain or pressure is likely to occur.

50. Messrs. Whittaker Bros.' yards and works were inspected, and it was interesting to note the extensive operations of this firm in connection with wagons, drays, spring carts, masher carts, lorries, and large wheels for North-West wagons, the class of work being excellent throughout. The timbers mainly used are tuart and wandoo with iron-bark for spokes for smaller wheels; tuart is used for the larger spokes. This firm also does a large business in joinery and appears to take every care in the preparation of the finished article. They also import timbers from Borneo which are capable of being utilised for furniture and joinery. It was interesting to note that the Cape Lilac had not escaped the attention of this firm. The Commission witnessed a log of this timber in the process of being sawn, which timber appeared to be suited for joinery purposes. The log, which could not have been growing more than 40 years, gave an output which should commend itself to the consideration of those interested in the growth of timber.

51. Bunning Bros.' works were inspected. This firm is engaged principally on cutting and dressing floorings, weatherboards and joinery, and also to a large extent on wagon and lorry construction, and settlers' ready-made cottages. This firm has several mills, and some of their operations are carried on in indifferent country.

52. The State timber yards and joinery shops at Carlisle were also inspected. It was found to be a hive of industry. The present building is apparently inadequate for the volume of business, and certain conditions under which the workmen were carrying on their operations were the most primitive of any of the works visited. The State Sawmills Department, however, has not lost sight of this fact, and has nearly completed the erection of a very large shed, the construction of which reflects credit upon the manager. The class of work being turned out in these workshops is of the standard used in medium priced buildings. In the opinion of the Commission it would not be possible for any joinery works to turn out the class of work that Millars' Timber and Trading Company do until such time as they are equipped with the kiln drying process, which not only means having properly seasoned wood but securing the highest grade, as it is not possible to treat to profit anything but the best timber. The Commission noted that, like the other yards and joinery works, the Carlisle establishment caters for general buildings requisites such as corrugated iron, gutterings, down-pipes, hinges, locks and fasteners, nails, bolts, etc.

SPARK ARRESTERS.

53. Evidence was taken by the Royal Commission at Whittaker's Mills, North Dandalup and in Perth. The chairman accompanied the party when a practical test was given on the Midland Railway Company's line, and evidence was taken from Mr. Cheney in Perth. The evidence submitted went to show that the spark nullifier was effective. The Commission having no expert knowledge in this regard called for the files dealing with the Cheney Spark Nullifier and the H.D.D. Spark Arrester. These files—W.R. 2002/22 and W.R. 928/22—indicated that the practical experiment given by the Cheney Spark Nullifier was not on such lines as to convince the

officers of the Railway Department of its efficiency; whereas the file of the H.D.D. Spark Arrester showed that it had certain advantages, although not sufficiently satisfactory to warrant the assumption that it was perfect. Mr. Whittaker, in giving evidence to the Commission in Perth, stated that so far as his company was concerned it was not satisfied with the result of the Cheney Spark Nullifier experiment on his locomotives. The Commission is not in a position to make any recommendation with regard to either the Nullifier or the Spark Arrester, but considers the matter of sufficient importance to warrant every possible trial being given to these patents for the purpose of overcoming this menace to forestry and agriculture. Inquiry shows that in different parts of the world thousands of locomotives are compelled to use some form of spark arrester during certain periods of the year, that is to say, those periods when fires are most readily started. Your Commission would therefore recommend that the use of spark arresters be enforced for certain areas and during the periods above stated.

THE CARBO-TEREDO PROCESS.

54. Whilst in Sydney the Chairman was waited upon by Mr. J. E. Cunningham with regard to the above process, of which he is the patentee, and given certain documents and plans illustrating his methods and the ineffectiveness of the application of the Monier cylinder, a process of cement sheathing. Seeing the importance of the discovery of some method which would render piles immune from attack from boring creatures, the pamphlets and plan of the Carbo-Teredo Process were submitted to the officer in charge of the Forests Products Laboratory, Mr. R. A. Fowler, who advised that the contention set forth by Mr. Cunningham is substantiated by experience; that is to say, that the process of charring has had a distinct preservative effect which is illustrated by experiments in Auckland, Sydney, Fremantle, and Portsmouth harbours. The difference between the Carbo-Teredo process and the process of ordinary charring, is smearing with crude petroleum prior to the application of heat. Mr. Fowler states that from evidence to date he is unable to prove whether the Carbo-Teredo method is more efficient than simple charring by an open fire, but contends that the problem of the protection of modern wooden structures is one which demands a good deal of further research. The present state of scientific knowledge on this subject is very incomplete. Whilst your Commission agrees with Mr. Fowler, it recognises that a considerable step in the solution of the difficulty appears to have been accomplished, and would recommend that further investigations by the laboratory be carried out.

CYPRESS PINE FORESTS IN EAST KIMBERLEY.

55. The evidence available as to the nature and extent of the Cypress pine forests at Kimberley prior to the visit of Mr. D. McVicar (Head Forester) was of the most vague and unreliable nature. Since Mr. McVicar's return, an interim report has been made available to the Commission from which it would appear that the forests at Kimberley are of small value to the State, the estimated quantity of market-

able timber being only 10,000 loads. This would be a doubtful proposition for any company to operate on, in view of the outlay in tramlines and plant necessary for such business. It is regrettable that a cypress pine forest of considerable value has evidently been practically destroyed by fire, and from present indications as set out by Mr. McVicar, will be entirely wiped out in a few years by this means. From the reports submitted it is impossible for your Commission to recommend any forestry expenditure on this area, as owing to the luxuriant growth of grass in country which, at one time, must have been a forest of considerable magnitude, it is doubtful if any measures which the State could afford, would adequately control the fires in this district.

POLES.

56. Pole getting has been prohibited in all places except on concessions, over which the Department has no control. The poles required by Government Departments and municipalities are the sound straight-barrelled variety that would eventually develop into a fine millable log. We recommend that the Forests Department obtain an estimate of the cost of dipping the bottom of karri poles at Denmark. A scheme for this treatment has been put up by Mr. Creswell, of the Railway Department, which is worthy of investigation. On some of the selections at Denmark, millions of young trees are fighting each other for a share of the sunlight and soil sustenance. These trees could be utilised instead of jarrah. If that were done it would have an appreciable effect on the jarrah forest, and be a little help to the selector who daily scans his stand of karri with the exclamation, "When will it come into cash?"

HEWING.

57. The registration of hewers is as follows:—1918-19, 242; 1919-20, 412; 1920-21, 286; 1921-22, 459; the total hewers registered since the passing of the Act being 740. Forestry File No. 1802/14 shows that at 31st December, 1914, there were 1,955 hewers' licenses in existence, but it is impossible to obtain the number of hewers eligible for registration. The numbers of hewers at present engaged in the industry on Crown lands is 459, which would leave, from the above total, 281 available for hewing on Crown or private lands. The Timber Workers' Union advises that the approximate number engaged in the industry is in the neighbourhood of 800. Prior to the passing of the Act there were over 2,000 men engaged in this calling. It would appear that constant employment on Crown lands does not afford opportunity for a greater number than those already registered, and if any additional registration were made it would militate against the permanency of employment for those already registered. So far as private land is concerned, registration is unnecessary, and anyone desirous of hewing thereon can do so. Your Commission after carefully reviewing the position, and in view of present circumstances, that is to say, the number in actual employment and the slackness of the timber trade, can see no reason to depart from the decision of Parliament, made at the passing of the Bill. From the evidence given it would appear that the position is not materially affected, and is more or less of a sentimental nature. During the debate which took place in Parliament it was shown that the hewer should

only be used in bush which was in an inaccessible position, and on timber which could not be operated upon by mills. Evidence goes to show that the inaccessibility has been considerably reduced by reason of the introduction of the log hauling plants. Your Commission therefore, in view of the foregoing cannot see its way to recommend any departure, at the present time, from the position as set forth in the Act of 1918. (Mr. O'Loughlen dissents from this finding.)

CATCHMENT AREAS AND SOIL EROSION.

58. During the taking of evidence, Mr. F. W. Lawson—the Engineer for Metropolitan Water Supply—gave evidence of a valuable nature, which illustrated the serious effect on our water supplies throughout the State, consequent upon the destruction of timber and the denudation of our forests. His evidence was endorsed in a measure by the reports of responsible railway officers, who instanced the effect of excessive ring-barking on the water supplies for locomotives. So far as the Mundaring Weir is concerned, it has been essential, for the preservation of that supply, that forestry measures should be taken for the restoration of the adjacent forest. In a desire for the speedy filling of the weir steps were taken to destroy the forest on the catchment areas environing it. The appreciation of salt in the supply caused thereby became so pronounced as to be forced upon the attention of the authorities, and inquiry elicited the fact that such accretion was due to the destruction of the timber. The evidence of Mr. Lawson is of such a conclusive nature that your Commission cannot do other than recommend that on all catchment areas the forest should be maintained, and placed under the control of the Forestry Department.

59. Following in the train of the removal of the indigenous timber erosion of the soils is in evidence. This fact is borne out when traversing the wheat areas in undulating country. A serious position has arisen in South Australia consequent upon the lack of wind-breaks. Following the introduction of fallowing as an essential to successful farming in the drier areas, there is a considerable loss in the surface soil, due to the high winds. So serious is this position, that the last ploughings in these areas have resulted in the turning up of the subsoil. The proposed remedy is the conversion of these areas into pastures. This position is brought before your notice in view of the enormous clearing that is taking place in our wheat areas, and with the desire to ensure the retention of adequate wind-breaks before the position becomes too acute. Whilst dealing with this question it might be well to illustrate the serious position in South Australia due to the lack of indigenous timber, where enormous paddocks have no protection from wind or from the elements. The position in that State can only be remedied by the introduction of trees, which are difficult to restore when the open spaces are so large. In view of this fact it seems obvious that advice should be given to new settlers when clearing to take every precaution in the direction of wind breaks, shade, and firewood supplies. When this matter is being undertaken by the Government, the contractors should be so instructed.

PRISON LABOUR.

60. The Chairman whilst in New South Wales had an opportunity of inspecting the *Tuncurry pinus insignis* and *pinus pinaster* plantations. The whole of

this work has been carried out by prison labour, and whilst the cost has not been cheaper to the Forestry Department, yet there has been a saving to the Department controlling prisons. The question of cost is not, perhaps so vital as the excellent result obtained by the utilisation of prisoners in this work. The prison is in the form of a quadrangle, three sides of which are devoted to huts for prisoners—one prisoner to each hut. In the centre is a buffalo or couch lawn. On the fourth side are the quarters of the officers in charge of the prisoners and the administrative buildings. Attached to this is a vegetable garden, and the cows are kept for the provision of milk supplies. Since its inception there has not been any attempt at escape, and the percentage of prisoners who have passed through this institution to freedom and returned to prison is approximately three per cent. It is indicative of the popularity of this treatment of prisoners that there is not a solitary instance of attempt at escape, and of its efficacy when out of the large number who have passed through this institution only three per cent. have returned to their evil ways.

ROYALTIES.

61. The question of whether the charge levied by the Government for permission to cut the State's timber is royalty in the proper sense of the term seems open to question. In the opinion of the Commission it is really the price at which the timber is sold to the mills. If this view be adopted then surely the price charged is a very low one; compared with the charges in the Eastern States it is much too low. The argument that the conditions are different inasmuch as in the Eastern States the markets are mainly local and that the export trade is the main outlet for this State's product, would appear to be an argument in favour of the increase in the amount charged, more especially in view of the fact that the export market, in consequence of our rapidly diminishing asset will not be available for more than 20 years. The stumbling-block to the fixing of an equitable price is Millars' Timber and Trading Co., Ltd., which, owing to its favourable position, makes it almost impossible to fix a really just price. Considerable evidence has been taken in this connection, more particularly from Bunning's, Whittaker's, The Kauri Timber Co., and Millars, the consensus of which goes to show that the basis of the new assessment of values is not equitable, in so far as one or two important factors have been left out. Evidence was taken from the Acting Conservator, Mr. S. L. Kessell, and his attention drawn to the points at issue. After consultation with the Commissioner the following scheme of charges was submitted, the computation of which is based on distance from port and rail freight:—

NET RATE OF ROYALTY SUGGESTED.
340 SUPER FEET TO THE TON.

Distance of Main Line Siding to Port.	Net Royalty per cubic foot in the round.	Net Royalty per load in the round.
Miles.	d.	s. d.
1-20	1.86	7 9
21-40	1.42	5 11
41-60	1.06	4 5
61-8076	3 2
81-1005	2 1

The factors that really enter into the question of price are:—

1. The distance from railway siding to port of shipment or market.
2. Distance from siding to mill.
3. Distance from mill to bush landing.
4. Quality of bush.
5. Accessibility of the timber.

From the foregoing it would appear that although the scale set out by the Acting Conservator of Forests might be reasonably equitable, yet it is not one which fully meets the case; and it appears to the Commission that if an accurate assessment be desired, then all those factors above enumerated must be taken into consideration. It was, however, stated by the Acting Conservator in evidence that the factors set forth above, which are in addition to those taken into consideration in his scale of suggested royalties, would not need to be considered in all cases. When occasion arose a special assessment would have to be made.

62. Your Commission finds that the price secured for permits by the Department suggests that an increased royalty should be levied as soon as the industry shows signs of revival. Mr. Lane-Poole put up a recommendation on 10th June, 1921, that increased royalties be imposed, which was not adopted by the Government.

63. The bearing that the railway freights have on this question is only material over distances which do not appreciably affect the position in this State.

64. The Commission suggests that a conference of sawmillers with the Conservator be held with a view to seeking their co-operation in the clearing up by controlled fires, etc., the areas recently worked. If such co-operation is forthcoming, then when the raising of the royalty is under consideration this factor should be taken into account.

DEPRESSION IN TIMBER TRADE.

65. The position, to-day, so far as the timber trade is concerned, is that there is a lack of markets for our indigenous timbers. This appears mainly due to the fact that most countries are in such a bad financial position that they cannot proceed with that class of work for which these timbers have hitherto been used. A wave of despair, at the moment, seems to be sweeping over the timber trade and those who have hitherto derived profits from its transactions. It is a question whether or not this depression may not be to the ultimate benefit of this State, as, from the careful inquiry which has been made into the question of forestry, no other conclusion can be drawn than that our future position will be a very serious one. In all the States there has been exploitation of the forests without any regard for the provision of adequate funds for protective silvicultural and reafforestation purposes until the position has become one almost of bankruptcy. The position calls for full and immediate consideration of the question of preserving the life of our forests.

FURTHER PERMITS TO COMPANIES.

66. The question of granting further permits to established companies to ensure continuity of profitable exploitation should be considered. For instance, a mill having worked out the major part of its per-

mit finds it unprofitable, with the balance of its holding, to bring the remaining timber to the mill or to remove the mill to operate on the untouched forest. Adjacent to the existing permit is Crown land, having a fair stand of marketable timber, sufficient to warrant the removal of a mill from its original site to a site where the operations can be carried on in a profitable way. The timber remaining on the original permit if not cut could not be marketed. The alternative to granting a permit over Crown lands sufficient to warrant the removal of mill to new site is the closing down of mill. It would appear, on the face of it, seeing that permits are subject to regulation and varying price of royalty, that a company so established should be afforded an opportunity for continuity of profitable cutting, each case to be considered on its merits.

MEASUREMENT.

67. On looking into the system of measurement it would appear that while the weight of evidence is in favour of the Hoppus system, a loss of over £10,000 a year royalty charges would result to the Department on the present basis, if that system were reverted to. The employers to-day pay the employees on the Hoppus system, and pay royalty on the new measurement. This necessitates the keeping of two sets of books. Most of the employers have expressed their opinion that, rather than be put to this extra expense and inconvenience, they would be willing to pay the difference in royalty. This might be considered when the question of increased royalties is decided on, but your Commission does not recommend a step which will lead to a consequent loss in revenue. The following resolution dealing with the question of measurement was carried at the Brisbane Forestry Conference:—

“That this Conference recommends that, as far as trade conditions permit, the cubic foot be used as the unit of volume measurement of timber, and that a correct formula be adopted for the computation of the volume of round logs.”

GENERAL.

68. The Commission's attention has been drawn to the report of the Interstate Commission of Australia on Tariff Investigation of May, 1916, more especially to the aspect dealing with timber. The specific duty of the Commission was to inquire into and report as to the desirability of increased tariff on timber. It is interesting to note that in their findings the increased duty is negated, and that in many instances remission or reduction of the duty existing at that date is advocated. When one investigates the report to ascertain the reasons for the attitude of this Commission one is struck with the cogent arguments which are submitted for consideration. It is unnecessary for the Commission to deal extensively with the matters contained in the report because so much of the conclusions at which the Commission has arrived are identical with the findings of that Commission. It is, however, worthy of note that Australia's forest area, in proportion to total area is less than in any other settled country, being only 5.35 per cent. The percentages for other countries range from Norway, 21.50 per cent., to Sweden 52.20 per cent. The Interstate Commission's report also refers to Western Australia's Annual Forest Report for 1913, in which Mr. C. G. Richardson, then Acting Inspector General of Forests, drew attention to the

regrettable fact that, at that date, "Western Australia had not one permanent reserve for timber"; and we find, after a lapse of nine years, the permanent reserves only total 45,000 acres. It is also interesting to quote the following concluding remarks of that gentleman:—

"Western Australia has now arrived at the stage when it is sheer folly to sacrifice the forests of the State even in the interests of land settlement, and it is to be hoped that in the future a more vigorous policy of reserving permanently large areas of forest country will be possible. The people of to-day hold the forests in trust for the generations to come after them, and if we are to profit by the lessons of the past, it is for us to look beyond the present to the future."

Attention is drawn to the fact that in New South Wales, Queensland, Victoria and Tasmania most of the valuable timbers at that time had practically been exhausted. When one takes into consideration the high value placed on eucalypts by the United States for such purposes as hardwood supplies, sanitary and other measures, our attitude of indifference, which is resulting in a determined extermination of our valuable timbers, is astonishing. So far as Tasmania is concerned, the Huon pine, claimed to be the best pine in the world, is a thing of the past; and the cedar of the North-Eastern coasts of Australia—a timber unexcelled in lightness, beauty and durability—has, to all intents and purposes, entirely disappeared. This position is also rapidly arising with regard to the iron bark of New South Wales, "the king of hardwoods." The Interstate Commission recognised, at that date, that, apart from the rapidly diminishing timber supplies of Australia, there was a grave danger of exhaustion of supplies in the great timber-producing countries of the world, which fact has been borne out by every expert witness who has given evidence before your Commission.

69. The following extract from a speech made by His Excellency, J. J. Jusserand, Ambassador of France, will be of interest:—

"The forest has one singular and providential advantage over most of the earth produced elements of our industries. When we have exhausted an iron mine, a gold mine, an oil mine, a supply of natural gas . . . it is finished. Not so with the forests. It is in our hands to improve or impair them, to kill them or to make them live."

70. Further, Mr. M. W. McLeod, President, National Lumber Manufacturers' Association says:—

"Consumption is annually increasing, not only from the increase in population, but from a material increase per capita consumption as well. On the other hand, the supply is annually decreasing. If this be true, all Government timber lands should be withdrawn from sale or entry and placed under conservative management—all mature timber being for sale, provided proper protection is given the young timber. In this way, at least, a partial supply of timber for future generations can be perpetuated."

71. In view of the foregoing, which after all is only a corollary of much of the evidence that has been submitted to the Commission, your Commission would be failing its duty if it did not impress upon Your Excellency the vital need for the utmost care and judicious expenditure in the protection, conservation, and regeneration of the State's forests, as it is undoubtedly the considered aim of forestry to maintain a sufficient supply of timber for existing and increasing requirements.

72. So much has been said on the length of the period necessary for the regeneration of our indigenous forests, that it is interesting to note that in

New Zealand, and for that matter, other countries, exotic conifers have been introduced with a view to replacing such conifers as the Kauri (*Dammara australis*), which is admittedly one of the most valuable coniferous timbers of the world. In view of the fact that little or no care has been paid to the indigenous forests of Australasia, it is reasonable to assume that no just approximation of the period necessary for the growth of indigenous timbers could be made, and also that given such conditions as are afforded to exotic conifer plantations, the growth of the regeneration of our own timbers might reasonably approach that of the exotics. One aspect alone will go far to illustrate this point, and that is the floor of a protected plantation where the needles form a dense mass of decaying vegetable matter, all of which is returned as humus to the soil, whereas in our indigenous forests the period of immunity from fire is so brief as to practically reduce such benefits to a negative quantity.

EDUCATION.

73. The most effective method of bringing the importance of forestry under the notice of the people is doubtless that of educating school children in the advantages of and necessity for forest conservation. Mr. C. E. Lane-Poole, ex-Conservator of Forests, published a most excellent primer for introduction in the school curriculum. This primer was very much appreciated by the Brisbane Conference which recommended education on the lines set forth therein. Your Commission would suggest that every possible publicity be given to this publication not only in the State Schools, but in private and secondary schools, by which a forest conscience would be aroused and stimulated in this State.

74. We recommend the laying down of additional arboreta, similar to that of Collie. Apart from supplying the needs of the Department it has a continuous educational effect, and will prompt the populace to foster tree culture. The importance of celebrating Arbor Day in our schools cannot be over-estimated. We recommend that a day be set apart for this purpose.

MUSEUM.

75. A more striking and adequate display should be made of our timber exhibits. The State Implement Works have their show rooms in a main street, while the gifts of the forest are generally relegated to a lumber room. In the propaganda that emanates from the Forests Department, jarrah is stressed as being too superior a timber for sleepers. As the private companies for the past 30 years have been endeavouring to sell it for other purposes, it would appear that it requires unceasing publicity, sufficient to wear down the prejudice against our heavy hardwoods. The carvings done by Mr. Howitt and Mr. Malraison demonstrate what can be accomplished with local timbers, and we think some of the work by these gentlemen should be on view.

OFFICE ADMINISTRATION.

76. *Staff.*—Your Commission has given serious consideration to the question of staff necessary to conduct the business of the Forestry Department on sound lines, and is of opinion that it should consist

of (a) a Conservator possessing all the scientific and practical training essential for the control and administration of the department. Your Commission has carefully weighed the position from the point of view of single and commission control, and after comparison with the systems in operation in the Eastern States and the statements made at the Brisbane conference by the Ministers for Forests of Queensland and South Australia, the system of single control would appear to be the most satisfactory. The argument used in favour of commission control is that that body is of a composite nature of specialised knowledge. Your Commission, however, is of opinion that such specialised knowledge is available to the Conservator from his senior officers. If, however, the Government decide upon the appointment of a commission, then the system such as obtains in New South Wales would appear to be best, because due provision is made for avoidance of a deadlock, in which case it would be advisable that the Chief Commissioner should be a professionally trained man. The principle of a single Conservator obtains in Queensland, Tasmania, South Australia, and New Zealand. In Victoria and New South Wales a commission has control. There should be a Working Plans Officer and Instructor in Forestry, both being trained and experienced in forestry, that is to say, possessing either Forestry degrees or diplomas. These Working Plans Officers should be men who have had experience in their work and in the handling of men. It would be advisable at this stage, in addition to these officers, to have at least three assistants who have had professional training and passed through the University. These officers would ultimately take control of districts when it becomes possible to decentralise.

77. The non-professional division should consist of a Head Forester and a staff of Foresters which must be increased as the work of reforestation and afforestation expands. The present staff of ten Foresters and four Assistant Foresters engaged on district work is none too many to cover the extensive areas of forests being exploited at the present time.

78. The number of Foresters and Assistant Foresters engaged in forestry proper will need to be increased gradually each year for some years to come.

79. The number of Apprentices and Forest Guards will need to be limited so that there may be reasonable opportunity for advancement for these boys when they have completed their training.

INSPECTORS.

80. The harvesting of timber is a dangerous occupation. The high percentage of accidents which, according to the evidence, has occurred over a given number of years, postulates that adequate safeguards are not provided to mill machinery. We recommend that in order to protect life and limb practical men be appointed to overlook machinery and gear, and take steps to minimise accidents. The Forest Department should have an abiding interest in all forest workers. The men chosen would patrol the timber areas, and should also be utilised as health inspectors, provided they had the necessary qualifications. This would prevent duplication and heavy costs so much in evidence in most departments to-day.

FOREST HOMES.

81. In travelling throughout the timber country we found that practically none of the forest officers were provided with homes. This is a defect that can and should be remedied.

OFFICE ROUTINE.

82. The Chairman was deputed to go through Head Office, examine the office routine, and compare it with that existing in the Eastern States. The system of correspondence records appears to be working satisfactorily, and the office does not appear to be over-manned. The card-system in vogue in the Correspondence Branch differs in some respects from that in use in Victoria, and also that of the accounts. This is mainly due to the fact that the Department in Victoria has a separate banking account, which would appear to facilitate business and make it possible to trace the operations thereunder more readily. The Forest Department suffers the same disability as that of most Government Departments, *i.e.*, inadequate and obsolete office accommodation. Doubtless considerable improvement could be effected if the conditions under which they work were on modern lines.

83. The Drafting Branch illustrates very clearly, owing to the restricted funds at its disposal, that the amount of work carried out in the way of clearing up and regeneration of the forest is infinitesimal when compared with that which the States of Queensland, New South Wales, and Victoria have accomplished, but on comparison with the amounts at the disposal of the other States, it is evident that the utmost possible has been done with the limited resources available. Your Commission is of the opinion that the office work, such as drafting, working-plans, etc., is considerably in advance of the actual operations in the field. A shortage of money is a hampering factor on the latter work, but we consider concentration on this phase should be more pronounced in future. In the absence of the Conservator or working-plans officers, we recommend the Chief Forester should fill the position of Acting Conservator.

RESEARCH WORK.

84. Failing satisfactory arrangements with the Federal Government, we think it advisable that a permanent research branch should be maintained in association with the Forestry Department, consisting of at least two chemists, one of whom would be officer-in-charge, and a youth; the clerical work could be done by the Forestry Department.

85. In view of the decision of the Federal Government to dispense with the services of Mr. Fowler, the officer in charge of the Forests Products Laboratory, it would appear that the Government has no intention of continuing in this work, notwithstanding the generous assistance which has been afforded by the State. Consequent upon the valuable data which has accrued from the experiments to date, the above recommendation by the Commission is the more pressing, and seeing that Mr. Fowler has carried out the work so successfully, advantage might be taken by the State of this gentleman's services.

86. In the course of its inquiry, the Commission came closely in touch with the officers of the Forestry Department, and it is only fitting here to pay them a

tribute. The spirit of earnestness and devotion to duty appears to pervade the staff from the Acting Conservator down to the lowest grades, and the work generally is carried out with enthusiasm, which counts so much in this branch of the Government's service.

ADVISORY BOARD.

87. The Commission recommends the present system continue, but that an advisory board of two be appointed to sit with the Conservator. They should with the Conservator review applications for land, tenders for permits, increased royalties, new regulations, and working-plans. The working-plans and regulations are submitted to Parliament, and should there be a strong difference of opinion, the advisory board could attach a copy of their objections to regulations and working-plans.

88. Your Commission, during the course of the inquiry, has been closely associated with the Acting Conservator of Forests, Mr. S. L. Kessell, and much information has naturally been gained which does not appear in evidence. Certain files have been perused by the Commission, and the following information obtained:— That in so far as the road at Mundaring is concerned, the Acting Conservator was not in sympathy with such expenditure, and that the inauguration of the fire-protection scheme at Mundaring by means of look-outs was due to him. Special commendation might be made of this officer's administration of his department.

SUMMARY.

The Commission examined 113 witnesses in various parts of the State, and the following is a summary of its recommendations:—

That—

- (1) The control of the Forestry Department be vested in the Conservator as set forth in the Act.
- (2) The appointment of an Advisory Board of two to act with the Conservator be made.
- (3) The allocation of the three-fifths of the net revenue from forestry be adhered to.
- (4) The provision of loan funds for expenditure on afforestation of conifers be made to the extent experiment may warrant.
- (5) The extension of the area at Collie to be reserved for mining timber purposes.
- (6) The State Sawmills or Railway Department take over the Wonnerup tuart mill, failing which its operations be continued for another 12 months, when the position can again be reviewed.
- (7) The system of fire-protection already in force in this State be continued, and that of fire look-outs be extended as funds become available.
- (8) The use of the most approved spark arrester be enforced for certain areas during certain periods of the year.
- (9) Conifers of different varieties be experimented with, and the pinus pinaster and other approved varieties be planted extensively.
- (10) The Gibraltar-Gnarlbine Forest Reserve be extended to the West. (Commission cannot recommend any encroachment on the existing reserves.)

- (11) When granting Tramway Permits, convenience of mining fields on prospective routes be considered.
- (12) The establishment of wood-pulp works for dealing with karri regrowth and regeneration be encouraged, and the utilisation of karri poles in substitution for jarrah.
- (13) The principle of marking and cutting of poles likely to be destroyed during felling operations be adopted.
- (14) The pure karri country should not be alienated for any purpose.
- (15) The control of the sandalwood industry be placed under the Forestry Department.
- (16) The immediate reservation of as large an area as practicable of sheoak country in the neighbourhood of Albany.
- (17) The planting of experimental areas with false acacia, for the purpose of axe and other handles, be put in hand.
- (18) The areas for Forest control agreed upon by the Lands and Forestry Departments be immediately gazetted.
- (19) The inauguration of a system of fire control throughout the karri country be commenced.
- (20) The investigations by the Forests Products Laboratory be continued.
- (21) The problem of powellising karri poles, to take the place of jarrah, be investigated.
- (22) The forests on all catchment areas be reserved, and placed under the control of the Forestry Department.
- (23) Regulations be framed to ensure the retention of sufficient trees on farms for shade, wind-breaks, and firewood purposes.
- (24) The increase in royalty so soon as the industry shows signs of revival.
- (25) A conference of saw-millers with Conservator to obtain co-operation in cleaning up cut-out areas be convened.
- (26) The areas of permits be extended where conditions render it necessary for profitable cutting.
- (27) Royalty be immediately increased to prevent loss of revenue consequent upon reversion to Hoppus measurement.
- (28) Additional Arboreta be established; a museum for the display of Forests products; the introduction of a Forest Primer into primary and secondary schools, and the observation of Arbor Day.
- (29) The staff be dealt with on the lines indicated on pages 18 to 20 of the report.

In conclusion your Commission desires to place on record its appreciation of the services of the Secretary—Mr. L. H. Jago—who has exhibited an intelligent and sympathetic interest in the labours of your Commission.

W. GEO. PICKERING,
Chairman.

H. W. MANN,
P. L. O'LOGHLEN,
Members.