1923.

WESTERN AUSTRALIA.

REPORT of PROCEEDINGS

OF

CONFERENCE of SENIOR OFFICERS

OF

FORESTS DEPARTMENT.

PERTH, JULY, 1923.

PERTH:
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Conference of Senior Officers—Forests Department.

Present:

Hon. J. Scaddan, Minister for Forests.

Mr. S. L. Kessell, Conservator of Forests.

Mr. T. N. Stoate, Assistant Working Plans Officer.

Mr. D. McVicar, Head Forester.

Mr. G. E. Brockway, Assistant District Forest Officer.

Mr. A. Rule, Instructor in Forestry.

Mr. H. McCoy, Chief Timber Inspector.

Forester H. Smith, Forester in Charge, Mundaring District.

Forester R. C. Mackay, Forester in Charge, Dwellingup District.

Forester A. R. Sharp, Forester in Charge, Collie District.

Forester P. E. Port, Forester in Charge, Donnybrook District.

Forester W. Donovan, Forester in Charge, Jarrahwood District.

Forester C. H. Turner, Forester in Charge, Bridgetown District.

Forester F. M. C. Schock, Forester in Charge, Manjimup District.

Forester H. Clifford, Forester in Charge, Albany District.

Forester W. M. Cusack, Forester in Charge, Kalgoorlie District.

Forester L. N. Weston.

Forester A. L. Clifford.

Assistant Forester F. E. Doust.

Assistant Forester B. Trainor.

Mr. C. M. F. Hill, Clerk-in-Charge.

Mr. H. R. Gray.

Mr. W. S. Brown, Clerk-in-Charge of Accounts. (Bowra)

Mr. H. V. Telfer, Clerk-in-Charge of Registration.

Mr. P. Stanley, Draughtsman-in-Charge.

Mr. C. A. Gardner, Botanical Collector.

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REPORT OF PROCEEDINGS

OF

Conference of Senior Officers of Forests Department, Western Australia,

HELD IN ST. GEORGE'S HALL, PERTH.

FIRST DAY—Tuesday, 17th July, 1923.

Morning Session.

Mr. KESSELL: It gives me very great pleasure to introduce the Minister for Forests to this conference of Senior Officers. Mr. Scaddan has been largely responsible for the advances in forestry in this State. A Permanent Head can make proposals, but whether they are given effect to depends entirely on the Minister, and a great thing about Mr. Scaddan is that he is prepared to listen to and accept new ideas. He was prepared not only to let us put an 80ft. tower up in the air as a fire look-out, but he went up the tower afterwards.

The objects of this conference, Sir, are, in the first place, to inform officers in districts where there is practically no reforestation work proceeding of what is going on, and of the advance we are making in other districts; to discuss proposed lines of development; and to enable officers to make suggestions. It is hoped that a great deal of mutual benefit may result, and that we may all learn from the discussions which will form an important part of the proceedings.

You have seen a certain number of the operations in districts, and we hope that in the near future you may make more opportunities to visit various works and let these men impress on you the importance of the work they are doing, and the efficient manner in which they carry out their duties.

Mr. SCADDAN: Mr. Kessell and Gentlemen, I have very great pleasure in declaring this conference open, and I want to suggest that whoever originated the idea that your senior district officers should discuss matters affecting the welfare of forestry in Western Australia, whether it be you or one of your staff, should be congratulated.

I know some of your officers, and that they are energetic and have a thorough knowledge of their work, and it is a desirable thing that the officers of the different districts should meet and discuss their work and learn what is being done by officers of other districts. It will be helpful to you and to them.

I would point out that in big businesses you have managers, and after all your district officers are managers, these managers come together to discuss things of mutual benefit. This business of forestry is of much interest to Western Australia, and I think you have done a very wise thing in asking your senior officers to come and discuss this business.

Your task is not a simple one, for after all the forest is largely looked upon as a growth of timber to be made available to anyone who requires it. If a man wants to take a broad axe and go into the forest, he thinks that he has a right to do so. If the public require the timber, they think they have the right to take it.

We look to the district officers to do their work from a point of view of public benefit, and to try to instil in the public generally the necessity of recognising that what you are doing is done in their interest and in the interest of posterity, and if we do not do these things to-day the time will soon come when it will be no good attempting it.

You say I am courageous in accepting new ideas. I do not know that I always am, it depends on where they originate. I get my suggestions very often regarding forestry from the man who walks around the block for seven days a week; I do not get them from your officers. But before accepting any suggestion I first of all try to consider it from the standpoint as to whether the person making the suggestion is entitled to make it, and knows something about the subject.

In your officers you have men who know something about forestry, you have a thorough knowledge of the technical side of forestry, and your officers who do your field work have the practical knowledge. I do not suggest that you get 100 per cent. results, but I do not think I shall be wrong in saying that the good results you do get largely overbalance the negative results.

Let me say that I believe we are making headway in Western Australia, even from the standpoint of getting a public conscience in regard to our timber resources.

We have a population of 350,000, and we must conserve our timber supplies for our own use. We look forward to the day when we shall have a million people in Western Australia, and if we do not conserve our supplies I do not know where we are going to get timber for them, and I do not think that day

will be so far distant. As our population increases our requirements become greater, and if within the next 20 or 25 years we have a million people in Western Australia, then we will be up against it pretty hard.

The Conservator of Forests will have to answer to the general public as to whether he has done the best thing in their interest. You are a person not to be moved by public criticism. I want to give you my assurance that although you may make mistakes, you can always depend that, as far as I am concerned, as your Minister, I will always defend and support you in your work. If a man is only prepared to support you when you are right, you do not want his support. You will get hard up against it at times, but in your Conservator you will find a man ready to give you support and defend you against those who malign you.

The Minister then withdrew to fulfil other important engagements.

Mr. KESSELL: You have all had the Agenda Paper and have an idea of the papers and addresses that are to be delivered. Most of the points I want to make can remain until they come up as subjects of the various papers. Forest practice has slowly developed since 1918 when the Forests Act became law. The one great setback that forestry has suffered in this State is the loss of Mr. Lane Poole, to whom the credit for practically all the work that has been accomplished up to the present time has to be given. The foundation that had to be laid in a country like this, where there has been no forestry work and unrestricted cutting for many years, was tremendous, and the groundwork he accomplished is the basis of the work we are doing to-day. Our general administration known as "District work" and the associated patrolling is for the most part very efficiently carried out. Timber inspection is well organised. Although improvements can always be effected in any system there is not a great deal of worry associated with those branches. Reforestation work is still in its infancy, consequently it needs nursing by everyone. As the Minister pointed out, there must be mistakes made. It is all right to talk and discuss the mistakes within the Department. We want to know what you consider a mistake and how it should be remedied. If you do not agree with anything, you should have an idea or some alternative method of overcoming the problem; and if so, your views will receive sympathetic consideration.

The basis of all forestry in the State must be fire protection. Certain of you may not agree entirely with that. Of course, you are wrong although you may remain unconvinced. Even those who do not agree with the necessity for complete fire control must admit the necessity for controlled burning of the bush after fallers. The destruction of the standing timber is then evident, and Mr. Weston in his paper on "Top Disposal Operations" will explain how we propose to cope with that particular problem. It is necessary to fully protect the present crop, and there may be some who still maintain that there is a satisfactory regeneration developing in the bush. Looking at the existing regeneration collectively, it does not look so bad. There appear a nice lot of saplings with green tops, but if such are examined systematically few sound ones are found. In attempting to thin out the present regrowth the trouble would be, not what to take out, but where to find saplings sufficiently sound to leave.

We have particular problems of silviculture in this country owing to difficult climatic conditions. We have a fairly certain winter rainfall, but we have at the same time five or six very dry months, which constitute our greatest problem in fire protection and silviculture; also, in afforestation, because we are limited in the trees which it is possible to introduce into this country. A certain amount of softwood timber is essential. One preaches the use of karri and jarrah, but there are uses for softwoods for which our local timbers are not as well suited. We are importing some £140,000 worth of softwoods at the present time. The trees to be planted to supply this need must come from climates that are more or less similar to ours.

Arboriculture, although not altogether a function of this Department, is important, and we may all do a great deal to help in the country districts. Farmers need encouragement to start small plantations or reserve wood lots for their own use. Councils and Road Boards are keen enough in planting their trees in many districts, but if the tree does manage to get above the tree-guard they spend the rest of their funds cutting its head off year after year because they originally planted it under a telephone line. In such cases foresters can do a great deal to influence public opinion.

The elimination of waste in the bush is a matter which, as far as existing operations are concerned, you are in a position to materially assist; but we require the assistance of the scientific investigator to show the economic possibility of working up the material which is left lying in the bush. For instance, in karri bark there is quite a high percentage of tannin, viz., 17 per cent. In tuart timber there is 12 per cent., and England is paying a very high price for wood containing 5 per cent. All these materials should be utilised. We have fought hard for the Forests Products Laboratory, and have not given up hope of a live institution being established in this State.

I regard the discussion on the papers as a very important feature of the conference, and I hope anyone who has anything to say in regard to them will do so at the conference, and not wait until afterwards. I will now ask Mr. Stoate to read his paper.

Paper by Mr. T. N. Stoate—"The Silvicultural Treatment of Jarrah Forests."

Forestry, like every other productive industry, is a business, and therefore in handling a forest or series of forests we can distinguish two separate, yet necessarily always closely inter-dependent branches, namely, the production of the timber and the disposal of it.

The Department is responsible for establishing and protecting the trees, because the present generation may derive no benefit from the work. The disposal of the crop is left to private enterprise, but we must supervise this disposal, since the conduct of the silvicultural work is influenced largely by the manner in which the bush is exploited.

As in every other business, it is imperative that the markets are fostered by seeing that the required type of produce is delivered to the buyer. At the same time, however, the disposal of as much as possible of all classes of mature timber is very necessary, and that this may be achieved the product delivered must be of the minimum quality that the purchaser will take.

The Inspection Branch fulfils the important service of maintaining the balance for the Department, as producer, between the buyer and seller, thus interpreting the buyer's specifications to the best advantage of the forest.

It will be readily understood that the way in which the bush is worked by the sawmiller is influenced greatly by conditions prevailing in regard to density of population and markets.

In Western Australia there are established trade practices, and a very large capital is invested in the industry. Consequently these established methods of working determine to a large extent the silvicultural operations which are economically possible.

If conditions here were as in some other countries where forest management has been practised over long periods, and density of population has rendered a closer utilisation of all kinds and classes of wood possible, the treatment which would be followed, to achieve the best results for a light-demanding species like jarrah, would be clear-felling, followed by even-aged crops. This means that the whole of the timber standing on a specified area of forest may be sold each year without restriction as to girth, method of felling, or cleaning up, making the supervision of the bush of minor consequence. But in Western Australia for the present we are compelled, through force of circumstances, to adopt less intensive methods, and the system, selection by groups, is clearly indicated.

Once having decided upon the provisional treatment to be followed, the success of the work depends, to a large degree, on the manner in which the removal of the timber is controlled, for the immature trees are mixed with the mature trees, and consequently the room for improper practices, which would not only hinder the work of regeneration but cause serious injury to the young growing stock, becomes immeasurably great.

One of the most salient features in the form of control we exercise is the Minimum Girth Restriction. This is not an ideal feature, but merely a matter of practicability for the time, and its weakness is readily recognisable. As a temporary measure, however, it does succeed in saving a certain amount of immature timber, as an inspection of the cut-over jarrah bush shows.

In any system of forest management that may be laid down, the determination of the amount that can be harvested every year for ever, or regulation of the cut, is of prime importance. This can be readily understood when viewing an isolated area which is to supply timber for a constant local demand. The harvesting of the mature produce must be so regulated that a certain specified area must be cut every year, or equal period of years, in order that a supply may be maintained for all time, and, as each area is cut out, it would be re-stocked with a new crop.

However, this is a question that need not cause particular worry to-day in any one division of the jarrah bush. The amount of timber being cut is far in excess of what can be maintained for all time. Consequently, even if regeneration work is commenced immediately, there must intervene a period of lean years between the time the last of the present crop is cut and the time when the new crop, that the regeneration operations are responsible for, is ready.

Most of the jarrah bush is in an abnormal condition, and until the whole of it can be improved to a state more or less normal, regulation of the cut will not be of any great consequence as far as silvicultural work is concerned. The only way in which the cut can be regulated whilst the forest is abnormal is a reduction in the rate of cutting, and this is one of the reasons that justifies the restriction of hewing. The large amount of money already expended in the erection of sawmilling plants precludes the possibility of doing anything in the direction of limiting the sawn output, even if this were desired.

Natural regeneration.—In order to bring about regeneration of the jarrah bush many people say that all that is necessary is to allow the sawmiller to cut what he wants, and leave the rest to nature. That is not so. The fallacy of such a belief is readily understood when we realise that in the operations of the sawmiller the over-mature and worthless trees are not removed, but are allowed to remain to occupy ground which might be supporting valuable new growth. Also, only the valuable kinds are cut, leaving the useless species, such as marri, banksia, oak, etc., in stronger possession than before. Promising groups of piles and poles which are left are often over-topped and spoilt in their growth by worthless trees.

It is seen, therefore, that in the exploitation of the bush here, as in all newly developed and developing countries, the timber-getter, in his work of removing the valuable portions of the growth, does not go far enough to ensure adequate reproduction, and so his methods become unsatisfactory if unaided. We must remedy this by supplementing his work by removing all that tends to hinder the development of a new crop.

It has been shown that the simplest way to attain our object would be to start at one end of the forest, and, working behind the "faller," clear-fell an equal portion each year. But, in addition to the difficulty of persuading the sawmiller to work in any particular place or direction, the clear-felling of any extensive area of jarrah bush to-day would necessitate the sacrifice of many immature and promising trees; also the retaining, at the far end of the forest, many trees which are mature and in need of cutting at the commencement, and which should be replaced by a new crop as quickly as possible. Moreover, the felling of young trees always results in heavy coppice, often to the exclusion of seedling growth.

An exception occurs where there is a demand for the young timber that must be cut and where the resulting coppice growth will supply the local needs, as in the case of a mining district. Here it is possible to employ the clear-felling system, and this system is adopted by this Department on the Coal Mining Leases at Collie.

Cutters are allowed to work up and remove all trees suitable for mining purposes, irrespective of size or species, and crooked or windy trees of any value which remain are cut for mill logs. By this means all useful trees are utilised. The departmental employees then carry out regeneration cleaning, which consists of the felling of everything below 12in. D.B.H. (Diameter Breast Height), and the ringbarking of the remainder. The stand which results is seedling with coppice forest: but there the main object is to meet the demand of the Mining Companies, and coppice growth will supply that demand.

The time of this ringbarking is of paramount importance, for everything on the area is killed. Con-

sequently, if regeneration does not result, there are no seed trees left, and the expense of artificial sowing may become necessary.

Matters on which officers should be able to gather valuable information are: the relation of the time of ringbarking to flowering, fruiting, and shedding of seed, and the results obtainable from regeneration operations on burnt and unburnt country. Should we ringbark when the buds are forming, when the flower opens, when the seed is about to fall, or not until the seed is in the ground? The relation of burning to regeneration is a debatable question. Is the supposed beneficial effect of burning more apparent than real? That is to say, are the seedlings merely more easily seen on burnt country? Again, are those on unburnt country protected from the scorching effects of the long dry summer by the litter and debris; and do the seedlings which appear on the burnt country merely shrivel up later and disappear? On the other hand, is burning necessary in order that a good seed bed shall be provided; or may it be required in order to "kill back" shrubs for a short period, and thus reduce moisture competition in the very early stages of the life of the seedlings?

An important feature in the control of the exploitation at Collie is that cutters are restricted to coupes or fixed areas. The object of this is to ensure more thorough utilisation. This principle should be more fully applied in other parts of the country than has been the practice hitherto. By way of illustration, take 500 acres of jarrah bush, carrying three loads of sleepers to the acre. Then, if a permit over this block is secured by a man working with one team capable of carting 50 loads a month, he is allowed nearly three times the area of country he can thoroughly "cut-out" in the one year, the duration of the permit. Under these conditions the sleeper-cutter, to secure his output, will take only the best trees, making the remaining timber worth very much less per load by reason of this, when the block is again submitted for auction in the following year.

Having disposed of the particular case where we can apply a more or less ideal system, we come to the practical question at issue. For the major portion of the jarrah bush it has been decided, after a study of the condition of the forests, their silvicultural characteristics and trade requirements, that the best silvicultural system, or method of treatment, is selection by groups. This method is indicated by the fact that jarrah occurs in groups of even-aged trees in its natural state. When in the sapling stage, with the trees only a few inches apart, such a group is readily recognisable in the forest. In the pole stage, where the trees have a diameter of about 15 inches at breast-height, and have thinned out to a distance of from five to 10 feet apart, the group is still distinguishable. But later, when the trees have attained a girth of ninety inches, and are separated by distances of 20 to 40 feet, the boundaries of a group are much more difficult to define, yet nevertheless the group still exists. Often trees of a lesser girth, which appear to be a later crop, are found between and below the larger members. These are not a further crop, but are merely those left behind in the struggle for existence.

The Group Selection scheme consists of the formation of openings or blanks in the forest, by the removal for trade purposes of such mature produce as possesses market value, and the enlargement of the openings so formed by the destruction of over-mature and worthless trees adjoining. The faller removes the valuable portions of the mature growth when cutting for industrial requirements, and the Departmental employees subsequently carry out regeneration cleaning by ringbarking the adjacent useless trees. Ringbarking, of course, introduces an additional fire hazard, and particularly so when applied to marri, but where, as at Mundaring, close fire-protection has been instituted, ringbarking is considered to be a legitimate risk. Under those conditions then, and there only, it becomes merely a finance question, being cheaper than felling.

Further problems regarding which local officers can make observations are—the most advantageous size for the groups, the effect of side shade, the distance the seed will carry, and the advisability of leaving seed trees in the openings formed. The relation these factors bear to the encouragement or repression of marri is of outstanding importance.

The disposal of the debris and tops resulting from the felling is an integral part of the regeneration operations in the jarrah bush, but this is to form the subject for a separate paper at this conference.

Mr. STOATE: In conclusion, I would like to say that I have touched on as many points as possible, and have introduced many problems in the form of questions in order to promote discussion.

Mr. KESSELL: In view of the large amount of work that has been done under both silvicultural systems at Collie, I have asked Mr. Sharp if he would open the discussion.

Mr. SHARP said that they had not done much cutting under the group selection system at Collie, but in what they had done there had been a certain amount of difficulty in getting the men to realise the necessity for leaving seed trees. It was said that in the clear felling system all trees were ringbarked. All trees were not ringbarked at Collie until it was evident that there were sufficient seedlings on the area. The speaker said that on country that had been burnt over during November and December, up to January, there had been really good germination of jarrah seedlings, and also on adjoining country that had not been burnt. When out the other day making notes on the country and the difference in the seedlings, he found that all the seedlings on unburnt country had practically disappeared, and they were in all stages of being eaten by insects, whereas, on the burnt country adjoining, very few of the seedlings had been destroyed.

Mr. KESSELL said that on the burnt country they were likely to have more difficulty in getting through the summer.

Mr. SHARP agreed, and said it was a question which was the worse, the fires burning up the humus and litter, or, on the other hand, the insects destroying the seedlings. Proceeding, Mr. Sharp said he had taken some measurements on the clear felling system on one of the compartments on the Co-operative leases. There had been no fires whatever on it since the felling and regeneration cleaning.

The compartment was worked over in the latter part of 1920. The tops and the leaves the timber workers left lying on the area in 1920 were very hard to find to-day. During the regeneration of jarrah there were seedlings there, but they were not to be found now. Mr. Sharp gave figures for the rate of growth of two-year old jarrah coppice. One

area of from 50 to 60 acres of ironstone, sandy gravel country, contained 1,217 coppice shoots to the acre. There had been three times that number but that was all that remained after thinning. Some of them were 2in. to 3in. in diameter at breast height, and they averaged 20ft. to 25ft. height in the two years. But there were no seedlings whatever.

Mr. KESSELL: How does that rate of growth compare with marri?

Mr. SHARP: Marri beats jarrah. Of the 2in. to 3in. diameter from 21ft. to 25ft., there are 10 jarrah; of the 2in. to 3in. diameter 20ft. to 25ft. there are 70 marri. Altogether there are 1,217. At the present rate of growth, that will give us, in five or six years, 26 loads to the acre.

Mr. KESSELL: That rate of growth would slow down after the first few years.

Mr. McVICAR asked Mr. Sharp did he say he had no seedlings at all?

Mr. SHARP replied that they came up, but the insects destroyed them. This was purely coppice.

Mr. TURNER asked was it ever burnt?

Mr. SHARP replied No; no fires have been on the area. On country that had been burnt there were about 1,134 shoots of jarrah and marri to the acre, before thinning.

Mr. McCOY asked Mr. Sharp was he sure that the coppice was not stronger than the seedlings? It was quite possible that the coppice killed the seedlings.

Mr. SHARP said it was only during the last few months that the seedlings had disappeared. They had been eaten by caterpillars. He did not know the actual insect doing the damage, but there were various kinds in the bush.

Mr. McVICAR said, in dealing with the coppice and the seedlings, he took it they were speaking of the same area.

Mr. SHARP said Yes.

Mr. STOATE said he had apparently omitted the question of seed trees, and that was one of the questions on which we require information. Was it necessary to leave any seed trees, and, if so, what number to the acre? Trees with good crowns were at present being left for this purpose in all our silvicultural operations, both in the Group Selection System and Clear Felling System. The important point was that at Collie we were getting sufficient restocking from coppice growth, but that was not what we were aiming for in the major portion of the jarrah bush.

Mr. WESTON, dealing with the question of the manner in which the seedlings on burnt country would stand the summer, said that, particularly in the karri and the tuart forest, the splendid manner in which the seedlings stood the summer where the crown of the fallen tree had been burnt and the ground severely scorched and the seedlings exposed to the sun, was very noticeable in those circumstances, and he thought, therefore, where the jarrah seedlings were entirely exposed to the sun and heat, owing to bush fires having previously burnt the debris and litter, there would be no doubt about such seedlings thriving.

Mr. KESSELL asked was Mr. Weston allowing for the ash, which formed a fine seed bed? Mr. Weston appeared to be comparing a bed of ashes to a hard-baked ironstone.

Mr. WESTON said he had given an example that could be frequently seen at any rate. Dealing with the action of insect pests, when fire protection is instituted, the speaker said that our entomologists told us that these insect pests work in cycles and that the natural parasite would prey on the insect pest in the course of time. It remained to be seen how long it would take before their natural enemy got to work with them. He had noticed often that these insect pests seemed to be more prevalent where the country had not been burnt; in a lot of cases, there was an obvious reason. In the tuart country, for instance, there was the haplonyxtibialis that cut the buds. The grub lived in the bud on the ground for many months, and, in the circumstances that prevailed before fire protection was instituted, the fire came through and killed out a number of these insects. There was a big chance that those insect pests would multiply when one of their enemies—fire—ceased to exist, though other insects might kill them. The result might apply to the area Mr. Sharp had mentioned where the insects were beginning to work on the country that had not been burnt.

Mr. McCOY said photographs had been taken some years ago of a piece of country near Holyoake. These were taken for the purpose of showing destruction by heavy fire in the jarrah bush. There was a regrowth since grown there, which showed that jarrah would grow well in heavily burnt country whether exposed or not.

Mr. SMITH said that in connection with the effect of fire after regeneration, he would like to be sure whether that growth now was seedling or coppice. At Mundaring the growth, originally seedlings, had been burnt many times and there were not 5 per cent. of seedlings there now.

Mr. McCOY said a big proportion of the regrowth he spoke of was seedlings, not coppice.

Mr. KESSELL said that in the ring-barking of 20,000 acres of timber at Mundaring no attention had been paid to the leaving of seed trees. The extent of the country ring-barked showed that the work had taken many months. The season evidently had had no effect there. Heavy fire went through the area after the ring-barking, and practically the whole of the prolific regrowth was jarrah.

Mr. McVICAR said that in the discussion on Mr. Stoate's paper they had got on to the burning question right along, and had missed some very vital points. Dealing with the amount of timber that our forest was making, the speaker said we laid out our sample plots in various districts, under Mr. Lane-Poole's instructions, to get accurate data as to what our forest was really making per acre and per annum. At the second measurement of these blocks a great many of the trees had disappeared altogether, but, nevertheless, we were able to get some approximate figures, and it was found that our forest was making 250,000 loads a year. Against that we found that we were cutting out 800,000 loads per annum. Consequently, with only 400,000 acres of virgin jarrah to work upon (speaking now of three years ago), our forest asset of merchantable timber was very soon going to be a thing of the past so far as export was concerned at any rate. The vital question was how to regenerate these forests. There had been interesting arguments about fire, and the result of fires on the germination of the seed. There were different opinions held by almost every man in the bush as

regards fire. Personally, he believed that the fire helped to germinate the seed.

It was said that the fire simply made a good seed bed of potash, and the seed germinated more rapidly in that potash than it would do on the hard-baked ground. Mr. McVicar recounted an experiment he had carried out himself. He took two thicknesses of envelope, and put some jarrah seed into them. He set one envelope alight and sowed that seed in one box, and took other jarrah seed that he had not touched in any way by fire and sowed it in another bed. From the seed that had gone through the fire he got a good germination, and from the other seed he got scarcely any germination.

Mr. McVICAR said that protecting our forests from fire did not mean that we were absolutely going to prevent all fires, but that all fires would be controlled fires.

He thought that if we put fire through and then protected the area after a good seed year, instead of getting a mass of coppice we would get a mass of seedlings that would come to maturity and restock our forests.

Mr. McVICAR referred to Mr. Stoate's remarks on the ringing of the redgum and other useless timber. Was the redgum useless timber? Many of our commodities and many of the things of the world that were considered useless a few years ago were to-day articles of commerce.

The question of redgum was important, because we had a leather chemist out from England in connection with the Forest Products Laboratory for two years to investigate the decolourising of the kino that we get from the redgum. With that decolourisation he thought that we had a first-class merchantable article in our redgum, and we had a better article in our redgum than we had in our imported barks, or in our other tanning barks, because with the redgum tree we could simply tap or scrape the bark to get the kino and yet leave the tree alive, whereas with the mallet bark and the wattles the tree was killed by getting the kino.

Mr. KESSELL said there were one or two points he would like to comment on after Mr. McVicar's remarks. The first was in connection with the heating of the seed by burning in order to secure quicker germination. We regularly gathered seed, sent it down to Hamel where it was taken out of the seed case and sown, and our germination there was very satisfactory. We never had recourse to any burning or heating in connection with eucalypt seeds.

Mr. SMITH said the point was, whether the seed was out of the seed vessel or not.

In all cases the seed did not drop from the seed vessel. The seed vessel itself did not drop, and it was possible that where a particular tree was felled before the seed was entirely ripe, the seed vessels might not open. The difference between a fallen tree and a standing tree was that we did not heat the seed vessels to get the seed out in the latter case.

Mr. DONOVAN said he had tried an experiment on tuart seed down at Jarrahwood. He had about 1 oz. of seed, half of which he steeped in boiling water, and they germinated. The other half were not treated in any way and they did not germinate at all.

Mr. McVICAR said that five or six years ago on the tuart plantation he noticed that a big tree had been felled, the log taken, and the debris burnt. On the site where the fallen tree-top had lain the ground was covered with seedlings. As an experiment he ran a light fire under some standing tuart, but no seedling growth resulted.

Mr. KESSELL said interesting results had been arrived at in connection with regeneration of tuart. It seemed that there was no germination except in heavy seed years except where seed fell on ashes. The theory was that the seed fell after the ashes had formed and that the ants were unable to walk on the ashes, and consequently the seed was left to germinate; whereas if it had fallen on the surrounding soil it would have been carted off by ants.

Mr. SMITH said that at Mundaring some silvicultural operations were carried out about two years ago on several compartments of from 400 to 500 acres on the group selection system. He carefully noted results, and there was practically no germination, except in little clumps. He thought the whole cause of the matter was that the tops littered the ground. But there was a certain amount of regeneration, and the seedlings looked well and would probably grow. The conclusion that he had come to was that the silvicultural work was probably wrong. He thought that we should have to regenerate on the group selection system, and that it would be best to put a fire in at night. A good clean burn could be obtained at night, and it would not affect any small young seedlings. The fire would be severe enough to clean up the ground, and he would advocate that next year experiments be carried out on these lines. The bush could be ringbarked at the end of the winter, and by the end of the summer we could clean it up and await results.

Mr. GARDNER said he certainly thought that regeneration results were considerably higher after a fire. This was not due to the action of the fire on the seed, because fire destroyed seed. When a fire went through, it caused a large fall through the opening of the seed vessels on the trees. There was no doubt that in forests such as the Eastern District and the goldfields forests the regeneration was very much greater after a fire had been through the bush. Fire prepared the seed bed; it also gave greater light spaces, and destroyed parasites on the ground which fed on seed. Ants caused a considerable amount of jarrah forest to be lost by carrying away seed. He had seen ants—a certain large red ant—with their nests full of jarrah seeds.

Mr. DONOVAN said that, speaking of the regrowth of jarrah, he had come to the conclusion that it grew a lot faster than we thought it did. He based his remarks on what he had seen in the Margaret River railway country. Between 40 and 50 years ago that country was cut out clean by Mr. Yelverton, and it was now carrying from six to seven loads to the acre. Thirty thousand sleepers had been cut from about 2,500 acres recently for the Margaret River railway.

Mr. KESSELL asked had that been burnt regularly?

Mr. DONOVAN replied: It had been burnt just the same as other country.

Mr. STOATE, replying to questions raised, said that he thought the regeneration of jarrah bush was a very simple matter, for examples of it might be seen anywhere in the jarrah country where heavy cutting operations for trade purposes had been carried out. He was quite sure we were going to get jarrah and very little redgum after our silvicultural operations, because you could see this result anywhere in the good jarrah areas to-day. He agreed with Mr. Smith that it was a matter of ordinary common sense that, once regeneration was secured, it must, at least in its early stages, be protected from fire at all costs. The question of marri being a use-

less timber to-day, and possibly of value in the future, was a very important one. He felt quite sure that redgum would be useful in a few years' time; but we knew this: that, in other than mining districts, the redgum to-day was worthless, and we ringbarked the occasional redgum so that in 20 years' time we would have a growth of jarrah which we were certain would be valuable. In the exceptional case, where there were a number of sound redgums together, we left them; for there it was likely that marri would occur in greater numbers than jarrah in the regrowth that would follow the ringbarking of these trees. Moreover, owing to the large extent of jarrah country to be dealt with, the small groups of pure, or almost pure marri, could economically be left untouched.

Mr. KESSELL said Mr. McVicar also raised the point of the value of the marri kino for tanning purposes. Some three years ago he (Mr. Kessell) had done some research work on the origin of the gum. He was perfectly satisfied it was not caused by fires. He was equally convinced that before many years were gone by we would have a system of tapping by which we would have a constant flow of kino. For tapping purposes the young regrowth would be more valuable than the old gnarled trees at present in the forest.

Mr. SHARP said last summer he had collected six sacks of jarrah seed. The seeds had been thrown in the office yard; there had been no fire but thousands of seeds had germinated. He said that jarrah seeded between November and January.

Mr. McVICAR: Not every year.

Mr. SHARP: In a seed year. Before beginning this regeneration work we should put a fire through just before the seed fell. The seed would then have a good bed to fall on.

Mr. STOATE said the question of seed years was an important one. They knew very little about the actual factors which influence regeneration. They were certain that regeneration would naturally follow the silvicultural operations, because there were many examples of this to be seen in jarrah country, but they did not know what period of time might have elapsed in some instances between the operation of cutting and the appearance of the seedlings. Seed was to be found in any year on some trees in the bush, but satisfactory regeneration might take place only after a heavy seeding of all or most trees. If such was proved to be the case, then they must expect, except where cutting operations took place in a seed year, some time to elapse before the seedling regrowth they worked for was established. Burning of those areas on which regrowth was sought for was practised chiefly because it was the most practical way to eliminate root competition for moisture by scrub, when jarrah seedlings were in their very early stages. Incidentally, of course, the fire hazard was reduced by the destruction of debris and scrub.

Mr. McCOY asked did Mr. Stoate advocate putting a fire through.

Mr. STOATE said, failing absolute fire protection such as they had at Mundaring, controlled burning with a light creeping fire was, in his opinion, advisable in certain circumstances. This could be carried out in only those portions of the bush not carrying young growth. It must not be thought the burning of the whole jarrah bush each year was advocated. This was neither necessary nor financially possible. For example, to eliminate the damage caused by the fires raging among fallen crowns, the top disposal operations were carried out. Again, in order to protect those compartments on which seedling growth had been established, the older bush surrounding such areas would be burned with a light creeping fire. With indiscriminate firing it followed that all trees from seedlings upwards were included, and although jarrah in its older stages was not seriously affected by a light fire, seedlings at least were killed back to the ground, and saplings similarly treated or badly malformed, as was exemplified anywhere in the jarrah bush to-day.

Mr. McCOY said when the bush reached the stage when the saplings were a height that an ordinary fire would not reach the leaves, he thought then it was wise to put a fire through about once every twelve months.

Mr. KESSELL asked would that not cost more than complete fire protection.

Mr. McCOY replied he did not think it would cost much. He thought we were only following nature if we put a fire through these groups. The ground was burned in patches. When the saplings had their crowns high enough to be out of danger of fire he thought we should put a fire through.

Mr. KESSELL asked what about the effect of the fire on the root system of the tree?

Mr. McCOY said he did not think fires had a serious effect on the root system.

Mr. KESSELL said food was taken in through the roots, and some of the roots were very shallow. The root hairs must be scorched by those fires. The rate of growth of jarrah was slow, and if it was curtailed forestry might not be worth while as an economic proposition.

Mr. McCOY said there were big trees on this area.

Mr. McVICAR pointed out if you had large trees in conjunction with small, the large trees suppressed and dominated the small.

Mr. McCOY said he thought there were often too many trees to the acre, and that a fire should be put through, otherwise we would get a big fire through and the whole lot would be gone.

Mr. MACKAY, speaking in regard to the regrowth on these experimental areas, referred to an area of one acre, karri country, at Channybeerup. Some 50 years ago that plot was ploughed and a crop of wheat taken off. The regrowth on that was over 97 loads to the acre. A fire passed through that area from year to year. That case spoke for the regrowth of karri. Fires going through the karri country were generally much more severe than in the jarrah country.

Mr. KESSELL said if they knew the road from Manjimup to Nornalup, he thought they would agree the amount of timber left after fires in the karri country, near the Shannon River, was very small indeed.

Mr. MACKAY said that when he was in the Bridgetown district for seven years no fire of any extent went through that country. The sun rarely reached those gullies, and the undergrowth, consequently, was always damp, but in the very dry summer referred to a fire which commenced at Greenbushes went right through to Nornalup, and ruined more timber than if a fire had been run through every year.

Mr. KESSELL said karri country will in many cases only burn after a long interval of years.

Mr. SMITH said there was only one thing he would like to speak about in the karri country: that was some country that had been ringbarked down around Big Hill Brook and at some of the branches of the Warren. The country down there was selected many years ago, and it had been ringbarked and carries a very large percentage of redgum. Whilst classifying those areas he noticed that the karri regrowth absolutely ousted the redgum. For every redgum seedling you would see, say, 100 karri.

Mr. KESSELL said it was the general experience of a great many settlers down there.

Mr. SMITH agreed.

Mr. KESSELL said there was one point in connection with the density of regeneration that was commonly misunderstood by the public, and he would like foresters to be very clear on it. The criticism often in pine planting work was that we plant too closely. Well, with all due respect to Mr. McCoy's observation, nature's way was to start a crop of trees very closely. It was not peculiar to Australia. You must have trees close to prevent the formation of side branches and to secure height growth. The prevention of side branches was not so important with eucalypts as it was with pines. The eucalypts were naturally clean boled. But to draw the trees up in the early stages it was important to have them comparatively close together. The distance of trees in a crop depended very much upon the size of a tree. If it was admitted that a crop of jarrah could only carry 50 trees to the acre when mature, you wanted to start with at least 500 or 600 to the acre. You could not start with trees 30 feet apart if you wanted mature trees 30 feet apart. You must start with them only a few feet apart even if you wished to finish with them 30 feet apart. That was the basis of all silviculture. It was the accepted law of nature which applied all over the world.

There was one other point he would like to make on the limiting of size of permit areas. That was a matter of district administration. When a man applied for a permit area, he usually applied for all the Crown lands within sight that were shown vacant on a plan. When the area was inspected, a report was sent in, and the permit was granted if there was no objection to its going for hewing or sawmilling as the case might be. But the forester should pay particular attention to the output that man was likely to maintain from his mill or by hewing, and limit the area of country recommended to the area he could cut over within a reasonable time. If a man erected a small sawmill plant, he might reckon on working for 10 or 20 years, but there was no reason to give him country to keep going for 50 years. In connection with hewing he might wish to cut for two or three years. There was every reason why a hewing permit holder should compete in the open market every year, and, if a man was going to take off an area, say, 50 loads a month, he wanted an area carrying 600 loads of timber to last him twelve months. He did not approve of giving a man 1,500 or 2,000 loads when it was known that he only wanted 600 loads during the term of his permit, otherwise he would naturally take the best of the timber rather than clean up any particular section. The market value fluctuated from year to year, and, if his permit only carried sufficient work for one year, the upset might be lower next year if the value of timber had decreased, or it might go up. It depended on the price to what extent he could work out the bush. If you reckon the price he is getting for his sleepers—he should get two loads to the average acre and he wants a total of 600—well then 300 acres should more or less satisfy him. If prices were better, you might reckon he could get 2½ loads to the acre. Less country might then do him.

Mr. McCOY said it took a pretty good bushman to estimate to half a load.

Mr. KESSELL said he was trying to emphasise the principle, not any particular case, and the figures given were merely illustrations. Absurdly large areas for hewing had been given in different places where a man would have been satisfied with a much smaller area and prepared to come and bid for another adjoining area next year. We had gone further and, on certain areas, owing to the men running through the bush when they had a limited order, we had had to cut them down and say they should cut a certain coupe and work that out before going on to another coupe. It was the most satisfactory method, but still the supervision involved was much too great to apply it generally over the whole country.

Mr. McVICAR said it really meant that, say we were considering 1,000 acres, and 300 was enough to get his quantity off, the balance of that 1,000 acres was as good in a year's time, when it would be put up again for sale, as it was at the beginning of this year, whereas the other 300 acres would be worked out.

Mr. MACKAY referred to a hewing bush on Sawmilling Permit 27/11. There were originally three 1,000 acre blocks. Hewers were allowed on No. 1 and they remained there until that was passed by the Ranger as thoroughly cut out before being allowed on to No. 2 block. Those blocks were as well cut out as any in the State, and he thought hewing might be controlled in that manner.

Mr. KESSELL referred to the practice that had applied in the past of allowing the sawmiller to follow up his own operations with hewing. It was a bad practice, and the sooner we could do away with it the better. The sawmiller took up a sawmilling permit, and he had no right to take the hewing timber. If he cleaned up the bush with his sawmill, that bush should revert to the department, and, if let for hewing, it should be put up again and bid for as a hewing permit. He knew there were cases where firms had log lines cut in these areas and were the only people who could work in the bush, but these were exceptions. They knew, in practice, that, if the sawmilling firms considered that they would get the bush after the fallers had been through, there was a great deal to be said from their point of view for leaving a few hewing trees about.

Mr. SHARP said the sawmiller should work over definite areas. In the past they had worked over the permits, taken out the best of the trees, a certain amount of regrowth had come up, and they went in and cut all that down again. Once blocks were cut over and finished, they should be deleted from the permit area altogether.

Mr. TURNER asked the Chairman did he think it wise that the hewers should follow the sawmillers?

Mr. KESSELL replied not unless the bush was going to be protected from fire. There was not a great deal to be said for working your bush out entirely if regrowth was not to follow. If regrowth was to follow, then it was advisable to provide for the removal of all mature trees, so that the bush could be left for a long period before it would be worked

again. But if it meant cleaning the bush right out and making no provision for regrowth, he did not think there was any argument for hewers following the fallers, except to help the dividends of the company.

Mr. TURNER said in his district there were quite a number of trees left that the big mills would not take. Spot mills were coming into operation, and he thought that spot mills and fruit case mills on these areas would be more benefit, from the forester's point of view, than the hewers.

Mr. MACKAY said the spot mills would not handle the big logs.

Mr. TURNER said the big mills would not take a log under 16 feet as a rule. The spot mills did handle logs of big girth.

Mr. KESSELL asked were they carting the logs in on large whims or splitting in the bush?

Mr. TURNER replied both. Then there was a lot of undersized timber. If the spot mill came in after the big mill was finished, the Department should reduce the royalty.

Mr. KESSELL said their cutting might form part of the silvicultural operations.

Mr. MACKAY said the question of the fallers leaving logs for the hewers could be dealt with in the way of cutting the bush out under the block system. Confine the sawmiller to a certain area and only allow him to go on to the next area when he had cut No. 1 area out to the satisfaction of the forester.

Mr. KESSELL said that under certain forms of tenure—leases and concessions—there were difficulties, and it raised distinctions between sawmillers. One firm was put under obligation to restrict its operations in a certain way, and another firm was unrestricted. Consequently, there were questions of policy involved in general application of practices of that sort, although there was no question about the results that would be obtained.

Mr. DONOVAN said weather conditions might stop a sawmiller from cutting one block out before shifting to another. In winter time he might not be able to haul.

Mr. MACKAY said that might happen. But you could allow him to go on to another block—a higher block if the first was wet—on the understanding that he came back and finished No. 1 as soon as the weather was favourable.

Mr. RULE said there was one point he would like to bring up, and that was Mr. Sharp had mentioned that some considerable difficulty was found in getting forest workmen to distinguish the trees in the groups. That was a point that was rather interesting. You could hardly expect a forest workman to distinguish the trees in groups without any education in matters of silviculture. In this connection, he thought most people had found that forest workmen in the department were really very keen on knowing the work they were engaged in, and several times we had been asked very interesting questions about exact silvicultural operations that we were carrying out. With regard to ringbarking—he would here quote a little incident. During the war, the War Office decided to cut out the term "fatigue party" and substitute "working party," on the grounds that the term "fatigue" gave the soldiers the tired feeling, and he would suggest that the term "ringbarking" be cut out of the silvicultural dictionary, as it seemed to create in workmen a lack of interest.

Mr. KESSELL asked did Mr. Rule mean that the actual operation of cutting a scarf round the tree should not be called ringbarking, or did he refer to the general operation of ringbarking?

Mr. RULE replied that the forest workman tended to regard the whole operation as ringbarking. Silvicultural cleaning or something like that would be a better term to use.

Mr. KESSELL said in fixing terms regeneration operations were divided into two parts, one the removal of the mature crop by the sawmiller or forest worker, and the second part the "regeneration cleaning" undertaken by the Department. A good deal of thought was given to the choice of these terms, and foresters should endeavour to introduce the terms and have them accepted in forest practice, as suggested by Mr. Rule.

FIRST DAY—Tuesday, 17th July, 1923.

Afternoon Session.

(Paper by Forester L. N. Weston.)

"TOP DISPOSAL OPERATIONS."

Fire protection will, of course, remain one of the basic principles of forest conservation in Western Australia. To be effective, however, fire protection must be intensive.

It is hoped eventually to have a dedicated State Forest of some 3,000,000 acres, and during the interval which must necessarily elapse before such a large area can be placed under sylvicultural treatment, much of our forest country will be at the mercy of those persons who, from various causes, find delight in seeing the fire fiend at play, callous as to the toll it is taking of the forest. Apart from acts of incendiarism, accidental fires arising in those forest areas not at present closely protected present a problem too great to be dealt with by our limited staff, and it is a full realisation of this fact which is responsible for the apathetic fatalism common to those living in the timber country. These people know that unless *effective* measures for fire protection are instituted, fires are sure to run riot sooner or later, and a fire going through after a five years' interval will be more severe than after a three years' interval.

Until our organisation is perfected, therefore, it will be a decided gain if we can minimise the worst effects of these uncontrolled fires, by burning parts of the country at such times and under such conditions as will cause the least possible ill effect.

The most severe fires occur after the prime mature timber has been felled for milling, and the crowns and bark remain to lumber the ground. An uncontrolled

fire sweeping through such an area in the heat of summer will do incalculable damage to the remaining stand of immature trees, checking and stunting their growth, burning off the tops of saplings, and causing them to fork low down, and so become useless for producing timber of commercial value, burning off patches of bark, and allowing ingress to the borer, sometimes killing individual trees and (on rare occasions) killing sections of the forest on a face.

In order to obviate as far as possible such wholesale destruction, the tops of fallen trees will in future be disposed of under circumstances which will not be nearly so detrimental to the remaining stand. Work of an experimental nature has been carried out during the last few months with a view to testing the efficiency of such a scheme, and satisfactory results have been obtained. Experiments were first carried out at East Mornington, and there the results of various fires, controlled and uncontrolled, can be observed side by side. First can be seen the result of a very severe fire which went uncontrolled through the forest shortly after felling operations, in the month of December. In June the scene was still one of scorched boles, charred limbs, death and desolation. Most of the trees were then only just beginning to show green leaves once again, and many will never do so. In the night time this fire had died out upon reaching a creek. About a mile away a fire had run over a hill in the autumn, during a cloudy week-end. The effects were not nearly so severe, though, where the crowns of fallen trees had lain around the butts of poles and saplings, some of these latter had suffered the death penalty. Further along the local forest officer had chosen his time and run a fire through the forest before felling operations were commenced. This controlled fire had apparently done little or no damage to trees which had passed the seedling stage. After the fallers had cut over this area, forest workmen followed and cleared the debris for a distance of about three feet around such of the immature trees and saplings as it was considered advisable to protect. When sufficiently dry, the tops of the fallen trees were burnt.

The result of the protection afforded by clearing debris from around the trees was striking. The trees so protected are still growing vigorously, whilst the faulty trees, which of course were not cleared around, are in a few cases dead, and in most other cases so severely scorched that they have not yet started to put forth fresh leaves.

The work of disposing of the tops of trees in this manner necessitates the employment of two men to keep pace with fourteen fallers at East Mornington, and a similar number at East Kirup. This is fairly satisfactory in view of the results achieved, but is not likely to be satisfactory when small mills have to be dealt with, or where old bush is being cut over again and logs obtained here and there.

An alternative method of disposing of the debris would be to pay the faller to do the work.

One of the outstanding features of all felling in jarrah forest is the number of piles and poles irretrievably damaged, and much of this could be avoided by the faller were it to his interest to do so. Were a faller paid so much per load on all timber felled, on condition that he cleared the debris from around all valuable trees and poles, it would be to his advantage to see that his tree did not crash into them if it could be avoided. This system will be tried out at some of the smaller mills and, if successful, extended as opportunity offers.

Burning the maiden bush prior to felling operations, and burning the crowns of fallen trees afterwards, is not an expensive proceeding. Figures available to date indicate that the cost will amount to approximately threepence per acre. This cost may be looked upon as a premium paid for protection against the possibility of very severe fires spoiling our second and third crops of timber.

In calculating the premium, the value of the humus and leaf litter destroyed in burning must not be included, for in any area not intensely fire-protected this litter would otherwise be destroyed by uncontrolled fires.

The protection of individual trees by removing debris from around them is a much more serious item of expenditure. This cost would nearly approximate the expectation value of the tree protected, were the value of timber *per load* to remain stationary. Even on this basis, the indirect gain to the country through increased production, and the duty of a forest department to provide for timber requirements would justify the expenditure. However, with the depletion of timber reserves throughout the world, and the inevitable increase in values which must result before our saplings are mature trees, the money now being spent protecting individual trees will undoubtedly return a high rate of interest.

This work incidentally appears to have the full support of all forest dwellers. Care must be taken, however, that the idea does not get abroad that this implies a reversal of policy, and that fire protection will be discontinued. Apart altogether from the areas being operated under working plans, it is highly important that such burning as must be done should be controlled by this Department. Otherwise we may, for instance, find the fallers operating in country which has been burned twelve months or so previously, thus rendering it impossible for us to run a fire through it owing to an insufficiency of leaf litter.

Normally, the removal of the jarrah crop is succeeded almost immediately by generous regeneration, and this is much more marked when the felling of the trees approximately synchronises with the burning of the area. If, therefore, there is a year's scrub and leaf litter on the ground at the time of felling, not only is the regeneration less general, but will be a year younger when the next fire goes through it than it would be had the falling immediately succeeded the fire.

In three years' time much of the forest over which this scheme will operate will doubtless be fire-protected. Where no working plan applies, however, it remains to be seen whether a certain amount of protection will be afforded the regrowth by burning as early as possible, and so forestalling the usual mid-summer fire.

Operations about to be instituted in connection with this scheme are as follows:—

The jarrah country will be cut into four divisions, each in charge of an Assistant Forester, and the whole in charge of a Forester.

Workmen will be placed at milling centres as required.

A light fire will be run through each cutting area prior to felling operations. This can only be done when the weather warrants, and will apply only to the area to be cut over during the current year.

The workmen will follow the fallers, and clear the debris for a distance of about three feet from around the trees and poles it is desired to protect. Limbs which stick up from the fallen trees and are likely to carry fire into the tops of adjacent trees will be lopped.

The crowns of fallen trees will be burnt as soon as advisable after the debris has been removed from around trees requiring protection.

Where convenient, it will be arranged for the fallers to clear the debris, at a rate per load to be fixed.

When the work has been placed on an organised footing, and uniformity obtained, it will probably be advisable to place under each District Forester the working of the scheme in his own district.

Considerable assistance has been given to us by all permit-holders on whose permits operations have been suggested, and in the case of Millars' Timber & Trading Company assistance of a practical nature is being rendered, in that they are providing a man at each of their larger mills to help the departmental employees in the work.

In conclusion I wish to read the following excerpt from a letter which I have directed to the Assistant Forester supervising operations:—

"Report to the local District Officer all breaches of Forestry Regulations within his district, or any other matter which may assist him in his work.

"In view of the extent of your division, the District Officers will possibly see as much of the top disposal operations as you will.

"I am, therefore, asking them to report to you or to myself any slackness they may notice amongst the men employed."

Mr. WESTON said he was instructing the Assistant Foresters to co-operate with the District Officers to the best of their ability, and he was asking for the same thing from District Officers. This scheme, when it was placed in uniform working order, would be handed over to the District Officers, so that in helping it along and getting it under way they were helping themselves, and he was just asking for all the co-operation and assistance in all branches that they could possibly get.

Mr. KESSELL, in opening the discussion on top disposal operations, stated that "To meet existing conditions, in all centres where forest work is in progress, operations akin to top disposal operations have been in practice for some considerable time. The possibility of applying similar measures to all bush where cutting operations are in progress was realised, and some twelve months ago the matter was discussed with the directors of Millars' Timber and Trading Company, on whose Mornington leases the practicability of the scheme was first tried, and when its efficiency was proved the details were further elaborated. Having reached this stage, it was decided to extend operations as rapidly as possible, and the method of control was considered for some time before it was finally decided to place this work under the control of a single officer. Forester Weston, who will be in charge of the work for the time being, was asked to read a paper explaining the details of the scheme."

Mr. KESSELL, continuing, said he wanted them to clearly understand the proposals that had been put forward, and the lines on which it was suggested the work should be started. There was no doubt of the damage caused by fires which went through in mid-summer after the fallers, when accumulated tops littered the areas, and it was a matter of getting in ahead of these fires. The work had been tried out for a considerable period at Mornington Mills, and it was found that the most satisfactory method of working was to put a creeping fire through the bush before the work was started. That is, the sawmiller indicated the area over which he intended to work during the next six months, and as opportunity occurred the area indicated was burnt by a fire which must never be allowed to get out of control. The result was that when the trees were felled and the tops were dried and set alight, the fire from the tops would not spread but would in each case be strictly localised. The public had the idea that to secure regeneration the first thing necessary was to clean up the floor of the bush like an orchard. As long as the tops of fallen trees were rendered non-inflammable, by burning the leaves and branchlets, the branches did not interfere with our work.

The greatest work involved was the cleaning away of the inflammable portion of the tops from around good piles and poles, and the extent to which the fallers could help the Department by turning the tree away from groups of good piles and poles was a matter of considerable importance.

An important point involved was the possibility of subsidising the fallers themselves to carry out this work. It had its difficulties, of course. It was an innovation, and there was no possibility of introducing it on a large scale yet. If the fallers assisted the Department by cleaning debris away satisfactorily, we might do the burning. The amount of work for the faller could be reduced if he took care to throw trees in such a direction that the tops fell among the fewest piles and poles, and thus simultaneously eliminate to a large extent the damage which was done by haphazard felling of trees.

The method of control was discussed for some time before it was finally decided to place this work in hand. It must be carried on uniformly over the whole country. If it was under 12 or 14 men it was very difficult to secure the desired result in a short period of time, and we would have to modify our specification as we got further experience in the work. It was proposed first to divide the timber country at present being worked into several different divisions. There would be forest workmen employed in the fallers' camps, and one assistant forester would move constantly among the fallers' camps in each division. Mr. Weston would be in charge of the whole operation, and it would mean that both the assistant forester and Mr. Weston would be moving through your districts. The more officers of the Department we could have moving through the bush the more efficient our control should be, and the Department wanted the officers concerned to realise that they were all members of the same organisation with common objects; and because they did not happen to be attached to one particular branch directly concerned that was no reason why they should not seek to suppress forest offences or forest practices which they considered wrong. It was the duty of all to report to the officer in charge any irregularities in any branch.

Mr. DONOVAN thought the scheme was a really good one.

Mr. KESSELL said there was another point of interest, and that was what the attitude of the sawmiller and the bush worker was likely to be towards operations of this description.

Mr. PORT thought the scheme laid down by Mr. Weston was a really good one. A glance at the Mornington bush country that had been burned before top disposal operations were introduced showed the value of such work. We had started at East Kirupp, and if we could get the fallers educated up to falling the trees away from the smaller poles and piles, there would be a great saving in the year. Some fallers were worth twice as much as others. Some felled the trees anywhere; others went in and looked where they felled the trees. The speaker was quite in accord with top disposal operations, and thought that in a few years the country would show a big difference in the waste of timber if this scheme was carried out.

Mr. MACKAY asked whether if this scheme was put into operation the bush cut over by sawmillers would then be locked up from any further operations? If not, the work would be duplicated. At Dwellingup the No. 2 Railway Mill cut over the bush (late Permit 114) some years ago, and left quite a lot of timber behind. A permit was granted to J. T. Holmes over this same area and they cut some 6,000 loads of timber off it. The work would be duplicated in such a case unless that particular bush was locked up.

Mr. KESSELL said that only emphasised the importance of controlling the operations of the sawmillers so that they had to work out a defined area and work it out properly before they moved on to another area. It was just a matter of policy as to how quickly we could introduce that control.

Mr. MACKAY pointed out that unless this was under control of the foresters, or whoever was in charge of the work, then the work would be duplicated.

Mr. McVICAR said in connection with that question of duplication, the whole point rested with this—the saving of the forest, and even if it was a duplication of work, yet, if we burnt to-day, we saved the timber that was left, and if we went through that bush in a few years' time and we burnt again, then we were saving still the timber that was left, whereas if we said we would need to do so until the bush was cleaned up altogether, we might have two or three fires through which might do incalculable damage. The ideal policy was a matter of one clear cut and then lock up. He did not mean on the face, but one clear cut of all marketable timber. That was the day we were striving for.

Mr. KESSELL said there was another point worth discussing, and that was the question of taking out damaged poles and piles after the fallers.

Mr. McVICAR said that if our scheme was carried out as we anticipated, then there should be no damage to poles and piles. They would then become our standard trees for future milling.

Mr. TURNER said though the poles and piles might not be damaged by falling trees, there were thousands which would never mature into milling trees. If those poles were cut to-day and stored we could sell them, and it would mean a fair amount of revenue. If we locked up the bush they would rot there.

Mr. McVICAR asked if Mr. Turner meant poles and piles that were damaged in some way or another by insects, etc. If we had the market it would be all right. At No. 1 Mill near Manjimup they were doing that and they could not get a market for them.

Mr. TURNER said he was afraid they never tried to. Thousands of these had gone out of the Bridgetown district.

Mr. SMITH inquired whether the general feeling of the meeting was that in clearing round the base of young trees, a distance of three feet was enough. He realised the further you clear away the debris from the tree the more expensive it was going to be, but the Conservator had told them about trees feeding on their fibrous roots and ironstone being a great conductor of heat. This debris when it was stacked would cause a pretty severe scorching. He would like to be sure that three feet was enough. Speaking as an old faller, Mr. Smith said he had often felled a big tree into another tree to turn it. As regards the poles and piles, he wondered whether it would pay the department to work in conjunction with the permit holders or concession holders to fall those poles and piles before the trees were felled. He knew there were thousands of saplings a month smashed down by mature trees, but some of them need not have been smashed down. Trees could be felled away, if we could get the faller to work in with the department on that work, and he thought it would be advantageous if we could organise the fallers to work in conjunction with us; he also thought paying the faller for doing the work was a good idea. If that could be done the faller would certainly create as little work for himself as possible, and a saving of immature timber would be the result.

Mr. WESTON, replying, said that the results that had been attained at East Mornington appeared to indicate that three feet was quite sufficient to clear away, because the trees that had had the debris cleared away for three feet were alive and growing vigorously. The matter of the burning of the roots was part of the penalty we had to pay as protection against a very severe fire. He thought the falling of poles and piles ahead of the fallers would mean very intensive work on our part. He thought the only way to get the faller to save these poles and piles would be to make it to his interest to do so. He had put the proposition up to about a dozen fallers and other bush workers at East Mornington, and told them that the idea would be to pay them on a loadage basis for all timber they felled, on condition that they cleared the debris from around the trees that were of any value. As Mr. Smith had noted, of course it would be to their advantage then to avoid falling the trees into a bunch of saplings if they had to clear around the saplings afterwards. The only difficulty to be found in seeking the aid of the fallers was that the scheme was new. The objections they raised were only trivial and were easily answered. Mr. Weston thought we could institute the scheme by paying them about 2d. per load, on condition they cleared the debris from around the trees, but it would be necessary to start at some of the smaller mills, because if we started at a big mill the majority of the fallers could not do the work effectively, and some would slum the work. We were trying the scheme at some of the smaller mills and would gradually institute it if possible throughout the mills. This would do away with most of this damage to poles and piles. As far as cutting the damaged poles and piles and selling them was concerned, the fact should not be lost sight of that unless there was a ready market, they would depreciate very quickly.

Mr. DONOVAN said that poles and piles which were cut at Barrabup lay there for a good while, split and went to pieces, and the Department got nothing for them.

Mr. McVICAR said shortly after he went down there the department seized quite a large number of

poles and piles that had been lying there for some years.

Mr. KESSELL, in reply to Mr. Smith, pointed out that there was an essential difference in burning the top and scorching the roots of a standing tree. When the top was scorched borers got in and the tree suffered. Scorching of the roots resulted only in a slowing up of growth, perhaps for two years, then the tree started off again without any damage to the actual wood tissue. In connection with saving of piles and poles, he would like to ask Mr. Smith what number of piles and poles he considered were damaged, and the use of leaving them until after the tree was felled. If it was to be decided before hand what were to come out, it was very difficult to know just how the individual faller that came along was going to decide to fall a particular tree. If the taking out of the damaged piles and poles was left until after they were damaged by the tree, were there many that were damaged so severely as to be rendered valueless?

Mr. SMITH said he thought there was an average of one or two piles or poles absolutely smashed to every tree that was felled in the bush.

Mr. KESSELL said he was trying to get at the difference between the number with the top crown knocked off, which could be used, and the number that were actually smashed to pieces.

Mr. TURNER agreed with the scheme of top disposal operations, with the exception of paying the fallers to do the clearing. He thought a better arrangement would be to arrange payment with the permit-holder, instead of paying the fallers direct.

Mr. KESSELL said it was suggested that, although the faller received the money, the payment should be made by paying, say, 2d. a load. The faller got 1s. 10d. a load at the present time. Supposing the department arranged with the permit-holder that, if the fallers did the work, they should be paid 2s. a load. We would have to supervise it, but the actual payment would certainly be made through the permit-holder. We would not pay the men direct; we would recoup the permit-holder 2d. on every load shown on his returns.

Mr. WESTON considered that when the scheme was well established, it should be possible to insert a clause in any permit agreement rendering it necessary for the permit-holder to have this work done.

Mr. KESSELL said the question of what royalty should be charged depended largely on the work and the extent to which the permit-holder would co-operate with us. If the permit-holder carried out practically the whole of our silvicultural work, as was done in France, then we were not particularly concerned with the question of royalty. In France, rather than maintain a big staff controlling labour in the forests, the department sold the trees standing, with provision that the forest must be left in a certain condition after marked trees were taken out. That meant that the whole of the silvicultural work was done by the man buying the trees, who with us was the permit-holder, and a reduction was made accordingly in the price charged for the trees. It was much more satisfactory, because the permit-holder had all the worry of labour troubles and the Forest Department was free to devote itself to problems of silviculture.

Mr. DONOVAN said if you paid the fallers their 2s. a load to clear away the debris, you would have to have a foreman over them, and he thought it was just as well to do it ourselves.

Mr. KESSELL said the department had to send a man round to burn these tops, and before he put the torch into the tops, he saw there were no good piles liable to damage. If there were good piles left without clearing he could see the faller's brand, and thus gain a good check as to who was doing the work satisfactorily and who was not. There were difficulties, and these difficulties prevented our going into the work on these lines on a wholesale scale immediately.

Mr. WESTON said that, even with our own men there doing the work, we had to employ a supervisor who had to go round and see that the work was done correctly. He would not have any more work supervising if the fallers did it.

Mr. McCOY thought it was better to have the assistant forester doing the work, because he could look after other work in the bush at the same time, and see that the regulations of the Forest Act were kept.

Mr. KESSELL said he thought we could expect the faller to do the work sufficiently well. The supervisors of these operations were assistant foresters and would assist, if only by their presence in the bush, with the general work of control.

Mr. A. L. CLIFFORD asked in the event of the fallers not carrying out the work, what pull would the department have on them?

Mr. KESSELL said that would have to come through the permit-holder. If his faller was not doing the work satisfactorily, and we were paying, we might reasonably expect him to get satisfactory fallers.

Mr. A. L. CLIFFORD said if he agreed to pay 2s. a load, and the department came along and said the work was not done properly, the faller would still want his 2s. a load.

Mr. KESSELL replied that the remedy was with the permit-holder.

Mr. PORT said he took it the officer in charge would know whether the man had done his work properly or not. In the event of the man not doing the work, he reported it to the permit-holder and the permit-holder got a man who would do the work.

Mr. WESTON said it was a full realisation of the difficulty mentioned by Mr. Clifford that was the reason we were only going to institute this business at the small mills to begin with, the mills where there were two to four fallers or something like that. It would be some time, of course, before we could get large gangs of fallers to do the work effectively. The question raised by Mr. Clifford was a vital one, and the Department would have to go very carefully into the matter.

Mr. KESSELL said if anyone had views on the best method of cutting and treating piles and poles, of actually stacking them in depots, and the time they could be held in depots without deteriorating, the officers present would be glad to hear them.

Mr. PORT said he had seen Millars', when he was in their employ years ago, cut piles months and months before they were sent away, and they used to have to keep docking and docking them all the time to get the split out of them. He did not think wire would stop it. He had seen wire on poles and piles. They opened out whether the wire was on or not. These were felled in the ordinary way and, when brought into the siding, they were rounded off with the axe, not sawn.

Mr. DOUST said *re* the storing of poles at Manjimup, the Commonwealth Telephone Department had had poles stored there for two years, and they were

wired and were quite a success. All sizes were there, from 6in. to 9in., and all lengths.

Mr. TURNER was of opinion that if they were wired you could store them for 10 years, provided they were kept off the ground.

Mr. McCOY said piles on the Bunbury jetty were generally seasoned four years, so that they would crack. When they charred them, they charred right into the crack.

Mr. KESSELL asked did they bind them to prevent excessive splitting?

Mr. McCOY said they wired them.

Mr. DONOVAN said a pole would hold together better if chopped than if sawn.

Mr. SMITH said if the bark was left on, it was an improvement too. He had noticed often in the bush that, if a tree had been down for years, and the bark was left on, it would not bend nearly so much as if it had been barked.

Mr. DONOVAN said if you chopped the pole off into a V, it would stand better than if chopped of straight.

Mr. TURNER said there were a lot of piles and poles at the Group Settlement at Manjimup. Perhaps Mr. Schock could tell them what happened to them.

Mr. SCHOCK said the ends were well covered up. It did prevent them from cracking. At Manjimup young timber was far more liable to split than timber cut further north.

Mr. KESSELL asked how long had they been in stock now?

Mr. SCHOCK said they were there before he went there, over 18 months ago, and there was no trouble from rot; only the ends splitting. When they got an order for piles, the lengths on the landing did not harmonise with orders, so a fair amount had to be cut off in waste.

Mr. TURNER referred to 700 poles in his district which the conservator had seen and had mentioned as being decent trees.

Mr. KESSELL said the two points governing the whole business were those previously raised: the question of there being an adequate supply for the time being on private property, and the difficulty, once the department started in a wholesale manner on Crown lands, of controlling certain concessionaires. He expected that the top disposal operations would be extended later, so as to include the taking out of damaged piles and poles, particularly if the companies would start and build up a market for certain standard poles, and would be prepared to hold them in depots. He thought the companies would gradually consent to do that. Each coupe would supply a few poles before the landing was pulled up. The last operation in the falling should be to haul in a few piles and poles from the area worked over from each individual.

Mr. PORT asked would it not be a good idea if a lecture or paper were given in the bush, right in the heart of the forest, on the subject of fires? The head forester or the man in charge of the burning off could give it. A lot of the men in the bush did not realise or understand the fire business at all. He thought the department should advertise it and make it well known among the fallers, and get their co-operation in the matter. It would be found to be of great assistance to the forester when working in the bush.

Mr. KESSELL said he would like to secure a railway coach run on the same lines as the Industries League coach, and send it round as a travelling exhibition, particularly if we could get permission to go on the bush lines. Most of those bush lines were satisfactory for the haulage of a coach of that nature, and if it could be a travelling show accompanied by lantern lectures among the bush workers, he thought it should be an improvement on the suggestion of Mr. Port.

Mr. WESTON said that in asking for the co-operation of all officers he wanted the assistant foresters who were on the job to get into touch with the foresters as much as possible and get their advice on anything that cropped up, and any hints or ideas that were brought along would be welcomed. One of the instructions that were given to assistant foresters was that the amount of work to be done around a tree should depend on its value. For instance, the cost of such work would nearly approximate the expectation value of the tree protected, were the value of timber per load to remain stationary. Even on this basis, the indirect gain to the country through increased production, and the duty of a forest department to provide for timber requirements, would justify the expenditure. However, with the depletion of timber reserves throughout the world, and the inevitable increase in values which must result before our saplings are mature trees, the money now being spent protecting individual trees will undoubtedly return a high rate of interest. He just wanted to mention that so that they would be able to know what was going on, and, if there was anything about which they were not certain, he would be glad if they would mention it to the assistant forester in charge of the work, or to himself.

Mr. McVICAR said he thought the whole scheme was sound. It would save the forests of the country to a very great extent, and also keep the foresters and assistant foresters employed for many years to come, and he thought that every co-operation should be given to the men in charge by the district foresters, who should give all possible help to Mr. Weston in carrying out his duties.

Mr. MACKAY: said, speaking of co-operation, there was no necessity, he took it, to let your report go right through to head office before it reached the officer in charge of the work. The Conservator could deal directly with him or with the assistant forester who was carrying out the work.

Mr. KESSELL said local officers should be given every opportunity of investigating irregularities in matters under their control before such irregularities were reported to Head Office.

Mr. SHARP had handed in two questions on Mr. Stoate's paper. The first was whether Mr. Stoate considered it only necessary to make the opening in the forest, and that natural regeneration of jarrah would take place, especially in good seeding years. The second was, was he of the opinion that seed lies dormant in the ground, and that it was not necessary to fire the country to get regeneration.

Mr. STOATE, replying to Mr. Sharp, said in regard to the first question, all that was necessary was to create openings in the forest, or, in other words, remove the present standing crop, and reproduction to replace it would follow. That was merely nature's way. The whole of this work would be done by the timber-getter were all the trees useful. Owing to the present condition of the forest, however, the department had to supplement the work by the removal of

worthless trees, which hindered satisfactory regeneration, and were occupying ground which might be supporting valuable new growth. The second question was an interesting one and it introduced a point on which practically no information was available. To-day he could not answer that question with certainty, but there were many experiments he would like to carry out in order to investigate that and many other interesting problems. It gave an indication of what a lot officers could do to help by making observations in the bush. However, although some seed in the ground may escape a fire, it seems scarcely likely that many seedlings would be secured from that source. It was most probable that regeneration resulted from seed falling or blown on to the burnt areas after fire. It must not be thought that no regeneration at all would result were the areas treated not burnt. Germination of the seed would take place in any case, but the "killing back" of the scrub on such burnt areas, resulting in reduced root competition in the early stages of the life of the jarrah seedlings, must help a greater number of those seedlings to survive the cotyledonary stage. There are no doubt many other factors, such as, for instance, insect damage, which firing influences, and reduction in root competition is merely one of them. While all these causes and effects, and factors which influence reproduction favourably and adversely, are being investigated, and the problem of the very best method of treatment to apply in all its details is being solved, regeneration operations along the simple lines already laid down by the department must be continued. For, after all, evidence is to be found anywhere in the jarrah bush to-day that such methods will give satisfactory results. It is most important that this fact be not lost sight of while we delve into the why and wherefore.

Mr. H. CLIFFORD said when he went down to collect seeds of Red Flowering Gum in its natural home near the Bow River in 1920 the only small area he could get seeds from was just about 10 acres. Where the fire had been he could get none. Both there and in Albany he noticed a great number of partly formed seed vessels had fallen off and he would like to know why.

Mr. GARDNER said with regard to the falling of flower buds, it must be remembered that in the redgum there were several flowers on the one stem. It was only natural to suppose that you would not get thirty large seed vessels where there were thirty flowers. The result was that when the flowers started to fertilise it was a case of the survival of the fittest, the smaller ones falling off. The same thing applied to jarrah flowers—there might be only six jarrah fruits where there were about 30 to 40 flowers. There were cases where the rain had got in and destroyed the seeds, but in any case the method of redgum appeared to be that the vessels fell off on to the ground and the seeds were scattered. The same thing applied to a certain extent to the jarrah. The fruits blew off and the seed was scattered about.

Mr. McVICAR: You mean after the vessel had fallen. It does not open on the tree?

Mr. GARDNER replied only in a very few cases where the seed vessel was small and thin.

Mr. McVICAR: The natural consequence is that there is not a wide scattering of the seed?

Mr. GARDNER replied no, there was not.

Mr. McVICAR said his reason for asking Mr. Clifford were the buds cut off or did they wither off was because in the tuart plantation the insect laid its egg in the bud, then it nipped the bud off quite clean.

Mr. H. CLIFFORD said the only thing he could see was that the borer was found in the bottom of the seed vessel and the whole thing withered. It was not nipped off.

Conference adjourned until 10.30 *a.m. on Wednesday,* 18*th July,* 1923.

SECOND DAY—Wednesday, 18th July, 1923.

Morning Session.

(Paper by G. E. Brockway.)

FIRE CONTROL ORGANISATION AND FIRE-FIGHTING OPERATIONS IN THE MUNDARING DISTRICT.

Introductory.—The first measure necessary for the successful practice of forestry is protection from forest fires. The cost of successful regeneration, whether natural or artificial, is such that on no account should it be undertaken until adequate provision has been made to protect it from fire.

In certain localities in this State great progress in fire protection has been made during the last two or three years. Although the areas protected at present represent only a small proportion of the total jarrah bush, nevertheless results obtained are of great importance in that they have dispelled a large amount of the uncertainty which was felt at the inauguration of the scheme. We consider that now we will be able to embark on larger schemes of fire protection with the knowledge and belief that bush fires in the jarrah country *can* be controlled, provided they are fought systematically. Were we not firmly convinced on this point, we would not have commenced either natural regeneration of jarrah or artificial regeneration of pines in the Darling Ranges.

My object in this paper is to deal with fire control organisation and fire-fighting operations in the Mundaring District.

Fire protection must be brought about in two ways, viz.:—

(a) Prevention of fires, *i.e.*, the elimination of the causes;

(b) Suppression of fires.

We will deal first with the subject of prevention of fires. We have as their chief causes the following:

—Locomotives, travellers, kangaroo and brumby hunters, bee-robbers, settlers, graziers, bush workers, school children, and occasional incendiaries of other types.

The first and perhaps the most important step in prevention is the *education of the public*. Up to date this has taken such forms as:—

(a) Illustrated lectures delivered in centres of population in and around the forest.
(b) The posting up of fire warnings offering rewards for information leading to the conviction of persons setting fires.
(c) The delivery to residents in the district of notices stating the laws in relation to the setting of fire and the penalty of their violation.
(d) Personal talks by Forest Officers with persons living in the district.

Judging from conversations I have had with various settlers, I am quite convinced that these people are quickly realising the importance of forestry. Certainly the majority of them refrain from setting fires as was the custom in previous years.

In our work of educating the public we meet numerous obstacles in the form of old beliefs, which must be overcome before all-round support can be hoped for. Thus, I have heard such opinions expressed as "It is simply the fate of the jarrah bush to be burnt periodically; there always have been fires and it is useless to try and prevent them because there always will be fires." Such fatalism as this is, to say the least of it, decidedly strange, nevertheless it exists among a very large section of the community.

A second method of prevention is to resort to legal action. This course, we consider, should be taken only as a last resort, and in particularly serious cases. It has considerable disadvantages, *e.g.*, the Bush Fires Act, as it now stands, is antiquated and decidedly unpractical, and, were we to enforce its clauses in full, we would be very soon regarded as enemies by every settler in the district.

A solution of many of the difficulties we experience when dealing with settlers in the district would be obtained were some system of burning under permit (granted by the Forester in Charge) introduced. A third factor which would be of particular value in some cases would be the introduction into the conditions of firewood permits—on fire-protected areas—of a clause whereby any portion of the permit area burnt should automatically cease to form part of the permit. I am firmly convinced that four firewood contractors out of five would do all in their power to prevent fires; nevertheless, such a clause as mentioned above is necessary to check the other one of the five.

A further point which might be mentioned in connection with prevention is the use of spark arresters on locomotives, particularly those using wood fuel in the forest. We do not expect that they will stop every fire from starting, nevertheless they should prevent the greater proportion of them. The sooner the use of these is enforced, the better will it be for the forest.

As a final point I would like to mention the use of fire-breaks. The burning or clearing of narrow breaks along public thoroughfares so that fires will not be started by carelessly thrown-down matches, cigar butts, etc., is advisable. Secondly, a system of properly located fire-breaks, subdividing the area, is of great help. These breaks need not be of great width, old tracks which have been cleaned up usually being sufficient.

Suppression of fires.—Two things are essential if a fire is to be fought successfully. The first is to locate it exactly as soon as it starts, while the second is to arrive on the scene in as short a time as possible in sufficient force to suppress it.

In order to ensure rapid and accurate location of outbreaks in the Mundaring District the first move was to obtain a reliable map of the area. A plane table survey was therefore made, and the area was marked out into 500-acre compartments. The two highest points in the district were then chosen, and were accurately marked on this map. On these two hills, which are some fourteen miles apart, look-outs, which were connected by telephone, were constructed just prior to the 1921-22 season. The particulars of these towers are somewhat as follows:—

There is a 10ft. x 10ft. floor 30 feet from the ground. The towers are roofed in and each fitted with the following:

(1) An obsolete Y theodolite for use in determining the bearings of a fire.
(2) A table carrying the plan of the district.
(3) A heliograph and stand.
(4) A telephone.
(5) Book of code numbers, signals, etc.
(6) Log book.

During the summer months a look-out man is always on duty from 8.30 a.m. till 5 p.m. and, if the weather conditions warrant it, later. The men take it in turns to go to the look-outs, each one staying for seven days. At the end of that time the next man arrives with a saddle back and a pack horse which carries the week's provisions. When they have changed over, the man who has completed his week on duty returns to the head-quarters.

Look-out man's routine.—Both look-out men must be on duty by 8.30 a.m. They then ring one another and also the head-quarters, and clocks or watches are synchronised. From 8.30 a.m. till 5 p.m. the look-outs must communicate with one another half-hourly. If no fires are located the signal "all clear" is given. In the case of a fire breaking-out, the following is roughly the procedure. Both look-outs take the bearing of the fire by means of the theodolites. This done, they advise one another what their bearings are, and both work out the position of the fire and check their results. The next move is to advise head-quarters of the existence of the fire. If there is a patrol in the vicinity of the fire, head-quarters is also advised to that effect. The patrol, as soon as he communicates with either look-out, is notified of the existence of the fire and is instructed to deal with it. Practically all communications with patrols are carried out per helio. All official messages sent or received by the look-outs are entered in the log book.

It is probable that in the near future this routine will be considerably altered, as it is hoped to instal a system of wireless. There will be a sending set on either one or both of the towers, while receiving sets will be carried by patrol men, working gangs, etc. These wireless sets should soon replace the heliographs which are now in use, and which can only be used to communicate with the look-outs from special high points in the forest.

Before leaving the subject of look-outs, I must remark on their efficiency. On a still day a fire a few

square yards in extent can be seen even at a distance of five or more miles, that is, provided it is not behind a high hill or in a deep gorge. On the other hand, on a dull smoky day, a fire in a gully may not be seen until it has attained perhaps two acres. Similarly, on a very windy day a fire in a deep gully or behind a high hill may perhaps have burnt a couple of acres before enough smoke has been formed to be seen.

Patrols.—During hot spells men are sent out to patrol certain beats where it is considered the fire hazard is very great. Each patrol is supplied with the following equipment:—

(1) Horse, saddle, bridle, and accessories.
(2) Heliograph and stand.
(3) Compartment map of the district.
(4) Loose-leaf notebook containing forms for various purposes, *e.g.*, reporting on daily work, fires, etc. Other forms in the same book give various code signals and numbers.
(5) Food for himself and horse.
(6) Water bottle.
(7) An axe.

On going out on duty the patrol is instructed to follow a certain beat, and communicate with the lookout from various helio stations.

Besides merely riding from one helio station to another, the patrol has other duties to perform, such as delivering fire notices and keeping a close lookout for fires on or near his beat.

Should a fire break out in the region he is patrolling, he must immediately proceed to it and fight it. If it is too serious for the patrol to suppress single-handed, and it shows signs of assuming large proportions before night time, it is his duty to engage casual labour or communicate with the lookout man, who will arrange for assistance.

All casuals engaged must be given a special form showing time worked and the amount due to them for their assistance. On presentation of these orders at district office, cash orders for amounts due are given in exchange.

It may be noticed that in the last few pages I have drawn attention to the fact that the workmen engaged are able to use the heliograph and understand Morse code. This, of course, in the majority of cases, has been learned since they have been in the employ of the Department. An ex-army signaller was engaged to instruct the gang in signalling just before the commencement of the 1921-22 season. By the end of the season practically the whole of the staff were able to use the helio quite well. One of the chief factors leading to such good results in this direction is the excellent practice men on the lookout are able to obtain sending messages to one another.

In order that no man can be unfairly treated by having more than his share of one particular kind of work, duty rosters are made out periodically and are pinned up in some prominent position in the camp.

It will, of course, be realised that men must be on duty during the week-ends, sometimes at night, and on public holidays. This, of course, is unavoidable. Such overtime is not paid for, but leave in lieu thereof is granted when the man is not on lookout or patrol duty.

Fire-fighting.—No two bush fires can be fought in exactly the same manner. Innumerable factors must be taken into account, *e.g.*, topography of the country, proximity or otherwise of roads or tracks, nature of the scrub, direction and intensity of the wind, distance from the base, size of the fire when it is first tackled, etc.

The usual procedure at a fire is somewhat as follows: On arrival a reconnaissance is made to determine the size of the fire and on what sides it is safe to leave it longest. Having decided on a plan of campaign the patrol commences fighting it. Rarely can the head fire be fought at the outset. It is usually advisable to start operations either on the tail fire and on the wings. As a rule these do not take long to suppress, and the fire-fighter feels safe should there be a change of wind. Having suppressed the least fierce portions of the fire, the fire-fighter can attack the head by gradually pinching it in. Unless a fire is particularly fierce, it can be largely suppressed by direct beating with bushes. For this purpose healthy redgums are preferable to jarrahs, which are too delicate, and wandoo, which are too heavy.

Each fire-fighter seems to have a slightly different method of beating. The method which I have found the most satisfactory is to beat each patch of fire at least twice. The first stroke should be fairly hard and straight down, while the second should be a glancing stroke, which has the effect of sweeping burning sticks, etc., on to the burnt-over ground. If there are two or more men on the fire, one should follow behind the other and throw in any burning sticks, etc., which are left. It is advisable for the fire-fighters to take it in turns, one beating and one following. If there is only one man at the fire, we consider it time well spent if, after suppressing four or five chains of fire, he goes back over it to see that it is quite safe. Sometimes, owing to the choppy nature of the wind, it is difficult to say exactly which is the head fire, which the tail fire, etc., for what is now one may in a few seconds' time be the other. With two men these fires can be dealt with fairly easily, as one can start on each side and take advantage of the change of wind to gather beaters for his next attack.

In cases where the head fire is threatening a dangerous area, such as a blackboy flat, where it would be likely to gain a considerable impetus, counter-firing must be resorted to. An old track or a break of some description is necessary for this. If there is not a break already, one must be made for the occasion. Unless the scrub is particularly high, a break one foot in width is quite good enough to commence the counter fire from. The clearing is best done with a heavy rake and an axe. In starting the counter fire one should not light more than about ten yards at a time, and when this is safe do a further stretch, and so on. For successful counter-firing, at least two men are necessary to ensure any degree of safety.

On only one occasion did we at all regard the fire as having the upper hand. On this occasion some kangaroo-hunters lit a series of about twelve fires along a front of some six miles. These fires were lit at the bottom of a big gully, just before noon on a particularly hot Sunday in March. Although the fire burnt something over five thousand acres, considering the conditions, no one can regard the results achieved by the fire-fighters as anything but satisfactory. The method which was employed and which enabled a small gang of men to cope with such a large burn was to fight the fire at night and rest or

patrol the edge where the fire had been suppressed in the daytime.

Practically all the large fires that have been experienced have occurred in poor wandoo or mixed country. Fires in pure jarrah do not run so quickly as those in the types of country above mentioned. Consequently, even if a fire in the jarrah bush has proved too severe to cope with in the daytime, it usually has not assumed very large proportions by the end of the first day, when suppression is comparatively simple.

An idea of the results achieved by fire protection may be gleaned from the following figures:—During 1921-22 season the area burnt was 1.43 per cent. of the total fire-protected area. During 1922-23 season the percentage had increased to nearly seven. This, however, is not so unsatisfactory as it at first appears, when we consider that five of the seven per cent. was burnt in the one burn mentioned above, and carried practically no jarrah bush.

During the two seasons a total of 165 fires occurred. Following are the causes:—

	1921-22.	1922-23.	Total.
Government locos. ..	22	6	28
Mill locos.	26	..	26
Bush workers	15	8	23
Campers	..	1	1
Stock owners	..	1	1
Travellers	12	26	38
Settlers burning off ..	8	3	11
Hunters, bee-robbers, etc.	6	20	26
Cause unknown ..	2	9	11

The costs of the various items have been somewhat as follows:—

Capital costs—	£
Lookout stations	550
Telephone line	550
Instruments	10
Firebreaks	950
Lectures	99
Survey of area	945
	£3,104=6d. per acre

On the per acre basis the maintenance costs have been as follows, per season:—

Manning of lookouts ..	·5 pence
Patrolling	·4 pence
Fires	·4 pence
Upkeep of breaks ..	·3 pence
Lectures, etc.	·15 pence
Total	1·75 pence per acre

Although our organisation and our methods and appliances for suppressing fires can be improved and modified to suit changing conditions brought about by continued fire protection, nevertheless we can hope to do very little without generous public support. The public will, however, help only when it realises that its forests are valuable assets which can and must be protected from fire if they are to retain for all time their value. Before the public can be expected to render help of a practical kind it must be educated, and to do this is the duty of every officer of this Department. Unfortunately, all officers do not seem to realise this.

As time goes on a burning forest will be regarded in much the same light as a burning crop or a burning house. Not till then, although we may train the finest gang of fire-fighters in Australia, can we expect anything near the one hundred per cent. success which we hope for from our schemes of fire protection.

Mr. McVICAR said we have all listened with great interest to Forester Brockway's paper on the fire fighting problem, or the prevention of fires, which should be our aim, rather than the suppression of them. We hope that Mr. Smith, with his wide experience in this subject, will open the discussion.

Mr. SMITH said you have heard what Mr. Brockway has said. He has expressed himself very clearly, but he has said a lot of things that may be discussed, and he will be well criticised by everybody.

One of the first things in fire fighting is to see the fire quickly, and to get to it. There are efficient men in the tower to take bearings of the fire and get in touch with headquarters and with parties of men engaged in work in the bush. The next thing after the fire is spotted and the bearings taken (you have your plan and map) is to get to it. Rapidity of transport is very essential. Our men should know the country thoroughly. A man might be told to go to a fire in a certain part. There may be a road leading to the fire ten miles round, but he should be able to get to it in a much shorter way by taking bush tracks, across country. We have got to the fire; we cannot do much until we get there. The first thing to do is to see that there is an assistant or a Forester there, to look round the fire and see how to deal with it; see the best way to get at the fire. Look around and see the country, and see if there is anything that will assist in fighting the fire, such as old roads, tracks, country that has been burnt probably the previous year, or anything at all that might be used, such as light scrub on one side of the road as against heavy scrub on the other. Another thing to study is the strength of the wind and the direction in which it is blowing, and the method of beating. We have to put it out. Mr. Brockway says that redgums are best. Some say they are no good, some say they are. We prefer them, for they stand more beating than the jarrah. Jarrah leaves seem to wither up.

Regarding the method of beating, Mr. Brockway says a downward stroke and then a side stroke. That is the best method of beating a fire. When you have a fire I believe in taking it on one of the flanks. A head fire is pretty hard, especially in the middle of the day. I can assure you that to attack a head fire is difficult. It is stated in some of these Yankee forestry books that you must attack a head fire; well, they must be hardy chaps, hardier than I am. The idea is to take it on the side. You can check it and gradually work the fire out to a point. It is no use going straight in front of it; try to work it into an old road.

After you have beaten a fire out, the next important thing is to make sure that you have got it out. I have seen a fire put out and it has broken out again. These fires must be patrolled. You can put a fire out and hours afterwards you may go over the area and find a log smouldering somewhere. I wish to impress upon you that when you have put a fire out, do not leave it unpatrolled for at least two days. It is easier with a small fire, but with a big fire they must be patrolled for at least two days after it has been suppressed.

Counter fires should only be resorted to as a very last resource. In only one case so far have we had to resort to it to any great extent. The year before last we had a fire in the ring-barked country in a mass

of blackboy. Most of the foresters know the ring-barked country in the Mundaring district, and the blackboys and scrub and suckers.

I can assure you that it is very difficult. Hunters went out there and got lost, and they used the system of blackboy firing to try to find where their cobbers were. That fire was so confoundedly hot that we could not get near it. We had to backfire. We came to the conclusion that we could not deal with it in any other way. We had several men there and the procedure of the backfire was that one man went along with a strong rake. He was followed by a man firing on the track cleared, or partly cleared; then he was again followed by a man beating the flames in towards the country burning.

You all know the jarrah country. There are so many roads and tracks that it is nearly always possible to get an old road or track or something to back fire from, if it becomes absolutely necessary to counter fire.

A very useful thing are these old roads and tracks, inasmuch as they increase the rapidity of access to any part of the bush. I would suggest that several of these roads in any area to be protected, be opened up. I may say that the scrub grows on them slowly. The York road in my district has not been used for years and years, and it is in perfectly good order. There are very few suckers on it and little scrub. They make excellent breaks.

Another very essential thing for the men to know is where the nearest supply of water is, and the nearest food supply. In connection with the fire at Mundaring, which gave so much joy to foresters, especially those foresters who were engaged in putting it out, we made a depot at Watson's place, just on the edge of the fire, and carted supplies of chaff and food there, and we got water from his well and fruit out of his garden.

Referring to the fire that occurred up there, I would like to stress one point about it. It started on Sunday night and Watson, Valentine, and Brockway and myself worked on it. When we had got it out I left instructions, before leaving, that Watson was to patrol that fire, and I might say that this Watson is one of the most efficient and conscientious men that I know. He is a thoroughly good worker. He went to the fire the next day and patrolled it, and about 12 o'clock said that the fire was absolutely out. At 2 o'clock the same day the fire had broken out again. I got a message from the heliograph station that the fire was still burning. You cannot be too careful in patrolling the site of a fire until it is absolutely certain that it is quite out.

An old dead limb on the top of a tree will often catch on fire. I was watching a fire once which had burnt about four acres when I got to it, and was going up the hill nicely. I put it out, and while watching the result of my splendid work coals started to drop down. I looked up and found a big jarrah tree was burning at the top. I had to set to work and burn a big strip around this jarrah. That goes to show that it is not always the fire that you sweep in that is burnt out. It may be the top that is burning and any man is apt to miss it. I think it is a source from which many fires do break out again. Another thing I would like to speak about is fire-fighting in the day time, and fire-fighting at night. You go to a fire in the day time, and do not think it can be put out except by back fire, etc. At night it is a totally different matter altogether—two or three men ought to be able to put out miles of it. You have only to beat it. Getting back to the fire in 1917, there was a splendid crop of saplings, two or three crops of blackboys, and goodness knows how many crops of scrub, and Mr. Brockway and I went to it about eight o'clock. We got busy about 9 o'clock, and beat it quite easily, in intense scrub, where I am sure that all the men in the district could not have got within 50 or 60 yards of it in the day time. Unfortunately, last year all the fires started on a Sunday, so I did not get many holidays. It appears that the fires are started by those "white blackfellows" who do nothing but hunt kangaroos and run a few brumbies. These men are a source of annoyance to the public and the forest workers. They burn the country to get the kangaroos to come in on it. The kangaroos come for the first green feed. When this conference is concluded, if we can find some way of inserting some clause in the Bush Fires Act, or in some Act, that will deal with these people effectively, we will have gone a great way towards fire control and fire protection. It is not the working men in the district we have got to deal with, but these "white black fellows."

Mr. A. CLIFFORD said Mr. Smith had said "a straight-down blow and a side blow afterwards." His experience was one blow one way. With a straight-down blow you spread your fire. You probably picked up twigs on your stick and threw them behind you. With reference to fires breaking out again, he had had considerable experience that way, and he noticed that most of the fires that broke out again were in old rotten blackboys. They often burned for two days. Mr. Port could bear him out in this. One of their sample plots burnt that way. The blackboys rolled off the side of a hill. With dry trees, he did not care where it was, if there was a strong wind blowing, the fire would get on the top of a tree and set alight to trees in the middle of ploughed fields, with no scrub underneath or anything. He thought the trees along the firebreaks should be chopped down.

Mr. KESSELL said a strip of green timber for two or three chains on either side was usually left.

Mr. CLIFFORD said a heavy wind would carry fire from one tree to another.

Mr. KESSELL asked Mr. Clifford what he considered was the necessary width of the strip of green timber.

Mr. A. CLIFFORD replied, about five chains altogether.

Mr. SMITH said he didn't believe in fire breaks at all. You would find dry topped trees anywhere in the forest.

Mr. KESSELL said in silviculture work you left a certain strip of green timber along the Department's boundary.

Mr. SMITH said Mr. Clifford was speaking about the downward stroke, but supposing the scrub was high and the fire was burning along the bottom? It was a very hard thing to get down to the source of the fire. He could assure him you would pick up scrub even if you hit a downward blow. Coming back to the source of outbreaks, he had seen roots burnt in the ground. They might go on for four or five feet and come up again. There were any amount of sources of catching after a fire had been beaten out.

Mr. PORT said they had always found a blow straight down often scattered the fire away from it. If you brought the blow in you had got a better chance of putting the fire out, because if you brought

the blow straight down you naturally made a wind and scattered the fire. He thought something ought to be done in regard to licenses for kangaroo shooting. Down in his district they had one or two big mills, and if you liked to go down there on a Sunday you might see eight or 10 kangaroo shooters out in the bush, and they had all got licenses to get meat. He thought something should be done so that these men were not granted licenses for getting meat. It was only another way of getting skins, and that should be stopped.

Mr. TURNER said he thought the previous speakers had been referring principally to kangaroo shooters and brumby hunters as the cause of lighting fires. In his experience, 90 per cent. of the fires started in his district were set by people granted grazing and pastoral leases over certain areas. The Government received revenue for these leases and, naturally, if the country was not burnt it was not much good for feeding their stock; otherwise the stock would not eat it. He claimed this, that whilst the Department granted grazing and pastoral leases over certain areas, the settlers would set fire to the country and have it burnt for feed.

Mr. KESSELL said, although some of these grazing leases existed at the present time under the Land Act, no more grazing leases were being granted without reference to the Forests Department, and the Lands Department were standing by the Forests Department now and not granting leases on prime forest country.

Mr. TURNER said even if leases were not granted, owners were allowed to run their stock there. He thought grazing should be stopped.

Mr. KESSELL said that was part of the organisation of more complete fire control. It was no good doing one thing with a view to fire prevention and causing a big annoyance in the district unless we took measures to organise the suppression of fires if they did occur. At Collie and Mundaring we were taking active steps to stop grazing.

Mr. McVICAR, referring to what Mr. Turner said about the graziers lighting the fires, said that happened every summer. He was travelling on the back road, between Nannup and Augusta one time, about 13 miles out, when he met one of the farmers in the Blackwood district, coming back from the "coast," as they called it. Every year they shifted the cattle from the coast to the hill country. He had not left that man 10 chains when he struck a small fire. As he progressed along that road, he got bigger and bigger fires. The man had lit the whole of the country for over 40 miles. He asked him how many dozen matches he had used. Naturally he said he did not light the fires.

Mr. KESSELL said that, of course, the top disposal operations would serve to a large extent to burn the best of the forest under conditions when the fire would do very little harm. It was a matter of using controlled fires to prevent big fires until we could extend fire protection organisation over the whole country.

Mr. SHARP said there was one point there, the issue of kangaroo permits, that Mr. Port mentioned. He did not know what was happening in other districts, but in Collie district all applications for permits and licenses went through the Forests Department.

Mr. PORT said in his district they went through the Police Department, and he thought it would be a good idea if they went through the Forests Department. The police did not know what was going on in the bush. They visited a certain centre, but the foresters were out in the bush nearly all the time, and they knew who were the people that should have the permits and who were not.

Mr. SHARP thought it would protect the areas if they all went through the Forests Department. The department took charge in Collie of the Game Act. Anyone could have a license before, but now only two people had them, and they were worthy people. He thought it a very necessary precaution that these things should go through the Forests Department.

Mr. DONOVAN said, speaking of fire beating, the best plan he had found for beating out a fire was a pronged stick, and not beat at all but just scrape along with it.

Mr. KESSELL said you had to take into account the difference in soil conditions in the two districts. Whereas Mr. Donovan had a good deal of sandy soil in his district, they were working on pure ironstone country at Mundaring, where scratching would not affect the scrub.

Mr. BROCKWAY said that system would be quite good, probably, in the virgin bush where there was leaf litter, but in the country they were protecting there was scrub several feet high, where it would not act at all.

Mr. MACKAY asked the Chairman as to the distance it was proposed to have these fire lookouts apart.

Mr. KESSELL replied, the distance would be about 15 miles. That probably was the optimum distance. It depended largely on the contour of the country and value of the forest and the density of the forest, but he thought 15 miles apart was quite an efficient distance for lookouts.

Mr. TRAINOR said he would just like to pass a few remarks on the subject of fire protection. In the first place he had to heartily endorse the remarks of Forest Officer Brockway and Forester Smith. There was one little remark of Mr. Smith's with regard to patrolling fires. He took it Mr. Smith did not mean to patrol after a fire for the whole day.

Mr. SMITH: No, say at dinner time.

Mr. TRAINOR said he was heartily in accord with the proposal to enlist the co-operation of local settlers, who would act as fire fighters when called upon. He thought it a fine thing to go round a district early in the season and talk to orchardists and all settlers, and obtain the names and addresses of all who would be willing to give assistance when fires were burning. It had been his experience when on the work of fire control at Mundaring that the use of the sideways sweeping stroke at the commencement was not possible in thick scrub. When a litter of leaves and small twigs covered the floor the sweeping stroke was naturally used. It was, however, only in exceptional cases where this practice was possible in the Mundaring district. More frequently the growth of shrubs was so thick that several downward strokes had to be made in almost the same place before the flames were beaten down. Then the sideways stroke was employed to sweep the burning ends of twigs and other litter on to the burnt area. In all cases after a fire had been dealt with at Mundaring an inspection would show a more or less clearly swept strip running round the end of the burnt country. With regard to the issue of licenses to kangaroo

shooters, he believed careful consideration would be necessary. There were some men who might want a license and, if refused, they would become our enemies, and we wanted to avoid that if possible. In the work he was now carrying out, he was endeavouring to become friends with everybody in or near the forests, and he would certainly recommend the issue of licenses to kangaroo shooters if he thought they could be trusted. Before concluding, he wished to emphasise the fact that the remarks of Forest Officer Brockway and Forester Smith were heartily endorsed by him.

Mr. BROCKWAY said, in regard to the question raised by Mr. Trainor *re* the granting of licenses, he did not think, if we did take the kangaroo shooters' licenses away, they could treat us very much worse than they did last year when they had the licenses.

Mr. SMITH said the thing still remained that we had no control over the man, whether he had a license or not. He could go out into the bush and, unless we saw him with the kangaroo or saw him shooting, we had no control over him. Those "white blackfellows" were the men who were causing us all the trouble.

Mr. MACKAY said that he had experienced the two largest bush fires that ever occurred in Gippsland. In beating out bush fires, he did not think it mattered whether you used the downward stroke, the upward stroke, the sweeping stroke, or the back swing. If we got bush fires here such as occurred there in years gone by, none of those strokes would put the fire out, either in the day time or at night time.

Mr. MACKAY referred to Mr. Smith's statement that he cleared five chains around a tree in order to prevent any further fire breaking out from a limb that was alight in the crown. As he undertood no other fire broke out he asked if there was any wind blowing.

Mr. SMITH replied: The usual prevailing winds.

Mr. MACKAY said five chains would not stop a fire extending from a burning limb with a very light wind blowing. He had seen fire travel half a mile from burning trees, and he thought they would light a fire much farther away in jarrah country.

Mr. BROCKWAY said during the past two or three seasons they had had a couple of hundred fires there, but on only one occasion did he hear of a spark blowing any considerable distance, and on that occasion it blew down to a blackboy flat. Usually it was quite impossible for a spark to blow that distance, because it struck leaves, etc., before it got that far. It was only in very open country that the fire was likely to spread that way.

Mr. KESSELL said if you watched sparks spreading while fire was burning, you would notice there was a big upward draught, but once the fire was out, the wind was either parallel to the surface or sweeping down, and there was very little danger, and the possibility of the spark carrying was very much less than when the main bush fire was burning. We must also have the lookout in order that we might see these new outbreaks immediately. Fires all started from a spark, and the quicker we got to them the smaller the outbreak we had to cope with. The difficulty in the past had been—and it was just the same in Gippsland—that nobody had paid attention to the fires until they had assumed serious proportions. It had been nobody's business to go. They had been let go until they had become big fires. We sought to fight bush fires while still small.

Mr. SMITH said he did not know much about the Gippsland country, but he had been in the Otway forest, which was similar country. He did not think any comparison could be placed on the conditions of the two forests. A fire that would start in Gippsland and assume enormous proportions would have no chance of starting here under the protection system. As Mr. Kessell had pointed out, it was nobody's business to go to it there, but here it was some man's business to go to the fire, and consequently it did not establish such an enormous face on it. He did not think we had got any trouble to fear from fires such as Mr. Mackay had experienced in the Gippsland country. Another thing, the bark of those trees was more inflammable and would carry farther than the barks of our timber.

Mr. McCOY said he not only saw sparks carrying five chains, but at Dwellingup mill he had seen bark carried 20 chains while the fire was burning—in jarrah country.

Mr. KESSELL thought the difficulties were just as great at Mundaring, because we had to cope with drier conditions. Nights were much moister and cooler the farther south we went, and the fire would die down at night much more than it would at Mundaring. We were no longer guessing, we had tried and succeeded.

Mr. WESTON asked Mr. McCoy, was not that fire at Dwellingup subsequent to the falling operations in that district, when the crowns still lumbered the ground?

Mr. McCOY replied that it was.

Mr. WESTON said we were going to do away with that risk in all districts.

Mr. MACKAY said he would like some little information. That was about looking round for tracks and so forth, to be conversant with the country in which a fire was likely to occur and in which foresters would have to fight it. He understood Mr. Smith to say that there would be tracks here and there which would practically act as fire breaks. Did those tracks occur in virgin forest or only in cut-out bush?

Mr. SMITH said, unfortunately, in the jarrah bush it was very hard to find virgin bush, and he did not think we would have much fire protection in it. Even in what was called virgin bush you would find tracks. You had to go a considerable distance to any part of our forest where you could not find tracks where people had been after poles or piles or something. There was always something to help you even in virgin bush.

Mr. WESTON spoke of the difficulty Foresters had with the "white blackfellow." He urged the importance of not ignoring the human element when dealing with these men. They read on a notice board that £100 fine or 12 months' imprisonment was the penalty for a forest offence, smiled, and dropped a match. The speaker said that from his experience much would be done in enlisting their sympathy by treating them as intelligent members of the community.

Mr. SMITH said it all came to the education of the community in each district before the inauguration of the scheme.

Mr. WESTON said he knew of one case where a man was an absolute enemy of the Department, and he had been known to light a lot of fires, but we had never been able to prove it against him. He came in contact with him when he went to the district, and he let him think that he (Mr. Weston) thought he had brains, and the man listened to him. Now he was

one of our helpers, and there had not been a fire there since.

Mr. TURNER said he did not altogether agree with Mr. Weston on one point when he stated that perhaps it would not be wise to get legislation to control bush fires. When a man caused a fire on private property he could be had up for trespass. It ought to be possible to get legislation to this effect where we got men lighting fires in the vicinity of Crown lands.

Mr. McVICAR said we must get our State forest areas defined, and then we could do it. We must get the dedication of State Forests first.

Mr. WESTON said in reply to Mr. Turner that in one State Forest a man did not trespass in order to light a fire, but he nevertheless lit two fires. He was riding along a road close to the State Forest, and he dropped a lighted match overboard. The evidence was plain enough for a bushman, but not for a law court.

Mr. KESSELL said the vast strides that have taken place in the attitude of the public towards this question, during the last two years, must be taken into account, and if we could secure the same progress during the next three or four years, we would be well on towards attaining the objects that had been mentioned in the recent part of the discussion.

Mr. SHARP said the main cause of the fires was from private property, and he thought we should control the fires on private property. We should issue some form of permit to those people who wanted to burn off. As it was now, there was a period from, he thought, the first of November to the first of March. He did not think there should be any specified time at all. There should be a permit issued stating at what time the holder might burn, and we could know exactly when fires were being lighted.

Mr. KESSELL said there were two amendments to the Bush Fires Act now before the Premier. He had promised to reconsider them. In these amendments provision would be made for certain areas to be declared "Fire Protected Districts" by the Department. No burning-off operations would be allowed in fire protected districts, except under permit. Secondly, that in such districts, in the event of a fire occurring on private property, the Department should have the right to send men in to control that fire, and the cost involved in fighting the fire should be recoverable in a court of law from the owner of the private property, if necessary. These two amendments would cover Mr. Sharp's suggestions.

Mr. MACKAY said he understood, that now private property owners had to notify the District Forest Officer before they burnt off.

Mr. KESSELL said that was so. We could not refuse permission to them.

Mr. MACKAY said it enabled us to take precautions against the fire spreading.

Mr. KESSELL said the trouble was at the present time that under the Bush Fires Act we had one closed season which commenced from, say, the end of December to the middle of March. The day after that season ended, the people owning private property grazing propositions wanted to burn off with a view to obtaining the best possible burn, while the weather was favourable, with the result that for perhaps a fortnight our lookouts were unable to see what was happening in our own country because of the smoke drifting in from the private property fires. If these fires were lit under permit we could arrange to have the burning off done systematically at different times.

Mr. BROCKWAY said the trouble was that up to the beginning of December all men could burn. We could not give any man permission to set his private property going after that, but after March we could not stop him. He thought what we really wanted was a system of permit, whereby we could give a man permission to burn at any time during the summer, and then we could get the fires well spread over the season, instead of getting them all starting at the same time. There would be less danger of fire spreading in February than there was in March. They all started as soon as the season was open.

Mr. WESTON said another awkward clause for the settler really was the fact that, according to the Forests Act, a settler gave us notice if he was going to burn on his own property and notified us, as he should do, according to the Act, and when the fire escaped we could prosecute him successfully for letting it get away. If he did not notify us, but had a fire accidentally on purpose, we had got no hold on him. When the farmer realised the position in regard to this section of the Act you might expect quite a lot of surreptitious burning, unless we could combat this by stopping a fire which he had originated without notifying us, and making him pay for the cost of putting it out.

Mr. McVICAR said in this connection, during the propaganda around the Mundaring district, he made it a point in the lectures to mention that the forester in charge of the district would issue cards to farmers around that district, and the farmer, if he was going to burn his country, had just to put the date when he was going to burn on the card and post it to the forester. The forester then would send one or more men to help that farmer with his burning off, and to see that the fire did not get into the State forest. He made a point of that. While we were asking the farmer to help us with fires in the forest, we were also willing to help the farmer.

Mr. PORT asked had anything been done in regard to mill locos using spark arresters? He thought they caused a good deal of the fires in the bush, especially on Crown lands where mill locos were running through.

Mr. SHARP said the Cheney spark arrester had been very satisfactory.

Mr. KESSELL said that the same principle applied to spark arresters very largely as applied to control of grazing country. We did not want to insist on the use of spark arresters in the country until we got some organised fire control system. It was no use causing annoyance to sawmillers unless we followed up the work, and the sawmillers had always co-operated with us in testing out of spark arresters. We had one imported from America, but it was a failure. The Cheney spark arrester had given very good results up to the present, and there was legislation at the present time that could be applied, if necessary, to force the use of spark arresters in fire protected areas.

Mr. RULE asked was the present system of fire breaks satisfactory? He understood the fire breaks under present conditions were not too effective. He believed there was some hope at one time that whim tracks would be made. A whim driver followed the line of least resistance, and fire breaks did not

necessarily follow the line of least resistance, so you could not expect the whim driver to follow the fire break. There were two little points he would like to mention. The two difficulties were, of course, that the population was very sparse and there was a certain absence of forest conscience. The most effective fire protection he saw was in Germany, in the pine forests. There the forester was backed up by a population whose forest conscience was stronger than the moral conscience. They had a very good system along the railway line. They had a fire break immediately along the railway, and 100 yards further another parallel fire break. These two breaks were connected at intervals by breaks running at right angles, so that the fire from the railway would be confined to a small compartment.

Mr. McVICAR said that was carried out in our own railway system.

Mr. RULE said there was one other point. Mr. Smith had remarked about the patrolling next day. He thought it would be found that there was a vital time next day when the sun got very hot.

Mr. KESSELL said in reply to Mr. Rule's first question, he needed to point out that at Collie we were faced with a particular problem. The only place where fire breaks were tried on any extensive scale was at Collie, and there the conditions approximated very nearly to the conditions under which a pine forest was worked, and consequently justified more intensive and expensive methods. The system of fire breaks at Collie was tried simultaneously with the lookout system at Mundaring. The lookout system was found more satisfactory and more economical, so that the cutting of fire breaks at Collie was discontinued.

Mr. RULE said he just brought up that point, because Mr. Smith mentioned he found fire breaks did not work satisfactorily, and that he did not believe in a fire break.

Mr. KESSELL said in an extensive area it was necessary to have certain fire lines from which burning back could be carried out. We used the existing cleared tracks in the country. The first work to be done in any country where it was proposed to organise fire control was to have a complete topographical survey made, and prepare plans which showed all these tracks.

Mr. MACKAY endorsed Mr. Smith's remarks as to the trouble following the Yankee grubbing of trees on breaks.

Mr. STOATE said, although they had only been discussing ways and means, he would like to mention, before the subject closes, that it was of vital importance that the belief must be strong in all officers that fire protection was possible. No matter from what cause, or under what conditions, or what country in the world, fire protection was possible. There was absolutely no doubt about it. It was only a matter of the cost involved and the number of men we could put on the job. He would like to make sure that all foresters were prepared to go out and convince the world that we could have fire protection.

Mr. KESSELL said there was one rather interesting sideline, that was the use of wireless in fire protection. It was a matter in connection with which inquiries had been made recently, and a few days ago he received a letter from the Amalgamated Wireless, in Melbourne, setting out the classes of apparatus and the cost. It certainly appeared to bring wireless telephony (not telegraphy) within reach. The objection to telegraphy was that you were confined to the use of the Morse code, necessitating considerable preliminary training. It would be much more satisfactory if we could have telephone messages sent out. We had only had one quote up to the present, but the price given for a self-contained sending and receiving set for use on a lookout station was £300, and the cost of a receiving set for use in the bush was £40. In the latter case, the men simply had to listen in at given intervals when messages would be broadcasted. With the development of wireless, the co-operation of other persons in the bush, settlers and people living on the mills, was much more easily secured. For instance, if we could supply a settler with a cheap receiving set which he could use not only to hear messages from the receiving station, but also to hear concerts at Perth, he might be more interested in fire fighting operations. It might appear rather fanciful, but he could assure them it was very near the realms of probability. In discussing all these schemes, we did not want to look forward to the day when we should have a huge staff throughout the country seeking to control fires. This work was not going to be done by employees of the Department, but bush hands and sawmill employees would be available. It would be a simple matter for us to have a representative at a bush camp and arrange for him to listen in at intervals during the day, and if certain or all men employed in the bush would recognise their obligations and form part of an emergency fire fighting force. We never expect to have the funds to maintain a fire fighting organisation run by the Departmental employees only. The success of the scheme was going to depend very largely on co-operation from general settlers and bush workers.

Mr. MACKAY said sparks from the bush mill engines were frequently blamed for the starting of fires. Personally, he blamed the bush worker more than the sparks. He thought, until we provided these men with thermos flasks and prohibited the lighting of fires in the bush to boil their billies, we would always have fires.

Mr. KESSELL said with top disposal operations we were going to do away with a lot of that. At present a man had the incentive to set the bush alight to help in his falling and hauling operations. We would do the burning before the faller entered new bush.

Conference adjourned until 2.15 p.m.

SECOND DAY—Wednesday, 18th July, 1923.

Afternoon Session.

(Paper by Chief Inspector McCoy.)

THE CONTROL OF TIMBER INSPECTION.

From a Timber Inspector's point of view the papers that have been read are pleasing, because the protection of the leading shoot from insects, fire, and the bending effect of large felled tree tops and limbs of growing banksia will lead to straight-hearted trees. One of the most serious faults in jarrah logs is the bendy heart which is a source of worry to the splitter, sawmiller, and timber inspector. A jarrah log would give a high percentage of wrought timber if its heart was straight.

Western Australia.

Standard Specification for Sleepers.

It shall be of good, sound, strong timber, free from heart-wood, dry rot, knot holes; to be cut square; out of winding and straight except that hewn sleepers may have camber to extent of half an inch.

Sleepers shall not be cut on full quarter and shall be cut with an allowance of a quarter of an inch in width and one-eighth of an inch in thickness to allow for shrinkage and no further allowances shall be made.

But will allow slight variations in cutting, sound gum veins, gum pockets up to 6in. x ⅜in; surface sunshakes, and shakes up to 6in., a few pin holes, but not in groups; sap or wane not to exceed two inches on either face and not to come under rail seat; sound and firm knots up to 2in. in diameter.

Length specified shall be subject to a variation of one inch either way.

When a contract is made for timber supplies, the Forester should be supplied with a copy of the specification and particulars of the structure the timber is required for. Upon receipt of this information he should request his assistants to inspect the timber in accordance with his instructions.

As contractors keep timber in stock for long periods, portion of it deteriorates. Buyers should put a clause in the specification stating that they will not accept timber unless it is passed after the date the contract is signed.

A Forester should see that his assistants' work is consistent, and that all the timber they pass is properly branded. Watch carefully and advise the Conservator when unpassed timber is consigned to the same boat as passed timber, also when deteriorated passed timber is consigned to the same boat as recently passed timber, and when rejected timber is loaded for shipment, mentioning the truck number, consignee, port, size of timber, and approximate quantity in each truck.

Timber for joinery purposes should be kept up to the letter of the specification.

Railway sleepers should be passed on the lines of the specification which states that they must be clear of sapwood under the rail seat, knot holes, and may vary slightly in size.

In my opinion a sleeper having an inch of sap wane on each corner under the rail seat is of average quality and superior to one sawn from the inner heartwood of a big log. A little sapwood on both the top corners is an indication that the sleeper is cut from the good part of the log. Although a heartwood sleeper does not show sapwane and looks nice when protected in a large stack, it may have been cut from a cross-grained, over-matured, snaky-hearted log.

Knot holes in hewn sleepers.—A sleeper having sound knot holes in it up to 2in. diameter, more than 8in. from the rail seat, without other serious faults is average quality. Sometimes it is superior to the average because the wood around the knot is exceptionally good and prevents the spike from splitting the sleeper. I have examined thousands of sleepers used in our local railway and have not found one where a knot hole 2in. in diameter has reduced the life of a hewn sleeper.

Inspectors should carefully examine the grain more than 1in. from the knot hole in a sawn sleeper. If an Inspector is satisfied with a sleeper with a knot hole in it he should brand the wood beside the knot hole. Sawn sleepers should be cut about ¼in. full in the width and ⅛in full in thickness.

Variation in size.—Hewn sleepers should be cut reasonably parallel and fairly rectangular except that it is better for the bottom to be wider than the top because the bottom shrinks more than the top before it is used, that is, the inner heartwood of a log shrinks more than the sapwood and outer heartwood.

10in. x 5in. hewn sleepers should be allowed to vary from 10in. x 5in. to 10¾in. x 5½in. providing they are cut with one side parallel to the other, that is, they must not be cut like pointers, but one sleeper may be larger than another.

9in. x 4½in. sleepers for local railways should be accepted up to 10in. x 5in.

Pinholes.—Sound edged pinholes is a fault, decayed edges on pinholes is a serious fault, and sleepers badly riddled with pinholes should not be accepted.

Rot.—Rot is a serious fault and should not be accepted, except a little in past or present sapwood.

Heart.—Sleepers cut from large logs should be free of heart, but when cut from small under-mature logs a little heart is not a serious fault.

Pops.—Pops are serious faults because a "poppy" sleeper does not hold the dog-spike well.

Ringshakes.—Ringshakes are serious defects. Some of the sleepers with ringshakes fall to pieces.

Wane.—A little wane is not a serious fault unless it comes under the rail on a neat cut sleeper.

Inside wane.—Up to an inch of this extending 18in. each side of the rail seat is not a serious defect.

Wind.—If a sleeper is cut full and if for a railway, and not for a wood-blocked town tramway, a little wind should be allowed, say up to half-an-inch. Sawn sleepers are not windy, when green, but they twist after being sawn unless they are well protected.

Accumulation of uninspected sleepers.—Although it is wrong to pass timber other than long clear of heart beams and sleepers until it is being trucked for shipment, large quantities of uninspected sleepers

hould not be allowed to accumulate or a hitch may occur when there is a rush of shipping.

Timber should not be passed unless it is beside a metal line on which Government trucks may run under permit from the Railway Commissioner.

Workmanship.—Although a sleeper roughly hewn is as good as one smoothly hewn, hewers should be encouraged to cut their sleepers true and smooth. Engineers desire well-hewn sleepers and, other things being equal, will buy from the country that supplies the ones most smoothly cut.

Beams free from heartwood.—These are superior to heart in beams and a little sapwood on two corners is a good sign.

Beams—Heart in.—These should be cut from small logs and are all the better if they have a little sapwood on each corner at the crown end. Care should be taken to see that they are not popped, sprung, partly broken, plugged, or have a rotten heart. Beams should not be roughly hewn. As the cost of them is high there is no excuse to slum them.

Boards cut from Eucalypt Trees.—Flooring boards should be cut on the back to keep the spring on the flat instead of on the edge. The same applies to parallel, rusticated, and feather-edged weatherboards.

If boards are cut on the quarter the gum following the slack concentric ring will eventually fall out and the floor will have daylight showing through it.

Boards cut from oak or banksia are best cut on the quarter. Boards cut for flooring that has to be dressed should be ⅛in. full in thickness and ¼in. full in width.

Building scantlings may be cut the neat size, and if they are cut on the back, so much the better, because the spring is on the flat. When timber is bendy on the edge the thickness of the plaster on the wall is uneven as the studs and joints have to be cut to straighten them.

Piles.—Seasoned piles are better than green ones for jetty and wharf work because green ones split after being charred and let the teredo in. The teredo determines the life of a jetty and a wharf pile.

Piles that are tough are better than those that are free, and a pile with short kinks is easier to drive than one with an even sweep. Knot holes up to 2½in. diameter in piles is not a serious defect, as the teredo finds it difficult to bore around them. When a pile is accepted with a knot hole in it, the wood near the hole should be branded. As banks advance up to 90 per cent. on the inspection return signed by the forester, inspector, and contractor's agent, it is essential that our head office should be consulted before timber is re-passed.

Sawn or hewn timber should always be sapwood side up if on top of a stack, and contractors should have the top pieces turned sapwood up when they are passed, and later on when some of the pieces are removed the remaining top pieces should be turned sapwood up.

Fence droppers.—These should be straight grained and strong, otherwise they snap when the wire is strained.

Specifications.—Although specifications vary, and those from some countries are more strict than those from other countries for sleepers, all countries should be supplied with the same class of timber for a similar class of work. I notice that countries that issue a strict specification for sleepers accept the same class of sleeper as those that issue a less strict specification. The pass should be regulated according to the structure or section of the structure the timber is for. For instance, a 3in. x 3in. truck scantling should be far superior to a 3in. x 3in. housing scantling, although generally they are supplied under a similar specification.

Inspection Certificates.—When timber is shipped the shipper applies to the Conservator of Forests for a certificate that the timber is passed and branded by officers of this department. Foresters will see that it is a serious matter if unpassed or undersized timber is included in the shipment, because oversea buyers pay up to 100 per cent. on the receipt by their bank of this certificate, together with the bill of lading.

When a pass has been given there are generally a number of rejects beside the stack passed. Unless the stacks are on skids, say, 15in. or more high, these rejects should be stacked 6ft. clear of passed sleepers before the next pass is given.

Mr. SHARP said there was one thing Mr. McCoy forgot to mention. He thought we could get over the difficulty by having a brand made and putting it on the end of the sleepers, and thereby each sleeper would be branded. If you put a blue stripe across the stack a lot might be taken away and the blue stripe would be gone.

Mr. KESSELL said when a stack of sleepers was inspected and paid for by the Railway Department, they were sometimes left for long periods. The Railway Department, if they touched that stack, generally moved it as a whole and, once the paint was put there, no more sleepers should be added to that stack. It indicated to the Railway Department that this was a complete unit stack of sleepers that had been passed and paid for.

Mr. SHARP said that did not obtain in the Collie District. There might be 3,000 or 4,000 sleepers passed one week and the blue stripe put on them. Next week you would find half the stack gone, while the other half would be left for months.

Mr. SMITH suggested that the W.A.G.R. should issue a brand with a number on, the same as our export hammers—the number of each forester or inspector, as the case might be—and brand the sleeper with the W.A. Government brand.

Mr. KESSELL said he would undertake to discuss with the Comptroller of Stores, Midland Junction, the views put forward, and see just how he regarded them, and if they could come to some arrangement that was satisfactory to all parties, they would do so.

There was another point, the Premier had been convinced by the Commissioner of Railways that the life of sleepers could be increased 50 per cent. by seasoning, and that satisfactory seasoning could be obtained in two years. He did not know whether that coincided with the observations of officers in different parts of the country.

Mr. DONOVAN said he thought that if a sleeper had about two or three years' seasoning it would last half as long again as an unseasoned one.

Mr. KESSELL said there had been considerable discussion among railway authorities as to whether the sleepers should be adzed or bored before being stacked.

Mr. McCOY said if sleepers were adzed and bored before stacking, especially sawn sleepers, they would wind after they had been stacked, some of them to the extent of ¾in.

Mr. KESSELL said of course in this country we used sleepers to a very high specification, and consequently the importance of such defect might be unduly magnified.

Mr. SMITH said while in France he took particular notice of the sleepers in the lines there. He thought they were billets. Some of the sleepers that

were in those lines were worse than the billets cut here. We had got a specification here now for our own Government Railways which seemed to him to be absurd. The sleeper that was put in had to be practically perfect. He did not see why this was necessary, seeing other countries could run trains a great deal heavier than ours and at a faster rate. The Chief Inspector said during his remarks that he considered a sleeper with 1-inch wane under the rail to be perfectly good, as it would give half an inch. He was quite in accord with that. He thought in many trees we were working off in the bush the inside sleeper might look perfectly good, and to all intents and purposes it was, but if you took that sleeper in your hands and dropped it down over a rail it would break. It was brittle and the wood was over-matured. He would like to get very definite information on that point from all the officers concerned, especially the old cutters, as to whether it would not be better to have sleepers with more wane than inside sleepers. We got some trees that were young that would be fast-growing timber, and the wood was perfectly good; then, again, we got an old matured tree and, although the sleeper was squared up, it was rotten and fit for nothing.

Mr. DONOVAN said that on the Jarrahwood line, between Wonnerup and the old line, when that line was laid about 50 years ago, they put down 8-inch to 9-inch saplings, with just a rail seat on top of them, and it was only within the last six or seven years that the last of them had been taken out of the line.

Mr. WESTON said that for the first 15 years there was scarcely a sleeper needed to be replaced on the Canning Jarrah line, built a matter of 33 years ago, although they were built of billets split out of the nicest young trees that the men could get hold of along the line, and there was scarcely a sleeper replaced till the Government took the line over about 15 years later. Even then some sleepers were left in the line until 1916. A couple of years ago the ganger said that even those were then in fairly good condition. Mr. Weston thought that the timber growing on the sand plains would last ever so much longer than timber which appeared to be more matured growing in the hills.

Mr. SMITH said, coming back to the durability of jarrah again, that while on classifying work in the karri country they told him that jarrah up here (Mundaring district) stood so much longer than the jarrah down there. He thought that was a mistaken idea. There was a stock fence along the Warren that had been up for 40 odd years, and he went to considerable trouble to get some of the posts out to see what they were like. Every time he crossed the fence he took out a post, and it was a considerable trouble. He was assured that the fence had been there 40 years. The timber was cut along the fence in mixed karri and jarrah bush, and it was still as good almost as the day it was put in there. He did not think jarrah would stand much longer than that, timber split up at, say, Mundaring or anywhere else.

Mr. HEBB said his experience was that it was only mature trees that would stand long.

Mr. McVICAR said, while they were on the durability of timber, he would like every district officer and every forester to bear in mind we have an Empire Exhibition coming on next year and the Department was on the look-out for any specimens for our Durability Section of the exhibition. It would be necessary to send the information to the Department first and wait for instructions concerning the forwarding of specimens.

Mr. HILL asked, could Mr. McVicar define his requirements in any way?

Mr. McVICAR said fencing posts would be a very good exhibit. Nothing must be longer than about six feet. As regards piles and poles, etc., they would get them from the Harbours and Rivers. Any small specimens, easily handled, and which they had known data for, would be very acceptable.

Mr. KESSELL said there was one point in Mr. McCoy's paper he would like emphasised, *i.e.*, the question of reporting the trucking and sending away by rail of uninspected timber or rejected timber. We detected a certain amount up at Bunbury or Fremantle as it was going into ship's slings, but it was very difficult to deal with the matter then. If foresters or their assistants moving around the country would pay attention whenever opportunity occurred to timber being trucked, and if they saw anything that appeared to be irregular and would immediately notify Head Office with full particulars, it gave the Department time to deal with a case before the timber was actually at ships' slings.

Mr. PORT thought the practice of putting the blue crayon on the end of a condemned sleeper was not a very good one, as the crayon could easily be wiped or even cut off. He thought some other arrangement should be made to distinguish the condemned sleeper from the passed sleeper other than the blue crayon on the end.

Mr. TURNER asked would it be possible to have a condemned brand on the other end of the sleeper?

Mr. KESSELL said that matter was under consideration at the present time. It was suggested that some form of condemned brand be put on the other end of the sleeper hammer in place of the present broad arrow, and it was further suggested that it should be made in the form of a punch that could be used to obliterate the brands already on sleepers. This was an important matter. If re-inspection took place at another time it was absolutely essential that sleepers re-inspected and rejected should have the original brands obliterated. There had been cases where re-inspections had been carried out and certain sleepers rejected and the original brand had remained on the sleepers.

Mr. TURNER said the last hammers issued had no broad arrow on the end of them.

Mr. KESSELL said there were two alternative suggestions put forward. One was that there should be a cross put on the end, and the other that a brand should be made so that it formed a series of punctures. His objection to a cross was that it appeared so much like an X, and so many fallers' brands with X in them were issued.

Mr. SHARP said he would like to draw attention to the poor class of timber being supplied to brand this year. It was very difficult to put the full face of the hammer on it.

Mr. PORT said another fault with the branding hammer was the eye in the hammer was too small. In regard to the branding hammers that the fallers were issued with, he thought there should be some change made with them, because they were too small altogether. The numbers and figures were too small. They got complaints every day about the hammers that had been issued.

Mr. KESSELL asked was it a general opinion that the numbers and figures were too small?

Mr. MACKAY and Mr. CLIFFORD endorsed Mr. Port's statement of the necessity of issuing to fallers brands with larger numbers and figures, and branding hammers with larger eyes for sleeper branding.

Mr. KESSELL said the papers were on his table at present, so that a good job could be made of next year's brand. He took it, from Mr. Smith's interjection that there would be a decided objection to increasing the weight of the hammers in any way.

Mr. DONOVAN said the handles were too short.

Mr. SMITH said there was no objection to the weight being increased. It was a longer neck that was wanted. The full face of the brand had to go on each end of the sleeper, and as some sleepers were cut 2in. long and some 2in. short, it was a hard job to get the face on both ends when they were stacked.

Mr. TELFER said increasing the size of the hammer head and also adding a rejection brand at the other end would mean that the size of the shank of the hammer would have to be increased, and that would add considerably to the weight.

Mr. HEBB said he had all his hammers drawn out by the blacksmith. The shank then was no thicker than a man's finger.

Mr. DONOVAN considered there should be lugs the same as on a carpenter's hammer.

Mr. KESSELL said, regarding the question of the inspector's number, he wanted it to be clearly understood in future that one number would be allocated to each person using an inspection hammer and that same number would run on from year to year. Foresters would be responsible for seeing that nobody but the man to whom the hammer was issued used that particular hammer. It was better to let a ship lie idle at Bunbury than to use another man's hammer. It was a very serious offence for any district officer either to allow anyone to use it with his knowledge, or to leave the hammer in such a position, while in his possession, that it might be used by anyone else, and if, for any reason, one man ceased to inspect, that number would remain out of circulation for a sufficiently long time that there should be no confusion as to who branded any sleepers with that particular number on.

Mr. MACKAY spoke of the folly of getting rid of our best timber at too great a rate. He said that we should shortly be importing timber from other countries at a higher cost, and he advocated an export duty. He thought the specifications should be greatly modified. He thought the timber companies should carry out their own inspections, although he was aware that the department derived revenue from this source. He deplored the fact that the late timber inspectors who were now doing ranging work were often unavailable for bush work owing to inspection of timber for shipping.

Mr. McCOY recalled that on one occasion 10,000 sleepers were sent away without inspection owing to an accumulation of stocks, when the assistant rangers were responsible for the work, owing to the fact that sawmillers did not turn sleepers when it suited the convenience of the department as is now done.

Mr. KESSELL said the policy was accepted of inspecting those sleepers, and it was a matter of the most efficient way of carrying it out. The fact that Mr. Mackay, for instance, had two inspectors in his district had only been occasioned by the fact that those inspectors had been employed by the department, and whatever they were called they were carrying out the duties, they could all see reasons against the "sacking" of these men because there was a change-over of system. The men were employed and naturally expected to continue in employment, and it was a matter of training them in the wider duties. Still, he thought that question of policy might be allowed to pass.

Mr. TRAINOR said with regard to the waste of timber, he understood that, if a cutter was sending in a number of sleepers that were condemned, he would not be allowed to cut any further. At least, that was so years ago. He spoke with feeling because Mr. McCoy once threatened him and three others that if they did not alter in their use of the broad-axe they would not be permitted to continue.

Mr. McCOY said, with reference to the statement by the Conservator of Forests, Foresters Smith and MacKay, that half round sleepers were equal to other sleepers, they might be all right in France and some of those countries where they used Spruce, but in a Jarrah sleeper the sapwood was stronger than the heartwood, and caused the sleeper to split without any pressure by the rail on the dog-spike. He advocated the use of a sleeper midway between the squared sleeper and the half round sleeper. When round back sleepers were carted in from the forest and shipped, it made it a very expensive operation. They could save much by shaping them off before carting them.

He might say that timber inspection was better organised than it used to be prior to Mr. Lane-Poole's appointment, and the general inspection was more consistent.

Address by Head Forester, D. McVicar.

"CO-OPERATION IN FOREST WORK."

Mr. Chairman and Gentlemen.—At the opening of this Conference, Mr. Kessell stated that Mr. Lane-Poole, the late Conservator of Forests, had laid the foundation of the Forest Policy of the State. Now, I want just briefly to deal with the forests as they were prior to that, and with the work of the Forest Ranger, as he was then called. In those days the work of the Forest Ranger was to patrol the forests, timber inspection and land inspection. His work was practically a matter of the collection of revenue, to see that the timber was not unduly wasted either in the mill or by the hewer, and to inspect land that was applied for for selection purposes. Then we had no hewing permits in operation. A man got a license and he went into the bush, and all lands were Crown Lands and Crown Land was a harvest for the sleeper cutter. Mr. Lane-Poole quickly saw that that sort of thing could not obtain for any length of time, and the output of the forests be maintained. Some seven years ago come September, when our then Chief had had time to go through the forests and study the conditions, he called such a conference as we have to-day, but not such a large number of foresters were present. He then laid down his plans with reference to what he thought was the best method, not only of handling the forests, but of getting to know what our forests really contained. At that board the inception of the classification scheme of our forests was inaugurated. I think also at that

time was laid down the marking out in different districts of our sample plots. He recognised that one of the first things that we ought to know was what our forests contained, secondly, the rate at which our forests were being denuded, and thirdly, what regeneration was happening in the forests. These sample plots were laid out in each district and as far as possible they are being protected from fire. I think we have only had one measurement so far, and that measurement has shown us definitely that the life of our forests is getting very near to a close, that is as far as export is concerned, at the present rate of cutting. I think I mentioned yesterday that on that first measurement our forests were making 250,000 loads a year, and we were cutting it out at the rate of 800,000 loads a year. Instead of our forests being of great extent, running into, it was said, something like 18 million acres, we found that it is pretty hard to secure the quota that has been laid down by the Commonwealth for our portion of forest country, namely, three million acres. And of that three million acres 2,600,000 acres has been already cut over. Consequently it pertains to every forester in the Department to exercise very great care that all waste shall be eliminated, and that the best possible use shall be made out of our remaining forests.

Mr. Lane-Poole went one step further; he not only started the demarkation of our forests but he changed the name from Forest Ranger to Forester. I think you will all recognise with me that that was not done as a mere whim. It was done so that the foresters would know that he had to have a wider outlook, and not merely have the collection of revenue; also that the public and the State would understand that the forester was there for forestry purposes. In that wider outlook the forester had to recognise that his range of country, his district, did not only embrace the Crown lands carrying forest, but it embraced his whole district. It took in not only Crown lands, but it took in all private property.

As has been remarked before to-day, we must have the sympathy of the farmers in and around our forest country. Without that our work will be practically useless.

I should not be the only one going around on our propaganda work. Each district forest office should be a centre of propaganda. Every district forester, every assistant forester, and every timber inspector should be a teacher and educate the people in his district. It is not for the district forester or the assistant forest ranger to say, "Well, it does not matter, I don't want to know so and so, he is only a 'cocky.'" That cocky may be a very great help to you, or he may be the cause of much annoyance. In the olden days in connection with the land selection business, the Department got into very bad odour. We were then under the Minister for Lands. It was a matter of the Lands Department against the Forests Department in very many cases. Many of the older foresters can bear me out when I say that we recognised our responsibilities as district officers when many times we recommended that the land should not be alienated. Perhaps a year afterwards or less, when we were passing along the same track of country, we found it being fenced in and turned into a farm, because we had practically no control. We were without a leader; we were without a head. Now things are different. We have got our classification and we have got a good strong control at the head of us who is going to buck every time that our recommendations are not carried into effect. Many of the older settlers are up against the Forestry Department. Now it is for us, as foresters, to try and eliminate the previous impression existing amongst the farmers in the various areas, and try to get the farmer to realise that the forester is there, not to interfere with his work, but to be a source of help to him, and also that that same forester expects that the farmer shall be a source of help and support to the forester in his work. It is only by this mutual sympathy that we need look for that result from our forest which we have the right to anticipate. In connection with this land selection business, a considerable amount of care must be exercised by all foresters. You know we laid down a certain standard, viz., land carrying four to seven loads in jarrah, and 20 loads in karri, that should not be recommended for selection purposes. Now, I do not want you to misunderstand me. When we say "land carrying four loads," that land may not to-day be carrying four loads, but if it was carrying four loads, or has been carrying eight loads or more, although it is not carrying four loads to-day, it should be cut out for timber purposes because, if it has been growing that amount of timber before, we must expect that it will not only grow that amount but increase, under improved forest conditions, not only 100 per cent., but in many cases, 200 per cent. Again, many small areas applied for in the timber country, say, from 10 to 20 acres. A man applies for it to make a market garden. There is a soak on it. It may be a considerable distance from any other settlement. There may be timber on it, or there may not. In the proper working of the forest for years to come we must have water for our future operations. Timber on the area is not the only consideration. A forester in his range should always keep a look-out for natural mill sites, because the days are coming, I hope, when we, as a department, shall ourselves deal with the whole of the timber transactions in the State. It will mean work, it will mean more worry, but if it means the proper marketing of our timbers and the elimination of waste, then it is something we should all work for. In connection with this Group Settlement Scheme of the Premier, in many of your districts they are picking out groups, as much as possible in the valleys. Say we reserve a range of hills for timber. Each district forester should look out before these blocks are laid out that there is a means of ingress and egress to that hill of timber, otherwise in years to come we will have an isolated hill of timber with no road to get it out, so that care must be exercised in that respect. Then again, in connection with our work of patrolling, the forester many times gets up against the sleeper-cutter, the sawmiller, or the farmer. We should not be looking so much for trouble and for difficulties. If you have given a man one warning and he is still going on doing that which is wrong, then prosecute him. Ask for the highest penalty you can get. If a farmer through ignorance does something wrong, then act yourself as the magistrate. Adjudicate on the matter yourself there and then without taking that man to court. Deal with him courteously, tell him the evil he is doing, explain to him the plans and aims of the department, and how, if this sort of thing is allowed to go on we will have no forest. A little quiet talk with a man along those lines will very often make a friend of the

forest out of him, whereas drastic action will more often make an enemy of that man, and one enemy on the outer fringe of your forest is going to cause you incalculable worry and trouble, and is going to mean a very great loss to our forests in years to come. During the course of the discussion on Mr. Brockway's paper something like that cropped up where a little quiet talk does a certain amount of good. They had a great deal of worry up there last fire season. I can assure you when you get fire fighting down in your own districts you will realise what difficulties these fellows have been up against. Fires started so often on one area there that it was thought wise that some drastic action should be taken. Prior to that the Conservator asked me to go up and hold a court of inquiry. That was done. The assistant forester was sent around to dig up the whole of the men who had permits in that district. Here I would just like to say that the working books Mr. Brockway referred to, of the fire patrol men, came in very handy, and I was able to get those loose leaves at that court of inquiry, and to get plans with the exact spot where every fire started. I was able to tell those men at that inquiry the exact amount it cost the department to put those fires out, and I was able to say to them—"Now, are you out to help us, or are we fighting alone?" and to a man they said they were out to help. Next Wednesday I am going there and I hope to start a strong branch of the Forest League. I think we as foresters should be foresters, not policemen. Do not be out looking for cases, but look out for friends of the forest instead of cases for the police court, and we will find our forest policy will get the sympathy of the people, and as we gradually come south our forest policy will be ahead of us and we will have the goodwill of the people with us. I do not think I need say anything further. You are all foresters, you are all bushmen, and you all understand what I mean.

Mr. KESSELL thought they must all agree with the full intention of all that Mr. McVicar had said. Just to prevent any chance of a wrong impression being created, he would point out that it was realised that although an officer might use his discretion and deal locally with a man, it was usually necessary that, for such officer's protection, the case should be reported to Head Office. Although it was not always necessary to take them into a police court, it was a dangerous precedent for any man to set himself up altogether in the place of the magistrate. That onus could be thrown on the Conservator. He had no love for taking a man before the magistrate. He knew it was not Mr. McVicar's intention, but he wanted it to be clearly understood that because an officer found it necessary to report one case after another he was not to be looked upon as a vicious individual causing a lot of trouble in the country. He thought there was not very much left for discussion, but they would allow five minutes to any member of the conference who would like to raise any matter at all.

Mr. McCOY said he wanted to speak on behalf of the Inspectors. He noticed right through the day the Inspectors were alluded to after the Assistant Foresters. He took strong exception to that.

Mr. KESSELL said that althought the terms might exist, it was hoped that they were gradually eliminating the distinction, and that there would before long come a time when there would be no such term as Inspector. Timber inspection would play a very important part among the duties of all officers.

Mr. H. CLIFFORD spoke of the use of banksia for cricket bats, and gave an instance where he had had a bat made up and it was most successful.

Mr. SCHOCK said he had not taken very much part in the discussion at this conference, but he could assure them that he had very much enjoyed himself. He must congratulate every officer who read a paper and discussed it, and also Mr. Head Forester McVicar for his address. He was sure that, although the work was in its infancy, by its development and by application, with modification, it must improve the status of the Forestry Department. He knew there were a lot of things of which he was not aware, as his district was far south and he did not get very much in touch with other foresters. He did not get information of all the work which was carried on. Therefore he did not take much part in the discussion because there were so many able men and able foresters capable of discussing the matter better than he was.

Mr. McVICAR moved the following resolution: "That this Conference of Foresters recommend that all application for Permits for licenses for hunting marsupials or other game in timber country in the South-West portion of the State be referred to the Forester-in-Charge of the District for recommendations before being granted." Mr. Port seconded the motion, which was carried unanimously.

Mr. PORT asked whether any more public posters were coming out in regard to the fire business. The Conservator had asked them to send in all back notices. Was he issuing fresh ones?

Mr. KESSELL said the notices would be redrafted before next season.

Mr. TURNER suggested that, with reference to the registration and the notice that appears on the back of it, it might be a good idea to insert two or three regulations on the back of the registration, one in particular, which seemed to be the cause of most prosecutions. That was the undersized timber regulation. He would like to see that regulation embodied in the notice on the back of registrations.

Mr. McVICAR said they had tried for that for the last 16 or 17 years. The magistrate gave it from the bench at Katanning, at a prosecution he had in connection with mallet bark, that it should He had the magistrate's notes taken do to Head Office. Still it was not license.

Mr. KESSELL said it would re He would see what objections past and would have the sub sidered.

Mr. KESSELL said he was any question of Conference had serve Schock alone would jus ence. An officer who w in a district remove quarters seldom met a position to explai developing elsewhere instances, hit upon w was quite aware. T more to introduce s But there were man that entered into th and innovations bro opinion were more t ends. It was not an which went rather too

allowed. If anything were introduced, either a regulation or a practice, and, because it was before its time it was discontinued, the result was that the reintroduction of a similar practice, even in a modified form, would have to be deferred for many years. Consequently, although many of the recommendations that were forwarded from District Foresters from time to time were absolutely sound and desirable, it was impossible to give effect to them. He did not want them to feel that, when they forward recommendations that were not given effect to, they were not appreciated. There was always some other reason underlying it. He could assure them that any recommendation that came forward was very carefully considered and, if at all possible, it was given effect to directly or indirectly, or else stored up for future use, when a fitting occasion arose. He would like to thank the officers who had gone to the trouble of preparing papers. The papers had been a valuable basis for the discussion, and considerable time and trouble had been put into their preparation. Mr. McVicar suggested the advisability of officers having opportunity to see operations that were proceeding. He thought, in view of the statement of the Minister in the early part of the Conference, there would not be much difficulty in persuading him of the advisability of holding further conferences from time to time, and, if at all possible, the next conference might be held in proximity to some forest centre where actual operations could be discussed on the site.

In concluding, he would like to thank all officers for the loyalty they had shown during his term of office and for the energetic manner in which their work was constantly carried out. Their efficiency was thoroughly appreciated.

(*Conference closed.*)

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